THE PREVENTION OF MOBILE PHONE THEFT: A CASE STUDY OF CRIME AS POLLUTION; RATIONAL CHOICES AND CONSUMER DEMAND.

By

Jennifer Clare Mailley

A Doctoral Thesis

Submitted in partial fulfilment of the requirements

for the award of

Doctor of Philosophy of Loughborough University

August 2011

Abstract

This thesis makes two contributions to environmental criminology. The first contribution is a rational choice event model for mobile phone thieves. This is based on interviews with 40 mobile phone thieves. In addition, the deterrent effects of 23 designs of phone are assessed. Comparisons are made between the responses of offenders and non-offenders; and between experienced offenders and less experienced offenders. The results show that mobile phone thieves make discerning choices about which model of phone to steal at the point of theft. The factors affecting handset choice reflect Clarke's (1999) CRAVED characteristics. Mobile phone thieves are differentially deterred by a variety of design solutions, the most effective of which reduce the resale value of stolen handsets. In contrast with offenders, non-offenders are more easily deterred, and statistically significantly more deterred for five of the 23 designs presented in this thesis; do not appreciate the importance of resale value; and are not so aware of the possibilities for circumventing or neutralising security technology. The differences between offender and non-offender responses mean that offenders are arguably best placed to assess product use and misuse in the process of designing-out crime.

The second contribution of this thesis is a Mobile Phone Theft Index which controls for phone availability in the absence of handset sales data. Mobile phone theft is arguably a form of pollution (Roman and Farrell, 2002) and can, therefore, be controlled using traditional pollution control instruments (Farrell and Roman, 2006). Informing the public of their risk of victimisation according to handset ownership would make security a marketable aspect of handset design, incentivising industry to decrease theft rates. Industry action to date shows evidence of obstructionism and pre-regulatory initiatives (Newman, 2004) meaning that a novel instrument such as the Index is necessary to alter the current status quo where industry costs UK society an estimated £1.2 billion per year (Mailley and Farrell, 2006).

Key words: crime prevention; design against crime; crime as pollution; mobile phone theft; offender interviews; rational choice perspective; routine activity theory.

Acknowledgements

Many thanks are due to my supervisor, Professor Graham Farrell. Your patience is extensive. Perhaps a paper on an incentives-based approach to PhD supervision is in order?

The research and writing phases of this thesis have spanned some significant changes in my personal circumstances, and the completion of this thesis has only been possible because of the love and support I have received from a core life raft of family and friends. Particular thanks are due to Mum and Dad, for welcoming me back home in every way possible; to Yvette for many hours of listening; to my brother Ric and his wife Julia for the fun times; to Emily Munro for being a consistently good friend; and to my cats Flooze and Connie for just being themselves. I cannot express how much I owe you all.

Many thanks are also due to a variety of people who helped in the original research, including members of the GSMA and of MICAF; Mr Shaun Whitehead; staff at NMPCU and from HMP. The support of often overlooked but crucial figures such as Deirdre Lombard and the library staff at Loughborough University is also much appreciated.

To anyone I have failed to name in person, I apologise profusely. Your contribution was nonetheless much appreciated.

Contents

Tables and figures (page number)

Chapter 1: Introduction to the thesis

Introduction

This chapter describes the context of the research reported in this thesis, by defining the discipline to which the thesis contributes, and key topics within that discipline. A summary is presented of the crime problem under scrutiny, and of the research project within which much of the research reported was undertaken. The role of the present author within the research team is clarified in order to identify which aspects of the thesis are original works, and which were completed as part of a research team. The chapter gives an overview of each chapter, before concluding with a synopsis of the main conclusions and recommendations.

Definitions

The discipline of environmental criminology

This thesis contributes to the discipline of environmental criminology. Environmental criminology is founded on a family of theories that share a common focus on criminal events and on the immediate circumstances in which these occur (Wortley and Mazerolle, 2008). The main premise is that the immediate environment plays a key role in determining human behaviour (Bottoms and Wiles, 2002; Wortley and Mazerolle, 2008). Each crime is viewed as the result of interactions between people and the situation they are in, or a ‘person-situation interaction’ (Wortley and Mazorelle, 2008:1).

Two applications of environmental criminology

Situational crime prevention (SCP) is one application of environmental criminology. It aims to decrease crime by increasing both the effort and the risk of crime commission, decreasing the rewards, and removing the provocations and excuses which increase the frequency of crime commission (Clarke, 1980; Cornish and Clarke, 2003). SCP requires a focus on specific forms of crime rather than on offender dispositions, and seeks to alter the nature and prevalence of crime opportunities (Clarke, 1980).

Design against crime (DAC) is a further application of environmental criminology. It aims to decrease the criminogenic potential of products and services. The process of designing out crime from products and systems has been described by 'the five Is' which are to gather Intelligence; identify an Intervention; ensure that Implementation is complete and sustained; explore how to stimulate Involvement from all necessary stakeholders, and assess the final Impact in order to hone the previous steps (Ekblom, 2008a).

Although a reasonably new field of application, there is a growing body of evidence that designing out crime from products is possible: a classic example is how an increase in security features of cars has decreased the prevalence of car theft (see for example Brown and Thomas, 2003; Farrell et al., 2011). Clarke and Newman (2005) review other examples of DAC including the use of toughened glass in British pubs to decrease violence related injuries, and the evolution of tamper-proof packaging for pharmaceutical products in the USA. Several authors have proposed that the level of security designed into new products should be commensurate with predicted risk, and this requires an assessment of theft risk (i.e. vulnerability) against the efficacy of any security features of the product (i.e. security) (Ekblom; 1995; Clarke and Newman, 2005; Armitage and Pease, 2008b)

Crime as pollution

Roman and Farrell (2002) propose that crime can be viewed as a form of pollution, since industry profits while the costs of crime are borne by society. Crime is an orthogonal (unrecognised) externality, and so the market can never define an acceptable level of pollution (Roman and Farrell, 2002; Farrell and Roman, 2006). Traditional forms of pollution are controlled successfully by a variety of control instruments and Farrell and Roman (2006) argue that these can be used to internalise crime pollution. The instrument that has been successful in decreasing UK car thefts is the UK Car Theft Index (Laycock, 2004). Publishing the relative risk of theft for different car models created consumer and insurance industry demands for increased vehicle security, leading to the innovation of features such as immobilisers and better quality door locks (Laycock, 2004). In the USA, similar calls for increased vehicle security and safety were eventually successful, but led to industry obstructionism (denying the need for internalisation of costs, and blaming drivers) and pre-regulation initiatives (industry did the minimum necessary to prevent government regulation) (Karmen, 1981; Newman; 2004).

The crime problem

Mobile phone theft is a chronic crime problem in the UK (POST, 1995; Harrington and Mayhew, 2001; Hoare, 2007). The Home Office estimated that 80 000 phone thefts occurred in 2004/05 (Hoare, 2007). Phone theft is estimated to cost the UK economy at least £1.2 billion each year (Mailley and Farrell, 2006). Phone theft was partly responsible for an increase in street robbery and theft in 2000 (Harrington and Mayhew, 2001), leading to public and media pressure for the government to respond to the problem (Tilley et al., 2004).

The research project

In 2005 Professor Graham Farrell of Loughborough University secured funding from the EPSRC, under grant EP/C52036X/1. The key outcomes from the research project including publications are described below. Professor Farrell undertook the bulk of drafting of the publications.

1) A systematic review of the literature describing the nature and extent of mobile phone theft in the UK, and industry and government efforts to decrease theft rates. A summary of this work was published in the practitioner journal Justice of the Peace as Mailley et al. (2006a)

2) Interviews with 40 mobile phone thieves, which allowed an assessment of the choice-structuring properties of phone models and the wider theft situation, and the deterrent value of 23 designs of phone.

3) A Mobile Phone Theft Index which uses police recorded data to rank models of phone according to their risk of theft. Risk of theft is calculated by comparing what is taken with what is available for theft. The methodology is based on that of the UK Car Theft Index, but specific methodological adaptations allow for the absence of industry cooperation in supplying data describing the UK phone pool (what is available for theft). The original count-based Index was published in Mailley et al. (2006b) and the final risk-based results in Mailley et al. (2008).

4) An estimation of the cost of mobile phone theft to the UK. The cost was estimated to be at least £1.2 billion per year. This estimation uses figures based on Home Office research of 80 000 theft per year (Hoare, 2007) and was published in the newsletter of the National Mobile Phone Crime Unit (Mailley and Farrell, 2006).

5) A novel assessment of the characteristics which make mobiles secure against theft, which can be summarised in the acronym IN SAFE HANDS. This work was mainly carried out by Shaun Whitehead, a member of the EPSRC project team, and published as Whitehead et al. (2008).

6) An assessment of the prevalence of phones which have altered identities (IMEIs) in the UK phone pool. This research was undertaken by Whitehead, Mailley and a criminology student at Loughborough University, Ms Toulay Kaplankarin. The results were published as Kaplankarin et al. (2008).

Contribution of the thesis

This thesis makes two key contributions to the discipline of environmental criminology. Firstly, a rational choice event model is proposed for mobile phone thieves. This describes the choice-structuring properties of phones, victims and the wider theft situation which phone thieves consider when assessing a potential theft opportunity. The model adds a new case study to the body of knowledge about decision-making during crime events, and removes an excuse which was used by the mobile industry to minimise crime prevention efforts. The claim that phone thieves will take anything available, and do not make choices at the point of theft, has been used by the mobile industry to argue that little can be done to prevent theft.

Previous work on product proofing electronic products (Armitage and Pease, 2008b) also highlighted the need to determine whether or not offenders consider security at the point of theft. The results reported in Chapters 5 and 6 of this thesis show that security is a factor considered by offenders, because different design solutions resulted in a variation in deterrence. Offenders also consider the likely financial value of the handset, its functionality, how modern it is and whether they are already familiar with the model. The wider situational factors considered include the likelihood of victim retaliation; whether any watching public might intervene in the theft event or act as eye witnesses later; the seriousness of the offence and the likelihood of apprehension and conviction.

The second contribution of this thesis is the production of a Mobile Phone Theft Index. The Index provides a novel means to incentivise the mobile phone industry to internalise the costs of phone theft pollution. The Index would inform consumers and insurance companies of the relative risk of theft for different models of phone, therefore incentivising the incorporation of improved security technology. The development of the Index resulted in a new methodology for controlling for product availability in the absence of a suitable denominator (what is available for theft), when calculating crime risk. The methodology has been refined in order to minimise the resources necessary for routine production of an Index.

More minor contributions have evolved from the process of producing the two key outcomes. These are:

- A thorough assessment of the nature and extent of mobile phone theft in the UK, and discussion of the methodological issues involved in collecting data on an underreported crime type (Allen et al., 2005 report that approximately half of phone theft incidents are not reported to the police);

- Evidence to support the hypothesis that the mobile phone industry has, to date, not fully engaged with government driven efforts to reduce phone theft. Progress made to date can be seen as 'pre-regulation initiatives', which aim to minimise investment in more responsible behaviours whilst still avoiding government regulation (Newman, 2004);

- Identification of the supercontrollers (Sampson et al., 2010) who have the potential to affect phone theft prevention efforts in the UK.

- A comparison of the decision-making processes of offenders and non-offenders, and the implications of this for efforts to predict the crime risk of products;

- A comparison of the decision-making processes of experienced mobile phone thieves with novices, and the implications of this for crime prevention policy;

- Quantitative evidence that different handsets are at varying risk of theft, and that theft risk varies over time. Theft risk varies during 'theft careers' or illicit product life cycles (Felson and Clarke, 1998) during the crime harvest stage of the change-crime cycle (Pease, 1997).

Clarifying roles

The author was employed as research associate on the EPSRC funded project and carried out the literature review on the crime problem, and identified and approached key stakeholders such as mobile industry security experts (reported in Chapter 4 of this thesis). The synopsis of the history of phone theft prevention, and comparisons with Newman's (2004) history of vehicle safety and security are the author's own work.

The author devised the offender interview schedules with guidance from Professor Farrell; and conducted the majority of the offender interviews and carried out all of the results analysis. The design of the interview schedule and the results of the offender interviews are reported in Chapters 5 and 6 respectively. The mobile phone theft event model presented in Chapter 6; the comparisons with previous research into offender target selection; and conclusions regarding the implications for using non-offenders to ‘think thief’ in crime-proofing phones, are the author’s own work.

The argument that mobile phone theft can be seen as a form of pollution is based on original arguments made by Roman and Farrell (2002) and Farrell and Roman (2006). The author analysed thousands of crime records and developed SPSS™ syntax with the help of Professor Farrell, to produce the count-based and risk-based Mobile Phone Theft Indices (reported in Chapters 7 and 8 of this thesis). The conclusions regarding the most suitable methodology for the Index resulted from team discussions. Considerations of the alignment of routine activity theory (Sampson et al., 2010) with the notion of crime as pollution are the author’s own. This thesis has been written solely by the author.

Summary of chapters

Chapter 2 describes the constituent theories and applications of environmental criminology. Particular emphasis is given to the theories and applications which underpin the work presented in this thesis. These are the rational choice perspective (Cornish and Clarke, 1986) and routine activity theory (Cohen and Felson, 1979; Sampson et al., 2010); and the applications of situational crime prevention and design against crime. Evidence is presented of the effectiveness of situational crime prevention and design against crime in decreasing crime rates, and the issue of predicting theft risk is discussed. The chapter concludes with a rebuttal of criticisms of situational crime prevention.

Chapter 3 introduces the notion of crime as pollution, and uses the example of the UK Car Theft Index to illustrate how public information mechanisms can stimulate consumer demand for aspects of design such as safety, or crime-proofing. In the UK, the regular production of a Car Theft Index stimulated industry to 'design out crime' by increasing the security features fitted as standard on new cars (Laycock, 2004). Hence immobilisers and central locking account for the majority of the two thirds decrease in UK car theft since the mid 1990s (Farrell et al., 2011).

Crime is seen as a form of pollution when the crime is caused by the production of a product or by a system when crime was not an intended outcome. Unintended outcomes are termed externalities, and externalities which are not recognised are called orthogonal (Portney and Stavins, 2000). Being unrecognised, there is no demand for the externalities to be internalised, unless a market for the internalised outcome (safer products, for example), is created. In the absence of this market for internalisation, pollution will continue unabated.

Indices can create new markets for less polluting products, by increasing consumer demand for, for example, increased safety. Some common uses of indices and of product marking are described. Consideration of crime as pollution naturally leads to consideration of responsibility for crime prevention, and the comments of other authors are summarised at the start of the chapter to set the context. The responsibility of offenders for their actions is assumed throughout the thesis, but is not the focus of the research. Policies which aim to alter offender motivation are less achievable and effective than policies which decrease the opportunities for crime (Clarke, 1980).

Chapter 4 describes the chronic problem of mobile phone theft in the UK and introduces the key actors in the mobile phone industry who each have a role to play in decreasing phone theft opportunities. The chapter gives a flavour of the scale of profit available for investment in preventive actions, and the domination of the industry by a small number of corporations who have, historically, acted together to resist calls from government to internalise crime costs. Comparisons are made between the actions of the UK mobile phone industry, and those of the vehicle manufacturing industry to calls for increased car safety and security (Karmen, 1981; Newman, 2004). It is argued that the UK mobile industry has not fully engaged with internalising the costs of phone theft. Furthermore, an industry-led assessment of how efficiently stolen phones are cut off (blacklisted) is methodologically unsound. It is therefore likely that the UK government believes that industry reaction has been effective, when in reality, further efficiency gains in blacklisting are the least that should be demanded from industry.

Chapters 5 and 6 respectively describe the methodology and the results of interviewing incarcerated mobile phone thieves and a control sample of non-offenders (students at Loughborough University). The interviews asked participants about their offending behaviour, and elucidated the factors they consider when making phone theft choices. These factors were determined by asking participants to describe why they preferred one model of phone over another, for six matched pairs of phones, and by asking them to express how much they would be deterred from theft by 23 different design solutions. Chapter 5 describes the development of the interview questionnaire and the practicalities of gaining access to a suitable sample of offenders and controls. Chapter 6 presents the results of the interviews. The choices of offenders in response to the six pairs of phones and the 23 deterrent designs are contrasted to the responses of non-offenders. In addition, the implications for predicting the theft risk of new products are discussed. The offenders' responses are further broken down in to those of phone theft experts and novices, in order to assess whether any differences in preferences have implications for phone design and crime prevention policy.

Chapters 7 and 8 describe both the methodology and results for a count-based Mobile Phone Theft Index and a risk-based Theft Index respectively. Chapter 7 describes the process of obtaining and cleaning the police records of the National Mobile Phone Crime Unit, based in London. The results of the count-based index are presented, and the methodological limitations noted. Chapter 8 then builds on the count based methodology to assess risk of theft for different models of phone. The methodology borrows heavily from the UK Car Theft Index, but a novel assessment of risk is necessary for phones since there exists no central and accessible record of which phones are available for theft. This methodology uses data already available to the National Mobile Phone Crime Unit and therefore requires no interaction with industry. The Index methodology is made minimal by demonstrating that the risk-based Index produced by recoded (cleaned) police records is significantly similar to that produced using original (raw) police records.

Chapter 9 summarises the conclusions of the research and identifies areas for further research; and the implications for policy and for preventive action. It is proposed that the routine production of a Mobile Phone Theft Index would incentivise innovation in novel secure phone designs. The information available from the interviews with mobile phone thieves can be usefully employed to inform practitioners about many of the aspects to consider when designing-out crime from phones.

Conclusions and recommendations of the thesis

The general aims of this thesis were to assess the nature and extent of mobile phone theft, in part from the perspective of thieves, and to use this information to explore methods of decreasing the risk of victimisation to mobile phone owners.

The conclusions and recommendations of this thesis are summarised below and are repeated in Chapter 9. The synopsis presented here is expanded on in Chapter 9, by clarifying the evidence which supports each statement.

A MACRO-LEVEL ANALYSIS OF MOBILE PHONE THEFT: ROUTINE ACTIVITY THEORY AND CRIME AS POLLUTION

1. Mobile phones are the crime target in mobile phone theft. The role of guardian (of the phone) can be filled by the phone owner, members of the public, and by technological or physical security features of the phone. Manufacturers are the supercontrollers (Sampson et al., 2010) who define the supply of suitable technological or physical security features, and therefore the supply of suitable targets.

2. The government, the police, insurers, and the public can be seen as supercontrollers who interact with phone manufacturers to create demand for increased security.

3. One means of aligning the incentives of all supercontrollers is to create public demand for increased security.

4. One method of creating a market for phone security is to inform consumers of the variance in theft risk across handsets.

A MICRO-LEVEL ANALYSIS OF MOBILE PHONE THEFT: THE RATIONAL CHOICE PERSPECTIVE

Mobile phone thieves display rationality in their choice of victim and their choice of phone target. A rational mobile phone event model is presented below, and is reproduced from Figure 5.6 of this thesis.

1. Mobile phone thieves prefer to take some models of phone over others. Thieves are not on aggregate opportunists who take any phone available.

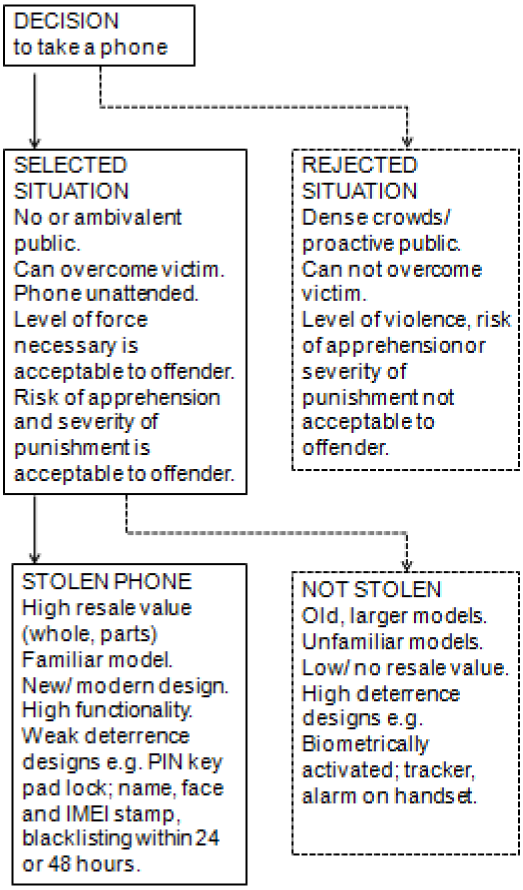
2. Different handsets are at varying risk of theft, and theft risk varies over time.

3. The main factor which increases risk of theft is resale value, which is assessed using the properties of handset moderness and functionality.

4. Increased experience of mobile phone theft leads to faster decision-making, because elements of the decision-making process are automatic.

5. Experienced thieves are less easily deterred than are novices, and are more resourceful in finding methods to overcome security measures.

Figure 5.6: A rational choice event model for mobile phone theft



IMPLICATIONS FOR GOVERNMENT POLICY

1. A Mobile Phone Theft Index should be produced using NMPCU (National Mobile Phone Crime Unit) data on a quarterly basis.

a) The routine production of a risk-based Mobile Phone Theft Index which assesses risk of theft for different models of phones is feasible and methodologically justifiable using data which already exist within the crime records held by the UK's NMPCU.

b) The equation for assessing theft risk for each phone model is:

$$\textit{Risk Ratio} = \frac{\textit{Proportion taken in targeted crimes (phone-only)}}{\textit{Proportion taken in acquisitive crimes (not phone-only).}}$$

c) The Index can use non-cleaned NMPCU data, saving on the resources necessary for routine production.

d) The Index should include all types of mobile phone theft (for example burglary; theft from the person), apart from bulk thefts.

e) The Index should only include models of phone where at least 100 handsets have been taken, but further analysis should reassess this threshold over time.

f) The Index should initially be produced on a three-monthly (quarterly) basis, but this time period should be reassessed depending on the theft trajectories or 'theft careers' of the most stolen phones.

2. The effectiveness of the Index should be assessed by NMPCU.

3. It is imperative that an independent review assesses the efficiency of blacklisting (cutting off phones by network operators).

IMPLICATIONS FOR DESIGNING-OUT CRIME FROM MOBILE PHONES

1. IMEI Blacklisting should not be the sole focus of future crime prevention efforts.

2. Future designs which aim to deter thieves should greatly reduce the resale value of handsets, perhaps by using advanced technology. It is imperative that technological solutions cannot be easily bypassed; and that tracking devices result in a swift and negative consequence.

3. Non-offenders are not suitable substitutes for offenders when predicting the crime consequences of new products.

4. The deterrent effects of the 23 designs which were assessed in the offender interviews reported here should be used to refine the weighting of Clarke and Newman's (2005) checklist of product security when considering mobile phones.

IMPLICATIONS FOR FUTURE RESEARCH

1. The efficiency of blacklisting phones needs to be assessed, via an independent and blind test. The results should be compared to those reported by System Concepts who carried out previous tests of blacklisting efficiency (see Pimm et al., 2005; Cooper et al., 2007).

2. Further assessments of the different responses given by offenders and non-offenders to questions concerning deterrence are warranted. The majority of the non-offender population used in this research were design students, and a wider variety of non-offenders should be assessed to develop a more representative model of non-offender responses.

3. Further assessments of a wider variety and greater number of mobile phone thieves are needed, in order to verify the validity of the initial rational choice event model proposed here.

4. Future research should consider whether the questions asked in the interview schedules used here could be randomised in order to minimise any order effects created by the interview design.

5. The research presented here has focused on stated preferences between phone models, and used police crime data to explore ‘real world’ preferences. Future research should utilise mock-up theft scenes, and technology such as eye-scanning tools, to assess offender and non-offender responses to potential theft targets in the context of more complex and non-interview environments. Observing the eye movements of offenders and non-offenders, as well as novice and more experienced thieves, would be an ideal way to assess how accurate are hypotheses that aspects of target recognition become more swiftly recognised with increased theft experience.

6. Since the empirical work for this thesis was undertaken, a key development is that the UK Home Office is considering regular production of the Mobile Phone Theft Index. Future independent research should measure theft rates, theft MO, and geographic patterns of thefts before and after Index publication, to test for preventive and possible displacement effects of the Index on phone thefts. There remains the question of how swiftly any decrease in theft rates would translate from Index, through to manufacturers, and onto the ground where consumers experience decreased risk of theft. This will in part depend upon manufacturer responses to the Index. It will also depend in part on whether the publicity alone from the Index has a positive effect and prevents some phone thefts before any newly designed models are released. Further desk-based research is needed to assess the probable timescales of the initial and longer term effects of the Index.

7. If an Index is to be produced regularly, the methodology used to produce it should be refined according to the recommendations made under the section ‘Implications for government policy’.

8. Further research should explore the nature of the phones which were discarded in the lost property sections of Loughborough Police and University, and could be expanded to a wider variety of lost property depots.

Industry data describing the profile (market share) of handsets sold around the dates that the lost handsets were handed in, should be compared to the profile of the handsets handed to lost property departments. This would allow an assessment of whether or not the discarded phones were the older and less valuable models of their day, which is the result predicted by the research presented in this thesis.

9. Data held by the National Mobile Phone Crime Unit should be mined further in order to assess the nature of several aspects of the 'theft careers' of different handsets. It appears from the initial analyses presented here that different models display theft careers of varying length and scale; and quantification of these factors would help to predict future theft patterns if those factors could be linked to some measurable aspect of the handset. It is likely that those measurable aspects will reflect the characteristics of CRAVED (Clarke, 1999) but operationalising (quantifying) these characteristics requires further research.

Chapter 2: Environmental criminology, situational crime prevention and design against crime.

Introduction

This chapter describes the three key theories upon which environmental criminology is built. Particular focus is given to the rational choice perspective (Cornish and Clarke, 1986) and routine activity theory (Cohen and Felson, 1979 and Sampson et al., 2010) because these form the two lenses through which the problem of mobile phone theft is examined in this thesis. The chapter discusses and provides examples of two applications of the founding theories of environmental criminology. These are design against crime (Ekblom, 1997; 2008) and situational crime prevention (Clarke, 2008). Both aim to decrease crime rates and are relevant respectively to micro and macro discussions about mobile phone design. The change-crime cycle (Pease, 1997) describes the process whereby new products or services are created without any thought being given to their crime consequences. Felson and Clarke (1998) propose that risk of theft varies during the crime consequence stage, mirroring the product life-cycle of legitimate products. The attributes which make products attractive targets for theft can be summarised in the acronym CRAVED (Clarke, 1999. Examples are given of successful situational crime prevention interventions and design against crime products. The case is made that incentivising crime-proofing of commonly stolen products remains problematic since there is no legal responsibility nor liability for business or central government to do so (Moss and Pease, 1999). The chapter concludes by presenting some common criticisms of situational crime prevention and environmental criminology, and their rebuttals.

Environmental criminology and Crime science

Environmental criminology is founded on a family of theories that share a common focus on criminal events and the immediate circumstances in which they occur (Wortley and Mazerolle, 2008). The main premise of environmental criminology is that the immediate environment plays a key role in determining human behaviour (Wortley and Mazerolle, 2008). Each crime is viewed as the result of interactions between people and the situation they are in, i.e. a 'person-situation interaction' (Wortley and Mazorelle, 2008:1).

In contrast to traditional criminology, little weight is given to the role of people's disposition to offend. Clarke (1997) argues that traditional criminology has made the error of assuming that explaining criminals is the same as explaining crime. Criminological focus on the dispositions of offenders naturally results in any attempts to describe, explain and affect crime being limited to describing, explaining or affecting only those dispositions. Furthermore, since the factors which affect dispositions are extremely varied, interact in a complex manner and are spread throughout an individual's lifetime, policy which tries to influence these factors is bound to be ineffective (Clarke, 1997). The theoretical foundation of environmental criminology is comprised of three related perspectives. The basic elements of each are described below and expanded upon in what follows.

The phrase Crime Scientist is used to communicate the role of the outcome driven, environmental criminologist as crime expert, working across disciplinary boundaries to exploit fully a wide range of analytical tools and solution options (Laycock, 2003; Clarke, 2004; Pease, 2008). The Jill Dando Institute of Crime Science was established in 2001 at University College London and was the first criminological unit in the UK dedicated solely to the study of crime and its prevention. Crime scientists deliberately seek to forge links with disciplines outside the social sciences, and will for example consult technological experts or evolutionary biologists when appropriate. Crime science is based firmly upon the founding theories of environmental criminology, which are introduced below.

Firstly *routine activity theory* (Cohen and Felson, 1979) originally described the three basic elements necessary for a direct-contact predatory crime to occur. Crime events occur when (1) a motivated offender comes in to contact with (2) a suitable target, at a specific time and place, in (3) the absence of a capable guardian. Only one of the three elements needs to be removed to prevent a crime from occurring (Cohen and Felson, 1979).

Secondly, *the rational choice perspective* (Clarke and Cornish, 1985; Cornish and Clarke, 1986) describes the decisions made by offenders to be involved in criminality at all (involvement decisions), and the specific decisions made during crime commission (event decisions). The central premise of the rational choice perspective is that offenders seek to benefit themselves from their behaviour. Therefore offenders are viewed as rational beings who make judgements about which behaviour will and will not be beneficial (Clarke and Cornish, 1985).

Finally, *crime pattern theory* recognises that crimes cluster in time and space rather than being uniformly distributed (Brantingham and Brantingham, 1981). Crimes tend to cluster in specific places according to what typically happens in those places: for example mobile phone thefts are common outside the exits of underground train stations because people reappearing from tube stations tend to check their mobiles, thereby making them excellent targets for theft (Hoare, 2007).

Rational Choice Perspective

In 1980 the basic elements of a rational choice perspective of offending were proposed by Ronald Clarke (1980). Citing evidence that people interviewed by social scientists were usually aware of consciously choosing to commit offences, Clarke (1980) proposed that criminological emphasis should be placed on offenders' decisions and choices rather than on offenders' dispositions. Such emphasis would, he argued:

(1) Focus criminological examination on criminal events, as opposed to offenders,

(2) Make explicit the need for separate explanations of different categories of crime, as opposed to any attempts to develop a general theory of crime, and

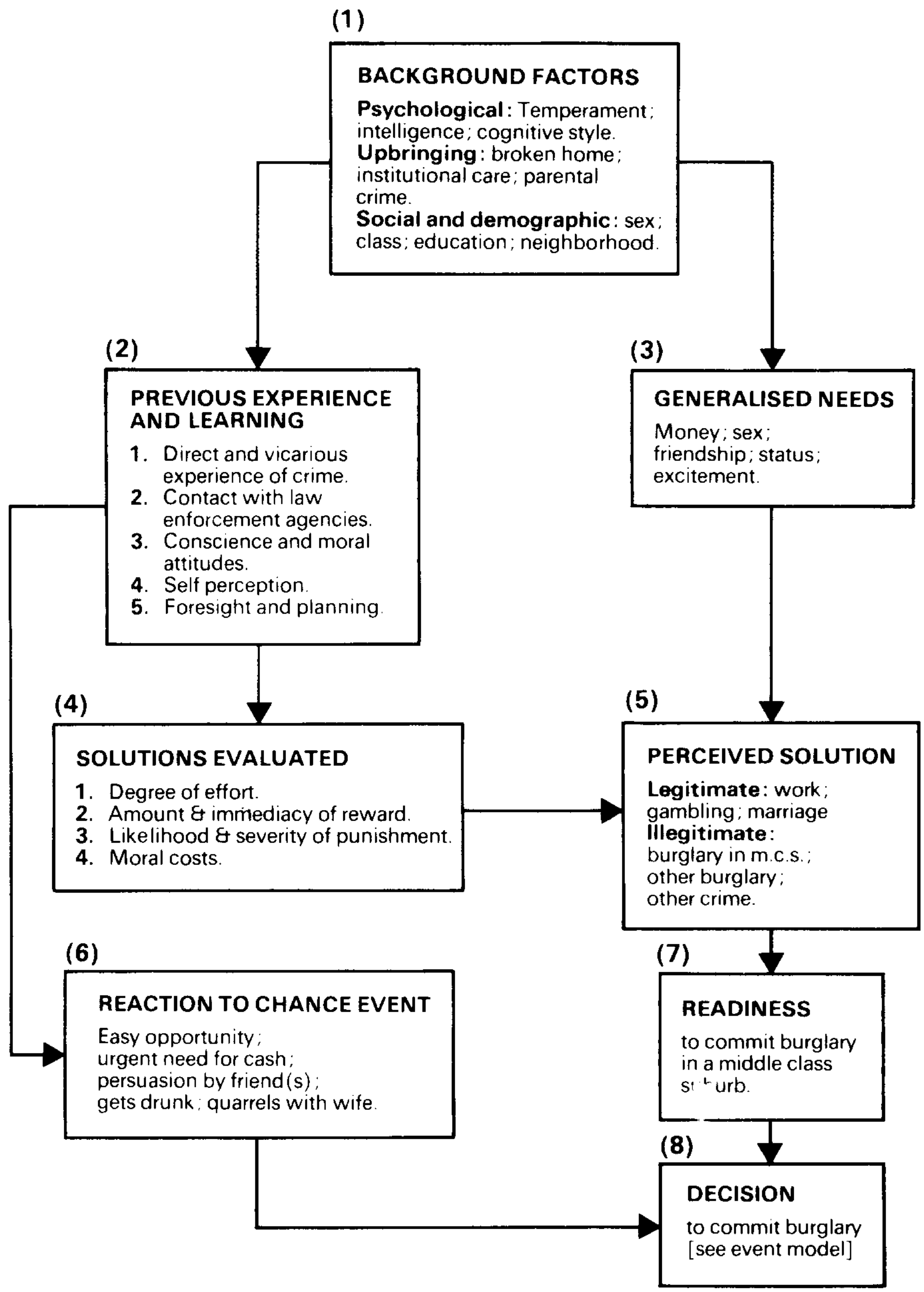
(3) Give more significance to the immediate setting of the crime and the offender's current circumstances, as opposed to the traditional focus on offender psychology or biology (Clarke, 1980).

By 1985 the rational choice perspective had been developed further by Clarke and Cornish (1985). After synthesising evidence from a variety of disciplines including criminology, psychology and economics, Clarke and Cornish (1985) proposed a series of offender decision models which were designed to inform research and policy development. A key development was to consider separately the decisions to be involved in crime at all (involvement, continuance and desistance decisions) and decisions made during the commission of an offence (event decisions). Together, the different decision models comfortably encompassed consideration of the influence of social, psychological and environmental factors on human decisions (Cornish and Clarke, 1986). The need for crime-specific analyses continued to be stressed as it had been by Clarke (1980), especially in event models, because specific forms of crime event require specific remedies (Clarke and Cornish, 1985).

The models detailing the decision to be involved in crime, and the decisions made during the crime event are reproduced and discussed below. The event model is pertinent to Chapter 8 of this thesis, which describes the event choices made by the mobile phone thieves who were interviewed for this research. In the schematics of the involvement and event models presented below, residential burglary is used because there was available to Clarke and Cornish

(1985) a mixture of recent empirical research and anecdotal or theorised knowledge about this specific offence type.

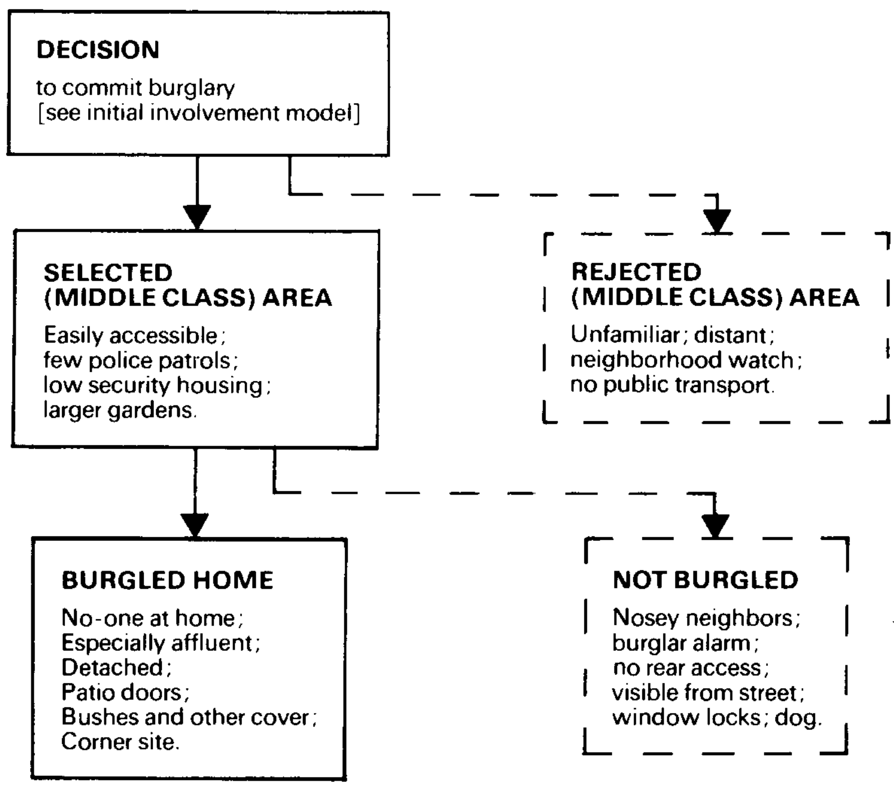
Figure 2.1: Initial involvement model (example: burglary in a middle-class suburb)



Source: Clarke and Cornish (1985)

Box 7 in Figure 2.1 represents an offender's 'readiness' to commit the offence under consideration. Readiness implies that the offender has considered what he/she might do if faced with a suitable opportunity to offend and has decided, on some level at least, that offending is a viable option. Readiness to offend is affected by a variety of factors, but mainly whether the offence is perceived as a satisfactory means of meeting needs. In turn the inclusion of an illegal act in box 5 (perceived solution) is influenced by the offender's generalised needs (box 3) and previous learning and experience (box 2), which are both in turn reliant on 'background factors' (box 1) (Clarke and Cornish, 1985).

Figure 2.2: Event model (example: burglary in a middle-class suburb)



Source: Clarke and Cornish (1985).

The event model depicts the decisions made by a ready burglar to target one particular house in favour of others. Clarke and Cornish (1985) predicted that other types of crime might have longer sequences, and that it was highly likely that broader categories of offence would have longer sequences. The rational choice perspective acknowledges that the information available to offenders may be incomplete; that planning might be rudimentary; and that offender information processes might not be perfect. These acknowledgements set the criminological rational choice perspective apart from purely economic models of decision making, and provide an explanation for decisions which may appear irrational to another person (Clarke and Cornish, 1985).

The continuance model defined three categories of variable which Clarke and Cornish (1985) argued act to increase the readiness of an offender to commit a specific offence type. These can be summarised as:

1) An increase in professionalism: increased skills and knowledge reduce the risk of apprehension and failed offence attempts, while the acquisition of fencing contacts maximises the financial gain of offence commission.
2) Life style changes influencing readiness: increased reliance on offences to satisfy relevant needs, coupled with alterations in legitimate behaviour to increase the frequency with which suitable opportunities are encountered, may lead to overall devaluation of legitimate ends to meet needs and the rehearsal of excuses and justifications for criminal behaviour.
3) Changes in peer networks: increased positive encounters with criminal peers will skew the offenders' 'routine relationships' towards others who commit similar acts. Ironically, criminal peer networks might be strengthened the most during incarceration (Clarke and Cornish, 1985).

The role of crime precipitators

Wortley (1997) argued that situational variables were not only responsible for allowing criminal behaviour to occur, but that in some circumstances they would precipitate or induce criminal behaviour. Therefore efforts to reduce criminality by altering only the perceived costs and benefits of crime commission were ignoring the role of situations in inducing criminal behaviour. Wortley (1997) classified precipitating factors as situations that prompt illicit behaviour; situations that exert social pressure; situations that permit illicit behaviour and situations that provoke such behaviour.

In response to Wortley's arguments, Cornish and Clarke (2003) agreed that precipitators have a role to play in offender decision making, but argued that this role is not equal to the role played by opportunity. They saw the role of precipitators as mainly acting on offender motivation and therefore on involvement decisions, and then only in some types of crime. Therefore, while acknowledging that in some types of crime the precipitator might cause the urge to offend, or give cues that it was permissible to offend, this still only created the 'ready offender' who still needed a suitable opportunity within which to commit his/her offence. When precipitators were seen as initiating illicit behaviour, this could only occur once for each offender because after an initial precipitation event, the offender would be seen in rational choice terms as ready to offend again. However, the expansion of focus to include the motivational element of decision making was welcomed as an important contribution to widening the scope of crimes which crime prevention specialists might tackle (Cornish and Clarke, 2003). In response to the arguments made by Wortley (1997), the variety of techniques available to practitioners wishing to decrease crime was expanded, and is discussed in the section on Situational Crime Prevention later in this chapter.

Offence specialisation

The ability of the rational choice perspective to predict and explain offence specialisation (where offenders commit crimes within a 'cluster' of similarly motivated and enacted events) was questioned by Kempf (1986). She argued that the continuance model implied the repetition of specific types of crime, and that the rational choice perspective therefore predicted increased specialisation along an offending career. As Guerette (2005) highlights, this conclusion may result from a confusion of the original demand for crime specificity when considering a crime event, with an assumption of crime specificity by the offender. That is, although analytical focus has to be narrowly focused and differentiate, for example, between theft of cars for joy riding and theft of cars for resale abroad (Clarke and Harris, 1992), the crime-specific focus makes no assumption of the variety of offence types committed by the offender (Cornish and Clarke, 1985). The results of interviews with 40 mobile phone thieves reported in Chapter 6 of this thesis provide evidence of a mixture of offence specialisation and versatility among the sample. Some evidence of increasing specialisation with experience is presented and discussed in that chapter.

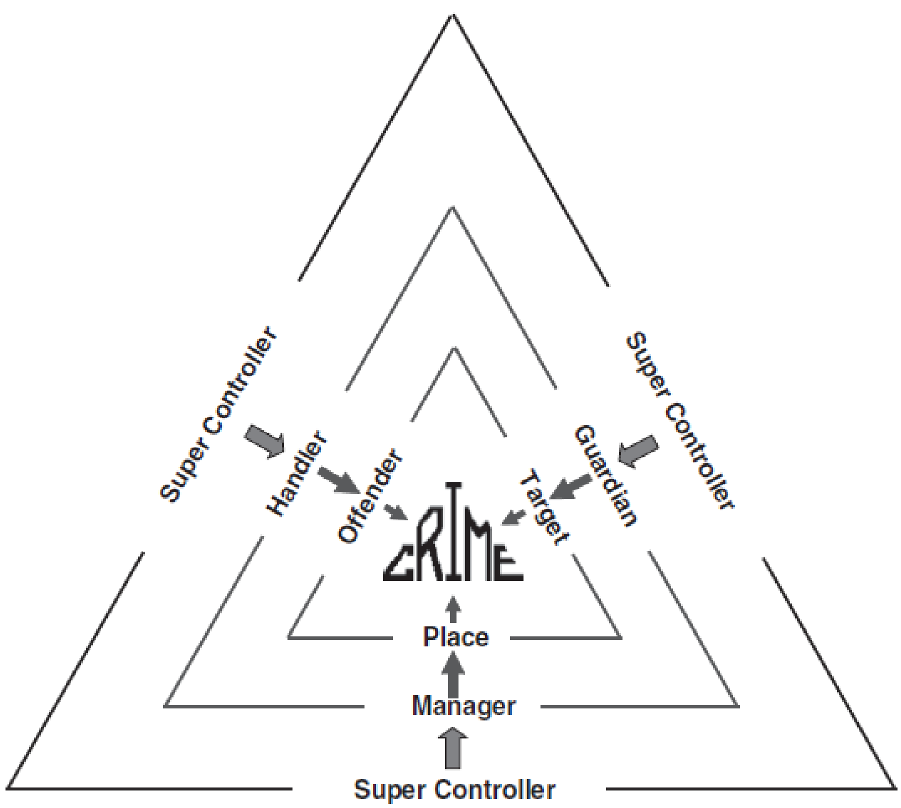
Routine activity theory

The central premise of routine activity theory is that a crime event occurs when a motivated offender makes contact at a given time and place with a suitable target, while a capable guardian is not present (Cohen and Felson, 1979). The latest version of routine activity theory is depicted in Figure 2.3 below and is taken from Sampson et al. (2010) which was published during the preparation of this thesis. The inner triangle represents the three elements deemed necessary for an offence to occur. These three elements are offender, target and place. Working outwards, the next layer depicts the people who might have supervisory roles (Felson, 2002) which influence the offender, target and place. Finally, Sampson et al.'s (2010) contribution of the supercontroller is depicted by the outermost triangle. Routine activity theory is immensely influential in environmental criminology, and so acknowledgement of the innovative thinking which led to its inception, and recognition of the micro and macro level implications of it, are warranted. A brief history of the various iterations of routine activity theory is described below, to afford these aspects their due attention.

The origins of routine activity theory

Cohen and Felson (1979) were the first criminologists to explain effectively why post-World War II crime rates rose in the USA at the same time as a decrease occurred in the social conditions which had traditionally been thought to cause crime. Dispositional theories of crime predicted that improvement in social conditions should lead to decreases in crime. However as unemployment fell and economic and educational disparities between white and ethnic minorities reduced, both acquisitive and violent crime levels rose significantly (Cohen and Felson, 1979). The assumed drivers of crime rates were proved false.

Figure 2.3: Routine activity theory complete with super controllers.



Source: Sampson, Eck and Dunham (2010)

Cohen and Felson (1979) proposed that at a micro level crime events resulted when a motivated offender met a suitable target, at a specific time and place, in the absence of a capable guardian. A guardian was not necessarily a formal figure such as a guard or policeman, but could be a teacher, parent, neighbour or passerby. They might deliberately or inadvertently decrease the likelihood that a criminal act took place in their presence (Cohen and Felson, 1979). The simplicity of this model risks masking its ingenuity and immense impact on criminology. Shifting analytical emphasis away from the offender and on to the components of a crime event instigated a paradigm shift in how crime events and crime rates were (and still are) understood by environmental criminologists (Cornish and Clarke, 2008).

Increased numbers of targets (such as televisions) simply increased the probability of the convergence of an offender and target. Conversely social trends such as increased employment decreased the number of suitable guardians at home during the day, and increased the concentration of people and goods on business premises. Thus, changing crime rates were explained by changes in the 'ebb and flow of everyday life' (Felson, 1986; 2002) and did not necessarily imply a change in offender motivation or in the number of offenders. In the original version of routine activity theory, the supply of offenders was taken as constant (Cohen and Felson, 1979; Felson, 2002). In response to Wortley's (1997) consideration of precipitators, this view was later revised and situations recognised as being capable, in some circumstances, of creating a ready offender who in a different situation, might not be described as ready to offend (Felson, 2002).

Cohen and Felson (1979) demonstrated the empirical fit between their theory and increases in USA crime rates. One example was that, according to the US census, daytime burglary rates rose by 15 percent between 1960 and 1970. At the same time, the number of females entering employment and the number of single resident households increased. They argued that increased burglary rates could be explained by decreased daytime guardianship of residential housing. The suitability of certain targets for theft also increased: the lightest television listed for sale in the popular USA retail catalogue Sears was 38lbs in 1960, compared to 15lbs in 1970. Cohen and Felson (1979) also noted similar trends in miniaturisation and weight decrease for products such as radios, record players and tape recorders. This trend continues today and the issue of target suitability, including portability, is discussed in more detail below.

Since the original version Felson and Clarke (1998) and Felson (2002) have shown that seemingly senseless or emotional crimes can be understood in terms of routine activity theory once (1) the details and sequence leading up to the offence are known, and crucially (2) crimes are seen from the viewpoint of the offender. Examples of how opportunity influences crime rates include the observations that the likelihood of a male’s aggressive response to a verbal insult decreases when the proportion of ‘observers’ who are either middle-aged or female is increased; bigger or taller people tend to attack those shorter or smaller than themselves; and gangs of offenders are more likely to attack groups with fewer numbers than their own (Felson and Clarke, 1998). Similarly, child abuse is most frequently carried out by people known to the child and who therefore have access and the ability to spend time with the child and not be interrupted by guardians (Wortley and Smallbone, 2006). Comparing the murder rate of the USA with the UK demonstrates most clearly that access to lethal weapons increases the incidence of deaths caused by the concurrence of a gun being too close and a hospital being too far away (Felson and Clarke, 1998; Felson 2002).

The addition of offender handlers and place managers

In 1986 Marcus Felson expanded routine activity theory to include a fourth element: the intimate handler. The handler is someone able to affect the behaviour of the (potential) offender. A handler, whether parent, teacher, friend or colleague, was someone whose social bond or 'handle' on the offender might be grasped in order to influence behaviour. The handler could prevent a crime event if they were present or exerted influence over the offender, even if the offender came into contact with a suitable target which was not sufficiently guarded (Felson, 1986).

John Eck (1994, in Felson, 1995) added the final person depicted in routine activity theory: the place manager. Managers are individuals who control or monitor places, thereby influencing access to, and the behaviour tolerated in, those places. Managers include home owners, janitors, receptionists, formally employed managers, and bus drivers (Eck, 1994 in Felson, 1995). Felson (1995: 55) summarised the implication for crime control as the fact that in order for a crime to occur, 'an offender has to get loose from his handlers, then find a target unprotected by guardians in a place free from intrusive managers'.

The addition of crime facilitators

In 1992 Ronald Clarke (Clarke,1992) further developed the routine activity approach by proposing the inclusion of crime facilitators. Crime facilitators fall into three categories. Physical facilitators either help in crime commission, and/or help to overcome preventive interventions. They include items such as vehicles which can be used as transport to and from offense sites; telephones which can be used to make obscene phone calls or to organise drug deals, and tools such as weapons which can be used to threaten or injure victims. Social facilitators such as peer pressure stimulate offending, often by providing excuses for offending behaviour. Chemical facilitators comprise drugs including alcohol, which reduce inhibitions and alter offenders' perceptions of the likelihood and impact of the consequences of crime (Clarke, 1992). The supply of facilitators is determined by the physical environment, and the convergence of offenders with facilitators depends on offenders' routine activities. Controlling or altering the supply or usefulness of facilitators is therefore an important factor in altering crime opportunities (Clarke, 1992; 1997).

The addition of super controllers

Super controllers are those who regulate the conduct of controllers. They thereby affect whether or not controllers fulfil their role as potential preventers of crime, and have an indirect influence on crime occurrence (Sampson et al., 2010). The typology of super controllers proposed by Sampson et al., (2010) is reproduced below in Table 2.1. Three broad categories of super controller are further broken down into ten more closely defined types. Formal super controllers tend to be institutions, while diffuse super controllers rarely consist of a single entity and are described instead as collections. Personal super controllers are networks of individuals or individuals who directly influence a controller. The typology is not mutually exclusive - super controllers can act in multiple roles and on each other (Sampson et al., 2010). However, the typology offers a starting point for thinking about super controllers and defines a research agenda which requires empirical evidence of the mechanisms by which super controllers work, and documentation of their effectiveness. According to Sampson et al. (2010) super controllers influence controllers in accordance with the rational choice perspective, since the controllers they influence make decisions about when and how to intervene in crime prevention according to considerations of the risk, reward, effort, excuses and provocations involved. Thus when a controller's effort is minimal, and reward maximised, super controllers will exert their full influence over controllers. When the opposite is true, crime prevention is rarely implemented. Similarly, if the leverage used by a super controller (for example reducing risk of negative publicity) is not aligned with the concerns of the controller (they are for example most sensitive to cost), then crime prevention is not likely to result (Sampson et al., 2010).

Chapter 3 of this thesis describes key literature which explores how market demand can be stimulated in order to provide incentives for crime control. In the case study of mobile phone theft, the government, the public and the police can be described as super controllers who influence the mobile manufacturers, another super controller.

Table 2.1: Typology of super controllers

Category	Type	Example
Formal	Organisational	Nightclub chain replaces glass beer mugs with polycarbonates; prison authorities train and set rules for their staff.
	Contractual	Sports venue has contract with a security firm; landlord has contract with a property management firm.
	Financial	Car insurer pressurises car rental agency to decrease car thefts, by threatening to increase premiums.
	Regulatory	Private sector: malls require minors to be accompanied by adults. Public sector: government agencies set rules under which businesses operate.
	Courts	Local government attorneys take property owners to (civil) court for inaction relating to continued nuisance behaviour on the property.
Diffuse	Political	State legislation controlling pharmaceutical drug sales
	Markets	University produces lists of certified housing suppliers for students; standard kite marks such as from the British Standards Institute (BSI).
	Media	Positive publicity stimulates crime prevention; negative publicity similarly galvanises organisations into action.
Personal	Groups	Neighbours influence the behaviour of other neighbours.
	Family	Foster children's organisations affect the behaviour of foster parents.

Source: Adapted from Sampson et al., (2010).

Felson and Clarke (1998) summarised the implications of combining the founding theories of environmental criminology in ten principles. These principles specify the various ways in which crime and opportunities are related, and are reproduced below in Table 2.2.

Table 2.2: Ten principles of opportunity and crime

1. Opportunities play a role in causing all crime.
2. Crime opportunities are highly specific.
3. Crime opportunities are concentrated in time and space.
4. Crime opportunities depend on everyday movements and activity.
5. One crime produces opportunities for another.
6. Some products offer more tempting crime opportunities.
7. Social and technological changes produce new crime opportunities.
8. Crime can be prevented by reducing opportunities.
9. Reducing opportunities does not usually displace crime.
10. Focused opportunity reduction can produce wider declines in crime.

(Source: Felson and Clarke, 1998)

Geographic dimensions of crime patterns and policing styles.

Due to the specific focus of this thesis, some important concepts within environmental criminology are not discussed in detail: this is a reflection of the orientation of this thesis and not of the importance of these concepts. They can be divided into two groups: the geographic dimensions of crime and the application of this knowledge to analysing crime patterns, and styles of policing. Both are summarised here. Generally speaking, the geographic dimensions of crime describe how crime concentrates at specific times and places due to place-based factors; aggregate crime patterns can be identified and used to inform crime prevention practices and policing tactics. More specifically, geographic profiling (reviewed by Rossmo and Rombouts, 2008) studies the distances travelled by offenders from their abodes to the places where they search for and seize crime opportunities. Profiling aims to help police identify the area in which an unknown suspect might live, based on a comparison of his/ her offending patterns with those of previous offenders. The technique can be successful (Rossmo and Rombouts, 2008) but in line with any predictive methodology also has limitations (Bouhana, 2004).

Repeat victimisation (Farrell and Pease, 2008) describes how a disproportionate amount of crime is concentrated on specific people and places. The implications of repeat victimisation for crime prevention implementation and policing styles are immense: knowing where crime concentrates allows resources to be targeted as efficiently as possible to produce the greatest net social gain from limited resources (Farrell and Pease, 2008).

Crime mapping and hotspot analysis (Anselin et al, 2008) are tools used by intelligence analysts to describe the geographic patterns of crime. ‘Hot’ geographic areas are the places where crime concentrates, and those areas requiring preventive interventions and police response.

Two key styles of policing related to environmental criminology are differentiated. Problem-oriented-policing (Scott et al, 2008) uses the same problem-solving methodology as situational crime prevention (Clarke, 2008), and seeks to address issues which are traditionally seen as outside police remits. Partnerships are key to the success of problem-oriented policing since a variety of stakeholders are necessary to solve the broad range of issues contributing to the crime problem (Scott et al., 2008). Intelligence-led policing (Ratcliffe, 2008) is more oriented towards prolific criminals and gangs than problem-oriented policing, and uses an extended range of information sources to gather intelligence which inform police management (Ratcliffe, 2008).

Target suitability and attractiveness

Pease (1997) describes the ‘crime-change cycle’ observed in relation to many new products and services. The cycle consists of three stages:

> ‘(a) the change occurs with little or no reference to its crime consequences; (b) the crime consequences become evident; (c) the change is revoked or a partial solution retrofitted to the problem.’ (Pease 1997: 235).

Pease (1997) observed that the cycle occurs because crime consequences are rarely, if ever, predicted. Predicting crime trends is difficult, but worthy of attempt since partial solutions and those that are retro-fitted are consistently less effective and more expensive than designing-out the crime potential of innovations before their release (Pease, 1997).

VIVA

Felson and Clarke (1998) proposed that the suitability of crime targets is influenced by four elements. These were: Value, Inertia, Visibility, and Access. The VIVA acronym was an exploratory attempt to identify the separate qualities of products, which made crime commission more likely.

Later, the term ‘hot products’ was coined to describe products commonly stolen, in parallel with the emerging discipline of geographic profiling which used the term ‘hot spots’ to describe areas with high crime concentrations (Felson and Clarke, 1998). However, the reasons *why* some products were hot and some less so were not fully understood:

> “Studies are also needed to elucidate the criminogenic properties of whole classes of products, such as cellular phones.” (Felson and Clarke, 1998; 21).

CRAVED

The first comprehensive review of the items most stolen in a variety of theft types was published by the UK Home Office's Policing and Reducing Crime Unit in 1999 (Clarke, 1999). The review aimed to evidence which products were 'hot' and why. Specific items were consistently stolen by thieves, for each kind of theft studied, and clear patterns emerged. For example, residential burglars took jewellery, videos, cash, stereos and televisions, where as shoplifters varied their favourite targets depending on the store. Book stores lost more magazines and cassette tapes than books, while supermarkets suffered the loss of cigarettes, video tapes, beauty aids and non-prescription medicine. However, despite variation in risk of theft according to setting, some items were consistently at higher risk of theft and included cassettes, cigarettes, alcoholic drinks, and fashion items such as Nike training shoes (Clarke, 1999).

Clarke (1999) proposed that the key attributes of these hot products could be summarised in the acronym CRAVED, which replaced VIVA. 'Hot' products were Concealable, Removable, Available, Valuable, Enjoyable and Disposable. Value could be either financial or psychological, while the attribute disposability was predicted to have the greatest effect on how often an item was stolen (Clarke, 1999). More recently, empirical research has used CRAVED to explore the theft patterns of products which physically appear very different from cigarettes and cassettes but can be seen as fashionable items within certain circles. Pires and Clarke (2011) operationalised each of the CRAVED variables to assess the theft patterns of parrots in Mexico. They found that those species which nest closest to open markets (where the birds can be sold) are stolen more frequently than those species which are rarer and more valuable, but nest further away. This finding is important as it lends support to the hypothesis that parrot poaching in this context is opportunistic rather than organised. A more organised criminal network would be predicted to focus efforts on the more valuable species (Clarke and Pires, 2011).

Cornish and Clarke (1987) recognised that target suitability is only one element which predicts the likelihood of theft: The rational choice perspective results in a consideration of the broader ‘choice structuring properties’ of crime settings. The choice structuring properties of a potential offence are, they argued, a combination of motive and situational factors which predict the likelihood of offence commission, by different subgroups of offender, or by the same subgroup of offenders at different times. Choice structuring properties will be unique to each crime setting but in general include:

- Target availability (the number of targets and their accessibility);
- Offender awareness of the required methodology to obtain the targets;
- The likely cash yield per crime;
- Planning and physical resources required;
- The time required for offence commission and the need for assistance of and coordination with other offenders;
- The risk of apprehension and severity of punishment if caught;
- The level of violence required;
- The nature of any potential victims;
- The means to get rid of any stolen goods (fencing contacts and accessories); and a moral evaluation (Cornish and Clarke, 1987).

Product life cycles

Building on Pease’s (1997) macro level crime-change cycle of product innovation, crime consequence and response, Felson and Clarke (1998) proposed a model to describe the four stages within Pease’s (1997) crime consequence stage. They described the vulnerability of a new product to theft as fluctuating during four typical stages of legitimate sales: innovation, growth, mass market and saturation (Felson and Clarke, 1998).

- In the early stages of product innovation, the product is new to the market, relatively expensive and perhaps large or heavy, and bought legitimately by only a few customers.
- In the growth stage, sales increase rapidly because product prices are lowered, and the latest versions of the products are lighter, smaller, and desired by more people.
- At the mass market stage, the product is well known, affordable and highly fashionable, perhaps even iconic.
- At the saturation stage, sales numbers plateau before declining, because at this stage most people who want the product have one. Individual product sales decline as the next desirable product is mass marketed and replaces the older product (Felson and Clarke, 1998).

One of the few empirical studies assessing price and product life cycles (Wellsmith and Burrell, 2005) found strong support for the four stage life cycle proposed by Felson and Clarke (1998). Between 1997 and 2003, DVD recorders essentially replaced video recorders as theft targets during burglaries. This coincided with a peak in legitimate ownership levels of video recorders, and decreased legitimate prices. This signified that video recorders had reached the saturation stage while DVD recorders were at the innovation stage (Wellsmith and Burrell, 2005). Some more complex patterns of theft were also observed: the frequency of TV thefts in burglaries had decreased, presumably because of the greater size and weight of flat screen televisions, giving further weight to the assertion that different products will follow different theft patterns according to their CRAVED characteristics (Wellsmith and Burrell, 2005).

It is likely that some new products need to be analysed at the model level in order to understand fully the detailed theft patterns and therefore risks to consumers. One example is the iPod (Farrell, 2007). Whereas an 80GB iPod bought online in 2007 cost £229.99 (Farrell, 2007), in early 2011 the same money bought either an iPod with double the memory (the 160GB Classic model) or an 80GB product with video capability. An analysis of model life cycles would reveal whether and when the 80GB product was replaced on the legal and black markets by the 160GB Classic and/or the 80GB video-playing upgrade. Similarly, in Chapter 7 of this thesis, the life cycles of specific models of phone are explored using police crime records. The results show that each new model follows a wave pattern of increased theft, plateau, and then decline consistent with Felson and Clarke's (1998) life-cycle hypothesis.

In contrast with entire products, the variance in theft levels of commodities seems more sensitive to the variables disposability and value. Sidebottom et al. (2010) observed a strong correlation between the price of copper and theft levels from UK railways. The implications of the different sensitivities of products and of commodities to theft according to value are important. When considering the potential consequences of any measures to decrease phone theft, theft for the sale of the entire phone would be sensitive to measures that theft driven by the value of recyclable metals in the phone (such as silicon) is not. This issue further highlights the need for the crime-specificity which should be applied in crime problem analysis (Clarke, 2008). Some tentative predictions about future phone-related crime types, including the issue of recycling fraud and recycling driven theft are discussed further in Chapter 9 of this thesis.

Design against crime

Design against crime (DAC) uses the tools, processes and products of design to work in partnership with agencies, companies, individuals and communities to prevent a variety of criminal events (Ekblom, 1997; Gamman and Hughes, 2003; Ekblom, 2008a). The discipline aims to produce products which are 'fit for purpose', and involves the practice of anticipating the crime consequences of new products, or recognising the crime consequences of existing products, and decreasing that crime potential (Erol et al., 2002; Ekblom, 2008a). The process of designing-out crime evolved during the 1990s (Erol et al., 1999; Press et al., 2000; Lester, 2001) and can be summarised by the five I's:

***Intelligence*:** The collection and analysis of information on the crime problem and its perpetrators, causes and consequences.
***Intervention*:** Applying generic principles, through practical methods.
***Implementation*:** Assuring genuine, practical solutions to crime prevention.
Involvement: Mobilising individuals or organisations to act as responsible crime-proofers.
Impact: Assessing whether the intervention has succeeded in reducing crime levels, or the severity of crimes committed, and whether this has been achieved in a cost-effective and acceptable manner. In an area new to crime-proofing, there is no point introducing anti-crime efforts without some indication of their efficacy (Ekblom, 2008a).

A review of the capacity and motivation of the design community to design-out crime was carried out by Erol et al. (2002) as part of the UK's Crime Reduction Programme. Interviews with a range of stakeholder (designers, clients and manufacturers) resulted in the following conclusions:

1) Both decisions makers and designers display limited awareness of design against crime.
2) DAC is not often on the agenda of clients, designers or manufacturers and so is rarely incorporated into design briefs.
3) Security and crime-proofing are only addressed late in the development cycle, and often after a crime harvest.
4) Incentives to design-out crime are rare and low, being perceived to have little return on investment for the client.

5) The design process already involves a wide range of competing demands including product functionality, aesthetics, production costs, and pressure to release a new product ahead of any competitors (Erol et al., 2002).

Good anti-crime design should not conjure images of barbed wire nor prison bars, nor unnecessarily increase anxiety about crime. It should be elegant and effective and require minimum human input or effort (Ekblom, 2008a). Designing products against crime in the UK is arguably led by Central Saint Martin's College of Art and Design, where the Design Against Crime Research Centre is based. The novel designs produced by Central Saint Martin's include three ranges of products listed below.

- A range of Karrysafe bags (Gamman and Hughes, 2003 in Ekblom, 2008) incorporates anti-rip material to minimise bag slashing; a reinforced handle to help prevent bag grabbing (snatch theft) and a Velcro roll-top to help prevent 'dipping' (like pick pocketing but from a bag) (Ekblom, 2008a).
- The Stop Thief cafe chair which has bespoke notches cut in to it in order to enable bags to be secured beneath the knees, and therefore locked into place once the user sits down. The bag is therefore positioned in a place where it is within the personal space of the user, making it more likely they would react to any theft attempts than if the bag were out of sight and out of their personal space (Ekblom, 2008a).
- A range of Grippa clips which secure bags to tables and furniture in bars and public houses, again to decrease incidents of bag theft and dipping (Ekblom, 2008a).

The detailed research leading to the production of such novel designs follows the principles of problem analysis described by Clarke (2008). A specific crime problem is analysed from a variety of angles (for example, offender viewpoint, victim viewpoint) and a variety of solutions considered, while an action-research cycle assesses the impact of the intervention and informs any necessary honing of the intervention (Clarke, 2008).

One example of the empirical research necessary to inform effective design solutions is that conducted by Sidebottom and Bowers (2010), which revealed the most risky places to leave bags in bars was on the floor, or on the backs of chairs. The study highlights the difficulties in locating suitable denominators for product availability when assessing crime risk, and how usage patterns affect theft risk.

Sidebottom and Bowers (2010) used police crime records to assess the risk of bag theft in 26 London bars, and customer surveys to determine the modus operandi of bag theft and customers' perceptions of risk and security in these establishments. An annual bag theft rate was calculated by using police crime data as numerator, and controlling for bag availability via the proxy measure of seating capacity in each bar. Bag theft rates were found to vary considerably between the bars in the study, with a small number accounting for a high proportion of thefts. This unequal distribution is common in studies of crime risk Sidebottom and Bowers (2010). The use of proxy denominators in the absence of a 'true' measure of bag availability mirrors the need, discussed in Chapters 7 and 8 of this thesis, to control for phone availability when producing a risk based Mobile Phone Theft Index.

An analysis of police records revealed that the majority of bag thefts occurred when bags were on the floor, on the backs of chairs or at customer's feet and were often committed without the victim noticing (Sidebottom and Bowers, 2010). Interestingly, the proportion of females who reported theft of mobile phones was 32 percent while the male equivalent proportion was just 18 percent (Sidebottom and Bowers, 2010). Home Office research based on the British Crime Survey has shown that mobile ownership is equal among males and females, but females are victimised more than males (Harrington and Mayhew 2001; Allen et al., 2005 and Chapter 4 of this thesis). The results obtained by Sidebottom and Bowers (2010) therefore imply that more females than males carry mobiles in bags. These observations exemplify that target attractiveness is not the only factor affecting theft risk. For example cars are also at variable risk of theft according to their age and usage (see Brown and Thomas, 2003; Clarke and Harris, 1992; Farrell et al., 2011).

Ekblom (2008b) recommends that designers are informed about offenders' modus operandi, so that they can 'think thief'. He argues that differences in offender experience and skill will result in different problems that require different design solutions:

> *"Know your offenders* – differentiate between design problems imposed by calculating, skilled and highly adaptable criminals and those where only the impulsive and poorly-resourced have to be countered." (Ekblom, 2008b).

The best way to gather knowledge about offenders' motivations and skill sets is arguably to ask them (Walsh, 1986). Some examples of research into offender target choices are presented towards the end of Chapter 3.

Project MARC

In 2004 the European Union funded a two year research project which aimed to define and operationalise Mechanisms for Assessing the Risk of Crime (MARC) for electronic consumer products (Armitage and Pease, 2008a). Project MARC reviewed existing crime risk assessment mechanisms; consulted with key stakeholders to determine if risk assessment was worth pursuing, and considered what form risk assessment should take. The project highlighted the need for:

> “exploration of consumer appetite for secure products; the development of a risk index of electronic products; further exploration of offender decision making at point of theft; [and] that criminologists and manufacturers become friends” (Armitage and Pease, 2008a: 7).

Armitage and Pease (2008b) proposed that a product marking scheme should be introduced which informed consumers of both the riskiness of a product, and its security level. This two tiered traffic light system would allow consumers to assess whether security was commensurate with risk.

The results from Project MARC were published in a 2008 special edition of the European Journal of Criminal Policy and Research. That edition included a paper by Whitehead et al. (2008), which was one of the outputs from the research described in this thesis. That paper describes a new acronym ‘IN SAFE HANDS’ which describes the characteristics of mobile phones security features. These characteristics are Identifiable, Neutral, Seen, Attached, Findable, Executable, Hidden, Automatic, Necessary, Detectable and Secure. The acronym is intended to help designers explore a variety of solutions to theft, as opposed to Clarke’s (1999) CRAVED and Cohen and Felson’s (1979) VIVA which both identify characteristics which promote theft risk (Armitage and Pease, 2008a; Whitehead et al., 2008).

During the early stages of Project MARC, the European Union introduced Mandate M 355/EN. The mandate demanded that, by 2005, the European Standards Institutes developed methodologies to assess and minimise crime risk in electronic products. The haste in which the European Union implemented Mandate M/355 EN resulted in duplication of effort between the research groups at Loughborough, those working on Project MARC, and the European Standards Institutes (Armitage and Pease, 2008a). Charles Brookson of the UK’s Department of Trade and Industry and ETSI, the European

Telecommunications Standards Institute, contacted Loughborough University in 2005 asking for help in responding to European Mandate M355/EN. The response was published as Brookson et al. (2007), but did not incorporate the results from Project MARC, nor the research described in this thesis, nor the acronym IN SAFE HANDS (Whitehead et al., 2008). An assessment of its usefulness has not been carried out, and nor has a revision in light of new information. Arguably, both are warranted.

The Foresight Crime Prevention Panel

The UK's Foresight Crime Prevention Panel was established in 1999 under the broader Foresight Programme, funded by the Department for Trade and Industry (DTi, 2000). The Panel consisted of members from academia, business, government and the voluntary and public sectors. After considering how a variety of factors, including technology, would impact on crime trends up until 2020, the panel concluded that:

- A dedicated funding stream should be established to focus science and technology attention on to crime reduction.
- A national e-crime strategy was needed for all levels of e-crime.
- Thinking on crime reduction should be incorporated into central government and business decision-making processes. Future threats should be identified by continuous horizon scanning.
- A programme should be developed to address crime at all stages of a product's life cycle (Armitage and Pease, 2008a).

By 2008, there was little evidence of routine consideration of crime risk and crime prevention by businesses or by government, meaning that incentivising crime-proofing remained problematic (Armitage and Pease, 2008a). Some options for creating incentives are considered in Chapter 3 of this thesis.

Crime Prevention Through Environmental Design

Crime Prevention Through Environmental Design (CPTED) is a place-based application of environmental criminology, and arguably the predecessor to design against crime in products (Cozens, 2008). It is not a main focus of this thesis but warrants brief explanation. CPTED practitioners redesign the built environment to create 'defensible space', a term coined by Oscar Newman (1973). The notion of defensible space results in key principles of CPTED which include: control access to buildings; manage the space use and image of places; increase natural and formal surveillance; define territories and boundaries (Cozens, 2008).

Situational Crime Prevention

Situational Crime Prevention (SCP) seeks to prevent crime by applying a set of 25 techniques (Cornish and Clarke, 2003) to specific crime problems (Clarke, 2008). It is one micro-level application of the theories of environmental criminology (Wortley and Mazorelle, 2008). SCP employs 25 opportunity-reducing measures which are presented in Table 2.3 below. These measures are directed at highly specific forms of crime; involve the management, design or manipulation of the immediate environment in as systematic and permanent way as possible; and make crime more difficult and risky, or less rewarding and excusable as judged by a wide range of offenders (Clarke, 1983).

The aim of SCP is to reduce the 'near' situational causes of crime, and in doing so reduce aggregate crime levels (Clarke, 2008). Many examples exist which show that SCP can be effective in decreasing crime rates. The first of an annually produced book, Crime Prevention Studies, was published in 1993 and the series has now reached its 26th volume (Madensen and Knutsson (eds.), 2011). The series includes volumes dedicated to specific topics and case studies within situational crime prevention. One web-based collection of full text evaluations is available from www.popcenter.org and this collection is now (in

2011) numerous enough to allow sorting of the case studies by problem type and by other factors such as the nature of the intervention used (for example CCTV or street lighting).

Smith et al. (2002) reviewed 142 case studies of crime prevention initiatives and found that reductions had occurred in the majority of cases. The range of crimes examined spanned common property crimes such as burglary, car theft and vandalism, and also fraud, robbery, street prostitution, drug-dealing and violent assaults (Clarke, 2008). Furthermore, an assessment of the timing of the crime reductions revealed that approximately 40 percent of those case studies which were sufficiently detailed showed evidence of anticipatory benefits (Smith et al., 2002). Anticipatory benefits are reductions in crime which occur before the start of a crime prevention initiative. They are one form of a variety of ways in which crime benefits can diffuse from a targeted crime initiative to a wider context (Clarke and Weisburd, 1994). Other forms of diffusion of benefits occur if crime types other than those tackled by the intervention also decrease, or decreases in crime continue long after the intervention is active (Clarke and Weisburd, 1994). Diffusion of crime benefits is discussed further below under the section 'Criticisms of situational crime prevention: displacement'.

Table 2.3: The 25 techniques of situational crime prevention.

Increase the Effort	**Increase the Risks**	**Reduce the Rewards**	**Reduce Provocations**	**Remove Excuses**
1. Target harden □ Steering column locks and immobilisers □ Anti-robbery screens □ Tamper-proof packaging	**6. Extend guardianship** □ Take routine precautions: go out in group at night, leave signs of occupancy, carry phone □ "Cocoon" neighborhood watch	**11. Conceal targets** □ Off-street parking □ Gender-neutral phone directories □ Unmarked bullion trucks	**16. Reduce frustrations and stress** □ Efficient queues and polite service □ Expanded seating □ Soothing music/muted lights	**21. Set rules** □ Rental agreements □ Harassment codes □ Hotel registration
2. Control access to facilities □ Entry phones □ Electronic card access □ Baggage screening	**7. Assist natural surveillance** □ Improved street lighting □ Defensible space design □ Support whistleblowers	**12. Remove targets** □ Removable car radio □ Women's refuges □ Pre-paid cards for pay phones	**17. Avoid disputes** □ Separate enclosures for rival soccer fans □ Reduce crowding in pubs □ Fixed cab fares	**22. Post instructions** □ "No Parking" □ "Private Property" □ "Extinguish camp fires"
3. Screen exits □ Ticket needed for exit □ Export documents □ Electronic merchandise tags	**8. Reduce anonymity** □ Taxi driver IDs □ "How's my driving?" decals □ School uniforms	**13. Identify property** □ Property marking □ Vehicle licensing and parts marking □ Cattle branding	**18. Reduce emotional arousal** □ Controls on violent pornography □ Enforce good behavior on soccer field □ Prohibit racial slurs	**23. Alert conscience** □ Roadside speed display boards □ Signatures for customs declarations □ "Shoplifting is stealing"
4. Deflect offenders □ Street closures □ Separate bathrooms for women □ Disperse pubs	**9. Utilize place managers** □ CCTV for double-deck buses □ Two clerks for convenience stores □ Reward vigilance	**14. Disrupt markets** □ Monitor pawn shops □ Controls on classified ads. □ License street vendors	**19. Neutralize peer pressure** □ "Idiots drink and drive" □ "It's OK to say No" □ Disperse troublemakers at school	**24. Assist compliance** □ Easy library checkout □ Public lavatories □ Litter bins
5. Control tools/ weapons □ "Smart" guns □ Disabling stolen cell phones □ Restrict spray paint sales to juveniles	**10. Strengthen formal** surveillance □ Red light cameras □ Burglar alarms □ Security guards	**15. Deny benefits** □ Ink merchandise tags □ Graffiti cleaning □ Speed humps	**20. Discourage imitation** □ Rapid repair of vandalism □ V-chips in TVs □ Censor details of modus operandi	**25. Control drugs and alcohol** □ Breathalyzers in pubs □ Server intervention □ Alcohol-free events

Source: Cornish and Clarke, 2003.

Some examples of SCP

Some examples of crime prevention evaluations taken from the Crime Prevention Studies series and from the literature available at www.popcenter.org are described below. A range of crime types have been included to demonstrate the wide applicability of SCP. The repertoire of crimes which have received focus from the crime prevention community has gradually expanded from the ‘usual suspects’ of volume crime such as car theft and burglary to include terrorism (Clarke and Newman, 2006, in Clarke, 2008); child sexual abuse (Wortley and Smallbone, 2006) and the illegal trade in endangered species (Pires and Clarke, 2010).

Guerette and Clarke (2003) reported that a decrease in robberies at ATM machines in Los Angeles and New York was significantly greater than overall city-wide robbery decreases. The mechanisms responsible for ATM robbery reductions were increased formal surveillance (the use of security cameras); increased natural surveillance (for example increasing lighting at ATM machines and providing mirrors so that users could watch their own backs), target hardening (placing ATMs inside security controlled vestibules), access control (altering the opening hours of ATM machines in response to crime patterns) and the publication of the crime preventive initiatives and advice to the public. Publicity alone has been shown to decrease crime rates in some contexts (Bowers and Johnson, 2005).

Ramsay (1990) reported a significant decrease in the occurrence of incivilities and of fear of crime in Coventry city centre after a local bye-law was passed making the consumption of alcohol in designated streets an offence. A large scale before and after survey was used to assess the effectiveness of the bye-law. The mechanisms at work were a combination of publicity about the new law, increased police attendance at licensed premises and several local initiatives such as the provision of alternative alcohol-free discos for youngsters by the local YMCA (Ramsay, 1990).

Sloan-Howitt and Kelling (1997) reported a significant decrease in instances of graffiti tagging on New York Subway cars, once a programme was introduced whereby sprayed cars were impounded and the graffiti removed as quickly as possible. This seminal study on preventing graffiti tagging used the information that offenders' reward for the crime was seeing their work transported around the city subway. There was no need to increase security or surveillance, which might have inconvenienced the general public.

Criticisms of situational crime prevention

Clarke (2008) succinctly rebuts seven repeated criticisms of situational crime prevention. These criticisms and their rebuttals are reproduced in Table 2.4 below.

Table 2.4: Seven criticisms of situational crime prevention – and rebuttals.

Criticism	Rebuttal
1. It is simplistic and atheoretical	It is based on three crime theories: routine activity theory, crime pattern theory and the rational choice perspective. It also draws on social psychology.
2. It is ineffective; it displaces crime and often makes it worse	Many dozens of case studies show that it can reduce crime, usually with little displacement.
3. It diverts government attention from the root causes of crime	It achieves immediate results and allows time for finding longer-term solutions to crime problems.
4. It is a conservative, managerial approach to the crime problem	It promises no more than it can deliver. It requires that solutions be economically and socially acceptable.
5. It promotes a selfish, exclusionary society	It provides as much protection to the poor as to the rich. Thus, one of the first applications of SCP principles was in public housing.
6.It promotes Big Brother and restricts personal freedoms	The democratic process protects society from these dangers. People are willing to endure inconvenience and small infringements of liberty when these protect them from crime.
7. It blames the victim	It empowers victims by providing information about crime risks and how to avoid them.

Source: Clarke (2008: 191)

Hayward (2007) adds to this list the accusation that situational crime prevention is only applicable to acquisitive crime, not to ‘expressive’ crimes. As Farrell (2010) argues, there is plenty of evidence that the opposite is true: the example of timely graffiti removal decreasing graffiti incidents has been discussed above (Sloan-Howitt and Kelling,1997). More recently, Wortley and Smallbone (2006) have shown that child sex offenders often offend because of the opportunity to do so. In contrast, there is no empirical evidence to back Hayward’s (2007) critique (Farrell, 2010).

Displacement and diffusion of crime benefits

Further evidence for the assertion that opportunity rather than disposition plays a key role in crime rates comes from the assessment of crime displacement. If offenders were so driven as to overcome or work round all preventive interventions, then aggregate crime patterns would always be displaced (simply moved) following any preventive interventions.

Reppetto (1976) proposed an early categorisation of types of displacement. These were: temporal, where an offence was committed at a different time; spatial, where an offence was committed at a different place; tactical, where a different modus operandi was used to commit the same crime; target, where a different target or victim was chosen; and crime type, where an offender committed a different type of crime. These categories were not mutually exclusive (Reppetto, 1976). Perpetrator displacement was added in 1990 and refers to a criminal opportunity that is so tempting that if one offender does not take it up, another may (Barr and Pease, 1990). Guerette and Bowers (2009) suggest a more accurate term for this phenomenon might be offender *replacement*.

A key study emphasising the importance of choice structuring properties in affecting behaviour comes from the seminal description by Clarke and Mayhew (1988) of how suicide by gas in the UK decreased greatly in the 1960s and 1970s after natural, non-toxic gas was introduced. The proportion of suicides committed using gas fell from approximately 50 percent in 1958 to only one percent by the mid 1970s. Furthermore, the suicide rate decreased by a third between 1968 and 1975, meaning that displacement to other forms of suicide was not observed. Not only did the ready availability of toxic gas and its simplicity to use increase the likelihood of suicide by gas, it increased the likelihood of suicide via any method. The absence of displacement was because no equivalent alternative was possible (Clarke and Mayhew, 1988; Clarke, 1997).

Only three assessments of displacement had been published at the start of the preparation of this thesis (Barr and Pease, 1990; Eck, 1993; Hesseling, 1994) (Guerette and Bowers, 2009). The general conclusions from these were that displacement is by no means inevitable; and is rarely absolute. More recently, Guerette and Bowers (2009) examined 102 evaluations of situationally-focused crime prevention projects for levels of spatial displacement and the frequency of the diffusion of benefits. Spatial displacement was observed in 26 percent of observations, and diffusion of benefits in 27 percent (Guerette and Bowers, 2009).

The presence of displacement does not necessarily imply the failure of a crime reduction programme. If displacement acts by spreading the experience of crime victimisation more evenly among a population, or the tactical displacement is from a more serious to a less serious form of offence, then displacement can be termed as benign (Barr and Pease, 1990). Benign displacement can also occur if more vulnerable victims are spared some of the burden of crime, or if crime is geographically moved to an area where the consequences for the local community are less acutely felt (Guerette and Bowers, 2009). Further research is needed to explore the interactions between malign and benign displacement (Barr and Pease, 1990) and the mechanisms by which displacement and diffusion of benefits may co-exist as a result of a single preventive intervention (Guerette and Bowers, 2009)

Summary

This chapter has described the founding principles of two applied research areas within the broader discipline of environmental criminology. The rational choice perspective (Cornish and Clarke, 1986; Clarke, 2008) provides models of how offenders, using the knowledge, skills and resources available to them, will make decisions about whether, and how, to commit criminal acts. Routine activity theory (Cohen and Felson, 1979; Sampson et al., 2010) has evolved to encompass the various factors of the person-situation interaction which together affect the likelihood of a crime event taking place. The notion of target attractiveness is captured in Clarke's (1999) CRAVED acronym, and these characteristics can be argued to cause the macro-level change-crime cycle (Pease, 1997), which can in turn be further modelled as an illegal product life cycle mirroring that of licit cycles (Clarke and Felson, 1998). Design against crime (Ekblom, 2008a) provides a methodology for altering the detailed design of products which are likely to follow a change-crime cycle (Pease, 1997) while the 25 techniques of situational crime prevention (Cornish and Clarke, 2003) describe a broader set of mechanisms by which crime rates can be decreased. Designers rarely consider the crime consequences of new products (Pease, 1997; Erol et al., 2002; Clarke and Newman, 2005) and this can to a large extent be attributed to the absence of crime considerations on design briefs, caused by the absence of both awareness of crime consequences and incentives to minimise them (Erol et al., 2002).

Discussion

The rational choice perspective predicts that decreasing phone theft will rely on the successful alteration of offenders' perceptions of the risks, rewards, and efforts of phone theft. At the micro level these perceptions could be altered through redesigning phones to make them less attractive or more difficult to steal. The qualities which make phones attractive to thieves were elicited from offenders interviews, described in Chapters 5 and 6 of this thesis. This information aims to answer Paul Ekblom's (2008b) request that designers are informed about various aspects of offenders' thinking processes, and Armitage and Pease's (2008a) call for an assessment of whether security is considered by offenders at the point of theft.

At a macro level, routine activity theory predicts that in order to coerce industry into redesigning phones, it is necessary to convince these super controllers (Sampson et al., 2010) of the need and utility of doing so. Chapter 3 of this thesis presents key literature which considers in more detail the ideas of responsibility for crime-proofing products, and how crime prevention can be incentivised. Viewing crime as a form of pollution allows the misalignment of industry and crime prevention goals to be identified, while learning from those who already control 'traditional' forms of pollution allows those goals to be realigned (Roman and Farrell, 2002 and Farrell and Roman, 2006).

Chapter 3: Crime as pollution and mechanisms to control it.

Introduction

This chapter describes how viewing crime as a form of pollution impacts on crime prevention practice and complements the most recent version of routine activity theory (Sampson et al., 2010). At a macro level, the instruments used to decrease more traditional forms of pollution can be used to incentivise the internalisation of crime costs by polluters (those who increase the opportunities for crime) (Roman and Farrell, 2002). The chapter begins by describing previous consideration of responsibility for crime prevention, before expanding on the notion of crime as pollution and its application to crime prevention. The UK Car Theft Index is used as an example of a successful public information mechanism that stimulated the vehicle industry to innovate improved security technology which is now incorporated routinely into car design. The effectiveness of incremental and competition-led security improvements in decreasing crime rates is proved by examining the decline in car thefts due to increased immobiliser and door lock prevalence and security. Alternative public information indices are also described, and the possibilities of using legal sanctions and incorporating crime proofing in to the Corporate Social Responsibility policies of businesses are explored.

The chapter concludes with a description of previous research into the decision-making processes of robbers and burglars, because this sets the scene for the interviews with mobile phone thieves presented in Chapters 5 and 6 of this thesis. Methodological issues relevant to the interviews reported in this thesis are reviewed.

Responsibility for crime prevention

A basic assumption throughout this thesis is that offenders are, ultimately, responsible for their actions. Policies which aim to alter offender motivation are less achievable and less effective than policies which decrease the opportunities for crime (Clarke, 1980). Therefore the focus of the research is on responsibility for crime prevention, not on crime commission.

Crime is so closely linked to opportunities that it can be said 'in a very real sense' to be caused by opportunities (Felson and Clarke, 1998; Laycock, 2004). Therefore, those who should assume responsibility for crime prevention include all those who have a role in affecting the prevalence and nature of suitable crime opportunities (Clarke and Newman, 2005). Felson and Clarke (1997) assert that responsibility for crime prevention relies on successful partnerships between governments, industry and the police. Responsibility is spread throughout society as follows:

> 1) Each person and organisation has a civic duty to take routine precautions against crime to reduce temptations to crime.
>
> 2) Each business and organisation has a moral and legal duty to protect the public from crime when using its goods and facilities.
>
> 3) Each business and manufacturer has a civic duty to reduce the opportunities for crime provided by its goods and services (Felson and Clarke, 1998: 210)

Laycock (2004) differentiates between the actions of those who are responsible for and those who are competent in preventing crime. Individuals can only exercise their responsibility if assisted by those with the competency to assist:

> "So, for example, if mobile phones are designed so that they can still be used once stolen, then there is little that the phone owners can do to protect themselves from theft of the phone." (Laycock, 2004: 28).

Felson and Clarke (1997: 212) suggest a ranking of individual responsibilities in relation to crime commission and preventive responsibilities. Felson and Clarke's (1997) ranked responsibilities are reproduced below in Table 3.1 below and depict increasing responsibility for car theft and its prevention. Only the last five categories are criminal.

Table 3.1: Degrees of responsibility for car theft and its prevention

1. Keep an eye on your parked car.
2. Lock car up.
3. Park in safer place.
4. Park in worse place.
5. Fail to lock up.
6. Leave keys in car.
7. Leave keys in car with motor running.
8. Do same near group of young males.
9. Notice someone who might be stealing car but do not look.
10. Notice someone stealing car but say nothing.
11. Keep lookout for friend stealing car.
12. Steal car with keys in and motor running.
13. Steal car with keys in.
14. Steal unlocked car.
15. Steal locked car after breaking in.

Source: Felson and Clarke (1997: 212).

Laycock (2004) expands on these ideas and suggests reasonable levels of responsibility for individuals, for the police and crime reduction partnerships, for government and for industry and commerce. Her suggestions regarding the responsibilities of industry and commerce are reproduced in Table 3.2 below and agree with arguments made by other environmental criminologists (Felson and Clarke, 1997; Pease, 2005; Ekblom, 2005; Farrell and Roman, 2006).

Table 3.2: The actions of socially responsible companies

1. Design goods, services and policies with 'crime in mind'.

2. Understand that goods fitting the acronym CRAVED will be stolen and need extra protection.

3. Resist marketing their goods in ways which risk drawing young people in to crime.

4. Take some responsibility for the threat of theft, attack and other offences being directed at customers.

5. Take reasonable measures to protect staff from victimisation through thoughtful policies, practices and training programmes.

Source: Laycock (2004:32).

Businesses, like people, tend to take routine precautions to protect themselves from risk of victimisation. Businesses do not tend, in general, to protect their customers (Felson and Clarke, 1998; Laycock, 2004; Clarke and Newman, 2005). The majority of products which have had crime designed out of them are products which business relies on, such as vehicles (for example buses, train carriages, trucks) and service delivery devices (for example parking meters, SIM cards, ATMs and coin operated payment meters) (Clarke and Newman, 2005). Examples of consumer products which have had crime designed out include cars and car parts, food and drugs packaging and labels, and some electronic equipment (see Clarke and Newman, 2005:19 for a full list). The mobile industry was successful in decreasing the cloning of SIM cards in the USA because the losses incurred by industry incentivised them to do so: Clarke, Kemper and Wyckoff (2001) report that losses due to SIM fraud were estimated to exceed 800 million dollars in 1995, but were largely eliminated by 1998. The innovations which caused this decrease included profiling systems to detect changes in usage patterns; assigning unique PINs to SIM cards, and radio frequency fingerprinting of handsets (to assess whether geographic usage patterns implied a cloned SIM was in existence). No displacement to other types of fraud was observed, and the investment of 240 million dollars resulted in an estimated saving twelve times as great (Clarke et al., 2001).

Similarly, many seemingly ‘green’ initiatives are financially motivated. For example, British Sugar wash off and re-use the mud and stones from sugar beet, and recycle the CO2 produced from their Whittington factory in Norfolk to increase tomato crop yields. The mud is sold for use on football pitches; the stones recycled to make aggregate. These initiatives benefit the environment, but only came about after EU subsidies for sugar beet production were removed, meaning that sugar production had to become much more efficient to remain profitable (BBC 1, Country Tracks, July 2008).

Ronald Clarke was arguably a pioneer of firmly apportioning responsibility for crime prevention to industry giants. Felson and Clarke (1998) described how US vehicle manufacturers had long resisted calls for improving vehicle security. Professor Clarke reported that he was particularly critical of vehicle manufacturers for not taking responsibility car thefts which he believed could be attributed to the provision of poor quality door locks (Felson and Clarke, 1998). At the same time his co-author, Marcus Felson believed that using crime prevention ‘as a stick to beat the vehicle industry with’ was not necessarily the most effective solution. One solution he hoped for was that security could become a marketable property of vehicle design (Felson and Clarke, 1998).

Professor Felson’s solution was eventually achieved in the UK, via government intervention which generated consumer demand for car security (Laycock, 2004). The development of the UK Car Theft Index demonstrates how crime prevention policy can be aligned with industry interests, and result in a successful outcome, while minimising government investment. The UK Car Theft Index is described in more detail following further elaboration of the idea of crime as pollution, and how those wishing to prevent crime should take lessons from those who already control more traditional forms of pollution.

Crime as pollution

Roman and Farell (2002) and Farrell and Roman (2006) draw parallels between crime pollution and 'traditional' forms of pollution, such as noise and air pollution. Furthermore, the study of how traditional forms of pollution can be controlled can yield useful lessons for those who wish to control crime pollution (Farrell and Roman, 2006).

Externalities are forced upon society, whether inadvertently or deliberately, and society bears the costs if they are negative, and reaps the benefits if they are positive. Crime is a negative externality (Roman and Farrell, 2002). An example is that while manufacturers and service providers profit from the sale and use of mobile phones respectively, society bears the cost of the victimisation which occurs because phones provide ideal theft targets. (For details of the nature, extent and estimated cost of phone theft in the UK, see Chapter 4 of this thesis).

Externalities can cost more to society if they act as multipliers: if, for example, an opportunity to commit crime precipitates (Wortley, 1997; 2001) or extends a criminal career. In this case, one crime opportunity not only costs society the one immediate crime event, but also any related events which follow (Roman and Farrell, 2002). Some evidence that particularly attractive phone targets act as prompts for criminal acts is presented in Chapter 6 of this thesis. Some examples of crime types which can be viewed as pollution are listed below in Table 3.3 along with the crime polluters responsible for them. The table is an abridged version of work presented in Farrell and Roman (2006).

Car park owners and management companies regularly declare their immunity to responsibility by placing signs telling users that they 'Leave vehicles at their own risk'. In truth, the design and management of the car park will greatly affect the risk of a vehicle becoming a crime target (or facilitator if it is used as a getaway vehicle). Car park owners, managers, and designers all have a responsibility to make themselves aware of how their practices can affect user risk, and to tailor their practices accordingly (Clarke and Newman, 2005). Similarly, Internet Service Providers know that the internet is a facilitator of crime, and doing little to protect their customers from victimisation is negligent (Laycock, 2004; Clarke and Newman, 2005).

Once ‘the penny drops’ (Farrell and Roman, 2006) it becomes easy to view other offences as pollution. A further addition to the crime types suggested by Farrell and Roman (2006) is increased illegal poaching of wild flora and fauna as a result of legal logging and deforestation in South East Asia (see Clements et al., 2010). Increased access to previously impenetrable habitat increases the opportunities for poaching by decreasing the effort necessary to access forests.

Table 3.3: Some sources of crime pollution by crime category (adapted from Farrell and Roman, 2006: Table 8.1)

Crime type/ area	**Possible polluters**	**Why is it pollution?**	**Comments/ possible measures**
Theft of/ from vehicles	Vehicle manufacturers	Savings on production costs which avoid built-in anti-theft design and measures.	Minimum crime safety standards and testing akin to those for crash safety.
Theft of/from vehicles	Car park designers, owners, managers	Savings on barriers to reduce access, on CCTV, on staffing, on design.	Safer Parking Scheme (new version of Secured Car Parks) extended to minimum crime-safety practices and standards.
Theft of/from vehicles	Car owners	Failure to lock car door is negligent.	System of fines for negligent owners (as used in Australia and elsewhere).
Residential and commercial burglary	Architects and builders	Failure to design safe designs standards.	Legislation to promote safer designs.
Theft and robbery of hot products	Product designers and manufacturers	Production of lightweight, valuable, easily stolen products (DVDs, iPods) and omitting security features saves on design and production costs.	Mobile phones cause mini-crime wave of robbery and theft in UK. Phone manufacturers and providers benefit but do not bear the cost of crime.

Crime type/ area	Possible polluters	Why is it pollution?	Comments/ possible measures
Internet fraud	Internet service providers, internet retailers, e-commerce and auction sites	Huge benefit to e-commerce but little (or belated) attention to crime risk.	Increased accountability of ISPs, perhaps incentives for research and development of tracking and detection software.
Shoplifting	Shop designers, owners and managers	Poor designs can encourage robbery.	Mandatory crime-proof checks akin to fire safety standards.
Child pornography	Internet Service Providers (ISPs)	ISPs benefit from subscriptions, but also facilitate exchange of illegal pornography. Society pays the cost in terms of crime.	Increased accountability of ISPs, perhaps incentives for research and development.
Inner-city grime caused by chewing gum on streets	Chewing gum manufacturers	Manufacturers profit from sales while society incurs the costs of extensive (and predictable) gum littering.	Manufacturers should pay for clean-up operations, encourage environmentally friendly disposal of gum (e.g. gum-tree boards or provide wrappers).
Domestic violence	Alcohol manufacturers and licensees?	Alcohol often plays a role (but is not an excuse for) domestic and other violence. Manufacturers and licensees profit but do little to absorb costs to victims and wider society.	Enforced responsibility of licensees. Perhaps taxes and fines used to fund domestic violence related services.

Roman and Farrell (2002) assert that developing effective crime prevention policies necessitates answering the question of how to maximise the net social benefit of crime prevention. They propose that cost-benefit analysis, extended to consider crime as an externality, promises to answer that question. The ideal scenario is for policy makers to have a menu of responses at their disposal, and to know the likely benefits and costs of each item on the menu (Roman and Farrell, 2002). The example of cell phone fraud elimination in the USA (Clarke et al., 2001) demonstrates how investment in security technologies can result in a considerable return on investment.

Controlling environmental pollution

Roman and Farrell (2002) and Farrell and Roman (2006) suggest that lessons learnt from environmental pollution control should be applied to crime prevention strategies. This section summarises some of the key mechanisms available for pollution control, and their individual properties. The summary is based on the discussion of environmental control within a book on the same, (Portney and Stavins, 2000).

Environmental policies are traditionally made of two components: a goal which can be general or specific and a mechanism to achieve that goal (Stavins, 2000). Market failure is said to occur when there is no market value placed on externalities, meaning that the market can never determine a level of pollution which is acceptable (Portney, 2000). Such non-recognised externalities are called orthogonal, and differ from pecuniary externalities which are recognised, but not controlled and can result in a decreased price (Roman and Farrell, 2002). An example of a pecuniary externality would be if land were less expensive because of its proximity to a factory (Portney, 2000).Crime risk in relation to electronic products remains an orthogonal externality: consumers are not generally aware of how their product choices affect their crime risks, apart from when choosing houses and cars (Learmount, 2005).

One set of mechanisms used with increasing frequency in US environmental pollution control is termed ‘market-based’ or ‘economic-incentive’ instruments (Stavins, 2000). These encourage behaviour through market signals, which define acceptable pollution levels. They avoid explicit directives which define a level of pollution, or sometimes the mechanism for decreasing pollution. Market forces are said to be ‘harnessed’, since the goals of the polluter (to maintain or increase profit) are aligned with those of the regulator (to decrease or control pollution) (Stavins, 2000). To use the terminology of Sampson et al.’s (2010) routine activity theory, an effective market-based crime pollution control policy would align the goals of the supercontroller(s) with those of the guardian, because both are motivated to decrease the number of suitable crime opportunities. This approach is closely aligned with UK government research published in 2006 which also advocated an incentive based approach to crime reduction where markets had failed (Home Office, 2006).

Traditional ‘command and control’ regulatory mechanisms tend to define acceptable levels of pollution, and may even prescribe the mechanisms by which pollution control occurs (Stavins, 2000). This can go so far as to define the type of technology to be used in pollution control (for example, that car exhaust fumes are filtered by catalytic converters, rather than by any suitable technology). Thus command and control strategies can confer relatively high costs to the polluter, and perhaps worse still, they can stall the development of technologies which might further decrease pollution (Stavins, 2000). The phenomenon of ‘designing down’ to minimal standards is well recognised in the field of design against crime (see for example Ekblom, 2005) and occurs because of the absence of incentives to exceed control targets (Stavins, 2000).

In contrast, market-based mechanisms provide both the incentives and the freedom necessary for technological innovation (Stavins, 2000), with the result that pollution decreases will often exceed regulatory limits. Four major categories of market-based pollution control mechanisms are described by Stavins (2000) and these are reproduced in Table 3.4 below.

Table 3.4: Mechanisms for market-based pollution control:

1) Pollution charges: a fee or tax is applied by the polluter, commensurate with the level of pollution produced.

2) Tradable permits: an allowable level of pollution is defined and permits are allocated amongst polluters, equalling the sum total level of pollution allowed. Firms are then incentivised to decrease pollution levels up to the point where further pollution decrease is more costly than the profit made on selling 'spare' permits.

3) Market barrier reduction: explicit or implicit barriers to market activity are removed. Three subtypes of market barrier removal mechanisms exist:

i) Market creation (government facilitates the creation of a new market)

ii) Liability rules (firms are forced to weigh the potential consequences of their polluting activities and may, therefore, reduce them)

iii) Information programs (the functionality of the free market is improved by increasing the quality of information provided to consumers, who can then 'vote with their feet' and purchase goods accordingly).

4) Government subsidy removal (the removal of subsidies which often inadvertently lead to economically inefficient and environmentally unsound practices).

Source: Stavins (2000).

Legal sanctions

Liability-based market barrier reduction could be achieved by adapting existing legislation. Moss and Pease (1999) argue that in the UK, Section 17 of the Crime and Disorder Act 1998 should be amended to confer responsibility for crime prevention. The Act already obliges local authorities, primary care trusts, the police and the fire service to consider the crime consequences of their actions, and central government and businesses should be added to the list (Moss and Pease, 1999).

Similarly, Farrell and Roman (2006) propose that liability-based market barrier reduction could be achieved via an ‘enhanced crime doctrine’. They argue that crime events, like car crashes, are predictable at aggregate levels; that victim fault is irrelevant; and that manufacturers are therefore obliged to minimise the probabilities of crime events associated with their products. The doctrine would read:

> “The theft of certain types of products is clearly foreseeable. Hence, manufacturers should have a duty to design for foreseeable theft and resale which occurs with or without the fault of the victim. Therefore, frequently stolen consumer products must be reasonably difficult, or unattractive, or unrewarding propositions for theft and resale.” (Farrell and Roman, 2006: 148):

A further legislative instrument which could be adapted is Article 12 on Corporate Liability of the European Treaty on Cybercrime. The Article makes companies legally accountable for crimes committed by their employees. Accountability is assumed ‘regardless of whether the employee was acting under instructions from [the firm] or was allowed to [commit the crime] due to a lack of adequate supervision or control by [the firm]’ (European Treaty, 185). It therefore seems reasonable to suggest that, if liability-based market barrier removal mechanisms were desirable, the Article could be extended to include legal accountability on manufacturers for crimes committed:

> “‘regardless of whether any person was contravening product safety or usage advice, or due to a lack of adequate anti-security measures being available or designed in to the product.”

In the UK, the Companies Act (2006) introduced a requirement that public companies report on social and environmental impacts (Economist, January 19th 2008). If crime pollution were recognised as a social impact of business, this Act would automatically mandate that the crime consequences of business activities were considered and reported on.

Corporate social responsibility policies

Another option for ensuring that crime risk was routinely considered by the private sector would be to include criminogenic considerations in Corporate Social Responsibility (CSR) policies. However there would be much work to do for this option to be pursued. In the UK, CSR polices typically include 'green' initiatives such as recycling schemes and minimising the use of plastic carrier bags, and can extend to investing in local community projects such as education or land regeneration (The Economist, January 19th 2008). However, crime consequences are not incorporated into CSR policies. In 2007 the present author attended the Public Interest Environmental Law UK (PIEL) Conference. Delegates included academics, private consultants and NGO employees within the fields of Environmental Law, and CSR. When the audience was asked, during a session on the future of CSR, whether crime was ever considered in CSR polices, the question seemed to cause confusion even to this enlightened audience, and the conclusive answer was no. The Department of and Trade and Industry recognises that CSR can increase sales (DTi, 2003) and has developed a framework to help companies introduce CSR into their usual business practices (DTi, 2004). CSR activities are also used to attract, motivate and retain high quality staff (Economist, January 19th 2008). Crime pollution, crime risk, and criminogenic properties are not mentioned in the assessment of CSR benefits (DTi, 2003), the implementation framework (DTi, 2004) nor a more recent review of 'good' corporate governance (Filatotchev et al., 2007). Nor is it mentioned in a survey carried out by McKinsey on what topics are important within CSR, reported in a special feature by The Economist (The Economist, January 19th 2008). Much more research is needed to identify how crime pollution might be incorporated into CSR, and whether the consequent self-regulatory practices would be as robust in controlling crime as those incentivised by instruments such as indices.

The UK Car Theft Index: an example of government leverage

The orthogonal nature of criminogenic externalities means that market-based crime prevention instruments have yet to be widely applied (Farrell and Roman, 2006). One notable exception is the example of the UK government publishing the first UK Car Theft Index in 1992, which made car manufacturers incorporate better security technology. The Car Theft Index is essentially a market barrier reduction mechanism, and specifically an information programme. Its aim was to inform the public and interested parties (such as insurance agencies) of the differential risk of theft for different types of car (Laycock, 2004). The title of this section mirrors that of a seminal description of the development of the UK Car Theft Index written by Professor Gloria Laycock. This section relies heavily on her work. Laycock (2004) describes three deceptively simple stages of index production:

1) Agree on the need for an index

2) Gain access to denominator data (what is available for theft)

3) Gain access to numerator data (what is stolen)

The UK motor industry was disinterested in vehicle security because security was not considered a marketable issue (Laycock, 2004). Even though Home Office research in the 1980s demonstrated that cheap and effective security could be incorporated, and designers had already predicted how cars might be made more secure (Southall and Ekblom, 1985), industry did not incorporate this security. This disinterest was little compared to the active resistance to government pressure that was to come (Laycock, 2004).

The concept of a Car Theft Index is to compare what is stolen with what is available for theft. Vehicles are then ranked according to their risk of theft. The process of translating this simple notion in to a usable, accepted and useful index was not easy. Laycock (2004) describes the key stages involved in producing the UK's first Car Theft Index, and Houghton (1992) describes the methodological nuances in further detail.

Agreeing on the need for an index

By 1991, theft of and from vehicles had increased in the UK to account for 28 percent of all UK recorded crime (Houghton, 1992). In 1988 the Home Office's Car Crime Working Group called for research to identify which cars, if any, were at greater risk of theft. The results showed that theft risk varied between models, and in response to this information UK government Ministers agreed in 1990 that a Theft Index should be produced to inform both the public and manufacturers of these findings (Houghton, 1992). The idea was not unique to the UK since Indices were already produced in both the USA and in Australia. Houghton (1992) describes the advantages of Car Theft Index production as:

- Providing information to existing car owners of the potential risk of theft.
- Providing information to potential car owners so that those who wish to can factor theft risk into their decision-making process.
- Providing manufacturers with the relative theft risks of their particular models and allowing monitoring of the success or otherwise of any newly introduced security features.
- Potentially assisting with research into car theft if the right data are incorporated into the Index.

Houghton (1992) describes the factors affecting the ranking of each car model within the Index as its level of security (i.e. vulnerability to thieves), its attractiveness to thieves (i.e. suitability for joyriding, or for chopping and resale), and the behaviour of drivers, in particular their parking habits. The Car Theft Index did not attempt to separate out these various factors.

Defining denominator and numerator

Identifying a suitable denominator for the UK Car Theft Index was problematic. Over 70 makes of car (e.g. Ford) were in use on the UK's roads, and consisted of over 290 different models (e.g. Ford Escort), which could be further broken down into ranges (e.g. Ford Escort Mark 1) and lines (e.g. 1987 1392cc Ford Escort GL Plus Mk 3). Many of these cars had different security features (Laycock, 2004).

Defining appropriate boundaries between categories of vehicle was central to the usefulness of the Car Theft Index: too narrow a classification would risk low numbers in each category, and produce too many categories for the Index to be informative to the public. Broad categories of vehicle type would risk aggregating together dissimilar vehicles and therefore masking underlying theft patterns (Houghton, 1992; Laycock, 2004). The 'ever watchful eye' of the motor industry scrutinised methodological decisions such as these (Laycock, 2004). Records held by the Driver and Vehicle Licensing Authority (DVLA) were not suitable because they resulted in over 10 000 categories of vehicles (Houghton, 1992). The categories used in the final index were based on a system developed by the Society of Motor Manufacturers and Traders (SMMT). Devised for use by the motor industry, SMMT records detailed the make and model of vehicles registered in the UK. The database was derived from DVLA data but records were cleaned to remove coding errors and inconsistencies, and perhaps more importantly, to reclassify vehicles into a smaller number of meaningful sub-categories than in the DVLA records. Furthermore, SMMT records included the age (year of manufacture) of each vehicle (Houghton, 1992).

The numerator for the Index was also difficult to identify. Several options were explored and none was ideal (Houghton, 1992; Laycock, 2004). For example, the data held on the Police National Computer (PNC) omitted cases where missing cars had been found before they were entered on the PNC. The final data set for the first UK Car Theft Index was obtained directly from 13 of England and Wales' 43 police forces (Laycock, 2004). This was labour intensive, because vehicles such as lorries, vans and motor cycles had to be removed, and free text fields corrected, but it yielded more complete information than the PNC (Houghton, 1992). The final numerator represented around one fifth (23%) of national thefts from November 1989 thru October 1990 (Laycock, 2004).

The number of vehicles stolen was divided by the number on the road according to SMMT records, resulting in a theft risk. Because only a proportion of national thefts was included, each risk calculation had a sampling error associated with it (Laycock, 2004). This reflected the uncertainty of how the ratio might have differed had a different sample been obtained (Houghton, 1992). The final index grouped cars in to high, medium and low risk groups according to theft risk, and that three category ‘traffic light’ grouping continued in all versions of the Index (for example Home Office, 2005a).

A search of the UK Home Office website in 2011 reveals that the Car Theft Index was published annually only until 2006. A Freedom of Information Act submitted to the Home Office in November 2008 by a member of the public (FOI T23587/8) resulted in a reply from the Home Office that a 2007 Index had not been published, and that plans for a 2008 Index to be published in 2009 were not confirmed. That reply is attached as Appendix 3.1 Further research should be carried out to assess whether the absence of an Index has slowed the progress of further innovation in vehicle security, and why the Home Office has decided to retract this tool.

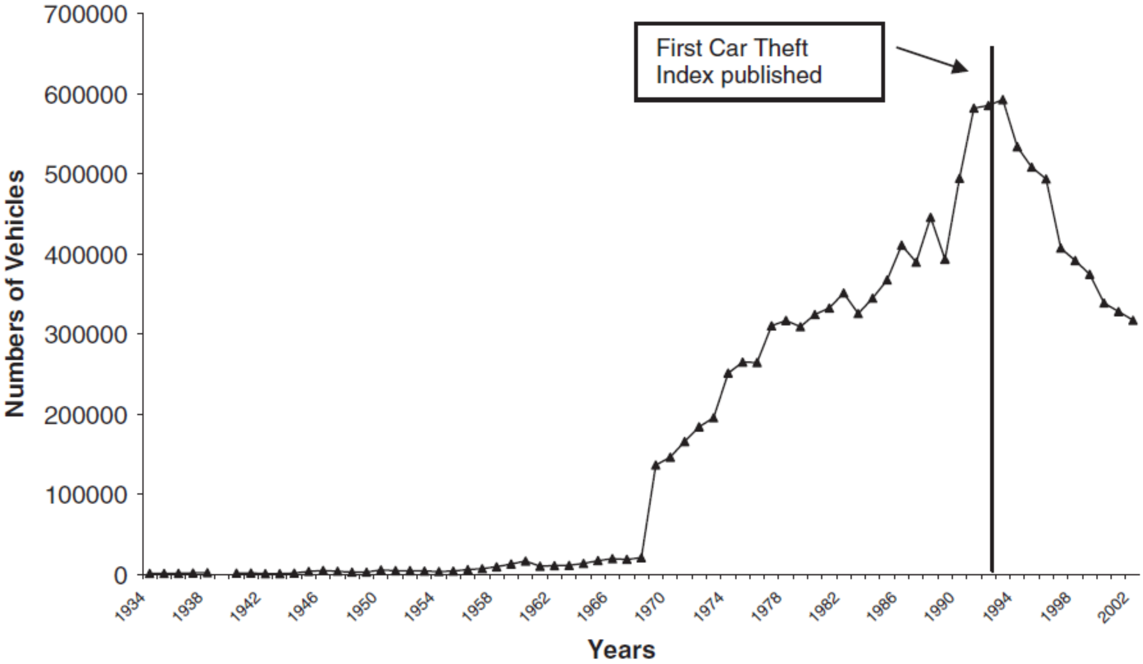
The effect of the UK Car Theft Index

> “The effect of publishing the UK Car Theft Index was dramatic” (Laycock, 2004:36)

The UK Car Theft Index was originally published in 1992. A five year delay then followed, until the annual Index was produced from 1997(Laycock, 2004) until 2006. The effectiveness of the Car Theft Index spurred the production of the Bike Theft Index, which ranks stolen mopeds, scooters and motorcycles in order of risk, and is based on a similar methodology (Home Office 2002; 2005b).

In 1992 the Home Office invited media and the major manufacturers to the Home Office in order to present the first edition of the Car Theft Index (Laycock, 2004). The publicity helped make security a marketable commodity, and therefore spurred innovation in the design, and the routine incorporation of, better vehicle security. The effect of the UK Car Theft Index on aggregate theft levels is clearly implied by Figure 3.1 below, reproduced from Laycock (2004). Although there is a possibility that alternative explanations exist for the decrease in car crime, a growing body of evidence suggests that incremental security increases have impacted on different types of car theft and resulted in the aggregate decline. Some recent evidence is presented in what follows.

Figure 3.1: Vehicle theft in the UK and the publication of the Car Theft Index



Source:Laycock (2004)

The impact of increased security

Clarke and Harris (1992) advocated that different motivations for car theft existed, and that the motivation would impact on how theft levels would alter in response to different security innovations. They ranked models of cars stolen in the USA made between 1983 and 1985 according to theft risk for three sub types of car theft: stripping for parts; theft for temporary use, and permanent theft. The models topping each Index differed: German cars with good audio equipment were at higher risk of thefts for parts; sporty American models were at highest risk of temporary theft; and foreign sports cars were at highest risk of permanent theft for resale abroad and chopping (Clarke and Harris, 1992). The differences were explained by Clarke and Harris (1992) by three broad categories of choice-structuring properties, made up of a combination of motivational and situational factors:

- Security: the quality of locks, alarms, immobilisers, and the presence or absence of soft roofs.

- Availability: how common the models were; where they were seen (used) and stored.
- Attractiveness for theft: the profit potential or kudos value, related to image, engine power, and monetary value of parts including sound systems.

They predicted that theft for joy riding (temporary theft) would be decreased by immobilisers more than permanent theft (for resale abroad), and suggested that different indices based on the three main motivations might help to identify differing theft trajectories according to security implementation. Several pieces of work have tracked the effect of a variety of security mechanisms on car theft in the UK and abroad. Some are described below. The key message is that different security measures have on aggregate decreased both permanent and temporary theft of vehicles, and theft from vehicles, and that Clarke and Harris' predictions were accurate. The evidence in relation to the effectiveness of immobilisers and better door locks is presented here as a case study. Similarly, it would be expected that different security measures introduced in to mobile phones would impact differently on the various motivations for phone theft. The motivations for phone theft are described in Chapter 4 of this thesis, and some predictions about the differential impact of security measures on phone theft are made in Chapter 9.

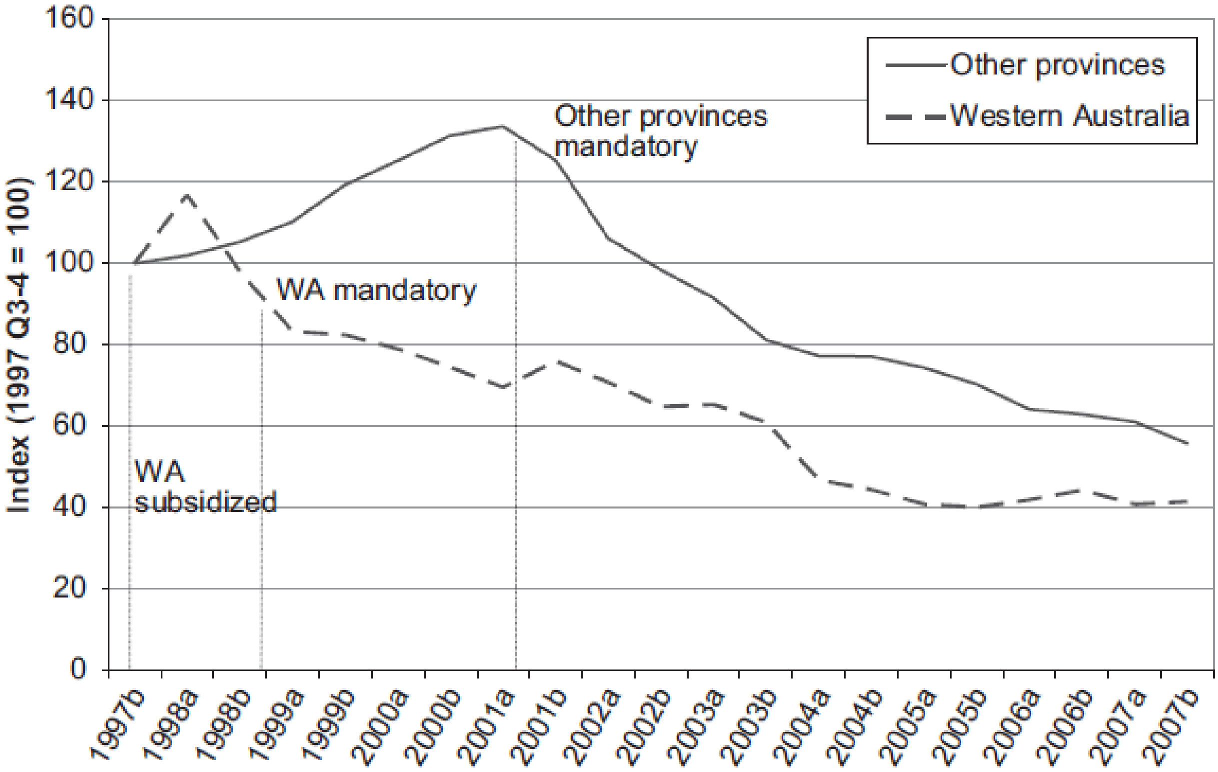
Brown and Thomas (2003) were the first researchers to account for vehicle age when assessing the impact of increased vehicle security. Increasing vehicle age had been shown to correlate with increased theft risk, for a variety of reasons, including decreased security on older cars and storage and usage patterns (Houghton, 1992; Brown, 1995). An assessment of immobiliser impact on the theft risk of UK cars stolen between 1997 and 2000 and controlling for age revealed that immobilisers conferred some protection against theft, but that there was evidence of some displacement towards older (less secure) vehicles (Brown and Thomas, 2003). These findings were mirrorred in Australia when Kriven and Ziersch (2007) repeated

Brown and Thomas' (2003) 'age crime curve' methodology and showed that immobilisers also decreased the risk of theft for Australian vehicles. More recent work building on these studies was conducted by Farrell et al. (2011). They hypothesised:

> "[ ] that immobilizers have greater impact on theft of than theft from cars (immobilizers do not make it harder to steal from cars), that alarms impact on theft from cars rather than theft of cars (alarms do not make it harder to drive cars away), and that central locking affects both but has a distinct impact on modus operandi (cars with central locking can still be entered in other ways)." (Farrell et al., 2011:153).

A natural experiment was conducted when Western Australia subsidised and then made mandatory 'quality' immobilisers (meeting specified criteria), and the rest of Australia mandated the same immobilisers two years later in 2001. Figure 3.2 below shows the relationship between car thefts and immobiliser subsidy and mandating in Western Australia, and mandating in the rest of Australia (Farrell et al., 2011). It is clear that immobiliser mandating in the rest of Australia was swiftly followed by a decrease in thefts. The story for Western Australia appears slightly more complex and it would be useful to unpick (1) why there is an initial increase in thefts after immobiliser subsidy; and (2) the relative contributions to the decrease made by immobiliser subsidies, and by a possible anticipatory benefit (Smith et al,. 2002) of immobiliser mandating.

Figure 3.2: Vehicle theft in Australia 1997 to 2007



Source: reproduced from Farrell et al. (2011). Data source of theft numbers=: CARS, the Australian Comprehensive Automotive Research System.

A second piece of evidence to support Farrell et al.'s (2011) hypotheses came from analysing the changes in decline in temporary and permanent thefts in the UK and in Australia, against an increase in the prevalence of security features in the car pools of both countries. Figure 3.3A shows the falls in temporary and permanent theft of vehicles in England and Wales from 1995 to 2006/7. Two thirds of the drop is accounted for by a fall in joyriding thefts (temporary theft where cars were recovered). Figure 3.3B displays similar information for Australia. The disproportionate decrease in temporary thefts in both countries supports the hypothesis that increased immobiliser prevalence and better door locks deterred the less motivated joyriding offenders more than it deterred thieves targeting cars for resale abroad.

Figure 3.3A: Temporary and permanent car theft in England and Wales, 1995 to 2007 (Source: BCS).

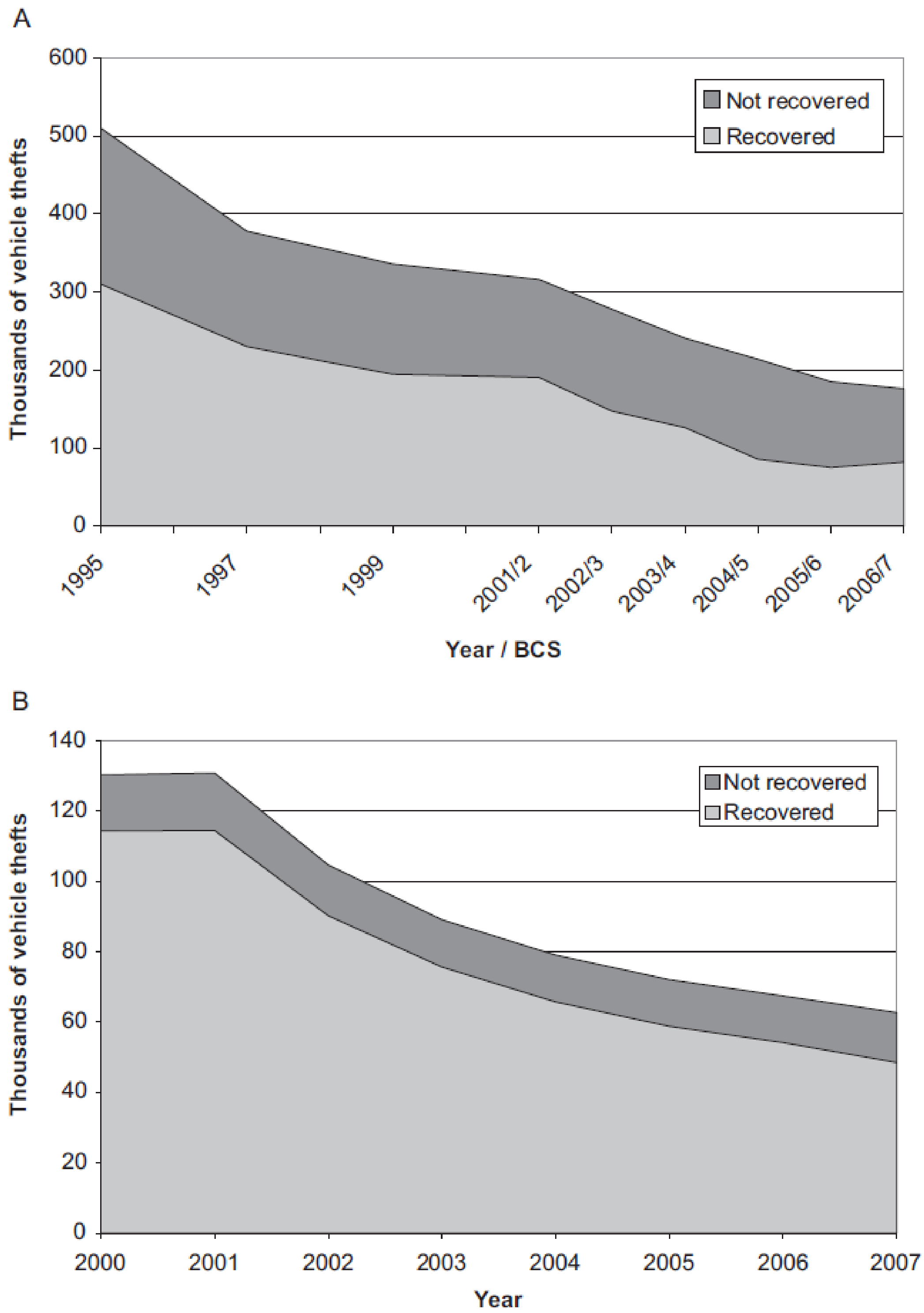


Figure 3.3B. Temporary and permanent car theft in Australia, 2000 to 2007 (Source: CARS).

A third piece of evidence presented by Farrell et al. (2011) showed how the modus operandi of vehicle entry had also altered as the prevalence of security in vehicles had increased. In both the UK and Australia, the modus operandi which decreased the most was that of lock forcing. The decrease in lock forcing is consistent with increased central locking prevalence and quality resulting in increased effort being necessary to break the locks.

Industry (in)action

The story of the UK Car Theft Index described above shows how index production can be successful in stimulating innovation and competition regarding security. Two case studies are described below which highlight how industry denied the need for increased vehicle security and safety, by laying the blame for thefts and accidents on drivers. Some generalisations about typical industry reaction to pressure for internalising crime costs can be made. These generalisations are compared in Chapter 4 of this thesis to the reactions of the UK mobile industry to government and media pressure to internalise crime costs.

Laying blame elsewhere

One of the earliest calls for increased car security came from the Netherlands. Karmen (1981) wrote a paper aptly titled ‘Auto theft and corporate irresponsibility’, in which he accused industry of irresponsibility providing easily stolen cars. He hypothesised two reasons for this behaviour:

1) Cost cutting: the externalisation of cost maximises profit.

2) Increasing sales: Karmen (1981) estimated that approximately five percent of vehicle sales were replacements for unrecovered stolen vehicles, or those recovered in poor condition.

A typical response of industry to claims that they should take some responsibility for the prevalence of car thefts was to ‘damn the driver and spare the car’ (Karmen, 1981:65). Some examples of industry statements are reproduced in Table 3.5 below. Some examples of mobile phone industry statements concerning responsibility for phone theft are presented in Chapter 4 of this thesis.

Similarly, Newman (2004) observed that as the concentration of cars on the road and driving speeds increased, deaths due to vehicle accidents increased, but industry vehicle manufacturers blamed drivers and not their products for increased injury rates:

> "The history of auto safety is a story of two struggles: ideas and interests. The struggle of ideas pitted the idea of the bad driver as the cause of car accidents (promoted by car manufacturers) against the idea of the bad design (promoted by small elements of the medical community) that contributed to the severity and extent of auto-injury" (Newman, 2004:221)

Table 3.5: Damning the driver and sparing the car

Source, Affiliation, Date	Statement about responsibility
Sherman, Manager, Automobile Manufacturers' Association, 1956	...the industry has exerted great efforts to assist in the prevention of automobile theft and makes available all possible help to assist officials and insurance companies in the recovery and identification of stolen automobiles. It is obvious that the first principle in theft protection must be the cooperation of the motorist in locking his vehicle.
Bogan, Vice President, Engineering, Chrysler Corporation, 1967	We (Chrysler) and the auto industry as a whole have cooperated with national agencies in auto theft prevention and recovery programs since our very beginning. And we are engaged in a continual process of improving the theft deterrence characteristics of our vehicles.
Scott, Automotive Safety Director, Ford Motor Company, 1967	I think that the record of the industry has been very creditable in responding wholesomely to correcting and changing components of cars which were brought to our attention as a theft problem. We do view anti-theft actions as important even though we can find little evidence of customer appreciation or desire to pay higher car prices to obtain a more secure product.
Wolfslayer, Assistant Chief Engineer, Chrysler Corporation, 1975	All the security you put in a car is not going to do a darned bit of good if people are careless. People have to learn to take better care of their autos.

Source: Karmen (1981:66)

Competing interests

Newman (2004) describes the competing interests of a variety of actors involved in vehicle design and sales. These actors include manufacturers, who seek advantages over competitors in order to maximise profits; industry suppliers, who have a keen interest in the inclusion of their goods in vehicle design; insurers, who remained in the background in the history of car security but generally assessed the changes in risk associated with differing manufacturing processes; plaintiff lawyers, who pursue their own financial interests in finding fault in car design and apportioning blame accordingly; consumer watchdogs, whose interests are in opposition to industries' financial motives and who seek to minimise risk to consumers; individual consumers, whose preferences ultimately drive the market; the state government, who regulated car production from the beginning but were slow to regulate fully safety-related issues; and the federal government, concerned with federal regulation. Clarke and Newman, (2005) add to this list of actors the media, and design and academic professionals concerned with crime prevention.

Corporate strategies in relation to car safety and security included obstructionism and pre-regulation initiatives. Obstructionism (Nader, 1966, in Newman, 2004) describes industry resistance to involvement by government in the design and marketing of vehicles, despite the fact that safety had been researched and prototype cars produced well before safety was mandated by government. Pre-regulation initiatives describe actions taken by manufacturers which are 'enough' to avoid mandatory action such as regulation or legislation, or which gain a market advantage (Newman, 2004).

Government response

Government activities were not always effective in increasing either safety or security in vehicles: an example of the tactic of technology-forcing is given by Newman (2004). President Nixon mandated that passive restraint systems, such as air bags linked to the car ignition, should be developed and included in vehicle design. This strategy fuelled competition among manufacturers and suppliers of passive restraints, but unfortunately also caused mistrust between industry and government. Public outcry at (apparent) infringements of freedom and choice caused the mandate to be repealed.

A further complication was government pluralism, where conflicts of interest between departments led to ineffective or unclear strategies (Laycock, 2004; Newman, 2004; Newman and Clarke, 2005). For example, a department concerned with security might mandate a security intervention which increased production costs, and departments concerned with trade and industry would oppose initiatives which decreased the competitiveness of the goods (Laycock, 2004). Farrell and Newman's (2006) proposition of using market-based instruments reduces the risk of pluralism, by aligning the goals of many actors. There may still be a risk that security which is valued in one country is not valued as highly in another, meaning that national crime prevention goals and international trade interests might clash. However, routine activity theory (Cohen and Felson, 1979) predicts that in the case of mobile phone theft, most countries where phone ownership has increased will be experiencing theft driven crime harvests, and so would benefit from more secure products and systems. Detailed cost-benefit analyses as recommended by Roman and Farrell (2002) and Farrell and Roman (2006) would inform policy makers whether the net benefits of national crime prevention strategies were greater than those from export.

Newman's (2004) conclusions about the differences between the development of car security and safety highlight that the idea of crime as pollution has yet to become a paradigm. There were, according to Newman (2004), no records of consumers complaining that cars had been stolen, nor of consumers suing a manufacturer for selling a car that was easy to steal. In contrast, there were plenty of complaints and consumer demands for increased safety. His conclusions about what was effective in increasing safety and security are useful lessons for those wishing to alter established industry practice. Legislation which interfered with manufacturing and suppliers was, he concluded, generally ineffective. Insurance groups could be powerful allies in lobbying for action, if they were incentivised to do so. Publicity was perhaps the most powerful tool, creating consumer demand

and therefore causing industry to react to that demand (Newman, 2004). The Mobile Phone Theft Index proposed in this thesis seeks to utilise consumer pressure in order to stimulate the internalisation of phone theft costs.

Informing consumers

Consumer information programmes, such as indices and standards labelling are highly varied. Those which aim to stimulate consumer conscience are often initiated by pressure groups within the NGO sector. Some systems for informing consumers are listed below in Table 3.6.

Table 3.6: Common rating systems and standards labelling

- Secured by design (SBD) standard accreditation on housing, by local Architectural Liaison Officers.
- Eco-friendly labels on cleaning products (for example if they are fully biodegradable)
- RSPCA ‘Freedom food’ labels on food products (to show a minimum animal welfare standard has been met)
- Organic labels on food products (such as the EU green starred leaf emblem which shows the product meets EU organic criteria)
- ‘Traffic light’ labelling of supermarket produce to inform customers of the fat, calorie and salt content of foods.
- Michelin Stars, and AA ratings to indicate the quality of food outlets.
- ‘Fair Trade’ labels to indicate the nature of the profit trail of a product.
- EU Energy Rating systems detailing energy efficiency of white goods, other electronic goods and cars, ranked from A to G.
- Energy Performance Certificates (EPCs) detailing the energy efficiency and carbon footprint of a property, given to UK home purchasers before purchasing a new property.

- Film classification to indicate for which age range a film is suitable, according to the British Board of Film Classification.
- Feedback scores for individuals and companies on online trading websites, such as E-bay and Amazon.

Standards labels and rating systems give consumers useful information, but consumers have to make between-product comparisons themselves. Indices allow these comparisons to be made at a glance. That is why they are ideal for stimulating between-manufacturer competition. Table 3.7 below describes some common examples of index usage. It is not exhaustive, but does show the range of topics for which indices are used.

<u>Table 3.7: Some uses of Indices</u>

- Indices of levels of corruption: for example, the Corruption Perceptions Index (Transparency International, 2010)
- Indices of environmental pollution by geographic location: for example, Blacksmith Institute (2007)
- Indices of school performance: in the UK, this is achieved via league tables published by Department for Education. Similar indices exist for Universities.
- Indices of hospital and regional performance, on a variety of variables such as mortality rates, patient satisfaction and MRSA infection rates (published by the NHS)
- Indices ranking places of work according to staff satisfaction.
- Indices reflecting popularity through purchasing choices: for example music download charts.
- Indices reflecting popularity according to votes, ranging from local and national government election results to programmes such as 'TV's funniest moments'.
- Indices ranking products by theft risk: UK Car Theft Index, UK Bike Theft Index.

- Indices reflecting financial performance: for example the FTSE 100 Index and the Dow Jones Sustainability Index.

- Indices comparing countries on a range of variables including aid effectiveness; the nature of land use; education levels; malnutrition prevalence and mortality rates, all provided by the World Bank.

- Football and other sporting league tables, ranking the relative performance of teams within a sport.

- Indices produced by price comparison websites which rank suppliers of goods and services according to price.

- Product value and efficiency ranking via established consumer organisations such as Which? and Good House Keeping.

With so many sources of information already available to consumers, it is important to assess whether there is an appetite for product ranking based on security (Armitage and Pease, 2008b). Research carried out by Simon Learmount of Cambridge University (Learmount, 2005) indicated that consumers do not routinely consider crime risk when choosing electronic products, but that they inherently recognise that increased security can decrease opportunistic crime. It is arguable that consumers do not consider the theft risk of electronic products because they are unaware of the variance in risk according to purchase choice. Armitage and Pease (2008b) also raise the question of whether offenders consider security at the point of theft. This chapter concludes with a review of previous research into the choice structuring properties of crime targets. Much of the evidence was gathered by interviewing offenders. This review and the results from interviews with 40 mobile phone thieves, presented in Chapters 6 of this thesis, aims to answer Armitage and Pease's question and to inform designers about which factors thieves consider when selecting phone theft targets.

Previous research on target selection

Many of the earlier empirical assessments of the rational choice perspective were published as a collection edited by Cornish and Clarke (1986). The methodological limitations of these earlier works have, to some extent, been overcome as more refined methods for researching rational choice have developed (Bouffard et al, 2007). For example, allowing offenders to spontaneously list the factors which they consider when faced with hypothetical or real-world scenarios is an improvement on asking offenders to choose from a researcher-defined list of alternatives.

This section describes the main methodologies and their limitations, and summarises previous research on offender target selection. The literature reviewed is restricted to some of the crime types relevant to mobile phone theft (robbery, theft and burglary) and excludes interesting but less relevant explorations of rationality in offences such as child sexual abuse (Wortley and Smallbone, 2006) or aeroplane hijacking (Dugan et al., 2005). Studies which use only non-offender samples are omitted as a growing body of evidence suggests that non-offenders are poor replacements for offenders. Nee and Meenaghan (2006) summarise four studies on burglary which show how the responses of burglars to visual cues about target suitability cannot be accurately replicated by non-burgling offenders. They describe a sliding scale of sensitivity to visual cues concerning target suitability. Experienced offenders are at the top of this hierarchy, followed by novice offenders (with no experience of the crime type under study), then police officers, and with the general public at the bottom (Nee and Meenaghan, 2006). Put simply, it appears that non-offenders find it more difficult to 'think thief' than might be assumed.

Previous research on the rational choice perspective can be grouped into three main categories (Bouffard et al., 2008). Ethnographic interviews ask offenders about their past decision-making processes. In general these studies have shown that reward is the key focus, while risks and costs are sometimes ignored. Longitudinal studies have compared future offending behaviour with a snapshot of offenders' perceptions of risk, effort and reward at the time of the research interview. These have found some evidence that opportunities and rewards influence crime rates, but little support that formal or informal sanctions act as deterrents (Bouffard et al., 2008). Hypothetical offending questions aim to elicit perceptions of various consequences of crime commission. Curiously, Bouffard et al. (2008) state that hypothetical scenarios have been used in a large number of studies, but that offenders are rarely included in the samples. They appear to have omitted the studies of offender decision-making included in the edited collection of Clarke and Cornish, 1986, and the work of Nee and colleagues described below.

Methodological issues

Analysis of aggregate crime statistics

Information about offender choices can be inferred from victim statements and official crime records, but this method will always result in hypothetical explanations rather than offender stated evidence. For example, the Home Office used these sources to identify some of the salient features of street robbery events (Smith et al, 2003). Offender tactics followed repeated patterns, allowing the researchers to identify four commonly used event sequences, referred to as blitz, confrontation, con and snatch. Each tactic implied different decision-making processes: the con avoided physical violence or threat, whereas the blitz relied on sudden unannounced violence to overpower the victim. Tactics varied to some extent according to victim gender: confrontation and con robberies were more common among younger and male victims, and snatch robberies much more common among female victims. There is no way of assessing whether this variation was due to the unwillingness of some offenders to be more violent towards female victims, or because there was less need to be so frequently violent towards female victims. The best way to answer this question is, arguably, to ask offenders.

Hypothetical scenarios

Carroll and Weaver (1986) acknowledge two limitations of the hypothetical situation methodology. They may omit some of the features crucial to decision-making, and offenders might respond in a more causal way than when faced with real consequences. However, they argued that verbal protocols (i.e. ‘thinking aloud’) reveal those elements of the thought process which are described. Verbal protocols will not however reveal any processes which are automatic or subconscious and therefore unrecognised by the participant. Using a variety of hypothetical scenarios and varying the components in a systematic fashion helps to eliminate the potential that offenders only verbalise what the researcher is looking for. As mentioned above, allowing spontaneous description of the factors under consideration also minimises the risk of omitting key choice-structuring properties from research models.

Incarcerated offenders

Walsh (1986) described several shortcomings of using incarcerated offenders as a research sample. In addition to the fact that the sample represented incompetent offenders (they had been caught), there remained the risk of potential unresponsiveness of the subjects. He suggested that it was difficult for offenders to summarise verbally the often complex mental processes, and the many factors which interplay during a crime event; and that recall problems impacted descriptions of past behaviour. Walsh (1986) also suggested that offenders might display reticence in unveiling aspects of behaviour which they perceived to be ‘trade secrets’, and might employ deliberate deceit in order to alter the interviewers’ perception of them (for better or worse). He did however conclude that offenders remained the best source of information on offending behaviour:

> "Because offenders are the source of the crime it would seem absurd not to avail oneself of their versions of what they were doing and why" (Walsh, 1986:49)"

Indermaur (1996) compared the self-reported behaviours of a sample of incarcerated robbers with prosecution records and concluded that on aggregate, there was little difference between self-reported levels of violence and prosecution files because those offenders who 'minimised' their reports of violence cancelled out those who 'maximised' their reports. In his sample at least the net effects of deceit suggested by Walsh (1986) were minimal.

Robbery and 'street theft'

Feeney (1986) retrospectively interviewed 113 Californian robbers in order to establish evidence of motive and planning relative to the involvement model of Clarke and Cornish (1985); to establish evidence of offence specialisation and the effects of learning and experience on event decisions, which were relevant to Clarke and Cornish's continuance models; and to ascertain the robbers' opinions about weapons and violence as part of the crime event. The findings revealed that although 80 percent of robbers reported using a weapon, 30 percent of those who used guns either did not have the gun loaded or used a fake. This was because of the desire to minimise the risk of hurting victims, and the risks posed by increased probability and severity of punishment (Feeney, 1986). A fifth of robbers (20%) chose personal robbery victims because of convenience, and 15 percent were victimised because they appeared to have money. A further 15 percent of victims were chosen because a fast getaway was possible, or the crime was perceived as low risk due to some other factor. Feeney (1986) reported variation in motivation for robbery with age, but not with race. For example, younger robbers were more likely to cite peer pressure as an influence in their decision to rob than were older offenders. On aggregate, over half of the robbers stated they employed no planning, but any planning that did occur was frequently performed a few hours before the robbery event. The more careful planners (15%) reported repeating previously successful patterns in victim selection and event decisions, supporting the hypothesis of reinforced crime scripts (Cornish, 1994).

Walsh (1986) employed retrospective interviewing and hypothetical victim and target selection to assess the rationality of 69 robbers and 45 commercial burglars. Significant differences in the behaviour of the two groups were observed, underlining the need for crime-specificity in offender oriented research. Over half of the robbers (52%) stated that they planned their offences, usually a matter of days or weeks before the event. They chose their victims based on knowledge gained through work, through other people (a ‘knowledge economy’ existed where people exchanged drinks and money for tip offs), and personal observation and experience. The non-planners (called opportunists) stated that they used intuition to select victims. Nearly half of robbers were drunk at the time of their last offence, and perhaps not surprisingly accidents and mistakes were accepted as a normal part of offence commission. Walsh speculated that descriptions of hunches, intuition and luck were in fact the result of prior experience leading to increased familiarity and automatic mental processes. The more rational robbers who planned their offences were described as ‘flaw hunters’ who acted purposively to identify the Achilles heel in any situation, whereas those exhibiting less planning were not so determined to identify these ‘windows of vulnerability’ (Walsh, 1986).

Burglary

Bennett and Wright (1984, in Nee and Meenaghan, (2006)) conducted interviews with over 300 convicted burglars, and incorporated videos and photographs of a variety of properties. Their research was among the first to show empirically the sequential nature of burglars’ decision-making (Nee and Meenaghan, 2006). Decisions to burgle were often formed away from the scene of the crime, and motivated by financial need. Purposeful searching of potentially suitable target areas followed. Burglars paid attention to cues signifying occupancy, accessibility, ease of surveillance, and levels of security when identifying target dwellings. Similarly, Hearnden and Magill (2004) report that interviews with 82 convicted burglars in the UK revealed money, boredom and the influence of friends to be the key motivations for burglary, and that the majority of intentions to burgle were formed away from the burglary site. The key factor affecting target choice was the ‘likely yield’, which was inferred from cues about the occupants’ wealth. The effect of different structural aspects of buildings on decision-making varied between burglars: some were deterred from flats because of the absence of escape routes, while one offender preferred flats because once inside the main building, there were many possible targets (dwellings). Two-thirds of offenders reported repeat offending at the same property at least once; and half of these repeat offences were carried out within one month. Repeat burglaries were motivated by the knowledge that previously stolen goods had been replaced (some offenders looked out for cues such as packaging left out for recycling); the knowledge that valuable goods had been left during the first offence, and the perception that risk was minimised because the property was now familiar to the burglar. Over eighty percent of offenders who offered an opinion on deterrence stated that alarms, owner occupancy and the presence of CCTV acted as deterrents. Strong doors and window locks deterred just over half of offenders, while poster campaigns and property marking schemes deterred 18 and 25 percent respectively.

Research in the Republic of Ireland also concluded that burglars were sensitive to cues relating to layout, wealth, occupancy and security (Nee and Meenaghan, 2006). The combination of factors taken into consideration varied according to the situation, and target selection in general was highly habit-driven. Logie, Wright and Decker (1992) were among the earliest researchers to ask US burglars, in a real-world crime setting, about their target selection strategies once inside the dwelling. Many offenders followed ‘cognitive scripts’, reporting that they prioritised a search of the main bedroom and were looking for cash, guns and drugs and aimed to exit within 20 minutes. Nee and Meenaghan’s (2006) more recent work in Ireland produced similar findings to those of Logie et al. (1992), showing again the hierarchical and systematic decisions made during dwelling selection and during the search within dwellings.

Variation between expert and novice offenders

Carroll and Weaver (1986) asked 17 expert shoplifters and 17 novices to ‘think aloud’ as they walked around shopping malls. The verbal protocols of experts and novices were recorded by the researchers and later coded into phrases to allow analysis of the protocols. Clear differences emerged between expert and novice shoplifters. Experts spoke about shoplifting explicitly in 51 percent of their phrases, while none of the novices spontaneously did so. Experts noticed the presence or absence of cues, such as security mirrors on the walls, more frequently than novices, and weighed these cues up as part of a hierarchical decision-making process. Experts considered the broader situation (for example shop layout, or the presence of people watching) before focusing their attention on cues relating to specific items. Novices described fewer attributes of the wider situation. Some experts were adept at neutralising the deterrent effect of risk factors by describing how they could circumvent them, or by offsetting them with a facilitating factor. Novices mentioned guilt and were deterred by it more often than experts (10% vs. 2% respectively). Experts also showed evidence that familiarity with certain objects was a key factor in deciding which items to take. Novices did not exhibit this prior knowledge.

Experience also appears to increase the recognition of suitable cues when offenders work in groups. Hochstetler (2001) found that experienced robbers and burglars reported in interview that they could converge upon a suitable target with almost no conversation. Less motivated offenders were also ‘pushed’ in to offending more often by group influence than if they had been acting alone. Hochstetler (2001) argues that the effects of interactions within co-offending groups on criminal behaviour are under-researched.

Summary

This chapter has described key literature relating to responsibility for crime prevention, and how to incentivise the private sector to internalise crime costs. The example of the UK Car Theft Index (Laycock, 2004) provides evidence that security can be made a marketable commodity once the barrier to market production, i.e. public ignorance of crime risk, is removed. Some generalisations can be made about how the vehicle industry reacted to pressure to internalise the costs of vehicle accidents and vehicle thefts. Their responses included obstructionism and pre-regulatory activities, and a tendency to blame vehicle drivers rather than vehicle design (Karmen, 1981; Newman, 2004).

The goal of internalising crime costs by increasing public demand for security is based on the premise that offenders will alter their behaviour in response to increased product security. Therefore, it is imperative to assess which cues offenders use to choose targets. Previous research describing the decision-making processes of burglars and robbers shows that offenders appear to follow the models proposed by Clarke and Cornish (1985), by exhibiting purposeful behaviour and taking note of a variety of cues to make initial and event decisions (Carroll and Weaver, 1986; Walsh, 1986; Logie et al., 1992; Indermaur, 1996; Nee and Meenaghan, 2006). Increased experience in offending leads to quicker and more automatic decisions (Carroll and Weaver, 1986; Hochstetler, 2001). The absence of offending experience is one reason why non-offenders appear to be poor substitutes for offenders in research which aims to identify the criminogenic potential and security features of new products (Nee and Meenaghan, 2006).

Discussion

The absence of the UK Car Theft Index

The Car Theft Index has not been made publicly available by the Home Office since the 2006 iteration. It is important for criminologists and policy makers to determine why this has occurred, and it is imperative to measure whether the rate of vehicle security innovation has altered in response to the removal of the Index. When security innovation stalls, the methods to overcome existing security improve and become more widely known among offenders, who then gain an advantage in the designer-offender arms race (Ekblom, 2005). If the Car Theft Index has made security an inherent aspect of vehicle design, it may be safe to stop Index production, because security innovation will continue. If Index production has stopped because of a lack of government or police resources, there is a risk that innovation will stall. Measuring what happens next, and unpicking the reasons why, will have important implications for vehicle security in the UK and more generally for lessons in how best to use indices as information programmes to incentivise innovation.

Crime as pollution

In economic terms, pollution which increases the prevalence of suitable victims can be seen as increasing the supply of crime opportunities (Farrell and Roman, 2006). The corollary is that pollution which increases the supply of offenders increases the demand for crime opportunities. It might be that in the future, as consideration of crime as pollution is developed further, it is necessary to differentiate between crime pollution causing increased supply and pollution causing increased demand. Differentiation would be necessary because these types of pollution will require different solutions.

A tentative typology for crime pollution is presented below in Figure 3.4. It is tentative because there will doubtless exist goods and services whose by-products overlap the three suggested categories. However the typology is presented here as a starting point for future consideration of the types of crime pollution which exist, the definition of which would enable future empirical assessment of whether any of the three types respond more favourably to certain types of control instrument than others. For example, the UK Car Theft Index shows that pollution caused by increased supply of targets (cars) can be decreased by a public information market-barrier removal instrument. It is difficult to imagine how a similar instrument could affect pollution caused by alcohol sales, which falls under the category of facilitator pollution.

As Felson and Clarke (2003) argue in their reply to Wortley (2001), opportunity is by far the most important factor affecting crime rates. It may be that the most useful role of the suggested typology or any subsequent typology of pollution will be to focus attention only on pollution which affects crime opportunities, since preventive mechanisms focused here will have the best chance of the greatest net decrease in social harm.

Figure 3.4: A proposed typology of crime pollution: Pollution via opportunities, precipitators and facilitators

1) Opportunity production: the production of a good or service results in an increase of suitable targets; incapable guardians; and/ or suitable times and places to commit crimes. Targets can be broken down into products and victims.

2) Facilitator production: the production of a good or service results in an increase in crime facilitators, such as alcohol or guns (Clarke, 1992).

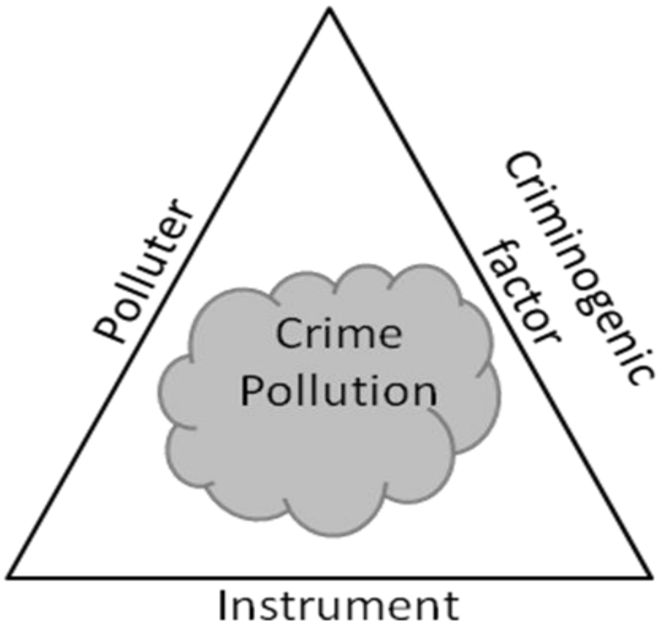
3) Precipitator production: the delivery of a good or service results in an increase in crime precipitators, such as when high temperatures in prison increase the frequency of violent incidents (Wortley, 2008).

A new proposal: the three aspects necessary for a polluting situation to occur.

It is possible to generalise about the conditions which give rise to crime as a form of pollution (Roman and Farrell, 2002 and Farrell and Roman, 2006). Routine activity theory defines the three elements necessary for a crime event to occur as being a motivated offender, a suitable target and the absence of a capable guardian (Cohen and Felson, 1979). The absence of any of the three prevents the crime event.

Figure 3.5 below respectfully attempts to mirror the original crime triangle (Felson, 2002) to define the three elements necessary for a polluting situation to arise. This diagram visualises Roman and Farrell's (2006) thesis, but draws parallels with Felson's (2002) crime triangle and the language used to describe the three elements necessary for a crime event to occur. Crime pollution occurs when a polluter produces a criminogenic factor (opportunity, facilitator or precipitator) in the absence of an effective pollution control instrument.

Figure 3.5: The three elements necessary to cause crime pollution



The schematic presented in Figure 3.5 may be a tidy way of summarising the macro level situation, but it is of limited use other than to identify the key actors in the polluting opportunity. Farrell and Roman (2006) propose that polluters can be identified by asking 'Who benefits?'. The schematic is not helpful for, nor is it intended to determine, how to affect the level of pollution.

Pollution control is only possible following identification of the polluter and the specific role of the polluting good or service in increasing crime rates.

Chapter 4. The UK mobile industry, theft levels and theft responses to 2008

Introduction

This chapter describes the context within which interviews with mobile phone thieves were conducted, and the Mobile Phone Theft Index was developed. It is essentially a summary of background research. Firstly a description of the UK mobile phone industry, dominated by a small number of manufacturers and network operators, shows how the industry can easily act in concert to either enable or block crime reduction initiatives. Secondly, examining the nature, extent and cost of mobile phone theft in the UK provides evidence of the need for more effective crime prevention efforts than have been achieved to date. The chapter concludes with a section describing the progress made up to 2008 in the UK towards combating mobile phone theft. Some of the literature is now slightly out of date but to the author's knowledge, there has been no significant progress in combating mobile phone theft since this initial research was carried out. Some of the research presented was published as Mailley et al. (2006a). Most government activity to date has aimed to increase law enforcement capability, and to prevent thefts by encouraging industry to block (blacklist) stolen phones. In parallel with the history of car safety and security, evidence is presented here of the competing interests between government and industry, and of Newman's (2004) industry obstructionism and pre-regulation initiatives. For at least three years (between 2008 and 2011) it appears that industry has maintained the status quo where do they do the minimum to avoid regulation and resist any calls for them to take on responsibility for the criminogenic properties of their goods. Professor Graham Farrell was invited to talk to the Home Office in early 2011 about how to decrease phone theft and other crimes associated with electronic goods. It seems that the production of a Mobile Phone Theft Index, backed by the detailed research from offender interviews, is needed more than ever to bypass the current situation where industry continues to pollute and the government appear unable to break their resolve.

The UK mobile industry and market.

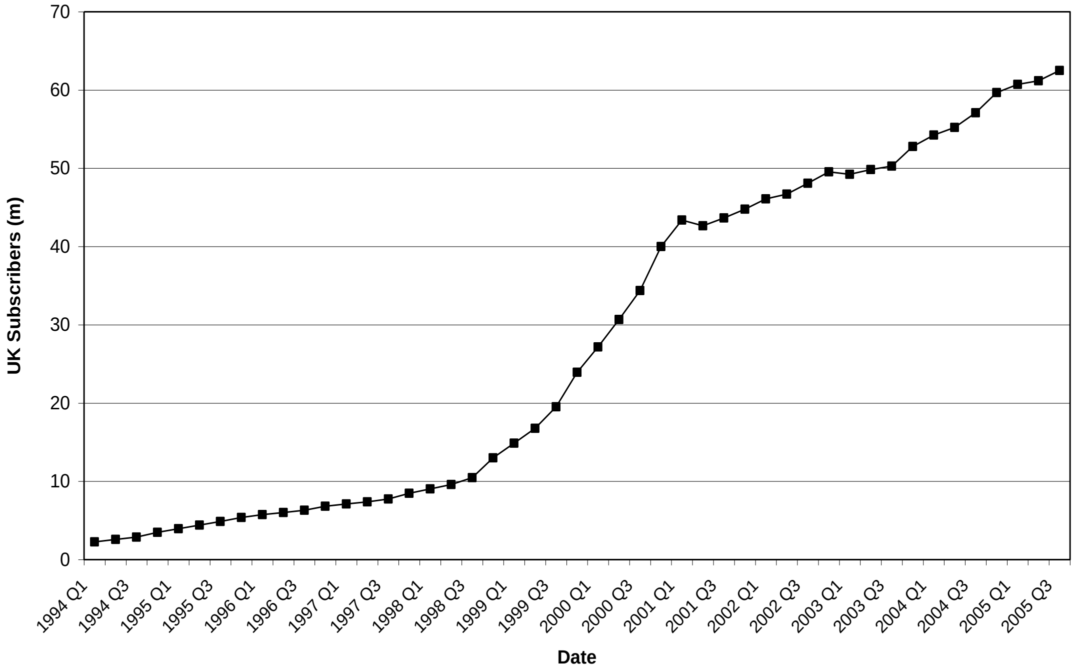
The research presented in this thesis is UK specific. However, it is noteworthy that most mobile manufacturers and some network operators are global enterprises who will tend to resist manufacturing changes which may be demanded in one country but not another (Saraga, 2008). Their global dominance also brings power and influence. For example Nokia manufactured 40 percent of all handsets sold globally in 2008 (Tech.co.uk, 2008). The UK is an established market, in that the majority of people already own a mobile phone and sales are therefore based on replacements or upgrades by existing customers, rather than attracting brand new customers (Mintel, 2007a). So called ‘emerging markets’ where a lower proportion of the population own a mobile handset include India, China and Africa (see Mintel, 2007b, and Tech.co.uk, 2008)

***Mobile connections in the UK*.**

Data on the number of mobile connections in the UK were available from a variety of key sources. This section describes these sources and compares their estimates of trends in UK mobile phone ownership.

The UK telecommunications regulator Ofcom publishes statistics describing key aspects of the UK mobile phone industry (for example see Ofcom, 2007b). A search of the various reports revealed there was no single source which detailed the yearly estimated number of mobile connections in the UK. Therefore a Freedom of Information request, FOI 2664892, was emailed in April 2006 which resulted in the return of an unpublished Excel spreadsheet (Ofcom, 2006a) detailing the estimated number of UK mobile subscribers between 1994 and 2006. Figure 4.1 plots these data and shows a gradual increase in subscriptions between 1994 and 1998, followed by a more rapid increase beginning in early 1999 and continuing to 2005.

Figure 4.1: Ofcom Count of UK Mobile Subscriptions between 1994 and 2005.

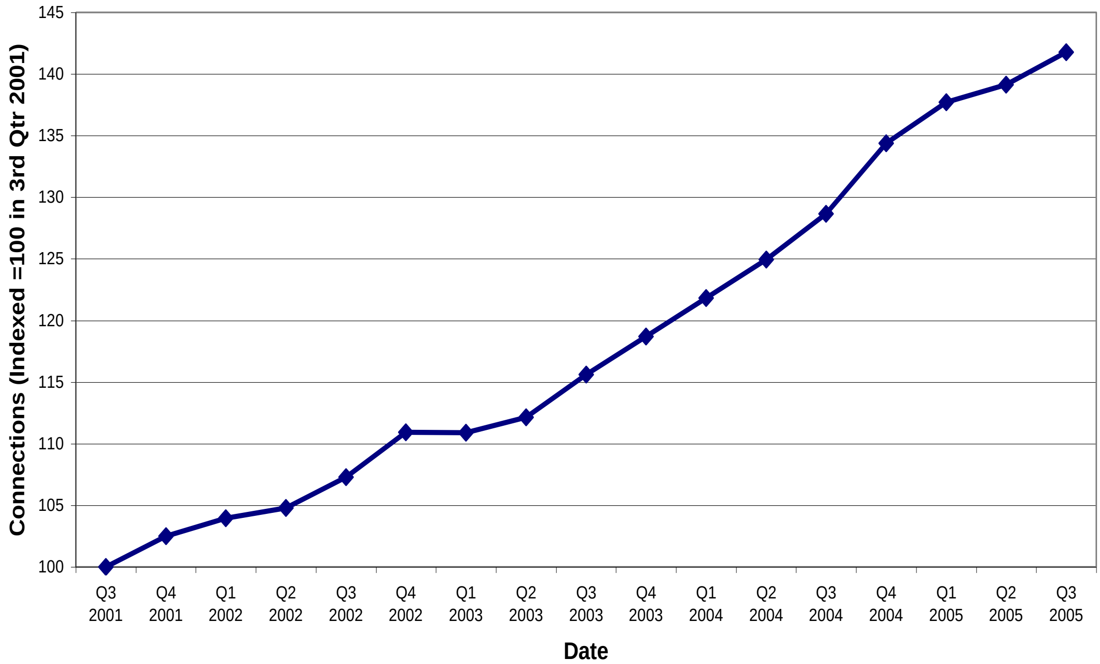


Source: Ofcom (2006a)

The methodology used by Ofcom was not specified in the FOI response, and so a complementary data source was sought. The GSMA (Groupe Speciale Mobile Association) host in the UK a database called the Shared Equipment Identity Register or SEIR, which records the unique identifier or IMEI of each handset active on UK networks. The functionality of IMEIs and their role in crime prevention are discussed below.

The GSMA were approached in March 2006 via personal correspondence and subsequently provided SEIR-based data describing the number of individual phones connecting to the SEIR between 2001 and 2005. The number of GSMA counted mobile connections are shown below in Figure 4.2. Data are indexed to Q3 in 2001, and reveal a steep rise in connections between 2001 and 2005. The SEIR cannot differentiate between the handsets of tourists and of UK residents meaning there will be an inflation of SEIR based numbers, accounted for by tourists' handsets. However, the steep rise in connections coincides with that evidenced in Figure 4.1 above based on Ofcom data.

Figure 4.2: UK Mobile Phone Connections Between 2001 and 2005 (Indexed to Q3 of 2001)



Source: Moran (2006) via personal correspondence to the author.

Other sources of data on mobile ownership in the UK include surveys such as the British Crime Survey and the General Household Survey which both estimate levels of UK mobile ownership. The numbers suggested by the British Crime Survey, Ofcom and the General Household survey are similar (Hoare, 2007). Mintel are an established market research company who also regularly produce specialist reports on the telecommunications industry (see for example Mintel, 2007a and b). Mintel estimated the number of UK subscribers in 2007 to be 69.7 million (Mintel, 2007a). This estimate is not incompatible with Ofcom figures of 65 million in 2005, if the trend of increasing subscriptions continued to 2007.

Mobiles per person

Between 2001 and 2005 UK mobile ownership rose from 77 percent market saturation to 108 percent, and saturation levels of 116 percent were reported for 2006 (Ofcom, 2007b) That is, since the mid 'noughties' there were more mobile phones than people in the UK. However this does not mean that every person in the UK owned a mobile phone: ownership was skewed towards younger people.

Demographics of UK mobile phone owners

According to the 2005/06 British Crime Survey mobile phone ownership was similar in both male and female UK occupants: 74 percent of males and 73 percent of females of all ages owned a mobile phone (Hoare, 2007). Table 4.1 below is reproduced from Hoare (2007) and demonstrates the young age bias of mobile phone ownership. Only 4 percent of sixteen to twenty four year olds did not own a mobile phone. In contrast, nearly forty percent of people aged over 65 did not own a mobile. The figures are in agreement with demographics of mobile owners published elsewhere. For example Mintel (2007b) reported that in 2006, forty two percent of over 65s did not own a mobile.

Table 4.1: Mobile ownership in different age groups, 2005/06 BCS data.

Age group	**Percent owning mobiles**
0 - 7	2
8 – 11	39
Dec-15	84
16 – 24	96
25 – 34	95
35 – 44	94
45 – 54	90
55 – 64	81
65 – 74	62
75+	35
Average	74

Source: Hoare (2007, Table 2.2).

Industry domination by key manufacturers and operators

Manufacturers

Within the UK market, handset manufacture is dominated by Nokia, Sony Ericsson, Samsung, Motorola, and more recently LG (Mintel, 2007a). Table 4.2 below shows the percentage UK market share for each manufacturer in 2002, 2004 and 2006. In no year does the percentage of the market share accounted for by the top five manufacturers combined fall below 73 percent. On one hand the domination of both the manufacturing markets and network operator markets by a small number of companies poses a challenge to crime prevention. Bonded together under the umbrellas of the GSMA and MICAF (the Mobile Industry Crime Action Forum) specifically, these companies effectively form a monopoly. The roles of MICAF and the GSMA in the history of preventing mobile phone theft in the UK are described later in this chapter.

Table 4.2: Estimated share of UK handset sales by manufacturer in 2002, 2004 and 2006.

	Share of UK sales (%)		
Manufacturer	**2002 (n=14.28m)**	**2004 (n=18.08m)**	**2006 (n=21.47m)**
Nokia	52	41	30
Siemens	11	10	*
Sony Ericsson	10	12	28
Samsung	9	10	23
Motorola	8	9	8
LG	*	4	5
Others	10	14	6
Total	100	100	100

* see Other.

Source: Mintel (2007a, Figure 22).

Network Operators

The key UK network operators are O2, Orange, Vodafone, T-mobile, and to a lesser extent Virgin Mobile, Tesco and most recently 3 or Hutchinson 3G (Mintel, 2007b). Table 4.3 below shows the UK network operator market share for 2002, 2004 and 2006 and clearly demonstrates the continued UK market domination by O2, Orange, Vodafone and T-Mobile.

Table 4.3: Network Operators' Market Share for 2002, 2004 and 2006.

	Market share of subscribers (%)		
Operator	**2002 (n= 49.6m)**	**2004 (n= 59.7m)**	**2006 (n= 69.7m)**
O2	24	24	25
Orange	27	24	22
Vodafone	26	23	21
T-Mobile	18	16	16
Virgin Mobile	5	8	8
3	-	4	5
Tesco	-	1	2
Other	-	-	1
Total	100	100	100

Source: Mintel (2007a, Figure 23).

Value of the UK mobile industry

Data supplied by the Department of Trade and Industry indicated that for the financial year 1998-99 the UK network operators had an estimated combined turnover of £5.8 billion (Conway and Morgan, 2001: 17). The total turnover generated by UK operators in 2005 was estimated to be £12.1 billion[1] (Ofcom, 2006b).

The total value of revenue generated during 2007 by UK mobile handset sales, subscriptions and call costs was predicted to exceed £14.5 billion (Mintel, 2007a). This represents a 67 percent increase in revenue compared to 2002 (Mintel, 2007a). These figures are in general agreement with figures published by Ofcom, where the UK's total mobile retail revenue was valued in 2006 to be £13.9 billion (Ofcom, 2007b). Mintel estimated that over 23 million handsets would be sold in the UK in 2007. Sales of mobile handsets alone during 2007, excluding accessories such as hands-free kits, holders and phone faces, and excluding call and text revenues, were estimated to be worth £1.38 billion (Mintel, 2007a).

In 2007 Nokia reported global post-tax profits of nearly 7000 million Euros (6746 million Euros) (Nokia, 2007a). Assuming a conversion rate of 0.8 Euros to one British pound, this equates to over 8400 million pounds sterling (£8432.5 million) profit. It is clear that there are considerable sums of money available every year for investment in crime-prevention measures if the will exists.

Key personal contacts within the mobile phone industry

During this research communication was established with key personnel from the mobile phone industry and associated organisations. This section describes these key contacts within the context of their company or organisation, since the personal correspondence from many of them form substantive sources. Furthermore, because of the monopolies formed by the largest manufacturers and operators, specific beliefs held by some key industry personnel can be pinpointed as crucial hurdles to effective crime prevention interventions.

[1] Figure based on multiplication by four of the mean turnover from Q1 thru Q3 2005. If turnover altered dramatically in Q4 2005 this estimate will be inaccurate.

GSM Association

In 1982 the Group Speciale Mobile (GSM) was formed to design and standardise the technology used by the telecoms industry across Europe. The GSM Association evolved from GSM in 1987, and now functions as a global trade organisation. The GSMA represents over 700 GSM mobile phone operators, which account for over 82 percent of the world's mobile phone customers (GSMA, 2007a and 2007b).

Personal correspondence was exchanged with James Moran, Director of Fraud and Security at the GSMA. A meeting was initially held with James at GSMA's headquarters in Dublin, where James outlined the history of using IMEIs to individually identify handsets, and the processes in place to increase the security and validity of IMEIs.

ETSI

The European Telecommunications Standards Institute, ETSI, is the official European Commission Standards Organisation for Information and Communications Technologies (ICT). ICT includes fixed, mobile and radio telecommunications technologies as well as broadcasting and internet technologies (ETSI, 2008a). The Standards developed by ETSI include the globally used GSM (Global System for Mobile communications) standard, which defines the technologies upon which mobile phone networks operate (ETSI, 2008b). The contact made within ETSI was Charles Brookson, an ex BT engineer, active ETSI Board Member, and employee of the UK's Department of Trade and Industry (now renamed as BERR, the Department for Business, Enterprise and Regulatory Reform).

MICAF

The UK's Mobile Industry Crime Action Forum, MICAF, represents the mobile manufacturers, some network operators and main retail outlets on matters relating to criminality and mobile phones. In 2005 the MICAF website described MICAF's mission to represent mobile phone manufacturers and some operators when addressing matters concerning phone security. It did not specifically mention lowering criminality associated with phones as an aim. Following the publication of some of the results from this research, and conversations with the Home Office, MICAF's web page in 2008 read:

> "An organisation set up by the UK telecommunications industry, including mobile handset manufacturers, to address the issues of mobile phone theft. The Forum meets regularly to exchange information and agree crime prevention strategies to reduce mobile phone theft and associated activity in the United Kingdom." (MICAF, 2008).

Clearly full credit for this change can not directly be associated with the research described here. However it is likely that the change was in part made in response to a growing call for more responsible actions, of which Loughborough's publications formed a substantive part.

The main contact made within MICAF was the chairman, Jack Wraith. He stated publicly that mobile phone thieves are non-discerning and that all phone models were at similar risk of theft (see Mailley and Farrell, 2007). This view is at odds with the rational choice perspective (Cornish and Clarke, 1986) and is proved false by the research presented in Chapters 5 and 6. Some of the statements made by Mr Wraith in response to media and government calls to internalise some of the costs of phone theft pollution are described later in this chapter.

The extent and nature of mobile phone theft

The following section describes the nature and extent of mobile phone theft in the UK. The section describes in detail the most comprehensive assessment of phone theft, conducted by Harrington and Mayhew (2001) for the UK Home Office. Their research is then compared with data provided by the UK's dedicated mobile phone theft police unit, the National Mobile Phone Crime Unit, and with more recent Home Office research. The section concludes by presenting estimates of the cost of mobile phone theft to the UK economy.

The extent of mobile phone theft in the UK.

Mobile phones were causing a crime wave as far back as 1995. The Parliamentary Office of Science and Technology (POST, 1995) summarises the main crimes associated with analogue mobile phones as being theft from both the person and from warehouses; cloning and re-chipping (copying and altering the phone's unique identifying number, the IMEI); and subscription fraud, where a false personal identity is given by the subscriber to avoid payment of bills. At this time alterating the unique identifier on a phone, the IMEI, was not illegal. Theft levels were estimated at between 12 to 15 thousand analogue phones a month, on top of a potential 1000 digital phone thefts a month (POST, 1995). This figure pales into insignificance when compared to what was to come.

In 2001 Harrington and Mayhew published a seminal piece of work estimating national phone thefts to be in the order of 710 thousand, representing two percent of phone owners. Their research presented a thorough assessment of the nature and extent of phone theft, and warrants some detailed description.

Data from police records, the British Crime Survey (BCS) and from two self-report surveys were combined to estimate national theft levels. The BCS annually surveys a representative sample of adults over age 16 residing within England and Wales. Inclusion of results from the BCS helped adjust crime figures for under-reporting to police, by those over 16. The two self-report surveys aimed to assess the extent of thefts within younger age groups whose victimisation would not usually be recorded by police (Harrington and Mayhew, 2001).

BCS results

Results from the 2001 BCS suggested that on average phone thefts and attempts were suffered at a rate of 1.1 incidents per 100 adult UK residents or 2.1 incidents per 100 mobile owners (Harrington and Mayhew, 2001: 6).

The 2001 BCS incident rates were extrapolated to the estimated adult population of England and Wales in 2000, resulting in an estimated annual theft number of 470 thousand. This is likely to be an underestimation because the BCS did not at the time of the 2001 sweep ask about victimisation of persons under 16, nor record commercial offences (Harrington and Mayhew, 2001). Furthermore, the BCS estimates were artificially restricted to allow only a maximum of five offences in a series to be recorded against each victim (Farrell and Pease, 2007).

Incidence rates express the average number of crimes (incidents) per 100 population. However, crime is concentrated on a small proportion of victims because a small proportion of victims are repeatedly victimised. Farrell (1992) showed that 70 percent of all incidents reported in the 1982 BCS were suffered by 14 percent of respondents. Such repeat victimisation is consistent across many crime types (Farrell and Pease, 2008).

Prevalence rates describe the number of people victimised once or more in a population. Harrington and Mayhew reported that the prevalence rate from the 2001 BCS respondents was 1 percent if all BCS respondents were considered, or 2 percent if only mobile owners were considered. The incidence rate of 2.1 thefts per 100 owners compared to the slightly lower prevalence rate (of 2 victims per 100 owners) suggests an element of repeat victimisation. This figure would probably change again if the absolute number of offences were recorded by the BCS, instead of capping the number of offences in a series at five. Farrell and Pease (2007) calculated that in the 2005-06 BCS, capping the number of repeat victimisations of robbery underestimated actual offence numbers by 7.2 percent, and underestimated mugging by 5.8 percent.

The 'On Track' survey

During June and July 2001 fifteen thousand 11 to 15 yr olds in schools in England and Wales were interviewed as part of the Crime Reduction Programme. The schools selected were all in highly deprived areas, and so were likely to report higher victimisation rates than the national school average (Harrington and Mayhew, 2001). The incident rate for all types of phone theft in the sampled schools was 16 per 100 respondents, with one quarter of victims being victimised more than once, giving a prevalence rate of all respondents of 11.9 percent (Harrington and Mayhew, 2001).

The nature of theft circumstances was not recorded directly by the On Track survey. However proxy measures of theft and robbery were developed: Fourteen percent of school aged victims reported their handset was in use when it was taken. Harrington and Mayhew (2001) asserted that a theft of this sort would probably be recorded as a robbery in recorded police figures (for adults). It is interesting to note that such behaviour might be colloquially termed 'bullying' when observed in the context of a school setting, but robbery when considering adults. The Home Office guide to the police for crime recording defines robbery is:

> "The use or threat of force in a theft from the person should be recorded as a robbery. For example, if the victim or a third part offers any resistance, or if anyone is assaulted in any way, then this constitutes force. Similarly, if a victim is under any impression from the offender's words or actions that the offender may use force, then this constitutes threat of force." (Home Office, 2004a.)

Harrington and Mayhew (2001) reported that twenty eight percent of On Track respondents' phones were taken while in their possession (that is on the person, such as being in a pocket or bag). Offences where the phone was in a person's possession but not in use might well represent the equivalent of the recordable offence 'Theft from the person'. (Harrington and Mayhew, 2001).

The 'proxy theft rate' of six per 100 On Track respondents was much higher than the rate of 0.23 thefts or robbery incidents per 100 adults estimated by the BCS. Bearing in mind the potential inaccuracies from sample bias and from participant exaggeration, the total number of UK mobile phone thefts among children predicted by the On Track survey was 550 thousand (Harrington and Mayhew, 2001: 7).

The MORI survey

In 2001 the Youth Justice Board carried out a survey via MORI which asked about general phone theft victimisation of just over five thousand 11 to 16 yr olds. The sample was smaller but more representative than the On Track survey (Harrington and Mayhew, 2001). The prevalence rate was five victims per 100 respondents. The equivalent prevalence rate for comparison from the On Track survey was 11.9 percent; for the BCS it was 1 percent. Clearly rates would be higher if only phone owners were considered but the MORI survey did not ask about ownership, and so these comparisons can not be made.

The MORI survey did not ask about the nature of incidents and so comparisons can not be made between rates of offence types between the BCS and On Track survey. Combined, the MORI and On Track surveys strongly suggested that in 2000 children were more often targeted as phone theft victims than adults, and that repeat victimisation among children was higher than among adults (Harrington and Mayhew, 2001).

Police records

Harrington and Mayhew (2001) also examined the records of all incidents where a mobile phone was taken within six police forces. Using weights to account for force size and level of urbanisation, the estimated number of police records in England and Wales of a mobile phone theft or attempted theft was 330 000 (Harrington and Mayhew, 2001). This will be an underestimate due to underreporting to police. Hoare (2007: 22) states that in every BCS sweep since 2001/02, only approximately half of phone theft victims reported the incident to the police.

Combining the results from BCS, On Track, MORI and Police data

Harrington and Mayhew (2001) combined the survey results to estimate the number of UK phone thefts within victims aged 11 years and upwards to be 710 000. Less weighting was given to the On Track survey compared to the more representative MORI survey. The police data were extrapolated to all of England and Wales, resulting in an estimate of 330 000 recorded phone thefts and attempted thefts within the adult population. This estimate was recognised as an underestimate due to the proportion of offences not reported to the police.

The nature of phone thefts in the UK

Phone unattended

Approximately two thirds of phone thefts recorded in the 2000 and 2001 BCS combined occurred when the phone was left unattended. One third of stolen phones were taken in offences classified as ‘Other theft’, and one third in thefts from the vehicle. (Harrington and Mayhew, 2001). The Home Office Counting Rules define Other Theft as a theft where the offence can not be categorised as robbery, theft of personal property, theft of or from a motor vehicle or pedal cycle (Home Office, 2004c). In reality this means offences where a phone is taken when the victim is not present. Similarly, theft from a vehicle tends to occur in the absence of the car owner. More recent evidence from the 2005/06 BCS reveals that this trend continued, with 69 percent of phone thefts reported to the BCS occurring while the phone was unattended (Hoare, 2007).

Offence type

BCS data suggested that in 2000 the more violent and headline grabbing offences of robbery and theft from the person accounted for only four and 15 percent of phone losses respectively. Much more common were Other thefts, thefts from vehicles (accounting for 29 percent of thefts), and thefts occurring during burglaries of dwellings, accounting for 20 percent of phone losses

(Harrington and Mayhew, 2001). However, the number of victims within each offence category was small, and so extrapolation to the national level should be treated with caution (Harrington and Mayhew, 2001). It is likely that trends were captured –that is, that the fewest phones were taken during robberies during 2000 and the most in Other thefts and thefts from vehicles- but possible that exact proportions were not.

Phone thefts drove a rise in street crime

Estimates of the number of thefts accounted for by crime type gave insight into how phones were being stolen. Harington and Mayhew (2001) presented evidence suggesting that in 20001 mobile phones were fuelling an observed rise in street crime, i.e. theft from the person and robbery. All figures were based on police recorded data.

Firstly, the proportion of robberies involving mobiles had increased from eight percent in 1998/99 to 28 percent in 2000/01. Furthermore, the proportion of thefts from the person involving a mobile had risen from 15 percent to 33 percent (Harrington and Mayhew, 2001).

Secondly a comparison of the proportion of offence types involving phones across forces revealed that robbery in city centres was more likely to involve a phone than robbery throughout the force as a whole (Harrington and Mayhew, 2001). These results could have been due to a higher availability of phones as targets in city centres than across the force as a whole, or because offenders targeting phones congregated in city centres.

Thirdly, police recorded data showed that the increase in robberies where a phone was taken was much greater than the increase in robbery of all types.

Finally, considering offences where the phone was the only item taken, ‘phone only’ robberies increased more than ‘phone and other item’ robberies (Harrington and Mayhew, 2001). Together the results imply that mobiles were responsible for a rise in the number of ‘acquisitive street crime’, and are not linearly correlated to the rising numbers of phones in circulation (Harrington and Mayhew, 2001).

Offenders and victims

In 2000, mobile phone thieves tended to be young males working in groups. A third of those accused of phone thefts were between 15 and 16 yrs old, and more than two thirds of phone robberies involved more than one offender.

Victims tended to be younger than for other types of robbery, with nearly half being under 18 yrs old, and ages 15 to 16 accounting for the largest proportion of any age group (Harrington and Mayhew, 2001). These patterns remained roughly consistent over time (Allen et al., 2005). Owners from Black and Ethnic minorities, and living in poor areas with high levels of deprivation were also at higher risk than other ethnic groups, and than those in more affluent areas (Allen et al. 2005: 22).

Comparison with more recent research

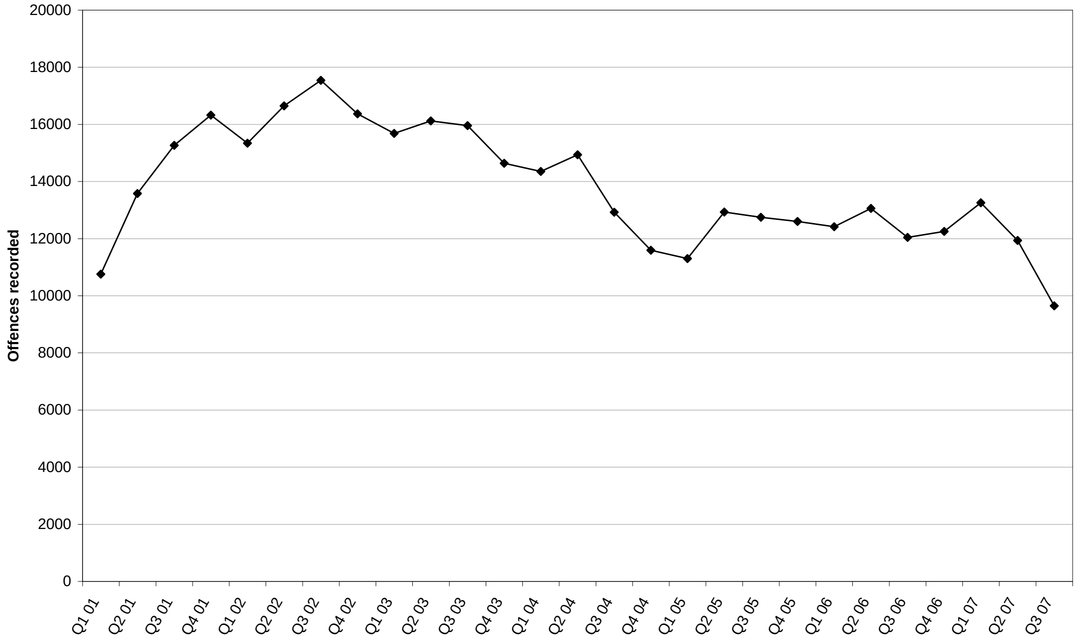
More recent Home Office research sought to assess trends in the nature and extent of phone thefts over time using the BCS complemented by other sources. Allen et al. (2005) analysed answers to the 2002/03 BCS and from the 2003 Offending, Crime and Justice Survey. The prevalence rate of mobile thefts rose from 2 percent in the 2000 BCS to 6.9 percent in the 20002/03 survey. Women were significantly more likely to be victims of phone theft than men, and of theft from the person in general (Allen et al., 2005). This may be due to usage patterns, and specifically storing phones more frequently in bags than males, as discussed in Chapter 3 of this thesis.

In accordance with Harrington and Mayhew's initial findings, the majority of phone thefts reported to the 2002/03 BCS occurred when the phone was not being carried, for example being left on a table or left in a bag. These unattended phones accounted for nearly three quarters (72 percent) of thefts. Sixteen percent of incidents occurred while the phone was on the person but not visible; while 6 percent occurred while the mobile was on the person and visible (Allen et al., 2005).

NMPCU data

More recent evidence from NMPCU showed that by 2007 the numbers of mobile thefts were decreasing to levels similar to those of 2001 (Higgins, 2007). Figure 4.3 below visualises this trend. However the issue of mobile phone theft still warrants attention from researchers and from policy makers. Even these decreasing figures still represent many thousands of thefts nationally. Furthermore, the reasons for the decrease in thefts are not understood, meaning that crime prevention lessons for other similar theft issues cannot be re-applied. Future research should seek to assess which proportions of the decline can be attributable to increased blacklisting of IMEIs. This would require data describing changes in blacklisting efficiency.

Figure 4.3 Total Metropolitan Police Recorded Mobile-Only Thefts Between Q1 2001 and Q3 2007.



(Source: Higgins, 2007)

Motivations for phone theft

Clarke and Harris (1992) showed how different motivations for car thefts resulted in differential targeting strategies. An equivalent definition of the various motivations for mobile phone theft is necessary in order to assess which crime prevention interventions are most likely to be effective. However, there exists very little empirical evidence describing the motivations for mobile thefts. Conversations with intelligence analysts from the NMPCU led to the following conclusions:

1) That the majority of phone thefts are motivated by the profit of resale in the UK and the reward of personal use by the thieves, but the proportions of thefts driven by these motivations are not known

2) That some thefts are motivated by sale of the phone abroad, and numbers of this offence type are thought to be growing but difficult to estimate. One difficulty is the need to cooperate with HM Revenue and Customs to quantify illegal export volumes at ports in sting

operations, which requires more resources than are available to the NMPCU.

3) That offences where phones were taken as part of bullying behaviour in schools form a significant and under-reported aspect of phone theft, but that numbers or proportions are not known.

False claims and under-reporting of mobile thefts.

Conversations with industry experts and police early on in the research reported in this thesis revealed a common perception that many phone thefts reported to the police and to insurance companies were false. Some phones were allegedly lost but reported as stolen in order to be eligible for insurance claims; others were (allegedly) deliberately sold or passed on and a free upgrade obtained through the false claim process. Industry used the 'false claim' argument (that thefts were not as high as implied by police figures) to downplay the need for crime prevention interventions. It was surprising to hear experienced police officers assuming this view to be correct, while there appeared to be little empirical evidence to support the 'paradigm'.

Although it is difficult to assess the true nature of the extent of false claims, it is important to try to gauge their impact. Evidence is presented below which estimates that false claims account for only between 10 and 20 percent of police recorded thefts.

Experienced officers at NMPCU estimated false claim levels to be in the order of five to 25 percent (Tilley et al., 2004). Forensic Pathways, a company analysing data provided by the UK's insurance industry, estimated that as many as seventeen percent of all insurance claims might be false, although some of these seventeen percent may have been duplicate cases (Leary, 2005). Other sources imply a lower level of false claims: an analysis of NMPCU data from March 2003 to February 2004 revealed that only 0.4 percent of offences reported to NMPCU were retrospectively labelled as 'wasting police time', and that only 7 percent were retrospectively recorded as 'no crimes' (Tilley et al., 2004). A record is 'no crimed' if information shedding significant doubt on the validity of the allegation is received after the offence is recorded.

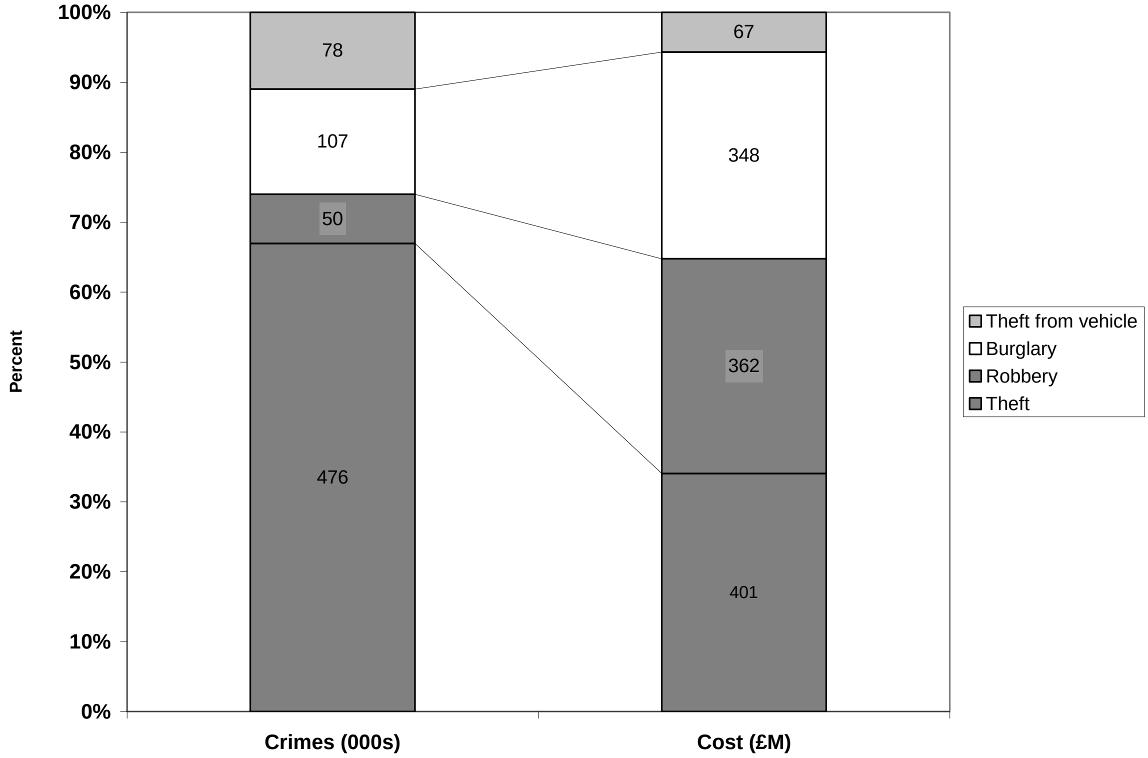
Even if the higher estimate of around twenty percent, based on Tilley et al. (2004) were considered, this is more than likely countered by under-reporting of offences to the police. According to the British Crime Survey 46 percent of mobile phone thefts suffered in the year prior to the 2002/03 BCS were not reported to the police (Allen et al. 2005: 24). Under-recording by the police would confound this effect. Therefore any claims made by industry that false claims distort police figures to any great extent are not supported by the empirical evidence.

The cost of mobile phone theft

The annual cost of mobile phone theft to the UK has been estimated conservatively at £1.2 billion (Mailley and Farrell, 2006). This estimate is described as conservative for two reasons: a likely underestimation of crime numbers, which has been described above, and a possible underestimation in the true cost of crime.

The methodology for estimating theft cost utilised Harrington and Mayhew's (2001) estimate of 710 000 annual thefts. The cost estimates used were sourced from Dubourg and Hamed (2005) who estimated a robbery cost £7281, theft £844, burglary £3268 and theft from motor vehicle £858. The proportions of offence types within the assumed 710 000 thefts was taken from 2005 theft data provided to the research team by Leicestershire police, because this was more up to date than Harrington and Mayhew's estimates of offence proportions. Figure 4.4 below shows the proportions of offences and the associated estimated costs.

Figure 4.4: Estimated cost of mobile phone theft in the UK.



Source: Mailley and Farrell (2006)

Dubourg and Hamed (2005) estimate the total costs of offences to victims and to society by summing direct costs such as the cost of policing, prisons and the criminal justice system, as well as ‘intangible’ costs such as the physical and emotional impact of crimes. Estimates of intangible costs involve QALYs- Quality Adjusted Life Years. which measure a victim’s mobility; ability to care for him or herself; ability to undertake usual activities; levels of pain and discomfort; and levels of anxiety and depression. QALYs can be translated into financial cost using established methodology (Dubourg and Hamed, 2005). A general term for this methodology of assessing crime costs is ‘victim-compensation’ (Roman and Farrell, 2000)

An alternative methodology to measuring the cost of crime to victims and to society is ‘willingness–to-pay’. This American methodology increases the estimated costs of crimes by at least a factor of ten when compared to the

UK methodology. Cohen et al. (2004) adapted a methodology called 'contingent valuation' (CV). CV has been widely used in environmental studies to place monetary value on otherwise intangible social benefits, such as increased air quality or protection of an endangered species (Cohen et al., 2004). Essentially, CV involves asking respondents to define the level of money they are prepared to pay in order to experience various social benefits within their community.

Cohen et al. (2004) asked respondents about their willingness to pay (WTP) for a ten percent reduction in pre-determined crime types. Table 4.4 below compares the resulting estimates of their methodology with UK estimates. US Dollars are converted into British pounds at a rate of 1.69 dollars to one British pound. Figures have been rounded for ease of reading, while factor difference was calculated using non-rounded data.

Table 4.4: Comparison between cost of crime estimates

Offence type	Dubourg & Hamed (2005) USA estimate (£)	Cohen et al. (2004) UK estimate (£)	Factor difference
Burglary	3.3 K	42.25 K	12.9
Sexual assault including rape	31.4 K	400.1 K	12.7
Murder	1.5 M	16.4 M	11.2

Source: Cohen et al. (2004) and Dubourg and Hamed (2005).

Cohen et al (2004) estimated the costs of burglary, armed robbery, serious assault, rape and sexual assault and murder. Therefore cost estimates using Cohen et al.'s (2004) methodology are not available for many of the offence types where a mobile is taken, such as theft from vehicle, robbery and other theft. However it seems logical to assume that the cost estimates for the crime types relevant to Mailley and Farrell's (2006) cost calculation would be inflated using the American methodology as were other offence types.

Responses to phone theft in the UK

The final section of this chapter summarises the various responses to the problem of phone theft in the UK. It explains why the Mobile Phone Theft Index (Chapters 7 and 8) is proposed as a mechanism to stimulate a coherent industry response to the problem. Responses up to the end of the research period, 2008, were only partial. In general, the responses to the problem followed similar patterns to the responses to car security described in Chapter 3: initial efforts were heavily government-led but relied on the involvement of the mobile phone industry, who complied enough to avoid official regulation but did not, it can be argued, engage fully. Industry action was coordinated and overseen by both MICAF and the GSMA.

The research which allowed the research team to understand the status quo involved over 20 face to face meetings with key personnel within organisations including the Home Office and Department of Trade and Industry; the European Telecommunications Standards Institute (ETSI); mobile manufacturers and service providers; specialist and local police; and independent forensic science providers. Appendix 4.1 lists the meetings held. There is a considerable amount of information to summarise and for the sake of brevity and clarity only the most salient findings are detailed below.

The section begins with a description of the goal of most historical activity. The goal was that stolen phones are cut off (blacklisted) using the unique identifying number which each handset possesses, the IMEI. Once blacklisted, phones are not able to send or receive any information through the UK networks. Blacklisted phones are therefore of little to no value to thieves who wish to use stolen phones themselves, or to sell them on for use in the UK.

The section then progresses logically through a description of the progress made in implementing blacklisting. The actions taken by government, police and industry are described before concluding with a description of the issues which appear to have slowed and halted progress. It is necessary to note that the story told by the research presented here stops in 2008, and progress on some aspects may have been made since that time. However, evidence will be presented showing that MICAF claimed in 2007 that blacklisting was carried out more often than is probably true. While this claim by MICAF stands, government pressure will inevitably have decreased, since the government believe or cannot disprove that ‘enough’ has been done by the industry to protect customers. The proposed Mobile Phone Theft Index would incentivise industry to overcome any remaining hurdles to efficient blacklisting. More importantly, it would also incentivise industry to decrease theft types which would not be decreased by blacklisting. These types include theft for resale abroad and are discussed further below.

Blacklisting

Blacklisting removes the rewards for some motivations for phone theft. Since a blacklisted phone cannot be used on any UK network, phones stolen for personal use and for sale in the UK will be worthless. If blacklisting were efficiently carried out it would still be possible to make money by selling stolen phones for their parts, for recycling, and for resale abroad. Blacklisting would not remove the presumably psychological incentive for bullying thefts.

The blacklisting process is summarised in Figure 4.5 below. Following the loss or theft of a mobile phone (stage A), the owner is responsible for stage B, informing their service provider (network operator) that the phone needs to be deactivated (blacklisted). In stage C the service provider then places the identity of the phone on their own local IMEI database or EIR, which includes a list of the IMEIs belonging to blacklisted phones. The IMEI databases from each service provider are networked to a central GSMA-hosted IMEI database covering all UK service providers, called the Shared EIR or SEIR. At stage D, information about all newly blacklisted phones is uploaded from local service providers’ EIRs to the SEIR once every 24 hours. The final stage E occurs when the SEIR updates all other service providers with the identities of newly blacklisted phones. Each service provider downloads the updated SEIR records once every 24 hours.

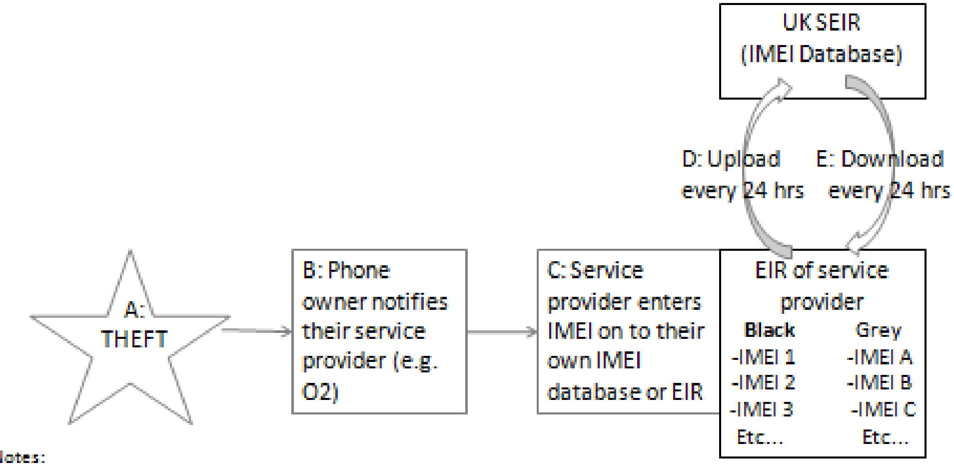
Successful blacklisting relies on three conditions being met. These are listed below and the history of each aspect is described in what follows.

1) That IMEIs are unique, so that duplicates do not exist on the SEIR.

2) That IMEIs are secure against hacking.

3) That information provided by customers to service providers is entered quickly and accurately on to their EIRs, and that all EIRs are updated efficiently by the SEIR.

Figure 4. 5: The process of blacklisting an IMEI in the UK



Notes:
1: Phone may be lost or stolen at stage A.
2: At stage B, owner may not know their IMEI number. Registration at point of sale, such as carried out by the Carphone Warehouse, solves this issue.
C: Since files are uploaded from EIRs to the SEIR every night, and downloaded the next day, there can be 48 hours between stages C and E.

How IMEIs are composed

The unique identifier for a handset is a 15 digit number called the International Mobile Equipment Identity (IMEI). The IMEI of a handset can be revealed by entering *#06# on the keypad. The 15 numbers comprising an IMEI contain information relevant to manufacturers and to network operators. The first two digits indicate the country which the phone was manufactured for. The 9th to 14th digits indicate the manufacturer and model of the handset (GSMA, 1992).

IMEI allocation

In the UK, allocation of IMEIs is carried out by BABT (the British Approvals Board for Telecommunications), an agent appointed by the GSMA. BABT allocation is funded by the GSMA and so manufacturers incur no direct costs for using this accredited supplier (BABT, 2004). The process for IMEI allocation is that manufacturers request allocation of IMEIs from BABT, detailing in their request the make, model and number of units to be manufactured. BABT then allocates a block of sequential IMEI numbers to that manufacturer for the specified batch of handset model. BABT maintains a register of this allocation, and reports the allocation to the GSMA so that the IMEIs are listed as useable (whitelisted) on the GSMA's shared IMEI database or SEIR (BABT, 2004).

Unique IMIEs are central to the viability of the blacklisting process. If duplicate IMEIs exist then blacklisting one specific IMEI would cut off all identical IMEIs. The issue of duplicate IMEIs being allocated to some types of telecommunications device, and the possibility of unused IMEIs being hijacked by IMEI reprogrammers are discussed further below.

The history of UK responses to mobile phone theft

Figure 4.6 below visually summarises the various arms of the UK response to mobile phone theft. The responses by government, police and industry are interwoven and explained in the sections which follow. The UK government were instrumental in creating the conditions in which blacklisting could be utilised, by passing legislation which made tampering with IMEIs illegal; by allocating police resources (the National Mobile Phone Crime Unit) to deal with transgressions of that law and to deal with phone theft in general; and by launching the Street Crime Initiative as an initial crackdown on street crimes including mobile phone theft. At the same time, government applied pressure to industry to increase the security of IMEIs; to work with the NMPCU in sharing intelligence data, and aiding the public to report stolen mobiles; to make sure that only unique IMEIs were allocated, and to agree to a Charter defining acceptable levels of blacklisting efficiency. The main stages of progress are summarised in Table 4.5 and discussed below.

Figure 4.6: UK responses to mobile phone theft

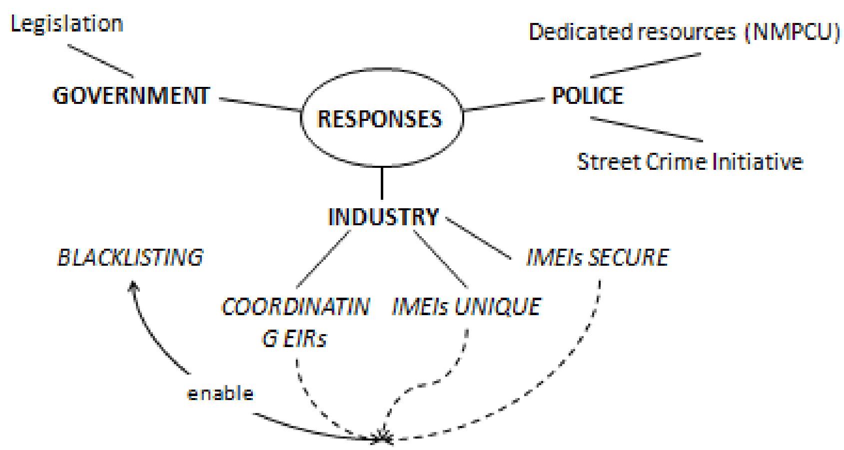


Table 4.5: Key stages in the history of mobile phone theft prevention in the UK

Date	Activity and comments
1985	Ernie Wise makes 1st ever call in the UK on a mobile phone.
1992	GSMA guidelines state that IMEIs should be unique.
1995	Parliamentary Office of Science and Technology reports concerns over cloning of analogue phones and a rise in thefts.
2001	Media pressure and publicity highlight the rise in street crime (Tilley et al., 2004)
2001	Harrington and Mayhew (2001) publish seminal work on the nature and extent of mobile phone thefts. Phones are a cause of rising street crime.
Mar 2002	Government launch the Street Crime Initiative, consisting mainly of targeted policing activities, aimed at decreasing many types of street crime including mobile phone theft. Other tactics include increased sentencing for 'street crimes'.
Feb 2002	Government and media push for the IMEIs of stolen phones to be blacklisted via a coordinated IMEI database (the SEIR). UK Vodafone and BT Cellnet refuse to do so. Duplicate IMEIs are their excuse. Other operators have local EIRs.
Nov 2002	SEIR is officially launched and all UK network operators join.
2002	Mobile Telephone (Reprogramming) Act (2002) makes an offence of altering or intending to alter an IMEI. Difficulties in proving intent make enforcing the law difficult for NMPCU.
2003	National Mobile Phone Crime Unit (NMPCU) is launched.
2004	GSMA's Nine Principles are adopted, which state that IMEIs should be resistant to alteration (hacking).
2004	Phonesec (2005) shows an increase in altered IMEIs between 2004 and 2005.
2004	A Vodafone executive promises publicly to blacklist all stolen phones across Vodafone territories, and is made redundant shortly after (Mobile magazine, 23 June 2006)
2005	England (2005) reports very low levels of duplicate IMEIs are present on the UK SEIR. Those that do exist are mainly IMEIs which are used in bulk on goods tracking devices, and are easily differentiated from hacked IMEIs
2005	Mobile Telephones (Reprogramming) Act 2002 revised via the Violent Crime Reduction Charter (2005). This makes it

	easier for NMPCU to carry out sting operations and arrest IMEI hackers: offering to alter an IMEI is now an offence.
2005	MICAF commission the 1st test of blacklisting efficiency. Results (Pimm et al., 2005) showed that four of the six network operators failed to blacklist one third of reported IMEIs within five days of reporting, and another (Vodafone) had twice this fail rate. The network 3 performed considerably better, only failing to blacklist two of 22 handsets within five days.
2006	Kaplankarin et al. (2008) show that up to 5% of IMEIs in a sample of UK lost property phones are altered or tampered with.
2006	Home Office minister Hazel Blears calls a meeting with industry and the then Police commissioner Ian Blair. Media pressure increases for industry to take some responsibility for phone thefts and to minimize customer risks (Mobile magazine, 2006).
2006	MICAF signs the Mobile Phone Industry Crime Reduction Charter (2006). This contains goals of blacklisting 80% of phones reported as stolen within 48 hours on the UK SEIR.
2006	Loughborough University publish work which estimates the cost of mobile phone theft; assesses the progress made in phone theft prevention to date, and presents the first count-based Mobile Phone Theft Index.
2007	MICAF commission the 2nd test of blacklisting efficiency. The resulting report (Cooper et al. 2007) uses questionable methodology and results in erroneous conclusions.
2008	Loughborough University (Mailley et al., 2008) publish the first iteration of the risk-based Mobile Phone Theft Index. MICAF react by arguing that the rational choice perspective is false.
2011	UK Home Office calls a meeting with industry representatives, MICAF and crime experts. Professor Graham Farrell notes that MICAF are still opposing calls for industry to internalize the costs of phone theft.

Government and police response

The first coordinated policing response to mobile phone theft formed a part of the 2002 Street Crime Initiative (Tilley et al., 2004). Newspaper headlines such as “Are the police doing enough?” (The Evening Standard, 2 Jan 2002) and “Shot for her mobile phone” (The Evening Standard, 13 February 2002) fuelled the fire of public anxiety and pressure for a decisive government response

(Home Office Communications Directorate, 2003). The Street Crime Initiative included measures ranging from increasing police awareness of the severity and nature of mobile phone theft; increasing prison sentences for offences where a phone was taken; producing educational material for courts of law; and directing police forces to target high problem areas (Tilley et al., 2004).

An early review of the Street Crime Initiative showed that these measures had a positive effect: the Home Office (2002) reported a ten percent decrease in all street robberies when compared to 2001, and an increase in conditional bails and remands. However, it was recognised that this ‘front end driven’ success was not sustainable in the long term because it relied on resource-intensive targeted operations and high visibility initiatives, both heavily reliant on overtime working (Tilley et al., 2004). The prevention of key drivers of street crime, including mobile phone theft, was crucial. The government therefore invited and pressurised the mobile phone industry to cooperate in developing more secure IMEIs, coordinated IMEI databases and more efficient blacklisting processes, and provided resources to launch a policing unit dedicated to mobile phone theft: the National Mobile Phone Crime Unit or NMPCU.

On Wednesday 17 December 2003, the National Mobile Phone Crime Unit (NMPCU) based on Sirdar Road, Nottingdale, London W11 was launched by Hazel Blears MP and Lord Toby Harris. The primary aim of the NMPCU is to reduce street crime and the number of mobile phones stolen during street crime offences. The secondary aim is to identify and target the market for stolen mobile phones (NMPCU, 2004).

The government introduced the Mobile Telephones (Re-programming) Act (2002) in order to criminalise the act of altering an IMEI. This Act came into force on October 4th 2002 (Home Office Crime Reduction, 2002). Under the Act it is an offence in England, Scotland and Northern Ireland to:

- Change an IMEI without the authorisation of the manufacturer; and
- Possess, supply or offer to supply the necessary equipment with the intent to use it for re-programming mobile phones.

The offences carry maximum penalties of five years' imprisonment or unlimited fines or both (Home Office UK Acts (undated)). However, NMPCU and security experts at Panasonic reported to the research team that proving intent to alter an IMEI, or proving that equipment was supplied for the purposes of altering IMEIs, was in practice a complex and costly exercise. This was because the equipment which resulted in IMEI alteration also had another use, of unlocking SIM cards from specific networks. The ‘dual use excuse’ hindered NMPCU sting operations which aimed to target suspected IMEI hackers, because intent was hard to prove beyond reasonable doubt unless IMEI alteration was observed first hand by police officers.

This loophole had been anticipated by the House of Lords when the Bill was first read (Lords Hansard 2002, column 482). However it was not amended until 2005 when a clause was included in the Violent Crime Reduction Bill (2005) which made an offence of offering to alter an IMEI (UK Parliament Internet Publications, 2005). NMPCU reported to the research team that this had improved the ease of bringing prosecutions, but that successful prosecutions under the Reprogramming Act (2002) were still few and far between. Prevention remained a priority.

In 2006, Home Office Minister Hazel Blears called a meeting with key actors from the UK mobile industry including representatives from MICAF, the GSMA, and all major network operators and manufacturers (Mobile magazine, 23 June 2006). The attendance of the then Police Commissioner Ian Blair suggests the importance placed on this meeting. The outcome of this meeting was an agreement by industry to sign a crime reduction charter (described below), while the time lag between this meeting and the initial set up of the NMPCU and the alteration of legislation suggests that industry were not incentivised to act autonomously and increase mobile security in the absence of government pressure.

Industry response

The story of the industry response to the issue of mobile phone theft was told to the present author differently by MICAF and the GSMA compared to the story told by personnel involved in the government's efforts to persuade industry to respond in a sufficiently robust manner. Mr Jack Wraith and James Moran from MICAF and the GSMA respectively claimed that industry action to make blacklisting an effective preventive mechanism was driven by or invested in wholeheartedly by their organisations. Personnel within the Home Office reported that a level of pressure was necessary in order to secure investment and action by the industry, at each stage of the process. This tale has striking parallels with that described by Laycock (2004) and Newman (2004) concerning the response of the vehicle manufacturing industry to issues of security, and the summary of generic industry responses to designing out crime made by Clarke (2005).

The various aspects of the response which were reliant on industry are summarised below under headings which describe the conditions necessary for blacklisting to be achieved for all stolen phones. These conditions are summarised above in Figure 4.6. IMEIs need to be both unique and to be secure against alteration (hacking), and the EIRs of each service provider need to be coordinated and updated regularly via the Central EIR. Together these three conditions make blacklisting technically possible. However, the only assessments of whether the industry does in fact utilise this potential was arranged and funded by MICAF. The current section concludes the entire chapter by describing why the research team remain unconvinced that the latest assessment, by a company called Systems Concepts, was carried out with sufficient scientific rigour to be used as a key indicator of mobile industry action. As mentioned above, this test is key to determining whether the government believes that ‘enough’ has been done by the industry to prevent mobile phone theft.

IMEIs need to be unique

The GSMA (1992) defined from the outset of IMEI use that they should be unique. The original role of the IMEI was defined by the GSMA as two-fold:

> “the main objective is to be able to take measures against the use of stolen equipment, or against equipment of which the use in the GSM system can [ ] no longer be tolerated for technical reasons.” (GSMA, 1992)

Our MICAF contact explained that in the past, manufacturers would deliberately over-order the number of IMEIs needed for a particular ‘batch’, in order to keep sales figures of particular models secret. The problem with this was that this left many spare ‘genuine’ IMEIs for either hackers to guess, or to steal or coerce from malleable industry contacts. Panasonic stated that they had made considerable efforts to both reduce the numbers of spare IMEIs ordered from BABT, and that those used were chosen randomly from within the block of allocated numbers. Using randomly selected numbers meant that large sub-blocks of numbers were no longer available for sale or for hackers to guess as easily.

Are IMEIs unique?

There is a complex history behind the evolution of unique IMEIs, and the reluctance of industry to engage fully with the research described here means that the picture remains fuzzy. Jack Wraith from MICAF stated to the research team in 2005 that duplicate IMEIs were still in use, and that this meant blacklisting had to be judged on a case by case basis. Using duplicate IMEIs is clearly in contravention of GSMA (1992), a standard signed up to by all suppliers of mobile handsets to the UK. A cynical point of view is that 'the duplicate excuse' allowed the industry to put forward an apparently technical reason for not blacklisting every phone reported as lost or stolen. This excuse was probably used to resist government calls to sign a Charter which set quantitative targets for blacklisting efficiency. However, it could be that by 2005 the GSMA's principles were being adhered to more strictly, removing the prevalence of IMEI duplicates on the SEIR. When industry were challenged by government to assess the extent of IMEI duplicates and to do more to decrease them, a confidential report made available to the research team (England, 2005) claimed that very few duplicate IMEIs existed, apart from some easily recognisable IMEIs used on tracking devices, and concluded that:

> "the operators can see no further value in investing resources into this analysis" (England, 2005: 1).

IMEIs need to be secure

On 27 February 2004, the GSMA and the major handset manufacturers agreed to a set of Nine Principles (GSMA, 2004b) which protected the integrity of the IMEI. The Principles stated that security was not absolute, by requiring that IMEIs be *resistant* to change rather than change-proof (GSMA, undated a). The UK government had a significant role in persuading the six major manufacturers supplying the UK market to agree to the Nine Principles (Patel, 2003). By allowing the manufacturers to decide on how to technically implement the broad principles, security of the IMEI of different manufacturers should become a competitive factor taken into consideration when operators make purchasing decisions. However this will only occur if security is demanded by customers.

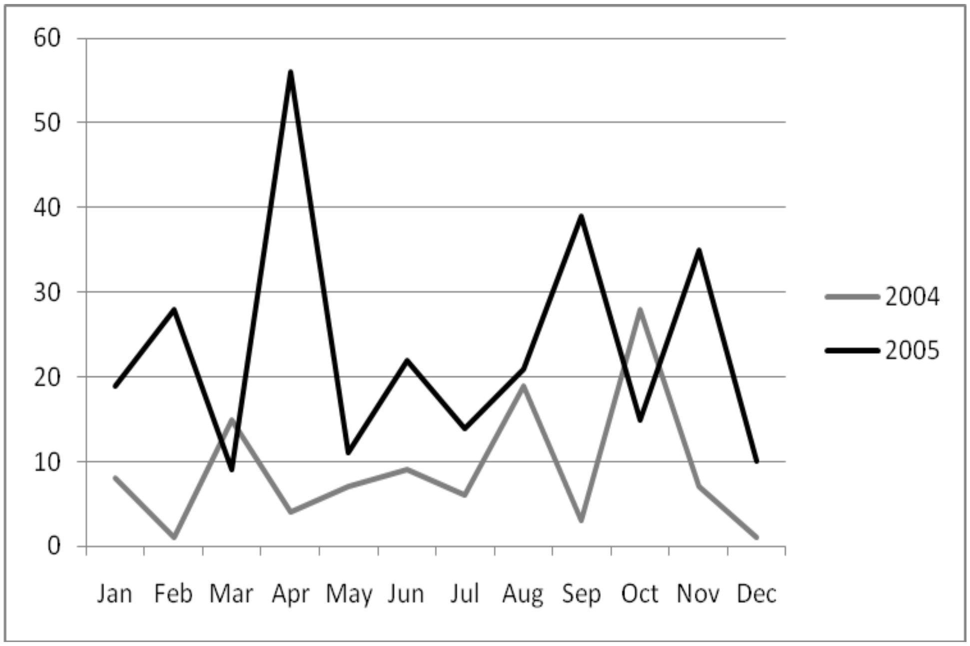
The methods of making the IMEI more secure which were reported to the research team were varied, and included: storing the IMEI in various parts of the phone so that it cannot physically be tampered with easily; protecting the location of the IMEI with a casing; writing the IMEI into memory which is only 'One Time Programmable'; and blowing tiny fuses between the IMEI and attached circuitry in order to leave fewer 'backdoors' for would-be hackers to use to access the IMEI.

Are IMEIs secure?

The question of whether IMEI security had improved as a result of the GSMA's Nine Principles proved difficult to answer. Panasonic advised that their product security had increased greatly (David Rogers, personal correspondence, November 2005). MICAF claimed that the NMPCU had to use very old models to set up sting operations in which the IMEI was deliberately altered. Quantitative data describing IMEI hacks are collected by the GSMA, via their IMEI Weakness Reporting and Correction Process, but these data were not made available to the research team: the GSMA stated they were commercially sensitive.

Therefore two alternative sources of empirical evidence were found, and they showed that IMEI security was not absolute. The first measure came from an independent monitor of IMEI security, the French company Phonesec. Phonesec describe themselves as a company specialising in mobile phone security and anti-piracy measures (Phonesec, 2005). They scan the internet and involve themselves within the hacking community to alert network operators of potential security breaches. They validate the alerts before passing the information to the GSMA, who collate and pass on this information to the relevant manufacturers (personal correspondence, Pascal Capauno of Phonesec, December 2005). Figure 4.7 below depicts the count of IMEI breaches detected and validated by Phonesec in 2004 and in 2005. There were twice as many alerts between 1 January 2005 and 21 September 2005 as in the same period for 2004.Unless the number of phone subscriptions also doubled in that time, this seems to represent an increase in the proportion of IMEIs hacked.

Figure 4.7: Monthly IMEI breaches reported by Phonesec, 2004 and 2005



(Source: Phonesec, 2005).

Phonesec reported that the security of IMEIs from different manufacturers varied greatly. Further research would reveal which methods of securing IMEIs were most effective, and where market forces were failing to incentivise manufacturers to further increase IMEI security.

The second source of empirical evidence regarding IMEI security in the UK came from practical research carried out by the research team, published in Kaplankarin et al., (2008). Mobile phones stored in the lost property departments of Loughborough Police and Loughborough University were checked for signs of IMEI hacking and tampering. Hacking was simple to detect and relied on comparing the software version of a phone's IMEI with the hard copy version. As mentioned previously the software version of an IMEI is revealed by typing *#06# on the phone's keypad. The IMEI is also physically etched on to metallic labels, often located under a phone's battery.

The observation of a removed or defaced label suggested the possibility of a hacked IMEI, since there are few reasons to alter the sticker other than to hide the true IMEI. A difference between the software and hard copy IMEIs of a phone proved that the IMEI had been altered from its original state. The checks of lost property samples were complemented by an on-street survey of mobile phone owners who agreed to their IMEIs being observed by the interviewer. The results together suggest that around 5 percent of the phones sampled had their IMEIs altered (Kaplankarin et al., 2008).

EIRs need to be coordinated

The purpose of an EIR (Equipment Identity Register) is to allow a network operator to control and monitor the equipment operating on its network. An EIR is essentially a database consisting of lists of the IMEIs of all mobile equipment operating on a network, composed of mainly mobile phones but also equipment such as ‘mobile modems’ used to track consignments of goods. Once each piece of equipment is turned on and ready for use (booted up), it will transmit to the network and the IMEI of the equipment is compared to three lists referred to as white, black, and grey.

White lists do not contain individual IMEIs but consist of *ranges of numbers* allocated by BABT. Black lists consist of all individual IMEIs which are barred by the network which owns the list. Barring can be either due to being reported as lost or stolen, or for technical reasons, such as network non-compatibility. Grey lists contain the IMIEs of handsets which are monitored for technical reasons, or for financial reasons.

In order that the status of each IMEI is consistent across networks the separate EIRs must connect and communicate. This is achieved via the GSMA hosted Central EIR, the SEIR, via the process described in Figure 4.5 above.

Evolution of the UK's SEIR

The government had to pressurise the network operators in to coordinating EIRs. The following newspaper extract demonstrates the public stance of both the government and some of the mobile network operators:

> "The government and industry experts are infuriated by Vodafone UK and BT Cellnet's refusal to implement the systems [ ] that block stolen handsets when the other major networks- Orange, One2One and Virgin Mobile- have all done so. 'We want to see all mobile phone operators using this technology' said a Home Office spokesman." (The Guardian, 2 Feb, 2002 in Broadbridge, 2002).

At the same time that they were arguing about the feasibility and usefulness of a SEIR, all five UK networks were cancelling the SIM cards of phones reported as lost or stolen. The situation parallels that reported by Clarke et al. (2001) when US cell phone SIM frauds were designed out, but cell phone thefts were not. In defence of their inactivity, one UK operator cited the issue of duplicate IMEIs:

> "BT Cellnet says it is a misconception that a blacklist would cut crime and argue that they would cut off innocent users because up to 10% of IMEI numbers are duplicated.
>
> The majority of handset manufacturers disagree. Nokia says it is extremely hard to change the IMEI numbers on its phones and any duplication is rare, and usually occurs on phones shipped to different parts of the world. Sony Ericsson claims it never issues duplicate IMEI numbers.
>
> The issue is complicated by thieves reprogramming or 'chipping' phones to change their IMEI numbers. The Home Office has asked the industry to discuss whether this should be outlawed." (Guardian, 2 Feb 2002 in Broadbridge, 2002)

Following discussions with the industry via MICAF, the government announced on 8 February 2002 that it would outlaw the reprogramming of mobile phones as soon as parliamentary time allowed (Broadbridge, 2002). Eventually, the SEIR was publicly launched on 1 November 2002 by the mobile phone industry, Government and police, with all UK networks using it and communicating with each other (Patel, 2003). Unfortunately, according to our GSMA contacts, key documents recording when and why industry made the decision to cooperate with the government about the SEIR are not available under the GSMA Security Classification scheme.

Blacklisting efficiency

In 2005 MICAF commissioned an independent test of UK network operators' blacklisting processes. The report, prepared by the company System Concepts (Pimm et al., 2005) showed that four of the six operators had not blacklisted one third of the phones in the test (n=22 per operator) even after five days had passed since the phones were reported as stolen. Vodafone had not blacklisted two thirds of its phones, while the operator 3 had blacklisted nearly all (n=20) of its handsets.

In 2007 MICAF commissioned the second test of blacklisting efficiency in the UK. The five UK network operators tested were Orange, T-mobile, Vodafone, O2 and 3. The methodology of the test is described below in Figure 4.8 and is based entirely on the final report to MICAF by Cooper et al. (2007). The methodology is described before criticisms and comments are put forward.

The network members of MICAF signed up to a Crime Reduction Charter in 2006, which specified that a handset reported to them as stolen would be blacklisted on the handset's usual ('home') network within 24 hours of the report being made. Blacklisting on all UK networks would then take place, via the

SEIR, within 48 hours of the report being made. MICAF set two targets for the 2007 test of blacklisting efficiency:

- Target A was to blacklist 80% of stolen handsets on the ‘home’ network and upload the handset details to the UK SEIR within 24 hours of receipt of the report of the stolen handset.
- Target B was to blacklist 80% of handsets reported as stolen to other networks within 48 hours of the theft report (Provided that the handset details had been successfully uploaded to the UK SEIR within 24 hours).

Figure 4.8: Process for testing blacklisting efficiency in the UK

Steps 1 – 7: Getting ready for testing.
Purchase a handset, SIM and credit for each UK network participating in the test. Register the handset, home SIM and use the phone for 2 calls per day for 7 days. Furthermore, buy a 'clean' SIM for each UK network and check each works in the handset. The handset now has a registered SIM working on the home network, plus is able to use clean SIMs from each of the other UK networks.

Step 8: Report as stolen.
On the 8th or 9th day, switch off handset and report as stolen to the home network.

Step 9: Test the registered SIM.
24 hours after the report of theft, switch the handset back on and try to make a call using the registered SIM. Record pass or fail.

Step 10: Differentiate between 24 hour SIM block and home network blacklisting.
Also test the clean SIMs in the 'stolen' handset: replace the registered SIM with each of the clean SIMs and attempt a call. This checks whether a call blocked using the registered SIM was due to SIM block or blacklisting.

> 10i: If it was not possible to make a call using a clean SIM, record this as a pass and move to step 11 for that SIM.
>
> 10ii: If it was possible to make a call using a clean SIM, make a further 9 calls at a minimum of 30 minute intervals. Switch handset on and off between each call.
>
> > 10ii a: If it was possible to make a tenth call then inform MICAF and, record this on the test sheet, and wait for further instructions.
> >
> > 10ii b: If it was not possible to complete the tenth call, record this as a pass and move to step 11.

Step 11: Test for 48 hour and 72 hour cross-network blacklisting (i.e. download of the blacklist by each operator).
24 hours after establishing that the handset was blacklisted on the 'home' network, conduct cross-network blacklisting checks by placing a clean SIM from each network in the handset and attempt a call.

11i: If it was not possible to make a call then this indicates the network of that SIM has blacklisted the handset. Record this as a pass for test B.

11ii: If it was possible to complete a call, make a further 9 calls with that 'clean' SIM. (Note: timing between calls not specified)

11ii a: If it was possible to complete a tenth call then the network of the clean SIM has failed the 48 hour blacklisting test. Repeat step 11 for other non home network SIMs.

11ii b: If the network had failed the 48 hour test, wait a further 24 hours and attempt a call at 72 hours after the theft report. Record the success or failure.

11ii c: If it was not possible to make the tenth call at stage 11 ii then record this as a pass for that network and repeat step 11 for all other non-home network SIMs.
Source: Cooper et al. (2007)

Results

Cooper et al. (2007) reported that all networks had blacklisted over 80 percent of handsets reported as stolen, on the home network, within 24 hours of the loss report. Therefore all networks were assumed to have exceeded Target A. Similarly, all networks were reported as having met Target B, by apparently downloading the identities of blacklisted handsets and blocking their use within 48 hours of the theft report. However, detailed consideration of the methodology questions whether these claims are valid.

Criticisms of the System Concepts methodology

A fundamental methodological design flaw was that the test was not carried out blind: all network operators knew about the test. It is therefore possible that knowledge of the testing process and timings affected the networks' performance during the testing process. Internal controls, such as numbers of staff on duty and total man hours worked before, during and after the test would help ascertain whether the tests were carried out under 'normal' working conditions.

A further diversion from good experimental design was the instruction at stage 10iia, where MICAF were contacted and 'instructions' sought if a handset was failing the 24 hour home network blacklist test. There is no information concerning the content of the MICAF instructions, nor how often they were contacted by the test team.

Time slippage is another key issue which is not disclosed or acknowledged by Cooper et al. (2007). If nine calls were allowed at a minimum of 30 minute intervals at stage 9, then it would be very easy for the later calls in this sequence to be made well over 24 hours after the handset was reported as stolen. This issue would be compounded if it was the case that one person was testing several handsets at once, but such details are not clear from Cooper et al.'s (2007) methodology. The most meaningful value to record would be the number of hours elapsed between the theft report and an unsuccessful call attempt. This is also the most simple measure to record and to report, which suggests that the methodology and results have been over complicated, perhaps to mask reality.

The time intervals between the nine calls allowed at stage 11ii are not specified, but could quickly add up to a time period significantly longer than 48 hours between theft report and test call. Furthermore, the results section does not specify whether the 'passes' recorded for Target B were those passes at stage

11ii, 48 hours after the theft report, or those recorded at stage 11iib, which is actually *at least* 72 hours after the theft report.

Another key flaw was that each handset was tested for cross-network blacklisting using a sequential methodology. So if for example an Orange SIM had failed to make a call after 24 hours, only then was an O2 SIM tested in the same handset. This sequential methodology could contribute more significantly to time slippage than the issue of the 30 minute intervals between calls, and should be clarified. Again, reporting the simple statistic of total times between theft report, home network blacklisting and non-home network blacklisting would reveal the true picture.

In conclusion, the methodology can be summarised as poor at best, biased at worst. Since the methodology was agreed with MICAF; contact with MICAF was written in to the testing procedure, and the results are unclear, it is difficult to assume anything other than the test and results amount to little more than a whitewash.

Damning everyone else and sparing the phone industry?

It is arguably harsh to claim that the System Concepts report was a whitewash, but this opinion has been formed because of a series of communications with industry which have demonstrated a tendency to argue for whatever will minimise the probability of industry investing in crime prevention efforts. Karmen (1981) gave examples of the motor industry ‘damning the driver and sparing the car’ and some of these are presented in Chapter 3 of this thesis. Similarly, Mr Jack Wraith of MICAF, one of the more influential persons involved in the industry’s response to phone theft, has displayed ignorance about criminological knowledge and a tendency to lay blame for phone thefts anywhere other than with the phone industry, as evidenced in the quote below. These are not meant in the spirit of a personal attack: it is important to identify the opinions of influential persons who might be hindering the overall progress made in increasing prevention implementation in the UK.

> "Based on figures on the UK SEIR the numbers of phones black listed before and after the signing of the Charter has not increased in any significant way. Since 2003 we have always blacklisted phones as and when they have been reported to us!" Personal correspondence to the author in 2006, as a response to a draft version of Mailley and Farrell (2006).

> "Mobile phone theft will NEVER go away. This shows a lack of understanding of the underlying problems of mobile phone theft. The authorities including Government, Police and industry can only put in place measures to impact on the post theft environment – phones will always be the subject of theft – FACT" Personal correspondence to the author in 2006, as a response to Mailley and Farrell (2006).

> "There's no way it is a practical scenario for a drug dealer [to use stolen phones]. What about the ancillary products like chargers? Drug dealers don't want to handle stolen phones in the same way they go to extreme lengths not to handle drugs." Comments published by Mobile magazine (23 June 2006) in response to NMPCU intelligence suggesting that phones were crime facilitators for drug dealers.

> "[Jack Wraith] would question 'the usefulness and the viability' of the phone theft index which he compared to a vehicle crime index,
> adding: 'A thief, in the main, steals a phone because the opportunity is there or the phone is a by-product of a robbery. I do not believe a

> thief stands on a street corner thinking: 'I am going to steal that because it is a Samsung and not that one because it is a Nokia'." Comments published in Farrell and Mailley (2007).

In addition to these written comments, Mr Wraith proposed a variety of reasons for industry non-action when asked about the history of industry cooperation during the initial stages of this research. These included the 'false claims' explanation, which aimed to play down the extent of phone theft; the duplicate IMEI explanation, which was used to argue that routine blacklisting was not feasible, but was in contradiction to the evidence presented by England (2005); and the argument that people should record their phone details on a central database (immobilise.com) so that police could reunite owners with recovered property. The immobilise database has not been described in detail in this thesis because its use seems questionable: it is only useful to reunite owners if stolen or lost property is handed in to the police and they check the database, via the National Mobile Phone Register (NMPR). Further research is needed to assess how often immobilise is actually used by the police or whether it is simply a distraction from the central issue of industry pollution.

Discussion and conclusions

Research carried out by Harrington and Mayhew (2001) and backed by data from the National Mobile Phone Crime Unit provides evidence of the chronic issue of mobile theft in the UK. The cost of phone theft has been estimated to exceed £1.2 billion annually (Mailley and Farrell, 2006)

The mobile phone industry is dominated by a small number of global manufacturers and network suppliers. While this may pose a challenge to crime prevention efforts, it also promises an opportunity for any changes made in manufacturing or network operator policies to become almost ubiquitous.

Data describing the turnover of the major corporations involved in mobile phone manufacture and network operating show the considerable sums available for implementing crime prevention efforts. This to some degree negates any argument which might be made that a company's first priority has to be to its shareholders: while there are large amounts of profit being made, it is morally difficult to justify not spending a small proportion of these amounts on crime prevention efforts.

The interventions to date which aim to decrease theft levels by blacklisting stolen mobile phones are not implemented fully. Some progress has been made through efforts to make IMEIs unique and more secure. However, it is also clear that the efficiency of the blacklisting process in the UK is not optimal. The 'monopoly' presented by MICAF in previous interactions with the UK government has lead to the extraordinary situation where a test (Cooper et al., 2007) presumably used to inform policy responses was not transparent, accurate or independent.

The history of the UK response to mobile phone theft (summarised in Table 4.5) shows how long it has taken for action to be implemented by industry. It seems progress has twice followed a cycle of industry obstructionism, increasing pressure from government, and pre-regulation initiatives (Newman, 2004). The first cycle resulted in the SEIR being established. The second cycle resulted in blacklisting being assessed and the Mobile Industry Crime Reduction Charter being signed. It seems likely that it is now time in 2011 for government pressure to build again.

While the UK government is being told that blacklisting is efficient, there is little room for leverage to persuade industry to take further crime preventive action. The effectiveness of blacklisting as a theft deterrent is explored further in

Chapters 5 and 6 which describe the methodology and results of semi-structured interviews with 40 mobile phone thieves.

The opinions of key industry figures are doubtless central to the stop/start and piecemeal nature of industry responses so far. Some evidence of those opinions has been presented here. There are many parallels between these opinions and the motor industry's excuses for not increasing car security sooner (Karmen, 1981). The next chapters describe the methodology and results from interviews with mobile phone thieves. The results prove that the assumptions of figures such as Mr Wraith are incorrect, because they show that while opportunity plays a large role in theft rates, mobile phone thieves also display rationality in their target selection and chose which phones to take and which to leave. The results therefore pave the way for considering how to incentivise greater industry investment in product proofing via the publication of the Mobile Phone Theft Index in Chapters 7 and 8.

Chapter 5: Interviewing Mobile Phone Thieves: Methodology.

Introduction

In October 2006, interviews were conducted with 40 individuals convicted of mobile phone theft. This chapter describes the methodology of designing and conducting those interviews. It begins with a description of the aims of the interviews, which sets the context for describing the interview design. A summary of relevant literature is presented which describes the need for careful planning of the order of the interview sections, question wording and delivery by the interviewers. The chapter describes the process of obtaining access to convicted offenders, and the practicalities of carrying out the interviews. This paves the way for the results of the interviews which are described in Chapter 6.

A control group of 45 students from Loughborough University was used to allow comparison between offender responses and those from a population assumed to not be involved in mobile phone theft. The student were either enrolled on Loughborough University's MSc in Criminology, BSc Product Design and Technology, or BA Industrial Design and Technology. The results of the comparisons are detailed in Chapter 6. Within the offender population, interviewees were assigned as either 'novice' or 'expert' thieves according to a range of factors, such as their stated experience of phone theft; their demonstrated knowledge of technical issues such as IMEI reprogramming; their contacts with fences and their level of knowledge about issues such as the value of different stolen models. This allowed a comparison of the results between less and more experienced offenders.

Background to the interviews

The belief that offenders make choices before and during offence commission is well established as a useful paradigm in environmental criminology. Since the initial proposal and development of a rational choice perspective in the 1980s

(Cornish and Clarke, 1986) a growing body of literature has added weight to the assertion that offenders are on the whole ‘rational’. Key pieces from that literature have been described in Chapters 2 and 3 of this thesis. The interviews described here aimed to add to the current knowledge about offenders’ rational choices by identifying the choice-structuring properties of different models of phones and the choice-structuring properties of different theft situations. Home Office research concerning mobile phone theft has described many attributes of victims and of offenders, such as gender, age, ethnicity and household status (see for example Hoare (2007) and Chapter 4 here). The research identifies only a few factors describing the circumstances of phone thefts. These are restricted to whether the phone was attended and in use at the time of the theft, and where the offence took place (see for example Hoare, 2007: 28). No research to date has quantified which phone models, if any, are at higher theft risk and why, leaving potential preventive measures unexploited.

Knowledge about what does or does not make one model of phone more attractive as a theft target should be incorporated into theft solutions. Similarly, knowledge about what affects an offender’s choice to attempt a theft in a given situation should inform both phone design and public education about ways to protect people from victimisation.

The absence of research into the choices made by phone thieves has led to the erroneous belief that phone thieves are purely opportunistic. This belief is held by key personnel within the mobile phone industry, as the following quotes demonstrate:

> “I do not believe that phone thieves are discerning”

(Fraud and Security Director, GSM Association, personal correspondence 2007).

"I do not believe a thief stands on a street corner thinking 'I am going to steal that because it is a Samsung and not that one because it is a Nokia'."

(Jack Wraith, Chairman of the UK's Mobile Industry Crime Action Forum, within Farrell and Mailley (2007)).

Jack Waith's statement calls into question the validity of the rational choice perspective (Clarke and Cornish, 1985), and has serious practical implications. It hinders the identification of novel crime prevention interventions. If the choice-structuring properties of theft targets (phones) are not sought out and defined, and if the choice-structuring properties of theft opportunities (the situational factors) are not identified, neither can be manipulated in order to lower theft rates.

Aims of the interviews.

The interviews had several inter related aims. These are framed below as research questions in Table 5.1.

Table 5.1: Interview research questions

1) Are mobile phone thieves discerning or do they take any objects available for theft?
2) Which phone-specific factors (if any) affect thieves' choices?
3) Specifically, does IMEI blacklisting deter thieves?
4) Specifically, can iconography and semantics deter thieves?
5) Which situational factors (if any) such as the nature of the victim, or the presence of witnesses, affect thieves' choices?
6) What level of knowledge do phone thieves have of fencing stolen phones, reprogramming IMEIs and making false insurance claims?
7) Do the responses of more experienced thieves differ from those of less experienced thieves?
8) Do the responses of offenders differ from those of a non-offending control population?

Identifying and accessing interview participants

The ideal offender participants were people with experience of taking mobile phones, and with a range of expertise in this. Previous research had shown that the majority of phone thieves are young males under 18 (Harrington and Mayhew, 2001; Hoare, 2007). Therefore establishments dealing with those below prison age were most relevant for sampling. Furthermore, increasing the proportion of younger, less experienced offenders in the sample minimised the systematic bias potentially introduced by concentrating on incarcerated and older offenders in prisons, who would typically represent more experienced offenders (Cornish and Clarke 1986; Walsh 1986). To minimise the time and expense taken to travel to prisons, the ideal participant sample was of offenders located within the Midlands of England.

Applying for access to offenders.

Within the UK, Her Majesty's Prison Service (HMPS) oversee two main types of institution for convicted offenders. Prisons typically house inmates aged over 21 years, while Young Offenders' Institutes (YOIs) house those aged between 15 and 21 years (CJS online, 2008). Within each YOI, juvenile offenders aged between 15 and 17 years are separated from those aged 18 to 21 years. Prisons and YOIs in the UK are grouped by HMPS in geographical regions called Prison Service Areas. Applications for research which involves establishments in two or more Prison Service Areas require submission of application form PSO 7035 to the National Research Committee (HMPS Research, 2008). Since Loughborough is located reasonably close to HMP institutions in Leicestershire, Nottinghamshire and the Birmingham area, it was very likely that the final participating prisons would be located within at least two PSAs. Appendix 5.1 displays the completed application form PSO 7035 which was submitted to HMPS Research in March 2006.

The application process for the research described in this thesis was complicated. A ‘catch-22’ situation arose where HMPS requested a definitive assessment of the number of establishments to be involved in the research, while it was not clear how many interview participants could reasonably be expected to be located in each establishment without some feedback from the establishment. However, HMPS maintained that contact with establishments should only be through them, and using the form described above. After some months of intermittent contact with HMPS, approval was given via email for research to be carried out within the West Midlands area. Management at both Birmingham’s main adult prison and YOI Brinsford in West Birmingham agreed to participate.

At the same time, local Youth Offending Teams (YOTs) were approached on an individual basis. Each local authority in the UK has a Youth Offending Team. These teams consist of a variety of staff from the local police, probation service and social services as well as experts in health, education, drugs and alcohol misuse and housing. The role of YOTs is to assess the needs of young offenders who are either due to be sentenced to a custodial term or community order, or are on Final Warnings. YOTs also assess the risks to the public posed by these offenders to the public. A Final Warning can be administered where an offender admits to a first or second offence. The YOT is responsible for supervision and continual reassessment of young offenders while in the community, whereas HMPS are responsible for their supervision if they enter custody (YJB, 2008).

In total, over 20 YOTs were contacted via over 100 emails many phone calls from Loughborough University. Keeping detailed records of the progress made with each institution was important due to the time delays between communications and the number of different staff involved. The YOTs who identified suitable and willing participants for the interviews were Leicester City

YOT, and Staffs ISSP (intensive supervision and surveillance project). The research team held face to face meetings with managers to explain the research process, and to establish commitment from the various establishments. Establishing rapport was key to engaging staff who were already busy and who personally stood to gain little from this research.

Within the prison, YOI and YOT, staff carried out reviews of individual crime records, and spent time recruiting interview participants. They were provided with posters to inform inmates of the research initiative. This poster is presented below in figure 5.1. The poster was designed to stimulate awareness about the research and to give offenders a local contact, while reassuring them about confidentiality. The poster was assessed and passed as suitable by psychologists working at HMP Birmingham. It was particularly important that the poster specified that there was neither reward for taking part in the research, nor any negative implications for not taking part.

Figure 5.1: Poster for prisons and YOIs

Designing the interview instrument

The interview questionnaire was a semi-structured instrument consisting of 6 sections. It is attached as Appendix 5.2 of this thesis. A considerable amount of literature was available giving advice about interview design, question wording and interview conduct. Key sources used for the research presented here were: advice in social research methodology books about overall interview design and delivery (May, 1997; Greenfield, 2002; Salent and Dillman, 1994); advice specifically tailored to questioning offenders for criminological research or for problem-solving (Connell and Farrington, 1996; Decker, 2005; Hearnden and Magill, 2004); psychological research describing the factors which affect people's ability to store information, to retrieve it and the effect of question wording and interviewer styles on the reliability of offenders' responses (Milne and Bull, 1999); and specific advice on question wording and content from the academic community (Question Bank Factsheets 2,4 and 6; Rowlands, 2002). The section below summarises the relevant lessons from that literature.

Overall interview design

The sample used for retrieving information about phone preferences and offending behaviour was a convenience sample of males convicted of mobile phone theft. The methods of identifying and gaining access to participants are described above. Since research took place in prisons and Young Offender Institutions (YOIs), it was necessary to design and deliver face-to-face interviews. Face-to-face interviews can, when conducted properly, be described as the gold standard of interview survey methodology (de Vaus, 2002). They result in high response rates, and in depth and reliable responses, because interviewers have the opportunity to probe for detailed information when appropriate. The main logistical disadvantages of face-to-face interviews are high costs and the length of time taken to gather the information (Question Bank Factsheet 2). Face-to-face interviews pose several methodological issues, such as social desirability bias. This is where a participant might under-report behaviour which is not socially desirable, such as offending behaviour or violence, unless they are reassured that no judgement is being made (Question Bank Factsheet 6; Milne and Bull, 1999; Greenfield, 2002).

De Vaus (2002) lists five generic principles to consider when designing the order and grouping of questions. These are:

- to ensure that the flow of the questionnaire makes sense;
- to commence the interview with questions that respondents will enjoy answering- those which are easy, factual and concrete yet relevant;
- to group related questions together;
- to leave open-ended questions towards the latter stages of the interview to ensure that rapport is established (though remember that within a question sequence, open-ended questions result in the most accurate recall of memorised events (Milne and Bull, 1999)); and
- to introduce a variety of question formats to make the interview interesting. However, a balance should be struck between including enough question formats to keep a participant interested, and including too many which might result in confusion or too much concentration being requested of the participant.

Question type and question wording

Questioning styles and wording can have a significant impact on the amount and accuracy of information provided by interview participants. *Open-ended questions* are ideal for gathering accurate information, because the participant is able to give an open and unrestricted answer. They are free to report any information which occurs to them, and are not likely to be adversely affected by the interviewer. The quality of information collected from open ended questions is high, but the information can be incomplete (Milne and Bull, 1999: 22).

Closed questions are best used to gain specific information or to probe after an open-ended question. The main advantage of closed questions is that they allow an interviewer to seek out specific information. The main disadvantages of closed questions are that they result in short and restricted answers; and they can increase the proportion of inaccurate information given by participants. The reasons that closed questions increase the amount of inaccurate information given is that they can suggest to the interview participant that they 'should' know the answer. Good interview practice therefore involves reassuring and reminding participants during an interview that not knowing, not remembering or not having an opinion are perfectly valid responses (Milne and Bull, 1999; de Vaus, 2002). Following this, it is logical that the answer categories presented in *forced-choice questions* must include the option of a neutral response or 'Don't know' as appropriate.

Question language should be carefully thought out at the design stage. It should be tailored according to the target audience, the aim of the question, and the question's place in the overall flow of the interview. In general, well designed questions will avoid complex grammar; avoid negative phrasing; avoid jargon and technical terminology (these can alienate the participant as well as decrease their confidence); always incorporate a 'Don't know' or neutral response if appropriate; avoid multiple questions combined into one; and avoid being leading (Milne and Bull, 1999; Question Bank Factsheet 4).

Question language can affect both the quantity and quality of information given by interview participants. Loftus and Zanni (1975, in Milne and Bull, 1999) demonstrated that using the definite article ('the') in place of the indefinite article ('a') increased the rate at which non-present items were recollected by students. The definite article can result in what is essentially a leading question, because the presence of an item or person is assumed. In a separate study, Harris (1973, in Milne and Bull, 1999) demonstrated that asking participants 'How tall' a person was resulted in an average estimate of height that was ten inches greater than when the wording 'How short' was used. The ideal wording is neutral, such as 'What was the height of the individual?'

De Vaus (2002: 175) provides a checklist against which to assess proposed questions. That checklist is reproduced in Table 5.2 below. An answer of 'yes' to any of the checklist suggests that the question requires revision.

<u>Table 5.2: Question wording checklist</u>

1. Is the language complex?
2. Is the question double-barralled?
3. Is the question negative?
4. Will the words have a different meaning for different people?
5. Is the question ambiguous?
6. Is the frame of reference for the question unclear?
7. Does the question have dangling alternatives?
8. Is the question a 'dead giveaway'?
9. Can the question be shortened?
10. Is the question leading?
11. Is the respondent unlikely to have the necessary knowledge?
12. Is there a prestige bias?
13. Is the question too precise?
14. Does the question artificially create options?
15. Is the question wording unnecessarily detailed or objectionable?
16. Does the question contain gratuitous qualifiers?

Source: de Vaus, (2002:175)

Attention also has to be paid to the order of responses presented to any questions which are not open-ended, referred to as forced choice questions. *Response order effects* occur when the ordering of answer categories affects the likelihood of the categories being chosen. *Primacy effects* refer to the tendency of respondents to choose the first option if presented with a list of options. Primacy effects are most commonly observed when information is presented visually. *Recency effects* refer to the tendency of participants to choose the last option from a list, and is most often seen when information is presented aurally (Question Bank Factsheet 6; May, 1997). Both effects can be minimised by presenting information visually via the use of showcards, while the interviewer also orally describes the response options. Showcards used in the interviews reported here are explained in further detail within the section 'The interview questionnaire in detail'.

Conduct during interviews

Generic rules for increasing the quantity and quality of information collected during an interview include: begin the interview with a general topic and gradually bring the discussion round to more specific areas of interest; maintain a professional but friendly rapport where possible; be aware of the possibility that participants might be bored by, wary of, irritated by or even in awe of the interviewer depending on how they perceive them in relation to themselves- minimise these effects by clarifying their consent to be involved, using neutral verbal language, relaxed body language and maintaining eye contact but not over-staring; use more open-ended questions to start with if the information required relies on memory- only probe afterwards with closed questions to try and elicit omitted information; repeat words used by the participants in follow-up probes or repeated questions; try to re-word unanswered questions instead of simply repeating them; recognise if a line of questioning or topic is fruitless and move on to a different topic where possible (and perhaps return to the same topic but reword the question later); only ever check any doubts about the validity of answers in a non-threatening manner, and ideally towards the end of the interview; wait until a rapport has been established and towards the end of the interview before dealing with contentious issues such as offending behaviour, and personal information such as ethnicity and age (Hughes, 2002; Milne and Bull 1999; Question Bank Factsheet 4).

The interviewer is also fallible in his/her recording of responses during interview. This is especially so if the interviewer has a mental predefined ‘script’ which the participant is expected to follow. In this case, *selective attention* can affect both the flow of the interview and which information is recorded by the interviewer. Selective attention refers to the phenomenon of focusing on information or actions which are expected, while disregarding those which do not fit the interviewer’s assumptions (Milne and Bull, 1999). The gold standard of transcript recording is to tape each interview, but where this is not possible, taking notes contemporaneously will minimise the likelihood of the interviewer forgetting the detail of responses given. Note-taking does, however, interrupt eye contact and interview flow, and can lead to a more formal atmosphere (Hughes, 2002).

An overview of the final questionnaire

The final questionnaire followed a standard overall structure of interview schedules (see for example Milne and Bull, 1999; Decker, 2005). An overview of each section is given below and specific questions are expanded on later. The questionnaire was piloted within the research group in order to hone wording and question order, and to highlight where questions could be cut down, omitted or reworded. Furthermore, questionnaire development was carried out under the guidance of Professor Graham Farrell who is experienced in interview and survey design and conduct, and as such represents an ideal source of advice (Milne and Bull, 1999).

Section I was an introductory stage. It allowed researchers to introduce themselves to participants, to explain the purposes of the research and the interview, to lay out likely time scales for the interview and to ask for consent to continue. The opening questions were about mobile phone ownership, phone use and preferences. The section introduced the topic of mobile phones and their use, while avoiding intrusive questions about offending behaviour at this early stage. Some of the opening questions also provided background information on participants' level of knowledge about SIM blocking and IMEI blacklisting. These processes were then explained to participants. In this way participant 'expertise' was assessed before new information was given to them, while the potential for confusion between SIM blocking and IMEI blacklisting was minimised.

The core of the interview consisted of three sections. Section II asked participants to verbalise their preferences within six matched pairs of phones. The phone pairs were matched on some factors such as colour and overall shape, leaving a key difference unmatched. The section allowed the quantification of group and individual preferences, and verbalisation of the reasons for preferences expressed.

Section III asked participants to report how much, if at all, they would be deterred from taking phones in 23 different scenarios and of different designs. This allowed both quantitative assessment of how much the designs deterred offenders, and capture of the spontaneously verbalised reasons why this was so.

Section IV asked participants various questions about their offending behaviour and the last phone theft they could recall. This provided information about participants' specialisation in phone theft; their reasons for choosing a specific target during their last offence; and an assessment of whether or not they expressed a standing decision to offend. These event-specific reports provided a valuable internal check about the more theoretical stated preferences and behaviours reported in Sections II and III.

Section V was short and provided an opportunity to better gauge offenders' levels of knowledge about fencing stolen phones, IMEI reprogramming and making false insurance claims, all of which can be seen as measures of expertise in the stolen phone market. The interviews were concluded by collecting demographic data and asking participants if they wished to raise any questions; further ideas or issues. The sections below explain each section of the interview in more detail. Indented sections represent wording taken directly from the interview schedule.

Conducting the offender interviews

One printed interview schedule was used for each participant. Since recording instrumentation such as tape recorders or Dictaphones was not allowed in the institutions, contemporaneous hand written notes were taken by the researchers. Bearing this in mind, the schedules had been devised with adequate space left for the responses to open questions to be written down verbatim. The options for forced choice questions were printed for each forced choice question, allowing responses to be quickly circled without interrupting the flow of the interview. Two researchers carried out the interviews independently from each other. Therefore the general demeanour of the interviewer, and variation in follow-up question wording were agreed prior to interviews being conducted.

The methodology adopted was to establish where possible a friendly and respectful rapport with participants. Initial interviews quickly revealed that respondents reacted well to being consulted as ‘experts in their field’. This approach worked well in all instances apart from one, which resulted in the termination of interviews at one prison. Interviews were conducted by the present author and one other member of the research team. While that member was interviewing in a West Midlands prison, one participant was particularly interested in discussing the 23 deterrent designs. Unfortunately, the offender took the researcher’s engagement in a conversation about these to mean that he was invited to collaborate in future employment. This erroneous assumption spread quickly through the prison, and despite the researchers' best efforts to reassure the prison psychologist, access to further participants was denied. Therefore that researcher only conducted nine of the total 40 offender interviews. The present author conducted the remainder.

Conducting the student interviews

Students studying Loughborough University's MSc in Criminology; BSc Product Design and Technology and BA Industrial Design and Technology were briefed about the aims of the interviews in a lecture theatre setting and asked to complete Sections II and III of hard copies of the questionnaires, and the demographics section. They were led through the questions by the present author, with show cards replaced by Powerpoint™ slides. The context meant that guidance was available if needed, but conferring between students was minimised.

The interview questionnaire in detail

Section I: Introduction to the questionnaire

After personal introduction, explaining the purpose of the interview and checking consent to particpate, one copy of the same semi-structured interview schedule was used for each participant. The full questionnaire is attached as Appendix 5.2. Questions 1 to 6 of the Introduction asked participants about the last or current mobile phone they owned. These questions aimed to begin to establish a rapport with the participants, by putting them at their ease and turning their minds to the subject of mobile phones. Since incarcerated offenders were not allowed access to mobile phones during their sentence, they were asked about the last model they owned before their sentence began.

Questions 7 to 11 asked participants to explain what they knew about mobile phone SIM blocking, IMEI reprogramming, and IMEI functionality. This section had several purposes. Firstly it allowed an assessment to be made of participant's true knowledge of mobile phone technology, before any further knowledge was introduced by the interview process. Since colloquial terms such as blocking were often used to mean both IMEI blacklisting and SIM card blocking, it was important to establish participants' understanding of these two processes. Where confusion was apparent, the difference between the two processes and the relevant language were explained. Finally, since blacklisting is mostly a response to a phone being stolen, this section took participants a step closer to considering their own offending experience without asking contentious questions too early on in the interview process. By the end of question 11 the interview had been in progress for approximately ten to fifteen minutes, almost all of that time focused on the participants' use of phones, their preferences for certain types, and their understanding of key technical issues.

Section II: Comparing pairs of phones

The aim of this section was to allow quantification of the phone-specific factors which affected thieves' target choices. Six pairs of phones were chosen by the research team, and pictures of each pair shown one at a time to participants. The pairs were chosen by the research team to elucidate different factors of phone design: most pairs consisted of a newer and an older version of the same basic phone shape. Three basic phone shapes exist and these are: candy bar, where the phone is a simple block shape with no moving components; clamshell, where the phone flips open and shut like a clam; and slider, where the phone keyboard slides out from underneath the phone screen in order for the phone to be used.

Participants were asked which, if either of the pair, they would prefer to take given a low risk theft opportunity. After they had stated their preference, they were prompted for the reasons for their choice. Figure 5.2 below displays the six matched pairs of phones. The order of the pairs of phones shown here matches that of the results in Chapter 6 and is not the same as the order of the pairs that were shown to interview participants. In figure 5.2 below the phone chosen most often is on the left; during the interview the handedness of the predicted favourite was varied between left and right to minimise the risk of participants ‘learning’ which side would display the preferred phone.

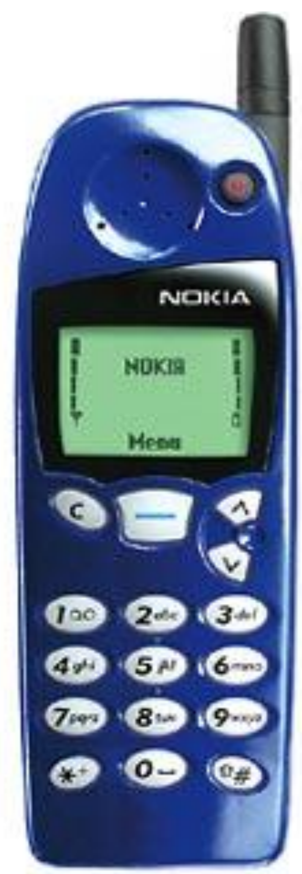
The names of the pairs were used for identifying the pairs during analysis and were not disclosed to interview participants. They were prompted with non-leading questions such as ‘Why do you say that?’ or for example: ‘You say the one on the left is better. In what way is it better?’ Care was taken to not express agreement or disagreement with participants’ choices. Similarly, during any conversations which arose from the probing questions, care was taken to avoid introducing or suggesting to participants which factors were predicted to be important in the decision making process.

Figure 5.2: The six matched pairs of phones.

Pair: Old vs. New

Nokia 6020 vs. Nokia 5110

This pairing controlled for make (Nokia) and shape (candybar). The key differences between the models was age, although the models also differed in size, the presence of an aerial, and colour. It was predicted that this pairing would result in a strong preference for the newer rather than the older model.



Pair: Sliders Popularity

Samsung D500 vs. Nokia 7650

This pairing aimed to encourage participants to verbalise and compare their perceptions of value and familiarity. Shape and colour were controlled for. The popular D500 (left) ranked 4th in the 2006 Count Based Theft Index and was predicted to be most easily recognised as iconic, and easy to fence, by experienced thieves. However the larger screen and the icons on the Nokia 7650 suggest more advanced functionality than the D500.

Pair: Clamshells Icon

Motorola Razr vs. Motorola V300

Make, colour and shape were controlled for, and the iconic Motorola Razr on the left compared to the well known but older and smaller V300. The research team predicted that a high proportion of participants would prefer the Razr due to its iconic status and long term high ranking in the Theft Indices.

Pair: Candy Bar Curves

Nokia 7610 vs. Nokia 6020

Controlling for make, colour and basic shape, this pairing tested preferences for newer models, displaying better functionality and design (the curves of the 7610, left) against more basic design and functionality of the 6020.

Pair: New Concepts

Sony E Concept phone vs. Loughborough's Fortress

Both handsets in this paring were novel phones not available for sale. The pairing compared reactions to the futuristic Sony Ericsson (top left below) which resembled a sleek candybar, with reactions to the totally unique and unfamiliar Fortress. The Fortress was designed by one of the students taking the MSc in Design at Loughborough University. Introducing novel designs encouraged participants to verbalise their decision-making process as they worked through their initial reactions and justified a decision.

Pair: Candy Bar Upgrade

Sony E K700i : Sony E T630

Controlling for colour, shape and make this pairing compared a slightly more modern upgrade with its predecessor. The styling and clearer screen icons of the K700i (left) suggest that it is slightly newer than the T630, but the functionality suggested on the screens is identical. These very similar handsets were predicted to be chosen by almost equal numbers of participants.

Section III: Design solutions

The aim of this section was to quantify the deterrent effects of various design solutions. The design solutions chosen for presentation at interview consisted of a mixture of those already in use, such as blacklisting, and novel ideas. Some of the novel ideas were developed by setting students taking Loughborough University's BSc Product Design and Technology and BA Industrial Design and Technology the task of designing a phone which would deter thieves. Firstly, students were briefed on the idea that deterrence might be achieved by the use of iconography and semantics, or by practical means such as making the phone useless or worthless after theft. The terms iconography and semantics refer to the overall appearance and symbolism of the phones. Examples include the biological hazard warnings seen on oil drums of chemicals, and the indicators of poison, danger or a bitter taste observed in the natural world such as black and yellow stripes (Felson, 2006). Students' designs were shortlisted by the entire research team and then scored according to which of the 25 techniques of crime prevention (Cornish and Clarke, 2003) they employed to deter theft. Appendix 5.3 displays this final list.

The final selection of phone designs and scenarios presented to interview participants ensured that a mixture of novel and current deterrent designs were tested, which utilised a variety of the 25 techniques of situational crime prevention represented. In addition, some wider situational factors such as the presence of a watching public were included to assess their influence on participant decision-making. The 23 designs are described below. Each participant was asked whether, and how much, each design would deter them from an easy and low risk theft opportunity. Participants were presented with, and asked to score, the level of deterrence according to the Likert scale presented in Figure 5.3 below. The Likert scale allowed participants to quantify their responses, allowing quantitative ranking of aggregate results, while also neutralising the initial question.

The 23 deterrent designs

The numbered indented sections below each reflect the original question wording as written on the researcher's interview schedule. The first three design solutions were all based on an increasingly permanent method of simple product marking. Product marking is commonly promoted by the UK police to aid product identification following a theft, and ranges from stamping children's bikes to writing postcodes on electronic equipment with invisible ink:

1. The phone has someone's name written on it with a marker pen.
2. The phone has someone's name stamped on the cover, but it is not one of those covers you can replace easily, so you can't get rid of the name.
3. The phone has someone's face stamped on the cover, and again its not one of those covers you can replace easily.

The next two questions tested the idea of iconography as a deterrent. In the first instance the icon –the ancient eye of Horus- was allowed to speak for itself in that its meaning was not explained to participants. In the second instance its meaning was explained. The eye is pictured below in Figure 5.4.

4. Now I'm going to show you a picture, and I'd like you to tell me what you'd think if you saw that on a phone- what's your gut reaction? [SHOW PICTURE OF EYE]
5. If I told you that the eye, this symbol, means the phone won't work if it's reported stolen.

The next deterrent design aimed to assess whether offenders believed that the ability to check the validity of a mobile phone was important.

6. Now imagine that the phone's serial number, the IMEI, is stamped on the outside of the phone so that people such as the police or a potential buyer can check to see if it's been changed.

The two following designs assessed the effectiveness of the phone being attached to the owner in some form. Theoretically, a different set of skills and motivation are needed to stop someone and force them to remove a worn item, compared to lifting an abandoned object from a location such as a chair or pub table. The Lanyard chain and the wrist band phone are depicted in Figures 5.5 and 5.6 respectively.

7. This phone is attached by a chain to someone's trousers [SHOW PICTURE OF LANYARD CHAIN]
8. This picture shows a phone which is worn on the wrist like a bracelet [SHOW WRIST BAND PHONE].

The next two questions assessed the effectiveness of alarms being activated on either the owner, or the stolen handset:

9. Imagine a phone where the handset communicates with another part on the wristband of the owner. When the handset is taken more than a few feet away from the user, a loud alarm goes of on the handset.
10. Imagine the same phone where the handset and wristwatch communicate. What if, when the handset is taken away, the alarm goes off on the wristwatch of the owner?

The following design centred on an already available technology, tracking devices:

11. Imagine that the mobile phone is fitted with a tracking device - like a tracker on a car - so it can be located when it's stolen.

The next eight suggestions assessed the effectiveness of increasingly efficient blacklisting, or personalised use of the phone using biometrics:

12. Imagine that the mobile phone handset will definitely be blocked in the UK within 48 hours of being reported stolen, so it cannot be used.
13. What if it would be blocked even quicker, say within 24 hours?
14. What if you knew that the phone would be blocked immediately in the UK?
15. Imagine that the mobile phone will definitely be cut off when stolen, but it will still work as a camera and MP3 player.
16. Imagine that the phone was likely to be cut off, but that your friend had the equipment to unblock it by changing its identity [*if necessary*: its serial number, the IMEI number], so that it worked again.
17. What if the phone would be cut off and the only way to reactivate it was to get inside and change some of the chips inside it, which is quite difficult to do.
18. Imagine that the mobile phone can only be activated with something unique to the owner, like a fingerprint, an eye scan, or face recognition.
19. Imagine that the handset is locked by a PIN code, so you need to take it to someone who can unlock it before it works.

The next two solutions ascertained participants' reactions to the presence of members of the public watching; and the need to take a phone out of someone's pocket:

20. Imagine you're in a public place and you see an unguarded mobile phone but there's other people watching.
21. Imagine that you know somebody is carrying a mobile phone because you can see the headset they're wearing, so you know the phone is in their pocket.

The final two design solutions presented to participants assessed the effect of decreasing the cash resale value of stolen phones by means other than blacklisting:

22. Imagine that people only carry very cheap 'disposable' mobile phones. They can only be used for voice calls and text. They don't have a screen. They can't be reprogrammed. They can have up to £5 worth of call credit on them.
23. Let's say that handsets in the future are free, and are just left lying around in bars, restaurants and so on. They don't hold any personal information on them, they are just used to connect to, say, the internet, so there's no money or personal details on them.

Figure 5.3 Likert Scale presented at interview

How much would it put you off?

1	2	3	4
Not at all	A little	Quite a lot	Completely

Figure 5.4 The eye of Horus shown to interview participants

Figure 5.5 Lanyard chain shown to interview participants

Figure 5.6 Wrist band phone shown to interview participants

Thanks are due to Shaun Whitehead for providing Figures 5.4,5.5 and 5.6 and for the bulk of artistic input into Figure 5.1

Section IV: Experience of taking phones

The initial questions in this section asked offenders about whether they preferred to take mobile phones compared to other objects, or whether they also took other objects. This was to establish their degree of specialism in mobile phone theft. Participants were also asked whether they made active choices about which phones to take, and which to ignore. This provided further evidence of the choices they made before and during offence commission.

The next questions were concerned with the details of the last offence they could remember. By focusing on the last offence, a more representative sample of offences was obtained than if participants had been asked about an offence within a given time frame, or a series of offences. It is possible that participants relayed the details of the last *memorable* offence, which might have been more dramatic than less eventful thefts, since dramatic events are more memorable (Milne and Bull, 1999). Furthermore, it is possible that participants wanted to either show off about their prowess as thieves, or to hide the worst details if they were embarrassed or ashamed of their behaviour (see the discussion of social desirability bias earlier). Nevertheless, the questions were designed to get a flavour of the offences committed by the offenders who were interviewed. Reactions such as shame and bravado were minimised by introducing the section to participants as follows:

Now as you know, the reason we're asking your opinion on these ideas is because you know a bit about taking phones. That's fine. It's actually very useful for us, because you're the expert. Can you tell us, from your experience, do you prefer to steal phones rather than other things?

Participants were asked, if they could remember and were happy to disclose the information, about the make and model of the last phone stolen, who it belonged to, and to give an account of what happened before and during the offence.

Asking offenders what happened to lead them to take the phone gave some insight into their standing decisions to offend, that is, their readiness to seize an opportunity. Asking them to verbalise the sequence of events during the incident gave further insights into the thought processes carried out and the choices made during offence commission. This questioning methodology followed the basic rules of the cognitive interview, which has been proven to increase the accuracy and completeness of accounts of remembered events during police investigations (Milne and Bull, 1999).

Offenders were also asked about the total number of phones they had taken, and the length of time they had been stealing. These factors along with their knowledge of fencing and of technical issues such as blacklisting were used to assess whether participants were novice or more professional thieves. The responses of novices and professionals are compared in the results chapter which follows this one.

Section V: False insurance claims

Since the level of false claims was an unknown entity, it was logical to ask offenders if they themselves or anyone they knew had made false claims. It is not altogether clear whether offenders would be more or less likely than the general population to make false claims. Previous research into offending behaviour has shown that ‘those who do big bad things also usually do little bad things’ (Chenery et al., 1999; Roach, 2004; 2007). If phone thieves have no need to make false claims because it is easier to steal a new phone than deal with the process of making a false claim, they might underrepresent the true extent of false claims. If, however, phone thieves are happy to make false claims as part of a repertoire of dishonest behaviour, then false claims might be higher within the phone thief population than within the general population.

Section VI: Snowball contacts, demographics and closure

In the final stage of the interview, participants were asked whether they knew of any other inmates who might like to take part in the interviews. This was intended to create a snowball effect, where one participant identified another knowledgeable participant and so on. However none of the participants identified anyone else, presumably because this would have been seen as ‘grassing up’ their fellow inmates.

The demographics of participants (age, gender, geographic region of abode and ethnicity) were obtained. Participants were presented with showcards of the various options. Numbers were assigned to the response options, such as age range or ethnic group, so that participants could avoid using descriptive language if they desired.

At the very end of the interview, participants were asked if they had any questions or concerns, or any other issues they wished to raise. They were then thanked for their participation and told who to contact within their institution if they had any questions at a later stage. This was designed to leave participants feeling that their contribution had been valuable, and that they had control over the information they had given, even at a later stage. This had the benefits of creating happier participants, and minimising any risk of negative rumours spreading about the interviews through the institutions thereby potentially decreasing the number of willing participants.

Criticisms of the methodology

Some criticisms of previous research into decision-making have been described in Chapter 3. The methodological limitations of the interviews with mobile phone thieves can be summarised as:

(1) Whether the results from a sample of 40 incarcerated thieves are generalisable to the wider offending population;

(2) Whether the hypothetical scenarios presented at interview allow conclusions to be drawn about real-world situations.

(3) Whether the offenders' accounts of previous behaviour or hypothetical behaviour are valid: some may exaggerate to impress the interviewers, while others might repress some details to avoid perceived judgement.

(4) For this particular interview instrument, how much the focus on phone theft throughout the interview generated biased responses in both students and offenders.

In reference to (1), whether the responses are applicable to the wider offending population, it seems unlikely that the thieves interviewed differ vastly from those in other geographical areas. However, it is not possible to assess how representative is the range of experience within the sample compared to the wider population. This could be assessed by interviewing larger samples, and samples from different geographic locations, complemented by scrutiny of the repeat-offender literature. Furthermore, the sample could be extended in future research to include phone thieves who have not been caught, in order to assess whether their choices vary considerably from those who are arguably less successful (Walsh, 1986).

In reference to (2), the hypothetical scenarios presented were not intended to fully replicate real-world situations. The six matched pairs of phone aimed to identify those factors verbalised by offenders when they made between-phone choices, regardless of other situational factors. The 23 deterrent designs aimed to compare the deterrent effects relative to the other designs, and to elucidate the reasons why. Future research could ask offenders to verbalise their strategies when selecting people and phones in a real-world setting (see for example Logie et al., 1992). This would identify the wider situational factors and further victim-related factors considered by thieves, which may be missing from the rational choice event model resulting from this research and presented in Chapter 6.

There are few checks available on (3) the validity of the offenders' accounts, although within-sample comparisons of responses should identify any severe outliers. One comparison was made between offenders' claimed knowledge about SIM blocking and IMEI blacklisting against their knowledge demonstrated during the interview. Future research could replicate Indermaur's (1996) methodology of comparing self-reports with prosecution or police files. For the present results, it is hoped that any minimisers (who hide the worst details) will on aggregate cancel out the effect of any maximisers (who exaggerate the negative aspects of their behaviour), if they exist at all.

Finally, in reference to (4), the possibility that a focus on mobile phone theft and the possibility that the order of the questions might have generated demand characteristics, i.e. increased the probability of exaggeration, false reporting or its opposite. The initial sections of the questionnaire were deliberately kept general in order to allow exploration of the offenders' genuine knowledge levels of phone theft. Therefore, a cross-check for likely exaggeration was possible, when analysing whether the responses of more and less experienced thieves differed. Furthermore, the aim of the sections asking about choices between matched pairs and the deterrence effect of the 23 designs were deliberately designed to ask about choices within these parameters presented, not to ask about choice rates in the real world per se. Again, a cross-check of reported preferences (preferences between model pairs) and data from NMPCU allowed some assessment of how accurate the offender responses were. The possibility of exaggerated between-model choices, is genuine, because participants were presented with only one pair of phones at a time. However, the aim of these questions was as much to identify any factors used to differentiate, and not the preference strength per se. Some exploration of how any preferences stated were reflected in real world phone theft data was possible. These analyses are presented in Chapter 6. Further analysis of the types of phones discarded, such as those handed in to stolen property departments, would develop the work presented here further: An analysis of the models discarded and their characteristics would enable an assessment of whether discarded phones are the corollary of those most commonly stolen, i.e. the older and less valuable models. In effect, such an analysis would attempt falsification of the hypothesis proposed here and supported by the evidence so far, that more valuable and modern phones are preferred by thieves, even opportunistic ones who happen across a lost handset.

Conclusion

This chapter has described the stages of identifying a suitable sample of convicted mobile phone thieves and of designing an interview schedule to be used for the research. After defining the aims of the interviews, the interview schedule was designed following generic sociological and specific criminological research advice concerning questionnaire design and interview conduct. In parallel, much effort was spent contacting prisons and Young Offenders Institutions within the Midlands area in order to secure research participants. The interview design aimed to minimise the compounding effects of methodological issues including interviewer conduct; question wording and order; and the hypothetical nature of the scenarios presented. While every effort was made to minimise these effects, the interview was conducted in the context of an interview about mobile phone theft: therefore all biases can not have been avoided. There remains some risk that offending behaviour, and between model variability, were inflated due to the false scenarios presented. However, comparison of stated preferences with real world police data allows some assessment of the scale of any inflation. Future research should focus on the corollary: an analysis of ‘by catch’ or phones handed in to lost property departments. The results of the interviews are presented in the following chapter.

Chapter 6: Results of the interviews

The final data set

Offenders

The final data set consisted of 40 male offenders aged 16 to 30 yrs old, who had been involved in mobile phone theft. The majority (77%) were aged between 16 and 20yrs. In all 85% (n=34) of participants were sourced from local YOIs and a local prison, with the remainder (n=6) being identified by two local Youth Offending Services. Table 6.1 below displays the breakdown of both offender and student interview sources. Those from the YOIs and the prison were interviewed on the wings in which they were incarcerated. Those from Youth Offending Services were interviewed in a variety of locations ranging from a static caravan home, to a shed while they were taking part in rehabilitative Art Therapy.

Students

In all, 45 male students were asked the questions in sections II (matched pairs) and III (23 deterrent designs) of the interview schedules, and for demographic information. It made no sense to ask them about their offending behaviour. The majority of student responses came from the BSc Product Design and Technology and BA Industrial Design & Technology (82.2%; n=37). Six were enrolled on the MSc in Criminology; and a further two (4.4%) randomly selected students were stopped on campus and asked to take part in the questionnaire. The process of randomly selecting students on campus was not pursued because identify willing participants was time consuming. There were no females in the final offender data set, and so female student responses were omitted from the final analysis.

The final sample is geographically convenient, and focused on samples from the East Midlands. It therefore risks not being generalisable to the whole of the UK.

Previous research has shown for example that robbery location varies with geographical area characteristics (Bernasco and Block, 2009). However, the main focus of the interviews was on choices made within the theft location, i.e. hypothetical choice of target (person and handset), and not the movements which resulted in the coincidence of offender and suitable opportunity. There is therefore a low risk that the opinions of this sample of offenders will vary considerably compared to others (see also Hochstetler, 2001). At worst, the sample represents a starting point for describing offender decision-making and comparing the responses of offenders with students. If future research reveals regional variation, then that will be the time to develop region-specific models.

Table 6.1: Breakdown of interview sources

	Source	**Frequency**	**% of all interviews**
Offenders	YOI Brinsford: Young Offender	18	21.2
	YOI Brinsford: Juvenile	10	11.8
	HMP Birmingham	6	7.1
	Leicestershire YOS	3	3.5
	Staffordshire ISSP	3	3.5
	Total	**40**	**47.1**
Students	Student: BSc/BA Design	37	43.5
	Student: MSc Criminology	6	7.1
	Student: Random	2	2.4
	Total	**45**	**52.9**
All	**Total**	**85**	**100**

Conducting the offender interviews

Offenders were almost all interviewed one-to-one. Exceptions came from those identified by YOSs, where a parent or YOS representative was present. Each interview took approximately an hour, and had to fit in with establishment routines. This sometimes resulted in interviews being cut short if participants were needed for an educational session, for a solicitor’s meeting, or even in one case because the individual was being moved to another establishment.

Entry to prison wings was not possible before 9.30 am; between 12 noon and 2pm, or after 4.30 pm. At these times offenders were either being moved to and from cells for eating purposes, or were locked in their cells as part of the everyday reality of incarceration. Mass movement of offenders by HMP staff was labour intensive and time consuming, because of the need to count each offender in and out at each stage. At other times, offenders were not available for interview because they were taking part in educational or physical activities. Interestingly some guards offered to go and interrupt educational and physical activity in order that interviews could be carried out. These offers were declined because it seemed unethical to interrupt any rehabilitative activities, and could have caused resentment from the participants therefore decreasing their cooperation during the interview.

Queues at reception, security checks and waiting for staff who were free to act as escorts all meant that entry to the establishments was sometimes not achieved until after 10am. The only items allowed past the prison security function were the interview schedules, consent forms and a pen. Car keys and mobile phone were left in a secured locker at reception in compliance with establishment rules.

The various daily routines and activities meant that at most, four interviews were possible in one working day. This maximum was rarely achieved because any delay, such as a wait while guards located and then escorted an offender to interview, would mean only one interview could be conducted in a morning or afternoon. Lunch was a solitary affair taken in the car park of the establishments, since all visitors were requested to leave during lunchtime lock up. However this did provide an opportunity to add extra notes to any interview schedules completed in the morning.

When interviewing the incarcerated offenders, each participant was escorted from their cell to a room designated as the interview room. Researchers were always closest to the exit door and noted any panic or help call buttons situated on the walls. In the event none of the participants were in the least bit intimidating or threatening. Many were respectful, calling the present author ‘Miss’, and seeming to welcome the break from their daily routine.

Interviews conducted with younger participants from Staffordshire and Leicestershire City YOTs involved fewer security logistics than those conducted within HMP institutions, but were influenced in other ways. Three individuals from Staffordshire were interviewed during an art therapy class. They were finishing the production and decoration of wooden objects created during a series of workshops. One object in particular was an outstandingly well crafted rocking cot for one teenager’s unborn child. Unfortunately, time ran out during these interviews, meaning questions concerning their offending behaviour were not answered fully. However the three participants did answer questions concerning choices within six matched pairs of phones and the deterrent effects of the 23 design solutions.

Another interesting interview location was on a mobile home site, where the family of the young offender lived. The majority of the interview was conducted out of earshot of the individual’s mother, who was clearly ashamed of her son’s behaviour, and might well have affected his responses had privacy not been sought.

For convenience, Table 6.2 below is repeated from Chapter 5. It lists the research questions which the interviews aimed to answer. The results are then presented in the order of these research questions. The key findings and conclusions are summarised and discussed at the end of the relevant sections, before being pulled together in the chapter’s final section. Quotes are used throughout and represent verbatim the responses of offenders, unless square brackets [ ] denote some filling in by the author to aid clarification.

Table 6.2: Interview research questions

9) Are mobile phone thieves discerning or do they take any objects available for theft?
10) Which phone-specific factors (if any) affect thieves' choices?
11) Specifically, does IMEI blacklisting deter thieves?
12) Specifically, can iconography and semantics deter thieves?
13) Which situational factors (if any) such as the nature of the victim, or the presence of witnesses, affect thieves' choices?
14) What level of knowledge do phone thieves have of fencing stolen phones, reprogramming IMEIs and making false insurance claims?
15) Do the responses of more experienced thieves differ from those of less experienced thieves?
16) Do the responses of offenders differ from those of a non-offending control population?

Results

The results sections below are numbered and in bold to denote research questions. Sub-sections are denoted by headings in bold and italics.

Research question 1. Are mobile phone thieves discerning or do they take any objects available for theft?

Phone specialists and generalists

Question 72 asked participants whether, in general, they preferred to take phones rather than other objects. Nearly half (46%) of the 26 valid respondents expressed a preference for phones, implying there exists a population of mobile phone theft specialists. The term 'specialist' refers to the choice of theft object within acquisitive crime types, and not to 'stability in offending types' as used in some research into criminal careers (e.g. Francis et al., 2004). The reasons given for preferring phones focused mainly on the financial value and the ‘enjoyability’ of phones. For example:

“[phones are] straight cash, everyone wants a new one.”

“You go by the value of the phones, depends how much money you get for it.”

“Newer ones are better. I always wanted the best camera [and that] for myself, and obviously if you’re selling it you get more money for it don’t you?”

The responses to this question also highlighted that the use of a stolen phone was flexible:

“When we was kids they were the things to have. [You’d] use them for a bit, and sell ’em if you needed money.”

A third (34%) of offenders were generalists, reporting their choice of theft object depended on the situation. Money, laptops, iPods and MP3 players were specifically mentioned as common alternatives to phones. Five individuals (19%) appeared to mainly commit offences other than mobile phone theft, in that they preferred to take other objects instead of phones. Of these five respondents, two were car thieves who took phones as part of the acquisitive trawl, and two did not give explanations. Only one offender (0.04%) expressed the opinion that phones were not worth enough money to warrant the risk and effort of theft. This in itself is a rational choice, according to the perceptions of that offender. The same individual hinted at being involved in his brother’s drug running business. He also stated that his brother sometimes accepted phones as part payment for drugs, and so had some knowledge about using and disposing of stolen phones. Therefore his responses are included in the analysis.

Stated preferences

The most direct evidence of phone-specific selection came through asking offenders whether they preferred to take some models of phone over others, or if they routinely took any phone available (Q74). Table 6.3 below shows that three quarters (75%; n=21) of respondents stated they would choose which models to take. The minority (n=6) who stated that they took anything available appeared to do so because phones were not their primary focus.

Table 6.3: Proportion of offenders who reported they made choices between models.

Response to "Make a choice?"	**Frequency**	**Valid %**
Yes made a choice	21	75.0
No took anything available	6	21.4
Depends	1	3.6
Total	28	100.0

Four respondents offered the information that they had either left, or even given back, phones they did not want. The action of leaving an available phone involves a very clear decision driven by strong preferences; the act of giving a phone back to a victim even more so. They provide further evidence that the belief that phone thieves are purely opportunistic is incorrect.

"If it's an old heap of junk I can't be bothered with it 'cause no one wants to buy it. [ ] I take newer flash ones."

"[I took the] latest ones on the market, ones you could get more money for and stuff like that. I did leave one because it was so crap, a Nokia 402."

> "I tended to take the newest ones, with cameras and MP3s [etc]. Once I stopped someone and gave it back 'cause it was so shit."

Research question 2. Which phone-specific factors (if any) affect thieves' choices?

Preferences within matched pairs

Q13 thru 24 required participants to verbalise whether, and why, they would prefer to take one model rather than another. Participants were shown pictures of six pairs of matched phones as described in Chapter 5. Comparisons of the aggregate strength of preferences within and between pairs are made by calculating a 'preference ratio'. This is the number of offenders who chose the more popular model within each pair divided by the number who chose the less popular one. Responses of 'Don't know' or 'I would take neither' are omitted.

Table 6.4 below displays the offenders' preference ratio for each of the six pairs. The strongest preference ratio is ranked at the top, with the pair eliciting the most split opinion at the bottom. The first column, 'viewing order', shows the order in which the pairs were presented to offenders during interview. The second column shows the pair name and the valid n (offenders who expressed a preference) within each pair. In the third column the preferred phone model is named on the left for each pair.

Table 6.4: Offender preferences within 6 matched pairs of phone

Viewing order	Pair Name (n)	Phone models in pair	Preference Ratio
1	New vs. Old (39)	Nokia 6020 vs. Nokia 5110	39/39
4	Sliders (36*)	Samsung D500 vs. Nokia 7650	33/36
5	Clamshells (39)	Motorola Razr vs. Motorola V300	34/39
3	Candybars (39)	Nokia 7610 vs. Nokia 6020	28/39
6	Concepts (40**)	Sony E Concept vs. Fortress	28/40
2	Candybar Upgrade (32***)	Sony E K700i vs. Sony E T630	20/32

*= One respondent could not decide between the phones; two would take neither.
**= One participant only cooperated and chose between the pair Concepts.
***= Five respondents could not decide between the phones; two would take neither.

Figure 6.1 below visualises the strength of preference within each pair, but the order of the bars reflects the order of the pairs and the models as they appeared on the interview showcards. The results suggest that the research team's efforts to randomise the placement of the phones most likely to be preferred were mostly successful.

Figure 6.1: Phones chosen within each pair as presented to participants

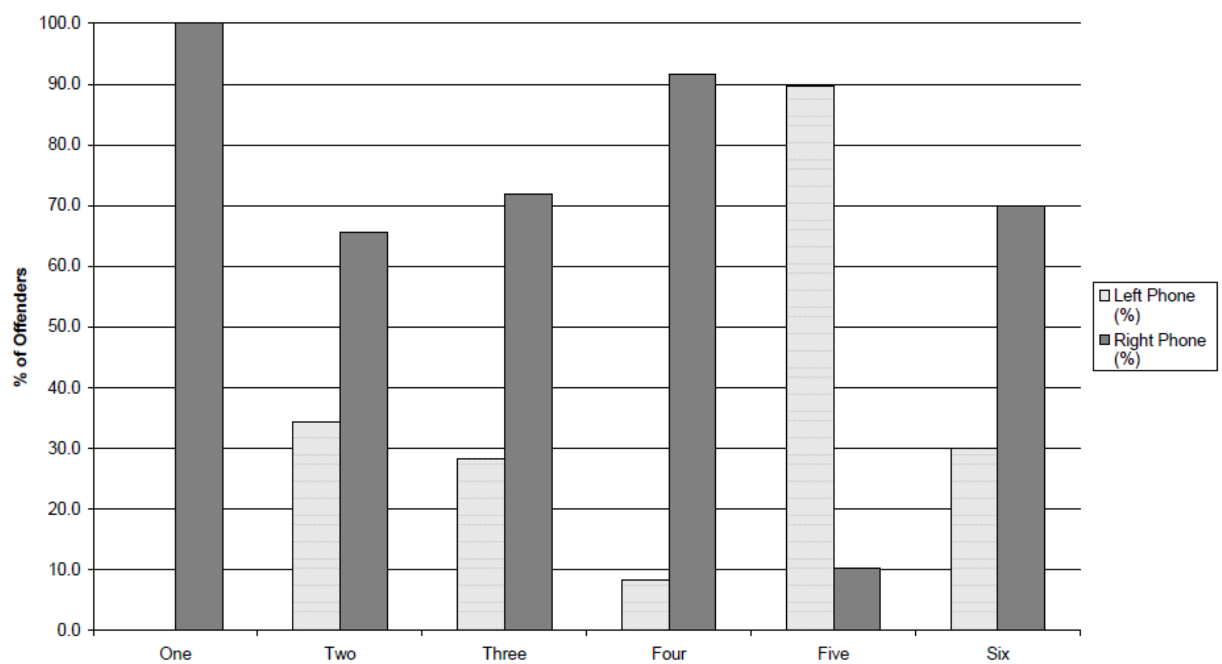


Figure 6.2 below shows the same results between pictures of each phone pair. The order of results is the same as in Table 6.4, and the preferred phone is shown on the left for consistency.

<u>Figure 6.2: Offender preferences within 6 matched pairs of phones.</u>

Pair: Old Vs New

Nokia 6020 vs. Nokia 5110

39/39

Pair: Sliders Icon

Samsung D500 vs. Nokia 7650

33/36

Pair: Clamshells Icon

Motorola Razr vs. Motorola V300

34/39

Pair: Candy Bar Curves

Nokia 7610 vs. Nokia 6020

28/39

Pair: New Concepts

Sony E Concept phone vs. Loughborough’s Fortress

28/40

Pair: Candy Bar Upgrade

Sony E K700i vs. Sony E T630

20/32

Strength and speed of preference and model familiarity

Easily recognised and iconic models elicited stronger aggregate preference ratios and faster preference decisions by individuals. Pairs containing unfamiliar phones and closely matched phones elicited a split aggregate response, more 'don't know' responses and slower individual decisions.

The strongest preference was expressed in the first pair shown, named Old vs New. The Nokia 6020 is clearly a more recent model than the Nokia 5110, and perhaps not surprisingly all offenders chose the newer. Even here however, the richness of information gained from face to face interviews is exemplified. One offender hesitated and commented that he believed the older Nokia was no longer available, but that he had known someone in the past who was looking for such a model to use in an old car. The offender would take the older Nokia if he knew that person was still interested, showing flexibility in target choice and that he was prepared to steal to order if the opportunity arose.

The two pairs eliciting the second and third strongest preference ratios each contained an iconic (well recognised and market leading) model. Within the pair Sliders, this was the Samsung D500 and within the pair Clamshells, the Motorola Razr. Many offenders recognised and named the iconic models, and made their decisions particularly quickly having recognised the model. Preferences for these models were due to disposability and enjoyability.

“The Razr- [they’re] popular phones so you know you’ll sell ’em quick and easy.”

“Its more popular, [you’d] get forty to fifty quid for the V3.” (Referring to the Razr)

“The D500. You’re guaranteed seventy pounds for that []”

“The D600. It’s newer than the other one, everyone’s after them.” (Misnaming but referring to the D500).

In contrast, when pair 6 (Concepts) was presented, offenders often paused for a long time, verbalised their thought processes and asked questions. They were asked to make their choice before the interviewer explained about the phones’ functionality.

“I would wonder how it's going to work” (talking about the Fortress)

“[Fortress] looks like it’s got more technology. Can do more things, and worth more money.... I dunno though, it says stolen on it.”

“That one [right model] looks nice, unusual. That left one- I don't even know what it is man.”

Offenders also paused and looked at the detail of pair 2 (Candybar upgrades) where the Sony Ericsson K700i was visually very similar to the T630. This pair elicited the greatest number (n=5) of ‘Don’t know’ responses, all of which were due to the models being too similar to chose between.

Value, functionality and ‘moderness’

The reasons given for the choices made within the six matched pairs were coded into five data-driven categories: Moderness; Functions; Form and style; Financial value and Other. Each category is defined below:

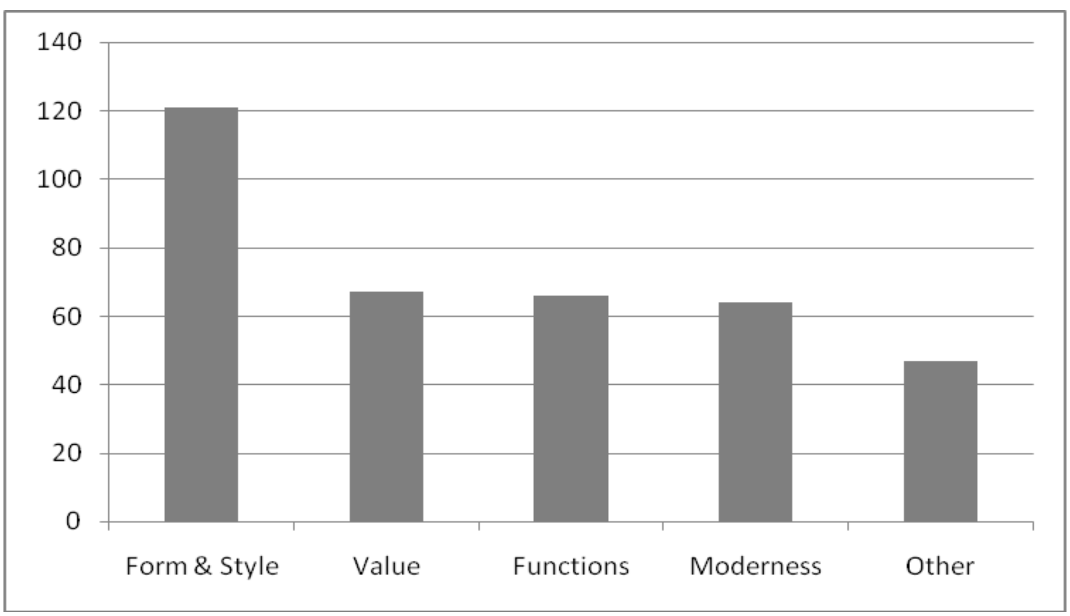
- Moderness- words such as age, new, or modern scored a mark in this category
- Functions- any mention of functionality, such as internet or a colour screen scored a mark in this category.
- Form and Style- any reference to how the phone looked, such as smaller, slimmer, cooler, less bulky, or comments such as ‘I prefer it it looks better’ scored a point in this category.
- Financial value- any mention of monetary value scored a point in this category.
- Other- this category included reasons such as personal experience of the phone, or not being able to make a choice, or other comments which did not fall into the other four categories.

The responses were scored by hand within SPSS™ and a random sample was checked for scoring consistency within the research team. The categories are not mutually exclusive, meaning that a sentence such as ‘That one looks new because its shiny, and it’s got internet’ would score one in each of the three categories Moderness, Functions and Form and style.

Figure 6.3 below shows the number of times each factor was mentioned as a reason for the choice made. Form and style was explicitly mentioned almost twice as often as Financial value, Functionality, and Moderness. Care was taken to only score Form and style if it was specifically mentioned. So a response such as ‘It looks nicer- its newer and slimmer and I prefer slimmer phones’ would score in both Form and style because slimness was mentioned, but also in Moderness. The answer ‘It’s the more up to date model so I’d get more money for it’ would score in Moderness and Financial value, but not in Form and style because although it is implicit within the explanation, specific aspects of form and style were not verbalised.

Value, Functionality and Moderness were mentioned with almost equal frequency by the offenders. These all relate to the CRAVED (Clarke, 1999) characteristics of Value, Enjoyability and Disposability.

Figure 6.3: Count of factors mentioned by offenders when choosing within six matched pairs of phones



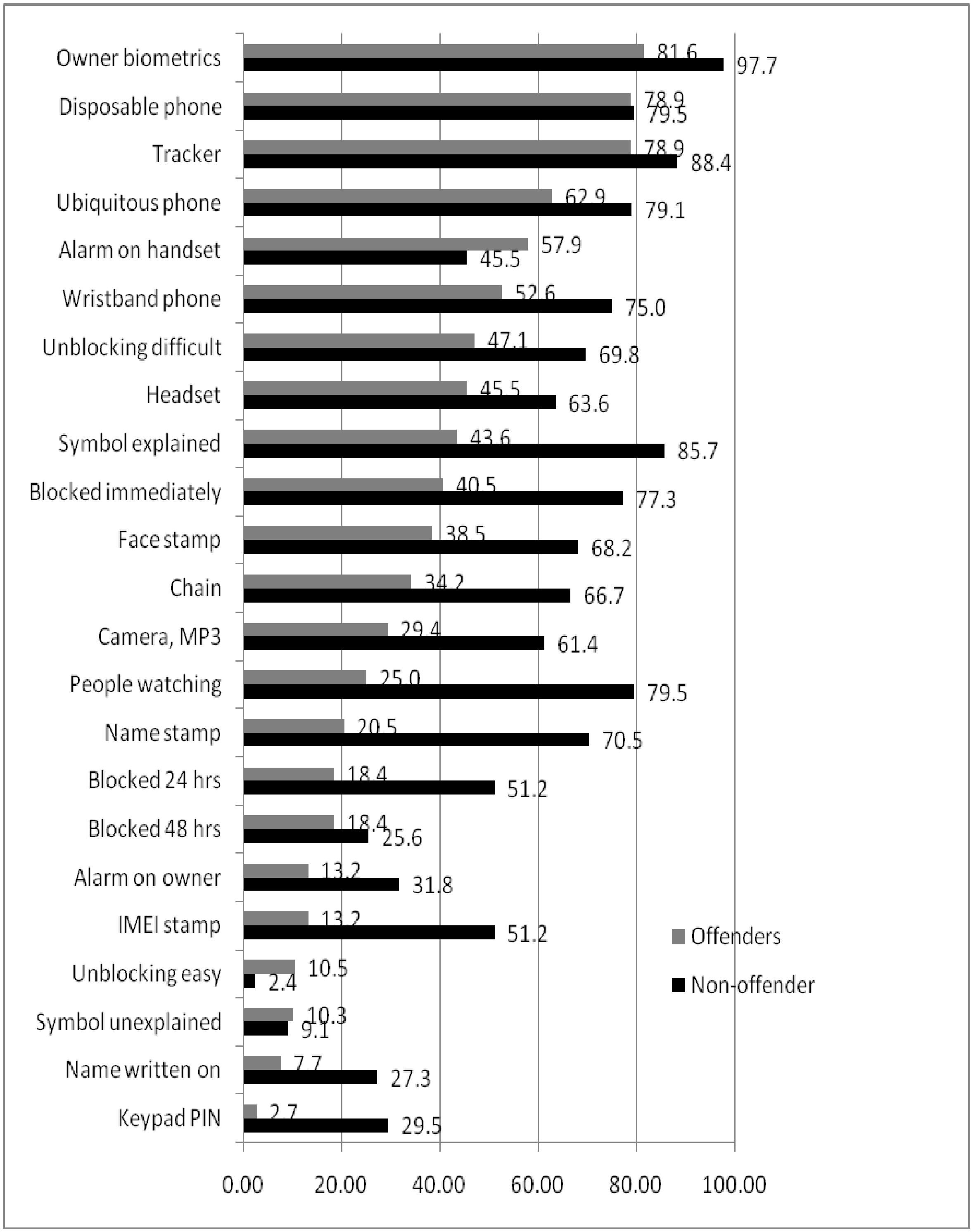
The following section groups research questions 3,4 and 5 together because these are all answered by analysis of the responses to the deterrent effects of 23 design solutions. When participants had verbalised how much they were or were not deterred by each deign, they were asked why, and this allowed the factors that they considered to be identified. This allowed quantitative ranking of the relative deterrent effects of the 23 designs, and qualitative descriptions of the choice-structuring properties of phone designs and the wider theft situation.

Research question 3. Specifically, does IMEI blacklisting deter thieves?
Research question 4. Specifically, can iconography and semantics deter thieves?
Research question 5. Which situational factors (if any) such as the nature of the victim, or the presence of witnesses, affect thieves' choices?

Q25 thru 70 of the interview schedule asked participants to express whether and how much they would be put off an easy theft opportunity by 23 deterrent designs. The results for both offenders and students (non-offenders) are presented in Figure 6.4 below. Statistical test to assess whether there were significant differences in the responses of offenders and non-offenders are presented later under Research Question 7.

The section below Figure 6.4 describes the reasons given by offenders for the deterrent effect of each design in turn. The total n of valid offender responses is given in brackets after the title of the design. The following section organises responses into phone-specific factors and the wider situational factors which offenders spontaneously verbalised.

Figure 6.4: The deterrent effect of 23 design solutions



Biometric phone (n=38)

The design which was most effective in deterring offenders was a biometric phone, where only the user could activate the phone via their fingerprint. The majority of deterred offenders (n=31) spoke about not being able to use the phone, or it not working without the biometrics of the owner. Several mentioned that although they were not aware of how to bypass the technology, someone would be or would develop methods in time. A few offenders considered increasing levels of threat and violence before rejecting these options: two considered but rejected forcing the victim to give their fingerprint, and one stated that he was not prepared to cut off someone's finger and so would not take the phone. One offender thought that it might be possible to use the phone if it was on or activated when stolen, but still decided the probability of this occurring was low and stated he would not take the phone. Five of the seven offenders not deterred by the biometric phone believed that they or someone would find a means to bypass the technology. One of the five also mentioned the alternative option of selling for parts in the event the technology could not be bypassed.

Tracker phone (n=38)

This design deterred 30 offenders. The phone was described to them as having a tracking device installed, meaning that its location would be known to the owner and the authorities. The majority of deterred offenders believed that the phone would be traced, although some verbalised doubts as to whether the police would follow up a less serious offence such as a mobile phone theft. Of the eight who were not deterred, four believed they could take out or bypass the tracking device, and four stated they would quickly sell on the phone before they could be traced.

Disposable (n=38) and ubiquitous (n=35) phones

The disposable phone was described as a cheap, cardboard phone which was designed to be disposed after a small credit limit had been reached. The ubiquitous phone was described as a phone which had better functionality than the disposable phone, but was free to everyone since payment was for the services accessed on it. The offenders deterred by the disposable (n=30) and ubiquitous phones (n=22) all stated that the reason was the lack of resale value. Of those who were not deterred by the ubiquitous phone, the majority said they would take it just in case there were some information on the phone or the possibility of selling parts. Those not deterred by the disposable phone were mainly hopeful that they could use any credit available.

Alarm on handset (n=38) and alarm on owner (n=38)

These designs utilised proximity alarms which were located on the phone user, such as in a piece of jewellery. The handset alarm design activated an alarm on the phone handset when the handset and proximity detector were removed a few feet away from each other. Conversely, the alarm on owner design was described as an alarm sounding on a wristband or necklace worn by the phone owner. The alarm on the handset put off a much larger proportion of offenders than the alarm on the owner (57.9% vs. 13.2%) The main reason was that those deterred by the handset alarm did not want attention brought to themselves. The risk posed by an alarm being on the owner was not perceived to be as high because it did not identify the thief.

Wristband phone (n=38)

The wristband phone is depicted in Figure 5.6 of this thesis. Twenty offenders were deterred by the design, many of whom stated that they were not prepared to commit a robbery instead of a theft. They feared the violence of the immediate struggle and the increased likelihood and severity of punishment for such crimes.

“[You’re] going to get a lot of struggle plus [he’s] got a spare hand to punch you!”

Those who were not deterred by the wristband design all stated that the phone would be worth a large amount of money, and that there would be a high demand for them on the black market.

> “..love it...[I’d] knock the guy to the floor for it.”

“Would be a craze to steal them: [face] needs to be flexible, so would be expensive. How would you talk on it though?”

IMEI blacklisting immediately (n=37), at 24 hours (n=38), and 48 hours (n=38).

Offenders had already been informed of the blacklisting process towards the start of the interviews and were reminded of this during these questions. The deterrence value of blacklisting increased if it was immediate compared to at 24 or 48 hours, but it still deterred only 40.5% of offenders. Only 18.4% of offenders were deterred by blacklisting at 24 hours and at 48 hours. Table 6.5 below depicts the reasons for offenders not being deterred by blacklisting at different time periods. Although the sample size is small, this analysis shows that selling phones on quickly, and reprogramming the IMEIs were both key reasons for not being deterred by blacklisting that was not immediate. The belief that phones could be reprogrammed was the main reason for immediate blacklisting not being a deterrent. The analysis only includes responses where a reason was given for the non-deterrence.

Table 6.5: Reasons why offenders were not deterred by blacklisting at 48hrs, 24 hrs and immediately

	Blacklisting time period		
Reason not deterred	**48 hrs (n=27)**	**24 hrs (n=24)**	**Immediate (n=16)**
Sell quickly	55.6	54.2	0.0
Reprogramme	18.5	16.7	50.0
Mix of options	14.8	25.0	25.0
Sell parts	7.4	0.0	18.8
Sell abroad	3.7	4.2	6.3
Total % of non deterred	100.0	100.0	100.0
% of all offenders who were put off	*18.42*	*18.42*	*40.54*

Reprogramming with ease (n=38), or with difficulty (n=34)

Offenders were asked whether the fact that a phone would be blacklisted would deter them if they had a friend who could reprogramme it (‘unblocking easy’), and if the chips inside the phone needed changing, which made ‘unblocking’ difficult. Only four offenders were deterred at all if they knew someone who could circumvent the blacklisting, whereas 16 were deterred if the IMEI chip had to be replaced. Those not deterred by the more difficult reprogramming (n=18) almost all stated that they would sell the phone for parts, still get round the chip themselves, or in one case, try to sell on the blacklisted phone.

Camera, MP3 (n=34)

Offenders were asked about the deterrent effect of a securely blacklisted phone which would still work as a camera and/or MP3 player. Once this was suggested, it decreased the proportion deterred by immediate blacklisting from 40.5% (n=15) to 29.4% (n=10). This suggests that not all of the offenders had spontaneously considered the use or resale value of the phone parts. Those who were deterred did not believe the effort and risk of crime commission was worth having a phone with only partial functionality.

People watching (n=32)

The concept of people watching a phone theft only deterred eight offenders. Those who were deterred believed that the watching public might intervene, or act later as witnesses. Some offenders had been caught by being recognised, and would not risk it again. The main reasons for non-deterrence were that offenders believed they could carry out the offence quickly and deftly; that the public were unlikely to intervene; or in a few cases, that the need for money would override the risk posed by the public.

“I've done it in the past- people are too scared to do anything.”

“If they were proper looking at the phone it might [put me off].Not really if I could get away with it.”

Headset (n=33)

Offenders were asked whether the sight of a headset, implying the presence of a phone hidden on the owner, would deter them from theft. Eighteen of the offenders were not deterred by this design. Most of them stated they were prepared to force the victim to give up the phone, but that this depended on the value of the phone. Those who were deterred (n=15) were put off by the risk of escalation of the offence to a more violent and serious one, or they were unhappy with not being certain of the phone’s location on the victim.

“If I wanted it I'd get it, you get me. I'd get his bag or pockets or summat.”

“You might get into a fight and that, and that's stupid (get longer sentence, get punched.) Not worth it for a £30 phone.”

Symbol explained (n=39) and unexplained (n=39)

The Eye of Horus was shown to offenders with no explanation of its meaning, and then again after explaining that it meant that the phone would not work once reported stolen. This symbol is presented in Figure 5.4 of this thesis. Almost ten percent of offenders (n=4) were deterred by the symbol in the absence of any explanation. The reasons they gave were that it looked odd and might make them suspicious, or that it would decrease resale value. Once the meaning of the symbol was explained, the deterrent effect was roughly equal to that of immediate blacklisting, suggesting that well publicised symbolism can affect offenders' choices.

Chain (n=38)

Offenders were shown a picture of a Lanyard chain (Figure 5.5 of this thesis). Only a third (n=13) were deterred by this. Of the 25 who were not deterred, eight believed that the chain would make a snatch and run robbery more easy: the chain identified the presence of a phone and would probably snap. Others stated they would be prepared to escalate the level of threat or violence, depending on the value of the phone. Those who were deterred believed that the chain would not snap, or they were not prepared to escalate the threat of violence necessary to obtain the phone.

Face stamp (n=39), name stamp (n=39), IMEI stamp (n=38) and name written on (n=39)

Each of these four designs aimed to individualise the handset and signify ownership. In general, stamps had a greater deterrent effect than the written name, but none of the designs deterred a high proportion of offenders. The offenders deterred by the face stamp (n=15) reported that the face would decrease how 'cool' the phone was, decreasing personal enjoyability and resale value. Several mentioned that it also implied a young owner, and therefore a childish phone. Those who were not deterred by the face stamp, IMEI stamp and name written on the phones all stated that they would be able to remove the stamp or name, and use or sell the phone anyway. Those not deterred by the IMEI stamp (n=33) believed the police would rarely if ever check the IMEI. Most offenders believed they could wash or scratch off a written name.

Keypad PIN (n=37)

The keypad PIN, where the phone was protected by a 4 digit PIN code, was the least effective deterrent. Only one offender was deterred. Many offenders almost sneered at this idea. Most stated that it was commonly known that PINs could be reset and therefore there would be an easy and cheap way round this protection.

Key factors emerging from the 23 deterrent designs

This section highlights the key factors which offenders consider in relation to phone theft. It builds on the previous section by using further quotes from the offenders to demonstrate repeated themes from the interviews. The factors are represented in a rational choice event model for mobile phone thieves in Figure 6.5 below. This is based on the event model for burglary of an urban middle class area depicted in Clarke and Cornish (1985), which is reproduced as Figure 2.2 of this thesis.

Level of violence

Some offenders were deterred by the possibility of increased violence. Common reasons for being deterred were an increased risk of injury from a defensive victim, or of an offence escalating to a more violent one and thus having greater potential repercussions:

“Its like robbery- [you’re] risking physical damage”.

“Street robbery is serious. I’m not like that.”

“How would you get it off them? It turns into a robbery not a theft.”

Several offenders stated that they would make a judgement depending on the victim’s physicality. The presence of co-offenders was also sometimes considered.

“Depends- if I thought I could have ’em”

One offender’s verbal protocol revealed his immediate thoughts of how to remove the wristband phone- either by sliding the phone off or taking the person’s wrist off. He then decided that it was probably not worth the risk because in a struggle ‘people see you and that, you get me?’ The Lanyard chain resulted in similar considerations of increased risk of harm and prosecution:

“It makes a scene, like when the D500 first came out I pushed a guy and it led to a fight, and I got done for common assault.”

“[That’s] the same as the necklace idea- I don’t want a struggle.”

Typical statements from those who considered violence and decided it worth their while are below. These relate to the Lanyard chain.

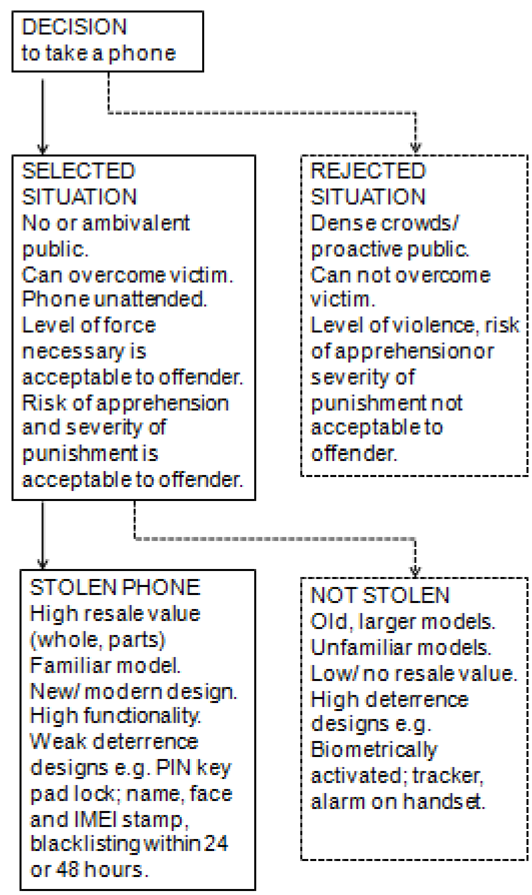
“If I was going to rob someone I’d bang them to the floor and rip it off. [Done this before] ..If you punch someone to the floor you’ve got all the time to get it.”

“[The chain] can just be ripped off”

“I’d still go for them- [it’s] easy to grab the chain, pull it and run off.”

It is difficult to assess the accuracy of any claims made by offenders that they would escalate violence levels. On one hand, an element of bravado may be involved, with interview participants wishing to ‘impress’ the interviewer (Walsh, 1994). However, participants might also not have wished to appear to be violent to the interviewer if they believed the interviewer would not see this as normal behaviour (Milne and Bull, 1999). This may have resulted in the effects of ‘maximisers’ and ‘minimisers’ cancelling each other out (Indermaur, 1996). Either way what is clear is that the need to use force and the associated risks of physical harm and of more serious judicial repercussions are key factors considered by mobile phone thieves when assessing potential theft opportunities.

Figure 6.5: Rational choice event model for mobile phone theft



(Adapted from Cornish and Clarke, 1985)

Monetary value

Financial value was mentioned in many offenders' responses to the deterrence designs. The following answers were given when considering the wristband phone, which looked modern and technologically advanced:

"As soon as they came out they'd be a target them would."

"...would be worth loads of money....You'd get loads for it."

"If a phone like that was worth a lot, [it'd] put me off a little but on the other hand it'd cause a scene. Not worth it, causing attention."

Counter moves in the arms race

Many of the offenders who were not deterred by technological issues such as IMEI blacklisting, PIN codes, alarms and tracking devices believed that they would find a way round the problem. Others said that if they did not already know someone who had the solution, they were confident that they soon would. This exemplifies the presence of 'flaw hunters' (Walsh, 1986) and the cause of the ongoing arms race between offenders and designers (Ekblom, 2008). It demonstrates why stagnation in innovation will result in increased theft levels.

"There's a way round everything. There's always someone out there who knows a way around it."

Others were already familiar with the design suggested and a possible counter move. When asked why he was not deterred by the tracking phone, one offender responded:

"Cos like cars you'd leave 'em parked up and see if they're really tracked" (see if someone comes along to retrieve it). "But if you sell it quicktime it doesn't really matter."

Another immediately considered how feasible the design suggestion was in terms of production costs and police response. The response is further clear evidence that offenders' decision making processes fit with a rational choice perspective, and suggests that offenders would be ideal for evaluating product vulnerability and security in schemes such as Project MARC (Armitage and Pease, 2008b) and as suggested by Clarke and Newman (2005: Chapter 6).

"I doubt they'd make them in the first place, they cost too much, plus the police wouldn't spend time tracking..... too many phones are taken."

Public watching

Offenders were asked outright about the deterrent effect of a watching public, but this was also a factor mentioned spontaneously in many answers. Hence it is briefly considered again here. The majority of offenders not deterred by the public believed the public would not intervene. Several who were deterred believed that the public might intervene, or that they might be able to identify the offenders later. The hypothetical scenario describing the presence or absence of members of the public may be too simplistic: many of the offenders stated that the nature and density of the public crowd would affect their choices.

"It depends- if I know the people, then yes it'd put me off, if I don't know the people, it doesn't put you off."

"I can be quick, and also busy places make [you] less obvious."

Research question 6. What level of knowledge do phone thieves have of fencing stolen phones, reprogramming IMEIs and making false insurance claims?

Reprogramming IMEIs

Reprogramming knowledge was measured by two means: firstly by asking offenders to describe what they meant by reprogramming, and secondly by assessing whether offenders spontaneously considered reprogramming when verbalising their reactions to the 23 designs

Nearly two thirds (61%) of offenders claimed to know about reprogramming when asked directly. Just over half (51%) were categorised as knowledgeable about IMEI reprogramming according to analysis of responses to the 23 deterrent designs. This is one of the few factors which could be assessed for exaggeration, and the scale of exaggeration is not particularly large

Fencing stolen goods

Offenders were asked directly whether, and how they sold on any phones they stole in Q91 and 92 of the questionnaire. Table 6.6 below displays who bought phones from the 20 offenders who reported regularly selling stolen phones. The majority of offenders sold to fences such as friends who knew local shops to sell to, or another distributor. The shops mentioned were always small, local shops and not large chains. Phones were sometimes swapped for goods but mostly sold for cash. Four offenders mentioned people or groups that they recognised as local fences, and commonly identified them by their ethnicity and not name, perhaps signifying the tenuous nature of their relationship with the fences. Several offenders knew what later happened to the phones: those sold to shops were sold in the shops, while those sold to friends were distributed to friends, relatives and other fences. Most offenders did not know whether the fences altered the phones before selling them on. One offender mentioned phones regularly being sold abroad. Only seven knew about the prices charged by fences for stolen phones, and five said that the price was only just below the price in a legal shop. The offenders were paid approximately half to three quarters of this resale value for the phones they provided, and the value was lower if the handsets were blocked.

Table 6.6: Who bought phones from the offenders

Sold to	Count	Notes
Friend	6	Most friends were in fact local fences
Shop	8	Mostly local small shops
Market etc	4	‘Chinese men on the market’; 'the DVD guy'; ‘the Bosnians who were always on the corner’.
Other	2	Drug dealing brother; anyone in need of a phone.
Total	20	

False insurance claims

Twenty eight offenders responded to the question of whether or not they would consider filing a false insurance claim. Sixteen (57%) said that they would or had done so, and twelve said they would not. This proportion is higher than that estimated by Tilley et al., (2004), and may reflect either the higher likelihood of offenders defrauding the system than the general population, or that the sample in these interviews exaggerated their readiness to commit illegal acts in the absence of real consequences (Carroll and Weaver,1986).

Research question 7. Do the responses of more experienced thieves differ from those of less experienced thieves?

In order to identify any differences in offender responses resulting from experience, the offenders were categorised into two data-driven groups, named ‘experts’ and ‘novices’. The groups were based on the three categories relating to the crime continuance model of the rational choice perspective (Clarke and Cornish, 1985). These are professionalism (skill sets and fencing contacts); life style changes (justification for offending behaviour, or the absence of consideration for victims); and peer networks (knowledge of other offenders and people who could by-pass security technology). The two groups were defined as below. There were a total of 16 experts and 24 novices.

- Experts: those who stated that they specialised in taking only mobile phones; had taken over 40 phones; had good or reasonable knowledge about IMEI reprogramming and SIM blocking; and had several contacts who they could sell to.
- Novices: those who stated that they sometimes took other objects along with phones; had taken fewer than 40 phones; and had limited understanding of IMEI and SIM technology. They tended to have limited options for selling on, and some reported receiving less money for their stolen goods than experts reported.

Variation in matched pair choices by experience

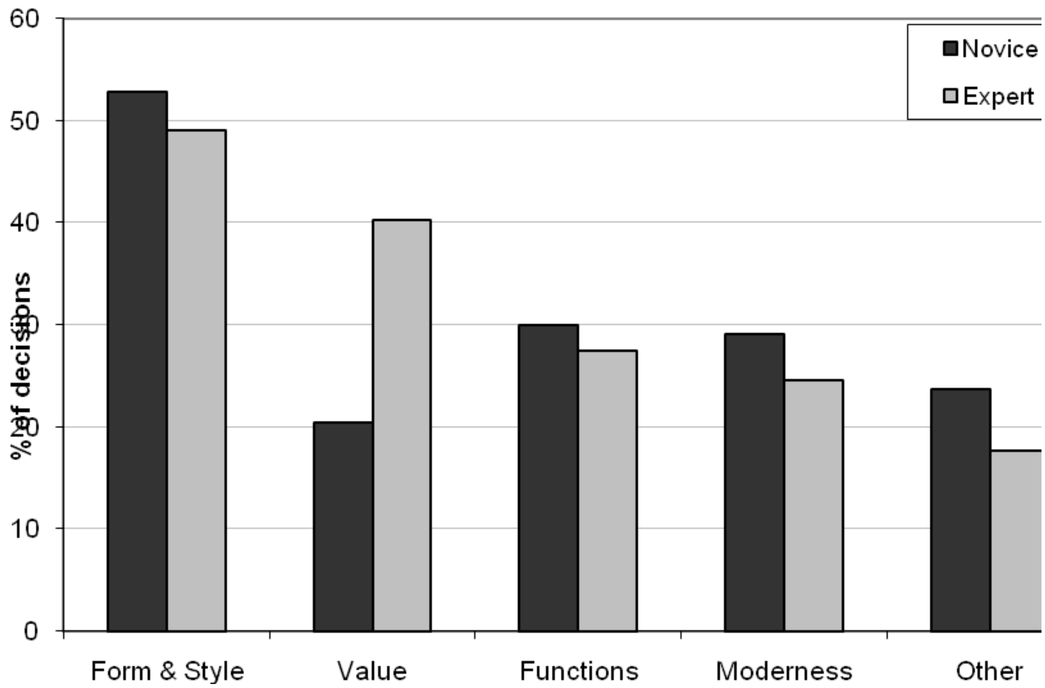
The preference ratios of experts, novices and all offenders were compared. Table 6.7 below shows that experts and novices always preferred the same phone within a pair. Fisher's exact test was used to assess whether there was significant difference in the choices made by novices compared to experts, because in most cases the expected cell count was less than five. None of the pairs resulted in a significant difference between novice and more expert thieves. Experts have stronger preference ratios for the pairs New vs. Old and Sliders. Only novices said they would ever leave both of a pair, suggesting they are slightly more easily deterred than experts. Novices expressed a slightly stronger preference ratio within the pair Candybar Upgrade, but this may be in part due to the low number of novices making that choice (nearly 20 precent either did not make a choice or said they would leave both). Not all offenders answered every question: all data shown below are of those who provided an answer.

Table 6.7: Comparing preference ratios between Experts and Novices

	Preference ratios		
Pair	**Novices**	**Experts**	**P-value**
New vs. Old	24/24	14/14	NA
Sliders	21/23	11/12	1.000
Clamshells	21/24	13/14	1.000
Candybars	17/24	10/14	1.000
Concepts	18/24	10/14	1.000
CandyBarUpgrade	14/20	7/12	0.703

Analysis of the factors mentioned by experts and by novices when choosing between models revealed that experts mentioned value more frequently than did novices. The two groups mentioned other factors in similar proportions, although novices were slightly more likely to mention functionality and moderness. Figure 6.6 below displays the proportion of choices in which each factor or choice-structuring property was mentioned by both groups. The results fit well with an explanation that experts consider resale value more frequently than do novices. Experience appears to lead to established cognitive scripts, where increased familiarity with different models allows experts to more quickly judge the key variable of interest, resale value, while by-passing the need to specifically assess functionality and moderness.

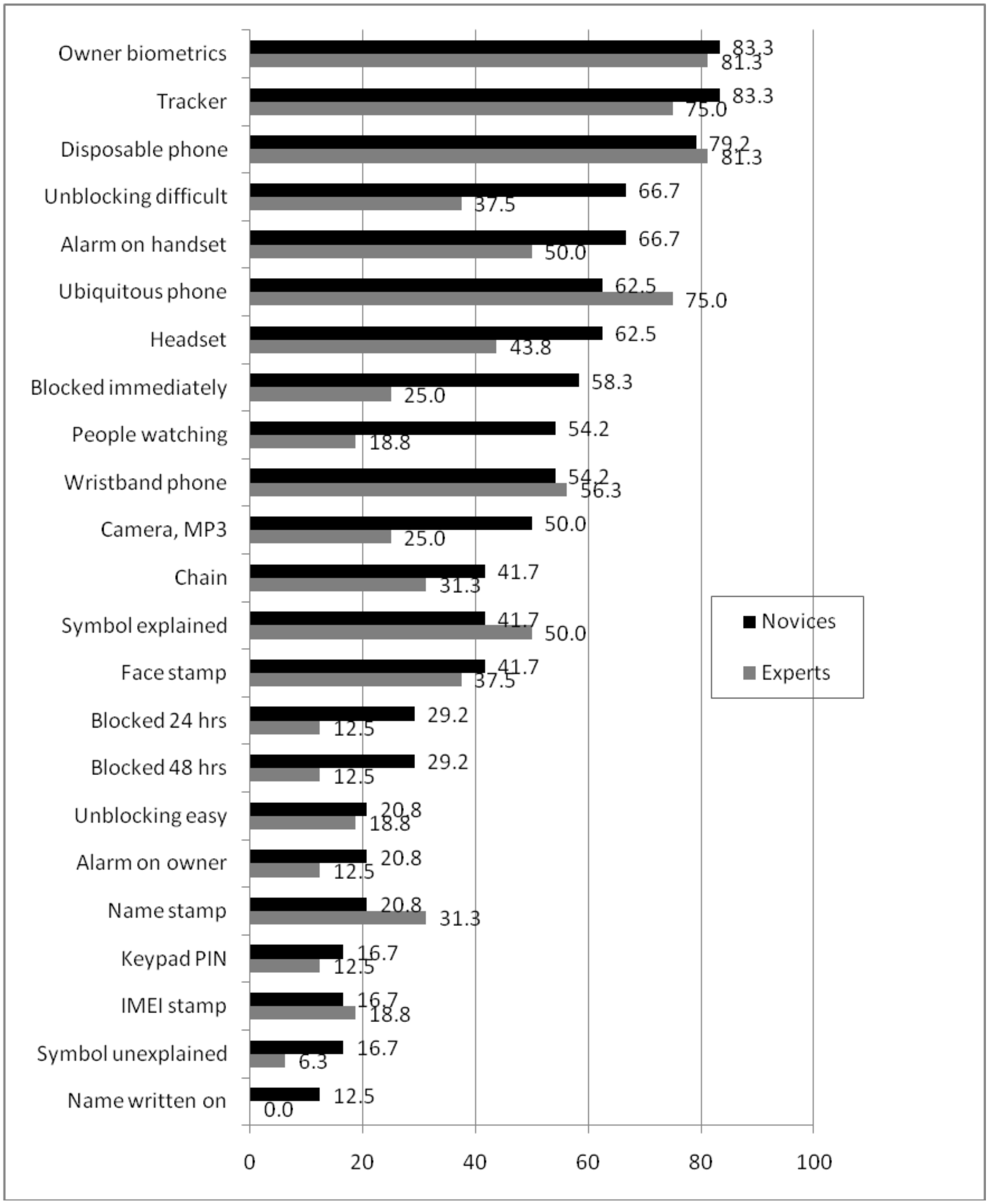
Figure 6.6: The proportion of expert and novice decisions in which five choice-structuring properties were mentioned



Variation in the deterrent effect of 23 designs with experience

Figure 6.7 below compares the percentage of novices and of experts deterred by each of the 23 designs solutions. The results show that in general, experts were less easily deterred than novices. However, Fischer's exact tests revealed that none of the design solutions elicited significantly different responses between novices and experts. On average across the 23 designs, 37.1percent of novices were deterred and 33.3 percent of experts were deterred. The numbers in each category are relatively low (a maximum of 16 experts and 24 novices for each design solution). The average difference in deterrent effect did not reach statistical significance (two sample t(37)= 0.63, p>0.5). However, the verbalised reasons for deterrence are worth exploration and are described below Figure 6.7.

Figure 6.7: The percentage of novices and experts deterred by 23 design solutions



Note: maximum (n) novices=24; maximum (n) experts=16

Note: none of the results were significantly different (Fisher's exact test)

Experts were not as deterred as novices by difficult unblocking; an alarm on the handset; blacklisting after any amount of time; and by people watching. Experts were in part defined as experts because of their awareness of security circumvention techniques such as reprogramming to overcome blacklisting. It is therefore predictable that they were not deterred as much as novices by blacklisting. Their opinions about the watching public are, however, interesting. Experts were more likely to state that the likelihood of the general public intervening were very slim, and this was also why the alarm on a handset was not as worrying to them as it was to novices.

For two of the designs, the ubiquitous phone and the phone with a name stamp, resale value was explicitly mentioned as the reason why experts were deterred more than novices. Experts were more likely to state that it was not worth their while to take these designs because of low resale values. This fits with the concept of increased skills and experience leading to more discerning decisions by experts, while novices might still be experimenting and 'try anything once'.

Research question 8. Do the responses of offenders differ from those of a non-offending control population?

Comparing demographics of offenders and non-offenders

Comparing differences between offender and non-offender samples was only meaningful if the socio-demographics of the samples did not vary significantly. Significant demographic variation between the two groups would mean that any differences in responses might be due to these factors rather than the offender/ non-offender categorisation. The socio-demographics collected for all participants were age range, ethnicity and geographic region of abode.

Offenders and non-offenders were closely matched on age: 75 percent of students and 77 percent of offenders were aged between 16 to 20 years. A

Mann Whitney U test confirmed there was no significant difference in age groups between offenders and non-offenders (U=879; p=0.803).

There was greater variation in the geographic area of abode in the student sample compared to offenders. Whereas 97.5 percent of offenders came from the East Midlands, only 60 percent of students resided in the area. However the difference in regions was not significant (U=824.5, p= 0.497).

There was a significant difference between the ethnicity of the student and offender groups (U= 695, p=0.029). Specifically, the proportion of students who were white was larger than that of offenders. Table 6.8 below displays the ethnicity of students and offenders, aggregated to broad ethnicity categories.

Table 6.8: Ethnicity of student and offender interview participants

	Student (%)	**Offender (%)**
White	88.6	67.5
Mixed	9.1	12.5
Asian	0.0	15.0
Black	0.0	5.0
Chinese	2.3	0.0
Total	100.0	100.0

Taken together, these results suggest there is merit in comparing the results of offenders with non-offenders. Any differences observed are not likely to be attributed to age, nor are they likely to be attributed to area of abode. Any differences between offender and non-offender responses may be attributable in part to ethnicity. Differences will never be conclusively attributable to the offender/ non-offender categories, because a wide range of other variables exist which might explain any differences observed. A key factor is the fact that the majority of students were design students, as opposed to students from a broader range of disciplines. Future research should investigate whether design students are more or less able to 'think thief' than students studying other subjects. It is not possible to control for any of the recorded demographic variables, including ethnicity, in the analysis presented below. Larger sample sizes would allow multivariate analysis to control for between group similarities, as used by Bouffard (2008) to control for age differences between groups.

Students and offender choices within six matched phone pairs

On aggregate, students chose the same phone models within each of the six pairs as did offenders. However, the strength of the student and offender preference ratios differed. Table 6.9 below displays the preference ratios for students and offenders for each of the six pairs. The final column indicates the strength of the difference in the preferences expressed by students and by offenders by dividing the student preference ratio with the offender preference ratio. The word ‘all’ is used in place of the symbol for infinity when all individuals in a group chose one model in a phone pair.

Table 6.9: Comparing student and offender preference ratios within 6 matched pairs of phones.

Viewing order	Pair Name (n)	Offenders	Students	Significant?
1	New vs. Old	39/39	43/43	NA
4**	Sliders	33/36	25/41	9.714 (p=0.002)
5*	Clamshells	34/39	33/34	NA (p=0.363)
3**	Candybars	28/39	29/39	0.076 (p=0.799)
6**	Concepts	28/40	38/40	8.658 (p=0.003)
2*	Candybar Upgrade	20/32	23/39	0.333 (p=0.566)

*Fisher’s exact test

** Chi-squared test

The results indicate that the students are reasonable predictors of offenders’ choices, because the same model was always preferred regardless of offending status, but there are important differences between offender and non-offender preferences. For the pairs Sliders and Candybar Upgrades, students expressed a weaker preference than did offenders. The students' preference for the iconic Samsung D500 model in the pair sliders was almost ten times weaker (0.13) than that of the offenders'. Students' preferences within the pairs Clamshells, Candybars and Concepts were stronger than offenders' preferences. For the pair Clamshells, students preference was nearly four (3.77) times as strong as offenders' preferences. For the pair Concepts, the students' preferences were eight times stronger than offenders'.

This result has important implications about the suitability of non-offenders as assessors of crime risk in new products despite the fact the for this sample, differences did not reach statistical significance. In the pair Concepts, student-predicted theft numbers for the preferred phone, the Sony Ericsson Concept phone, would be much higher than real theft numbers if offender preferences are a reasonable predictor of real-world theft patterns. The section below describes an exploratory analysis to assess whether either offenders or students preferences were similar to the theft patterns observed in police-recorded crime data.

Comparing the hypothetical choices to real-world theft patterns

The ideal way to assess how accurately student or offender choices reflected real-world theft choices was to compare offender and student preference ratios with the police-recorded theft risk for specific models of phone. Thus exploratory analysis was carried out to see if any validation of offender and student preference ratios was possible using the data available from the National Mobile Phone Crime Unit. For four of the models of phone chosen in the six matched pairs presented at interview, a real-world theft risk ratio has been calculated as part of the 2006 Mobile Phone Theft Index. The Index is described in Chapter 8 of this thesis. A direct comparison between the preference ratios and the Index theft risk is not appropriate, because the two ratios do not assess comparable choices. Preference ratios are a function of preference within a forced choice in a hypothetical scenario. The Index risk ratio is a function of preferences between many available phone models in real-world offences, and limited to NMPCU recorded crime data. What can be assessed is whether there is agreement between the *relative risk* of theft among the four models for which data are available.

Table 6.10 below compares the relative risk of theft for four models of phone according to three sources: the offender preference ratio; the 2006 Index risk ratio and the student preference ratio. The relative risk is depicted in the final three columns of Table 6.10 and compares the theft risk of the four models of phone, indexed to the risk for the Nokia 7610 (on the first row)[2].

Table 6.10: Comparing student and offender preference ratios with risk of theft according to police recorded data

					Relative risk		
Pair	**Phone model**	**Offender preference ratio**	**Index risk ratio**	**Student preference ratio**	**Offender**	**Risk Index**	**Student**
Candybars	Nokia 7610	2.5	1.2	2.9	1.0	1.0	1.0
Clamshells	Motorola Razr	9.0	1.5	33.0	3.6	1.2	11.4
Sliders	Samsung D500	11.5	4.2	1.5	4.6	3.5	0.5
Candybar Upgrade	Sony K700i	1.9	1.3	1.5	0.8	1.1	0.5

The results show that offender preferences were more closely matched to the strength of preference displayed in police recorded theft data, than were the preferences of students. Thus the offender preference ratios implied that the

[2] The comparison of 'predicted' and police recorded theft risk is only possible for four models from the six matched pairs of phones. The pair Concepts were not available to buy and so were not reflected in police recorded data, and the older Nokia in the pair New vs Old was not present in the police recorded data.

Motorola Razr was 3.6 times more at risk of theft than the Nokia 7610, and the Samsung D500 was 4.6 times more at risk than the Nokia 7610. Student responses predicted a theft risk 11.4 times greater for the Motorola Razr than for the Nokia 7610. Police recorded data (in the column titled Risk Index) show that aggregate theft patterns in 2006 in the Greater London area reveal a theft risk 1.2 times greater for the Razr; 3.5 times greater for the D500; and 1.1 times greater for the K700i than the Nokia 7610.

Students failed to predict the real-world strength of preference for the Samsung D500, but overestimated the strength of preference for the Motorola Razr. In contrast, the offender assessment of theft risk more closely matched the relative risk according to police data, implying that they are better placed to predict theft patterns than are non-offenders. Although the sample size is relatively small, these results suggest that those wishing to predict the vulnerability of electronic products to theft should consult the relative offending group for their opinions.

The section below describes the main differences in student and offender deterrence from theft by the 23 designs. The section concludes with some qualitative differences in offender and non-offender responses in an attempt to identify some of the reasons for the differences between the preference ratios of the two groups, and why offenders were more accurate ‘predictors’ of relative theft risk than non-offenders.

Differences in the deterrent effects of the 23 designs

Figure 6.4 above visually displays the higher deterrent effect that most designs had on students compared to offenders. The average deterrence rate across the 23 designs was 58 percent for students, compared to just 36 percent for offenders. The difference in the percentage of students and offenders deterred by the 23 designs was significant (two-sample t (82)= 6.5, $p<0.001$)[3].

Table 6.11 below explores for which deterrent designs there was a significant difference between student and offender responses. The calculations are based on the percentage of offenders and student either put of a lot, or completely, by each design. For 2 by 2 tables where any expected cell count was less than 5, Fischer's exact test has been used in place of Chi-squared. The key to Table 6.11 shows which test was used for each design solution tested.

[3] Appendix 6.1 displays the histograms exploring the distribution of deterrence among offenders and students: both groups approximated to a normal distribution and so a parametric test for difference was used.

Table 6.11 Testing for significant differences between student and offender deterrence in response to the 23 design solutions

	Percent deterred				
Design solution	**Non-offender**	**Offenders**	**Chi-squared**	**p value**	**Significant?**
Unblocking easy*	2.381	10.526	-	0.185	No
Symbol unexplained*	9.091	10.256	-	1.000	No
Blocked 48 hrs**	25.581	18.421	0.598	0.439	No
Name written on**	27.273	7.692	5.354	0.021	No
Keypad PIN**	29.545	2.703	10.130	0.001	No
Alarm on owner**	31.818	13.158	3.988	0.046	No
Alarm on handset**	45.455	57.895	1.263	0.261	No
IMEI stamp**	51.163	13.158	13.112	<0.001	Yes
Blocked 24 hrs**	51.163	18.421	8.251	0.004	No
Camera, MP3**	61.364	29.412	7.853	0.005	No
Headset**	63.636	45.455	2.528	0.112	No
Chain**	66.667	34.211	8.411	0.004	No
Face stamp**	68.182	38.462	7.357	0.007	No
Unblocking difficult**	69.767	47.059	4.071	0.044	No
Name stamp**	70.455	20.513	20.702	<0.001	Yes
Wristband phone**	75.000	52.632	4.463	0.035	No
Blocked immediately**	77.273	40.541	11.347	<0.001	Yes
Ubiquitous phone*	79.070	62.857	2.505	0.114	No
People watching**	79.545	25.000	22.436	<0.001	Yes
Disposable phone**	79.545	78.947	0.004	0.947	No
Symbol explained**	85.714	43.590	15.865	<0.001	Yes
Tracker**	88.372	78.947	1.330	0.249	No
Owner biometrics*	97.727	81.579	-	0.022	No

Note: df for each calculation is (1) as only 2 by 2 tables were used.

*= Fischer's exact test

**= Chi-squared test

In all, five designs elicited significantly different theft deterrence in students compared to offenders. In all cases, students were more easily deterred than offenders. These were: IMEI stamp, people watching, name stamp, immediate blacklisting and the Eye of Horus symbol explained. The reasons for greater deterrence among students can be grouped into four themes: an increased tendency to report guilt compared to offenders; a lack of focus on the financial resale value of the phone; a lack of knowledge of ways to circumvent security technology (such as reprogramming IMEIs); and finally evidence that a small number of students ‘got into character’ as they progressed through the task and did not produce consistent answers. Each of these four themes is explored further below.

Observations on comments made by students and offenders:

Students were not ready or experienced offenders (Clarke and Cornish, 1985). On aggregate they had not considered phone theft as a viable behavioural option. Thus when faced with the hypothetical scenarios of the questionnaire, they omitted some of the situational factors considered by offenders, and gave different weight to various factors when compared with offenders. Furthermore, they displayed the absence of knowledge or belief in the ability to work around proposed design solutions, and/or a stronger belief than offenders that society would work against the thief: i.e. that police would check IMEIs and that the public would intervene if they observed a theft occurring.

Students spontaneously mentioned guilt as a deterrent factor relatively frequently, whereas this was never mentioned by offenders. This explains why students were more deterred than offenders by personalisation such as the name or face stamps. Offenders tended to be deterred only if they believed the personalisation detracted from the kudos or resale value of the phone. Thus more students were deterred by the name stamp than offenders, and the difference reached significance ($p<0.001$, Fischer’s exact test), presumably because of a combination of lack of knowledge about the possibility of removing the name stamp, and mention of guilt. Interestingly, the face stamp did not elicit a significantly different deterrent effect when comparing offenders with students, presumably because offenders were similarly deterred by the high level of personalisation communicated by a face. The IMEI stamp deterred significantly more students than offenders (see Table 6.11 above). The reasons mentioned by students for deterrence were that they believed the stamp could aid checking by authorities and owners. In contrast, offenders mentioned more often than students that they did not believe police would actually check IMEIs. The presence of the public watching elicited a significantly stronger deterrent effect in students than in offenders. The key reason was that students believed the public might intervene, while more offenders did not. Similarly, experience gained by the offenders meant they were less deterred by the idea of immediate blacklisting than were students. The key reason was that offenders believed they might still sell the phone for parts, or find a work around to the blacklisting and still gain either personal usage or monetary value from the sale of the phone.

Overall, financial motivations for theft were clearly lacking in the student responses: most of their considerations were about the implications that design solutions would have on personal use, not on resale or parts markets. This may reflect in part the focus of their studies at University on design issues. Thus an interesting comparison group would be students studying economics, business or another financially focused topic. Students were also more likely to specify being put off by 'effort' and 'hassle' than were offenders.

The inexperience of students in phone theft was exemplified by their ignorance of the option to reprogramme IMEIs to circumvent blacklisting. This was despite the fact that the process had been explained at the start of the interview. In addition, most students were unaware that they could get a phone unblocked from a keypad lock at market stalls for minimal cost. Thus they were more easily deterred by the technological designs which deterred fewer novice offenders, and even fewer expert offenders.

There is a risk that one or two of students 'got into character' as the paper and pen exercise of assessing the 23 design solutions progressed. Towards the end of the assessment of the designs, comments such as 'it might be worth a go' appeared more often in the responses of two students. In contrast, at the start of the assessment many students explicitly expressed the absence of standing decisions to offend (‘its just not how I’ve been brought up’). It is unlikely that this shift dramatically affected the overall results, but it does demonstrate that future research should clarify and repeat throughout any testing process whether non-offenders are answering as themselves, or imagining that they are a thief. If these results were repeated in larger samples, they might suggest that even imagined theft experience alters the balance of perceived effort, reward and risk in individuals.

Last recalled offence

There is a considerable amount of information available from the offender interviews and non-offender paper and pen exercises, and the results presented above have focused on those most pertinent to the rational choice event model. Offenders were also asked to describe the last offence they could remember committing, in order to assess some of the characteristics which have been assessed in previous research into decision-making (e.g. evidence of planning, factors affecting target selection, and motivations for theft). Many of these characteristics have been accounted for in the event-specific model (Figure 6.5) or discussed in relation to increased experience and continuance.

Other characteristics assessed described the modus operandi and target choice for the last remembered offence. 25 offenders gave some details of their last offence. The largest proportion of phones were taken in robberies (48%), 16 percent when the phone was unattended, and 12 percent in burglaries. The majority of last recalled phone thefts were committed against strangers (88.5%). The proportion of reported thefts involving robbery are considerably higher than Home Office recorded figures (Hoare, 2007), highlighting the tendency of more dramatic events to be remembered, and perhaps that more serious offences will be prosecuted (the offender sample were, after all, incarcerated or under parole supervision).

Twenty offenders gave reasons for taking the phone during their last recalled offence, and the majority of responses showed little evidence of planning. Phones were taken most frequently because they were available (especially if unattended), or part of the acquisitive trawl in burglaries. However, half of the 10 robberies described could be viewed as prompted (Wortley, 1997) by the sight of the phone as exemplified by the reasons given for robbery below:

> “The K750 was a good phone. Did it out of habit....bit stoned and drunk.”
>
> “I knew it’d sell right away.....changed my mind from a till snatch to the phone ‘cause it was easier”
>
> “Because I liked it.”

Although the sample size is small, these results lend support to the assertion that phone thefts are sometimes deliberately targeted at specific models which ‘incite’ a theft, and others are taken as part of the acquisitive trawl. Even so, those taken in acquisitive trawls are likely to be taken only if they are valuable, an aspect which appears to be judged according to moderness and functionality.

Discussion and conclusions

The headline conclusion to be drawn from the interviews with 40 mobile phone thieves is that mobile phone thieves display rationality in target selection. Approximately half of the offenders interviewed state that they specialise in taking phones rather than other objects such as iPods. The choice-structuring properties of phone models and some properties of the wider theft situation are summarised in Figure 6.5 above.

The choice-structuring properties of mobile phones can be summarised as resale value and personal enjoyability, which are assessed via the visual cues of moderness and functionality. The choice-structuring properties of the wider theft situation include the likelihood of victim retaliation, personal injury and public interception.

Familiarity with phone models elicits stronger and faster preferences when offenders choose between matched phone pairs. This implies that models with more aggressive marketing strategies and those seen in everyday use will be chosen preferentially by thieves. Furthermore, analysis of the motivations for offenders' last recalled offence shows that the sight of a desirable phone can act as a prompt (Wortley, 1997) to initiate a theft act.

The deterrent effects of 23 designs vary between offenders and non-offenders, and between novice and expert offenders. However, only five design solutions result in a significantly different proportion of students and offenders being deterred. The key reasons for the difference in deterrence appear to be that students are not as financially motivated as offenders; they are less persistent; they are less aware of alternative markets (for example the market for parts) and they are less aware of technological workarounds (for example reprogramming IMEIs). They also have more faith than do offenders in the effectiveness of the police and society in intervening in crime events.

The designs which deter the largest proportion of offenders are those which reduce the resale value of the phone effectively (the ubiquitous phone and the disposable phone) and those which employ reasonably advanced technology (the biometrically protected phone and the tracked phone). Experts were less likely to 'bother' with the disposable and ubiquitous phones than were novices, suggesting that experts might rely more on prior knowledge of model usability and disposability than do novices.

Different handsets are at varying risk of theft, and theft risk varies over time. Hypothetical scenarios presented to offenders during interviews led to measurable group preferences within six matched pairs of phones. The strongest preference ratio within a pair was 100 percent, where all offenders chose the Nokia 6010 over the older and larger Nokia 5110. The pair which elicited a split opinion among the sample consisted of the Sony Ericsson K700i and its incremental upgrade, the Sony Ericsson T630. Offender preference ratios matched more closely the relative risk of theft according to police recorded data than did non-offender preference ratios.

Expert phone thieves are more likely to recognise and name the models of phone presented at interview than are novices. Their preference ratios within the six matched pairs of phones are the same as or higher than the preference ratios of novices. However, the differences between preference ratios of novices and experts did not reach statistical significance.

Expert offenders are more likely to mention resale value than are novices. Novices are slightly more likely to mention functionality and moderness than are experts. These results suggest that experienced thieves by-pass or carry out automatically an assessment of moderness and functionality, providing support for the hypothesis that experience leads to automatic progression along a familiar crime script (Cornish, 1994).

Increased experience can be modelled as embedding more firmly the option of phone theft as a perceived solution in Clarke and Cornish's (1985) involvement model. In contrast, the responses of non-offenders highlight that they are not in the possession of the three characteristics which predict continuance in crime (professionalism, life-style changes and peer networks (Clarke and Cornish, 1985)). This has implications for the use of non-offenders in decision-making research.

Some offenders also represent Walsh's (1986) 'flaw hunters'. They spontaneously consider whether they can circumvent any deterrent designs, for example by reprogramming blacklisted phones; waiting to assess if a tracker device is active; or whether PIN codes can be circumnavigated.

Armitage and Pease (2008b) considered whether product risk of theft should be communicated to consumers via a two tiered traffic light system. One light would reflect product vulnerability to theft, the other its level of security. Clarke and Newman (2005) suggest that product vulnerability be scored using an assessment of the presence or absence of CRAVED (Clarke, 1999) characteristics, and that security be assessed using a weighted checklist which assigns higher scores for security technology which specifically aims to negate CRAVED characteristics. So for example, technology which decreases the final value of the stolen product scores more highly than does customer education about 'safe' use of the product.

The deterrent effects of the 23 designs reported here should be used to refine the weighting of Clarke and Newman's (2005) checklist when assessing the security and vulnerability of new mobile phone designs. For example, Clarke and Newman (2005) advocate that a PIN code scores the maximum of three points on a product security checklist, whereas the deterrent effect of a PIN code was minimal according to offender responses. The security rating of a PIN code (and any technological security feature) should vary according to how easily the feature can be bypassed. Similarly, Clarke and Newman (2005) advocate that tracking technology scores three on the security checklist, but offenders’ opinions about the efficacy of tracking devices vary. Many believe that they can sell a phone soon after theft to avoid detection. Offenders also raised the valid question of whether police have the resources to follow up a high number of tracking signals. The issue of speed of disposability may prove to be important in assessing theft risks of some security technologies.

The results show that offenders consider security at the point of theft. Armitage and Pease (2008b) argue that this question had implications for any final ‘product proofing’ labelling system. If thieves consider security at the point of theft then it makes less sense to inform consumers of both vulnerability and security, because vulnerability is partly reliant on security.

The differences between offender and non-offender deterrence, and between more and less experienced offender deterrence suggest that involving criminals in product risk assessment is a necessary element of product design. As Walsh (1994) argues, it seems illogical to assess the thought processes of criminals without asking for their opinion. Offenders and students give different weight to some CRAVED characteristics, resulting in some statistically different responses to deterrent designs, and the presence or absence of standing decisions to offend appears to affect how easily they are deterred: Offenders frequently mention resale value and disposability, but students are not strongly motivated by these factors. Offenders make quicker and stronger aggregate decisions when faced with iconic (familiar) phones than newer models, and the preference ratios of experienced thieves are slightly higher in general than those of novices. The strength and speed of decision-making implies that experience and the familiarity it brings influence theft choices. It is difficult to see how non-offenders could imagine this influence when ‘thinking thief’. Future research should explore whether the responses given by the design students used as a comparison group here differ from those given by other students (and in particular those focused on financial topics of study), and from other demographic groups. This would help to inform who, if anybody, is best placed to ‘think thief’ when predicting the consequences of new design solutions.

Chapter 7: Background to and development of a count-based Theft Index.

Introduction

This chapter describes the background to, and development of, the December 2005 count-based Theft Index. The count-based Theft Index laid the groundwork for the 2006 risk-based Theft Index described in Chapter 8. This chapter details the origins of the data and data collection, and an overview of the methodology underpinning both indices. A detailed description of data preparation and manipulation is provided for transparency and to allow replication in the future if an Index is adopted as a crime prevention instrument.

Like the UK Car Theft Index described in Chapter 3, the final version of the Mobile Phone Theft Index ranked models of mobile phone according to their risk of theft: the models stolen were compared to the models available for theft. This chapter describes the process of producing the first iteration, which ranked models of mobile phone according to the number of models stolen and without a control for availability. Chapter 8 then describes the process and results of developing the risk-based Theft Index. Some of the work in this chapter and the next, particularly the main findings, were published as Mailley and Farrell (2006) and Mailley et al. (2006b, 2008). However, the present author was responsible for all the analytic 'leg work' detailed in these chapters and wrote all the present text.

A brief description of the context of this chapter, in relation to Chapter 8 that follows, is warranted. The count-based Theft Index for mobile phones was an innovation, but it was not ideal. Popular makes of handsets would be sold more often and therefore expected to be stolen more often simply due to their availability for theft. This is why Chapter 8 details the subsequent development of an index that takes availability into account, while the present chapter details the development of a simpler precursor index where availability is not controlled for.

Furthermore, one practical limitation of the methodology described in this chapter was the significant length of time needed to clean the data. This was almost certainly too great to make regular production of the index by the NMPCU a realistic prospect. Even in the unlikely event that enough resources were available, the data would probably be out of date before the index was published. If a mobile phone theft index is ever to be adopted outside academia it must be both practical to produce and timely. A phone theft index must arguably be more timely than a car theft index to reflect the more rapidly changing and dynamic phone theft market.

The previous paragraphs pre-empt three of the key conclusions of the present chapter – that an index must be (1) risk-based rather than count-based, (2) practical in terms of resources, and (3) timely if it is to impact in a fast-changing market. These are lessons that are also likely to prove applicable to indices for electronic and other stolen products. However, in the present context they also set the scene because they are the issues that are addressed more directly in Chapter 8 after the main methodological steps are described in the present chapter.

Acquiring NMPCU data

Laycock (2004) described the difficulties of accessing and manipulating numerator and denominator data to produce the UK Car Theft Index. Similarly, development of a mobile phone theft index required access to data which described the model of phones taken. The National Mobile Phone Crime Unit (NMPCU) is the UK’s only police unit dedicated to lowering mobile phone theft. Based in the Metropolitan Police, NMPCU comprises dedicated officers, intelligence analysts and management. Reports of mobile phone thefts from the Greater London area are collated by the NMPCU on their computerised crime recording system. Incident records include descriptions of victim and suspect characteristics, the nature of the incident, and the make and model of phone(s) stolen.

In order to facilitate access to NMPCU data, several meetings were held between the research team and NMPCU in late 2005 and throughout 2006 at

NMPCU's base in London. The face to face meetings enabled an understanding to be gained of the organisational structure and work processes of NMPCU, and for rapport to be established. Perhaps most importantly they allowed NMPCU to appreciate the crime preventive orientation of the research team, which led to full support for the research presented in this and Chapter 8.

NMPCU personnel advised on the procedures for gaining official clearance for access to NMPCU crime records. Firstly, approval from senior police management was needed and the advice was to write a formal letter of request to the Commander of the Metropolitan Police Territorial Policing Head Quarters, copying in the head of NMPCU, a Detective Superintendant. A copy of the letter to the Commander, as drafted by the present author and dated 28th October 2005, is attached as Appendix 7.1. Secondly, since NMPCU crime records are officially the property of the Home Office, support from the Home Office was needed. Therefore a letter of support was requested from the Street Crime Action Team (SCAT) of the Home Office. Face to face meetings were held with key personnel within the SCAT, to establish rapport, mutual understanding and to establish clear lines of communication. The SCAT proved a valuable ally in facilitating access to NMPCU data. Acting as the interface between NMPCU and government, they were keen to support applied research with a preventive focus. A letter of general support for exploratory analysis of NMPCU data was provided on 10th October 2005 and is attached as Appendix 7.2. A more specific letter of support for access to NMPCU crime records was produced on 11th November 2005, and is attached as Appendix 7.3. The letters evidence the evolution of SCAT's stance from tentative to more concrete support for the research. As the relationship with SCAT developed, trust was gained and specific goals of the research were clarified and communicated.

As a result of the coordinated request to NMPCU and support from the Home Office, NMPCU contacted the author on 24th December 2006 advising that access to NMPCU data had been granted. The delay between the initial letters of request and support and the decision to grant access was in part due to NMPCU staff changes, specifically, the replacement of the Commander, and the leave arrangements of other NMPCU staff involved. Such delays in gaining access to data are common in research across subject areas, in part due to the need to gain approval from various ‘gatekeepers’ of data (Munro, 2008).

The following section describes the data obtained from NMPCU and the processes involved in cleaning and preparing the data for analysis. The methodology and reasoning behind it are explained in detail to provide transparency and so that others might replicate the process using different or more recent data.

The results of the count cased theft index are described after the methodology. Exploratory analysis resulting in the count-based Theft Index involved cleaning and analysing NMPCU data from 2004 thru 2005. An analytic component of the work that evolved from preliminary descriptive data analysis was the ‘theft careers’ of the most commonly stolen models. This analysis is also presented below.

Data provided by NMPCU

NMPCU record mobile phone theft incident details in a relational database. Each incident is assigned a unique crime number. At the time of this research the NMPCU database consisted of five main data tables, cross-referenced by the unique crime number. The five main data tables were Property; Crimes; Victims and Witnesses (together); Suspects and; Accused persons.

The table Property, containing information about the property stolen, detailed incidents at the item level and included information on the manufacturer (referred to as make) and models of phone reported as stolen. The table Crimes detailed incidents at the crime level and consisted of the Home Office classification of each incident. The table Victims and Witnesses was organised at the person level and recorded demographic and personal information relating to victims and witnesses. The two tables Suspects and Accused respectively recorded the demographic and personal attributes of any individuals suspected or charged. While basic cross-referencing between tables such as Property and Suspects could be achieved using the unique crime reference number, each field also contained further reference numbers that could be linked to other record components. For example, each mobile phone listed within the Property table was assigned a unique code because a single incident could involve multiple handsets. This item code was unique within the incident but not within the entire database. Thus querying the database required the knowledge and skill of NMPCU analysts familiar with the database's set up.

Preliminary discussions involved the present author working at NMPCU to understand the nature of the data and its potential. Following this, an anonymised dataset including the information used in this thesis was provided by NMPCU. The university research team were obliged to provide written assurances regarding data protocols and the security of the data at the university.

The NMPCU data provided to the author was in the form of text files (suffix .txt). There were five main data files corresponding to the tables detailed above. These were cross-referenced by the unique crime number of each incident, which is referred to hereafter as the Crime ID.

The NMPCU provided a data file containing records from the table Property for incidents reported and recorded from 1st January 2004 to 31st December 2005 inclusive. This Property file contained variables describing the make of the phone; the model of phone; whether the phone was stolen or damaged; the total number of items reported missing per crime; the value of property taken, and the unique crime reference number. This file formed the basis for the development of the 2005 count-based Theft Index described in this chapter. The final count-based Theft Index used only data from December 2005 since this month represented the most recent and complete month of data available, but the exploratory analysis described below analysed records spanning April 2004 to December 2005. The risk-based Theft Index described in Chapter 8 uses NMPCU data spanning the calendar year 2006 (the change reflecting the fact that NMPCU subsequently provided a new data file for 2006 which contained the same variables as the 2004- 2005 data set as well as an added variable, the UK Home Office classification of each offence).

Overview of methodology for producing the phone theft index

The count-based and risk-based theft indices shared most components of their methodology, and these are described below. The analytical software used to analyse NMPCU data by the researcher was SPSS™. The SPSS™ software will only aggregate identical entries. The NMPCU data contained variables where information had been entered by hand ('free text' variables) resulting in considerable variation in entries which should have been identical. Specifically, the NMPCU Property table contained two free text variables, one to record the make of each phone (for example Nokia) and the other to record the specific model (for example 5210). In what follows, the capitalised M of Make and Model denotes these two SPSS™ variables, whereas lower case 'make' and 'model' are used in their usual sense as generic terms for manufacturer and type of handset respectively. Similarly, generic indices are referred to using lower case but the term Mobile Phone Theft Index is capitalised when referring to the specific 2005 count- based and the 2006 risk-based indices, in line with Laycock's (2004) capitalisation of the UK Car Theft Index. As mentioned, the free text nature of the variables Make and Model allowed considerable data entry variation and errors. For example Nokia had been entered among other variations as Nokia, nokia, NOKIA, and Nookia. While the human brain can use reason to assume that these entries all refer to Nokia, SPSS™ cannot interpret data entries in this manner and these entries needed to be made uniform. Hence a large part of the data preparation for both theft indices involved extensive recoding of the variables Make and Model. The recoding was undertaken using many thousands of lines of SPSS™ syntax that were written by the present author.

SPSS™ syntax consists of lines of code which instruct SPSS™ how to manipulate the data. It is an alternative to using the drop down menus available. Syntax files provide a permanent record of the analytical process, making the process available to other researchers and therefore replicable and transparent, or available for scrutiny when retracing methodologies to identify errors.

Figure 7.1 below presents an overview of the methodology common to both the count-based and risk-based theft indices. The syntax used for each stage is attached on the CD secured on the inside cover of the Appendix section of this thesis and labelled Appendices 7.4 thru 7.7. In the methodology below a 'case' refers to one row of data in SPSS™, which in this instance represents a single stolen item, most usually a mobile phone. 'Case' does not equate to a crime, which is referred to here as an incident or crime.

<u>Figure 7.1: Overview of steps involved in generating the phone theft index</u>

1. The NMPCU text file was imported into SPSS™ using the SPSS™ import wizard.
2. A unique identifier was assigned to each case (stolen item) to facilitate separation and re-merging of the data set during cleaning (recoding) (see step 7 below).
3. The date of each case was recoded using the syntax 'Recoding date.sps' (Appendix 7.4) to facilitate later analysis by requisite time periods.
4. The police variable PROPmake was recoded within the dataset using the syntax 'Recoding Make.sps' (Appendix 7.5) which is described in more detail below.
5. Data relating to each of the four main makes of phone (Nokia, Samsung, Sony Ericsson and Motorola) were separated out and saved as separate SPSS files.
6. The police variable PROPmodel was recoded within each of these four separated files using the syntax 'Recode Model.sps' (Appendix 7.6) which is described further below.
7. The four separate files containing the recoded data were added back into the initial dataset by merging on the unique case identifier. The data set then contained all original cases. Those from the main four

manufacturers were recoded to the model level. Other makes were recoded to the make level.

8. Using the syntax ‘Merging Make and Model.sps’ (Appendix 7.7), the recoded Make and Model variables were combined to form one variable: MakeModel. This was necessary because otherwise the SPSS™ output would consist of separate variables for make and model.

Further specifics of the methodology

This section of the chapter provides further details on key aspects of the methodology. It follows the sequence of steps outlined above. Some of the tasks undertaken are described at length in order to convey the extent and variety of data cleaning, some of the innovative nature of this aspect of the research, and in order to emphasise the fact that the data preparation was recognised from the outset as a most critical aspect of the work to develop a theft index.

1. Importing NMPCU data into SPSS

The NMPCU generated file ‘Property.txt’ was imported into SPSS™ using the import wizard in order that quantitative analysis could be carried out. The resulting data file was ordered at the item level, with each row in SPSS™ representing a phone or item reported as stolen to NMPCU.

2. Generating a unique identifier for each case

NMPCU data within the file Property were differentiated at the incident level by the NMPCU variable ‘CrimeID’. Running frequencies of the variable Crime ID revealed that some incidents contained multiple items (phones). The NMPCU data did not contain an identifier unique to each phone: as described earlier the NMPCU database assigned identifiers unique to each item within incidents but not across timescales. Since analysis for the Indices was at the item level, a unique identifier was needed for each item (row of data). After sorting the data by descending Crime ID, the unique item identifier was computed using the syntax:

```
Compute CrimeNum=($casenum).
Execute.
```

With hindsight, a more logical name for this unique identifier would have been ItemNum since the identifier is unique to each item and not to each crime as the syntax name suggests. This provides a good example of where syntax acts as an important record: without referring back to the syntax it would be easy for another researcher to look at the data set and assume that the variable ‘CrimeNum’ was a unique identifier at the incident level.

3. Recoding the date of each incident

NMPCU data included the variable ‘SupvrRecDate’ which described the date on which the incident occurred. In order to facilitate later analysis by time periods of varying length, new variables were computed which described the month, year and quarter in which the incident occurred. A copy of the original police variable describing date was generated and its format altered to script format, to allow the syntax ‘Recoding date.sps’ to be run (see Appendix 7.4) This generated three numeric variables respectively describing the month, quarter and year in which each phone was stolen. Creating a numeric variable with text labels meant that SPSS™ output was ordered by successive time intervals. If the date had been left as a text variable SPSS™ output would have been ordered alphanumerically. For example when analysing the 2004-05 dataset by month the output would have been in the order April 2004, April 2005, August 2004, August 2005, December 2004, December 2005, and so on.

4. Cleaning the variable ‘Make’

At this stage the data file consisted of item (phone handset) level data each with a unique identifying number and a new numeric variable defining the time period of the relative incident. Analysis to produce theft indices used data referring to the Make and Model of each item. As described above, the free text NMPCU variables Make and Model required standardising in order for SPSS™ to aggregate like Makes and Models of phones. The variety and errors observed in Make and Model arose from several aspects of data input including:

- Capitalisation (e.g. Nokia, nokia and NOKIA)
- Misspelling (e.g. Nookia and Nokiia)
- Extra spaces between words (e.g. Sony Ericsson)
- Abbreviation (e.g. Sony E or S Ericsson instead of Sony Ericsson)
- Writing both make and model in the field meant for make alone, or writing both in the field meant for model (e.g. v3 motorola)

Cleaning of both the 2004-05 and the 2006 data sets consisted of two key stages. First, the variable Make (manufacturer) was recoded, and then the data set was split into constituent makes and cleaned at the model level. The decision making process used to best interpret the various data entries is described below, following a description of the method used for efficient syntax development.

4.1 Syntax development

SPSS™ syntax was written with the aim of maximising the amount of useable information within the NMPCU datasets. Figure 7.2 below consists of a sample of the syntax used to clean the variable Make. The first four lines result in a new and empty variable which has the title ‘Make2’ and the label ‘renamed make’. The IF commands then instruct the software to follow a logical sequence where the new variable ‘Make2’ is populated with the recoded version of the police entry ‘PROPMake’. The syntax ‘Recoding Make.sps’ recoded the variable Make in both the 2004-2005 and 2006 NMPCU datasets. It consisted of 5052 IF commands and is attached as Appendix 7.5.

Figure 7.2: Sample from the syntax ‘Recoding Make.sps’

```
STRING Make2 (A20).
COMPUTE Make2 = ' '.
VARIABLE LABELS Make2 'renamed make'.
EXECUTE.
IF (PROPMake='T MOBILE')Make2='T-Mobile'.
IF (PROPMake='motorola')Make2='Motorola'.
IF (PROPMake='nokia')Make2='Nokia'.
IF (PROPMake='NOKIA')Make2='Nokia'.
IF (PROPMake='1 Samsung')Make2='Samsung'.
IF (PROPMake='1 Sony')Make2='Sony Ericsson'.
IF (PROPMake='02')Make2='O2'.
IF (PROPMake='02 MOBILE PHONE')Make2='O2'.
IF (PROPMake='02 x4')Make2='O2'.
IF (PROPMake='07914417512')Make2='Missing'.
```

The most efficient method of developing syntax of the sort above was to paste the output of the command ‘freq vars’ of the variable PROPMake into Microsoft Excel™. Once in Excel™ the single quote marks and IF commands could be added to one line and copied down an entire column (by clicking and dragging the mouse downwards). Similarly the closing single quote marks and full stop that is required at the end of each line of syntax could be added relatively quickly. Since each column typically consisted of hundreds of rows these efficiency measures were important.

After importing the resultant text into Microsoft Word™ as unformatted text, extra spaces between brackets, between single quotes and at the starts of lines were removed and the text finally pasted back into SPSS™ syntax. Newer versions of SPSS™ software will discount spaces between certain commands, such as between the closed brackets and the name of the recoded variable (here, Make2). At the time of analysis the version in use (version 12) would malfunction if commands were not flush. The final syntax was developed using an iterative process of cleaning as many entries as possible, running the syntax and assessing the proportion of entries cleaned, and repeating the process until over 95 percent of Make entries were recoded as either validated makes of mobile phone or as missing.

Decisions made when cleaning data

Many makes of mobile are well known and so interpretation of data entries was relatively simple and the results relatively certain. For example, while it was reasonable to assume that the entry ‘Nookia’ meant ‘Nokia’, other less recognisable entries such as ‘Z320i’ needed to be researched to gauge whether the make existed, or whether the entry referred to a specific model (as was often the case for alphanumeric numeric suffixes). Initially an unrecognised entry was entered into the search engine Google™ and the results used to determine whether the make was bona fide or a data entry error. It was reasonably common to encounter a model within the field meant for make, and in these cases the entry was recoded to the appropriate make. To continue the example above: the Z320i is a model specific to Samsung’s range of mobile phones and so this entry was recoded so that the variable Make read ‘Samsung’.

Analysis of the frequencies of the recoded make revealed that a large proportion of phones within both the 2004-05 and the 2006 data sets were made by Nokia, Samsung, Sony Ericsson and Motorola (see Results section, below). Of these four most prevalent makes of phone, Nokia is arguably the most simple to type and spell correctly. In contrast to Sony Ericsson, it is a single word consisting of only five letters, with little potential for erroneous entry of spaces, or for abbreviation. Despite its simplicity, over 300 lines of syntax were needed to recode the many variations of Nokia in the 2004-05 data set alone. Some of the more rare variations included Noka, Nockia, Nosia and Nkia as well as entries with variations in capitalisation, spaces and punctuation (for example Nokia? ‘Nokia’ and Nokia,). Common data entry errors in relation to Motorola involved permutations of the word spelt with double l and ending in ‘olla’ or ‘oller’, presumably because of association with the word roller. Issues common to Sony Ericsson were abbreviations of various permutations (for example Sony E, Sony Eric, S Ericsson) or incorrect spelling of the word Ericsson (for example Eriksson, ericson).

5. Separating out the main makes of phone

The frequencies of recoded Make (Make2) were run to check which phones accounted for the largest proportion of stolen items. Each of the four most common Makes were selected out from the main data set and saved as separate data files. This process was carried out using the drop down menus from SPSS™, though syntax could be used equally successfully.

6. Cleaning the variable 'Model'

Each make-specific file was cleaned (recoded) at the model level using a similar iterative cleaning process as for Make. Separating the files allowed attention to be focused on one phone manufacturer at a time, increasing the speed at which familiarity was gained with that manufacturer's alphanumeric model naming system and minimising swapping between the websites of different manufacturers. The syntax used to clean models in both the 2004-05 and 2006 datasets consisted of 7250 IF commands and is attached as Appendix 7.6. Figure 7.3 below consists of a sample of this syntax. The sample happens to be from a section focusing on models from the manufacturer Sony Ericsson.

Figure 7.3: Sample from syntax to recode Model within the 2004-05 and 2006 datasets

```
IF (PROPModel='D700I')SonyModel='Missing'.
IF (PROPModel='d705')SonyModel='D750i'.
IF (PROPModel='d750')SonyModel='D750i'.
IF (PROPModel='D750')SonyModel='D750i'.
IF (PROPModel='D750 i')SonyModel='D750i'.
IF (PROPModel='d750i')SonyModel='D750i'.
IF (PROPModel='D750i')SonyModel='D750i'.
IF (PROPModel='D750I')SonyModel='D750i'.
IF (PROPModel='d759i')SonyModel='D750i'.
IF (PROPModel='D7i')SonyModel='Missing'.
IF (PROPModel='e3?')SonyModel='Missing'.
```

Initially the command 'freq vars' was used to produce SPSS™ output of the frequencies of the police variable model (PROPModel) within each data file. This output was then exported into Microsoft Excel in order that IF commands, single quotes and full stops could efficiently be added. Syntax was then developed using the iterative process of looking up each questioned entry on the internet, adjusting the syntax accordingly and rerunning the syntax until the majority of entries were recoded. The aim was to recode entries where a data entry error or model permutation could sensibly be resolved in to what was judged the ‘correct’ entry. Some subjective judgement was required and the attempts to avoid introducing systematic bias are described below.

Models were checked in the first instance against the manufacturer’s websites. If the model was not found to be listed on current or archived lists of available models, a wider internet search was carried out to assess if the model was genuine. In many cases a model not listed on the manufacturer’s website or archive was recoded as missing.

Exceptions to labelling unrecognised models as missing were made when a decision could be made as to what the ‘correct’ entry should have been. The overall aim was to minimise sources of error in the data, and to some extent this required a combination of art and science. Different models of phone had specific data entry errors associated with them. The suffix lower case ‘i’ was frequently observed as either capitalised i (I), or lower or upper case ‘L’. In these instances the entry was recoded to include a lower case ‘i’. In other instances it was possible to deduce the typing error which resulted in an entry needing recoding. For example it was reasonable to assume that the entry ‘66230’ within the Nokia dataset referred to the Nokia 6230: There is not a model 66230, nor a 6623, and so the most likely explanation for this data entry is that the individual entering the data has lingered on the 6 key a fraction too long resulting in a double 6 instead of a single.

In some instances a reasoned decision could not be made. The entry ‘63300’ within the Nokia dataset was judged as likely to be the Nokia 6330 or the Nokia 6300, since both models exist. Thus this entry and others suffering the same ambiguity were recoded as missing. Similarly an incomplete entry such as ‘750’ within the make Sony Ericsson could refer to either the model K750i or the D750i and so was recoded as missing. An example of a model where resolution was mostly unambiguous was the Motorola Razr, where it was apparent that any entry similar to Razr or permutations thereof (Razor, Raz, Rzr) was meant to be Razr.

On occasion, reading the data entry aloud helped resolve the issue. Within the Sony Ericsson file there existed an NMPCU data entry 'K8Ti'. There was not a model K8Ti but the model K800i was known to exist. Saying aloud 'kay eight tea eye' clarifies what probably happened: K80i is only one zero away from the recognised K800i. Perhaps the zero had been missed off and the entry inputted phonetically because someone was reading the information aloud to the person entering the data. From this entry 'K8Ti' it was not a giant leap to assume that the entry 'kati' within Sony Ericsson was probably also a phonetic entry referring to the K800i (again saying 'kati' aloud clarifies the likely error). However instances such as this were extremely rare and if they resulted in erroneous interpretation of the correct model the effects on the overall data set will be minute. The examples are included here to convey the essence of some of the adaptation and innovation that was needed as part of the effort to ensure that the data was as clean as possible.

It was theoretically possible that focusing on only the four main manufacturers served to exclude models, from other manufacturers, which were stolen frequently. For example, the make ranking 5th might have been made up of only one or two models of phones, meaning that these models would have been stolen in similar numbers to models of the four most commonly stolen makes. Therefore the phone makes ranking fifth to eighth were checked for models which, with some recoding, might reach numbers comparable to models within the four most prevalent makes. Instances of cases where such models were identified were few, and are described in the results sections below.

7. Merging the four individual recoded datasets back with the original data set.

The recoded files of the four most commonly stolen makes of phone were merged back into the original dataset by matching cases on their unique case identifier. The data set now contained all original cases. Those from the main four manufacturers were recoded to the model level. Key models within makes ranking fifth to eighth were also recoded. Remaining makes were recoded only to the make level.

8. Merging the variables recoded Make and recoded Model

In order to merge the recoded text variables Make and Model together, the syntax 'Merging make and model.sps' was run. This generated a report within which the two text variables were merged. This syntax is attached as Appendix 7.7. The output from the report was saved in the text editing software Windows Notepad and then re-imported into SPSS™ as a new variable, 'Make & Model'. Cases were again matched using the unique identifier generated in step 2. The data file now consisted of all cases which could reasonably be cleaned within the eight most frequently stolen makes of mobile phone, each described by the month, quarter and year of offence and with a unique identifying number.

Results

The resulting size of the dataset for further analysis

The original NMPCU 'property' data set for 2004 - 2005 consisted of 255353 lines, each representing an individual item of stolen property. Over ninety percent of items (n= 229860) had a unique CrimeID, meaning that NMPCU records only contained a description of one item for that crime. However, analysis using the NMPCU variable ItemNum revealed that nearly fifty seven percent of items (n=145480) were stolen along with other items. It was NMPCU policy to not record the nature of items stolen along with phones. It would have been useful to analyse the nature of items which were taken along with phones, but this was not possible.

The prevalence of each manufacturer among stolen handsets

Over 3400 individual lines of syntax were written to recode the makes of phone in the 2004-05 dataset. The syntax resulted in 98.7 percent (n=252064) of cases being recoded as either a recognised make or as missing. Just over 90 percent of cases (n= 230372) were recoded into recognisable makes. The frequencies of the recoded makes within the 2004-05 dataset are presented below in Table 7.1 which shows that the majority (87%, n= 200337) of recoded makes were from the four manufacturers Nokia, Sony Ericsson, Samsung and Motorola.

Table 7.1: Frequencies of recoded phone make within the 2004-05 dataset.

Make	**Frequency**	**Valid %**	**Cumulative valid %**
Nokia	120315	52.2	52.2
Sony Ericsson	29542	12.8	65.1
Samsung	28874	12.5	77.6
Motorola	21606	9.4	87.0
Siemens	7450	3.2	90.2
LG	5622	2.4	92.6
Sharp	3273	1.4	94.1
NEC	2804	1.2	95.3
Sagem	2781	1.2	96.5
Panasonic	2550	1.1	97.6
O2	1027	0.4	98.0
Hutchinson	997	0.4	98.5
Vodafone	664	0.3	98.8
Orange	593	0.3	99.0
Phillips	521	0.2	99.2
Blackberry	476	0.2	99.4
T-Mobile	374	0.2	99.6
Alcatel	339	0.1	99.8
Virgin	262	0.1	99.9
BT	97	0.0	99.9
Sanyo	83	0.0	99.9
Palm	67	0.0	100.0
Toshiba	18	0.0	100.0
i-mate	16	0.0	100.0
Qtek	9	0.0	100.0
Bosch	4	0.0	100.0
Sendo	4	0.0	100.0
Fujitsu	2	0.0	100.0
Nikon	2	0.0	100.0
Valid total	230372	100.0	

The prevalence of handset models

The 2004-05 data set to be recoded at the model level consisted of the 200337 cases accounted for by manufacturers Nokia, Sony Ericsson, Samsung and Motorola. Over 10900 lines of syntax were written to recode models within this dataset, resulting in 71.4 percent (n= 143025) of cases being recoded into verified models. Analysis of the frequencies of models within the makes ranking fifth to eighth in Table 7.1 above revealed that only two models of phone, the LG U1820 and the Sharp GX10 were stolen in sufficient numbers to rank within the top 20 stolen models for any quarter.

Tables 7.2 and 7.3 below show the top 20 stolen phones for each quarter of years 2004 and 2005 respectively, within the eight most frequently stolen makes of phone. These eight makes are: Nokia, Sony Ericsson, Samsung, Motorola, Siemens, LG, Sharp and NEC. Analysis by quarter reveals the rapidly changing nature of phone thefts: models rise and fall through the ranks within a matter of months.

For most quarters the majority of top 20 positions were occupied by models from makes ranking first to fourth. Exceptions to this were few: the LG U1820 first appeared at rank 13 in the final quarter of 2004, rose to eighth at the start of 2005 and then dropped to twelfth the following quarter. By the third quarter of 2005 this model ranked 21st, with only 188 reported stolen in that quarter. In contrast the Nokia 7250 dominated for the majority of 2004 before dropping to tenth rank in the first quarter of 2005. It was immediately replaced by the Nokia 6230 which ranks first for the whole of 2005.

The ‘theft careers’ of the most stolen handset models

As the researcher conducted preliminary descriptive analysis of the trends in theft, it became apparent that there was significant monthly variation. That is, the prominence of certain handset models changed over time. Further investigation showed that there was often gradual change from month to month, producing distinct trends that varied from one handset to the next which the research team began to refer to as ‘theft careers’ of handsets, with reference to Felson and Clarke’s (1998) product life cycles.

Figure 7.4 charts the rise and fall of a selection of the most stolen models throughout 2004 and 2005. Each model has a clearly defined theft career or life cycle - that is, a gradual then almost exponential rise in the number stolen, followed by a plateau and finally a decrease. The stages parallel the stages of innovation, growth, mass marketing and saturation seen in the sales of products described by Felson and Clarke (1998). Wellsmith and Burrell (2005) showed that the decrease in theft numbers of both audio equipment and video recorders corresponded with decreases in purchase price, following saturation stage. It is likely that the demand for and rewards of stealing different models of mobile phone will also vary with purchase price. Further research could be carried out to track the price of different models on both pay-as-you-go and contract deals within the UK, and map the data back to NMPCU recorded crime numbers.

The patterns displayed in Figure 7.4 are doubtless to some extent reflective of the numbers of each model in circulation, that is, the number available for theft. The ideal Theft Index would be based on risk of theft controlling for availability. The development of a risk-based Theft Index is described in the next chapter. The rapid pace of change of ranks and analysis of theft careers by month demonstrated that any Index produced should focus on short time periods of around a month. Aggregation of theft numbers over longer periods of time risks conflating different aspects of rapidly changing theft careers.

Table 7.2: Top 20 stolen phones by quarter in 2004

	Q1 (n= 22131)		Q2 (n= 22237)		Q3 (n= 20538)		Q4 (n= 19090)		Total for 2004 (n= 83996)	
Rank	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**
1	Nokia 7250	9.1	Nokia 7250	7.7	Nokia 3310	5.3	Nokia 6230	9.7	Nokia 7250	6.6
2	Nokia 3310	16.2	Nokia 3310	13.4	Nokia 7250	10.5	Nokia 3310	14.0	Nokia 3310	12.2
3	Nokia 8310	22.8	Sony E T610	18.7	Samsung E700	15.7	Samsung E700	18.2	Sony E T610	16.9
4	Sony E T610	28.1	Samsung E700	23.9	Nokia 6230	20.8	Nokia 7250	21.9	Samsung E700	21.3
5	Nokia 6100	33.1	Nokia 8310	28.2	Sony E T610	25.2	Sony E T610	25.3	Nokia 8310	25.5
6	Nokia 7210	37.9	Nokia 6100	32.4	Nokia 6100	29.0	Nokia 6100	28.2	Nokia 6100	29.5
7	Samsung E700	41.1	Nokia 7210	36.1	Nokia 8310	32.3	Sony E K700i	30.9	Nokia 6230	33.2
8	Nokia 3510	44.3	Nokia 6310	39.2	Nokia 6600	35.4	Nokia 6610	33.4	Nokia 7210	36.5
9	Nokia 6310	47.4	Nokia 6600	42.2	Nokia 6310	38.2	Nokia 6600	35.9	Nokia 6310	39.4
10	Nokia 3410	50.5	Nokia 3510	44.9	Nokia 7210	40.9	Nokia 6310	38.3	Nokia 6600	41.9
11	Samsung V200	52.8	Nokia 3410	47.6	Nokia 3410	43.0	Nokia 8310	40.6	Nokia 3510	44.4
12	Nokia 8210	54.9	Nokia 3200	49.3	Nokia 3510	45.1	Nokia 7610	42.6	Nokia 3410	46.7
13	Nokia 3210	56.8	Samsung V200	51.0	Nokia 6610	46.9	LG U8120	44.5	Nokia 6610	48.6
14	Nokia 6610	58.5	Nokia 3210	52.6	Sony E T630	48.7	Nokia 3510	46.3	Nokia 3210	50.3
15	Sony E T68	60.0	Nokia 6610	54.1	Nokia 3210	50.4	Nokia 7210	48.0	Nokia 8210	51.8
16	Samsung A800	61.5	Nokia 3100	55.6	Motorola V600	52.1	Nokia 3410	49.6	Samsung V200	53.2
17	Nokia 3330	63.1	Nokia 7600	57.0	Nokia 3200	53.7	Motorola V600	51.2	Nokia 3200	54.6
18	Nokia 5210	64.5	Nokia 8210	58.4	Motorola V300	55.0	Sony E T630	52.8	Nokia 6210	55.8
19	Nokia 6600	65.9	Motorola V300	59.8	Sony E P900	56.4	Samsung E800	54.3	Nokia 3100	57.0
20	Sharp GX10	67.3	Samsung A800	61.1	Nokia 6210	57.7	Nokia 7600	55.8	Sony E T630	58.2
Other*		32.7		38.9		42.3		44.2		41.8

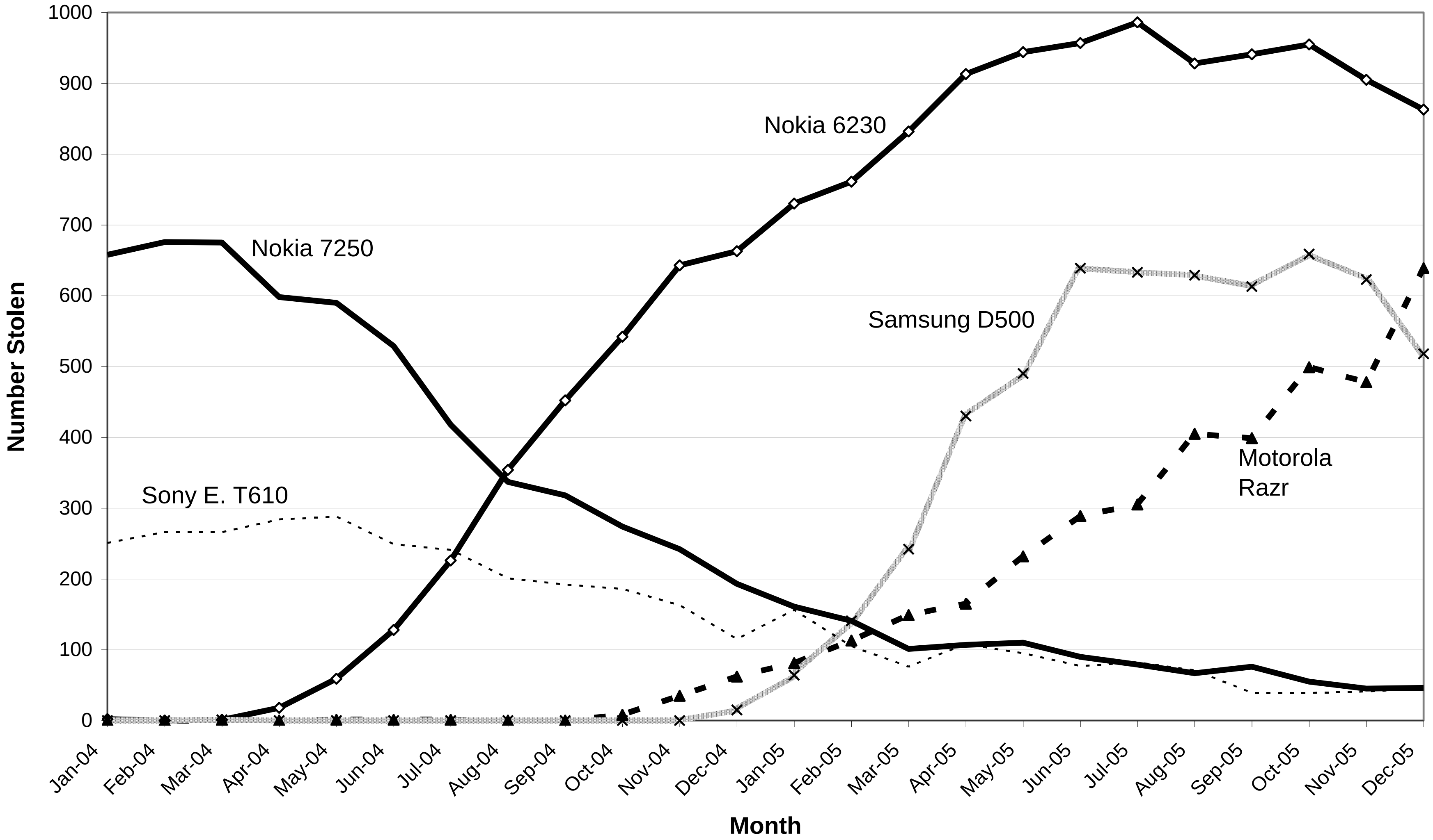
*= N of ranks varied by Qr:
Q1= 297
Q2= 289
Q3= 328
Q4= 345

Table 7.3: Top 20 stolen phones by quarter in 2005

	Q5 (n=18193)		Q6 (n= 20303)		Q7 (n= 20476)		Q8 (n= 20498)		Total for 2005 (n= 79470)	
Rank	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**	**Make & Model**	**Cum %**
1	Nokia 6230	12.8	Nokia 6230	13.9	Nokia 6230	13.9	Nokia 6230	13.3	Nokia 6230	13.5
2	Sony E K700i	16.7	Samsung D500	21.5	Samsung D500	23.1	Samsung D500	22.1	Samsung D500	20.6
3	Nokia 3310	20.1	Sony E K700i	25.3	Motorola Razr	28.5	Motorola Razr	29.9	Motorola Razr	25.4
4	Sony E T610	22.7	Motorola Razr	28.7	Sony E K700i	31.8	Sony E K750i	33.5	Sony E K700i	28.8
5	Nokia 6610	25.3	Nokia 3310	31.2	Nokia 6630	34.7	Nokia 6680	36.7	Nokia 3310	31.2
6	Samsung E700	27.8	Nokia 6610	33.5	Nokia 6680	37.1	Sony E K700i	39.6	Nokia 6610	33.3
7	Samsung D500	30.3	Nokia 7610	35.5	Nokia 3310	39.4	Nokia 6630	42.2	Nokia 6630	35.3
8	LG U8120	32.6	Sony E T610	37.5	Sony E K750i	41.4	Sony E W800i	43.9	Sony E T610	37.0
9	Nokia 7610	34.9	Nokia 6630	39.4	Nokia 6610	43.4	Samsung D600	45.5	Nokia 7610	38.7
10	Nokia 7250	37.1	Nokia 6310	41.2	Nokia 7610	45.0	Nokia 3310	47.2	Nokia 6310	40.3
11	Nokia 6100	39.1	Nokia 6100	42.8	Nokia 6310	46.6	Nokia 6610	48.6	Nokia 6100	41.8
12	Nokia 7600	41.0	LG U8120	44.4	Nokia 6100	48.0	Samsung E720	49.9	Nokia 6680	43.4
13	Motorola Razr	42.9	Samsung E700	46.0	Sony E T610	49.3	Nokia 6310	51.1	Sony E K750i	44.8
14	Nokia 6310	44.8	Nokia 7250	47.5	Nokia 6210	50.6	Nokia 6100	52.3	Samsung E700	46.2
15	Nokia 6600	46.6	Nokia 7600	48.9	Samsung E720	51.9	Nokia 8800	53.4	Nokia 7250	47.6
16	Sony E T630	48.1	Nokia 6600	50.2	Nokia 7250	53.0	Sony E K608i	54.4	LG U8120	48.9
17	Samsung E800	49.5	Nokia 6210	51.6	Samsung E700	54.1	Nokia 6210	55.3	Nokia 6210	50.1
18	Nokia 8310	51.0	Nokia 8310	52.8	Nokia 8310	55.1	Nokia 7610	56.2	Nokia 7600	51.3
19	Nokia 7210	52.4	Sony E T630	54.0	Nokia 7600	56.0	Nokia 1100	57.1	Nokia 6600	52.5
20	Nokia 3510	53.7	Samsung E800	55.1	Sony E T630	57.0	Sony E T610	58.0	Nokia 8310	53.6
Other *		46.3		44.9		43.0		42.0		46.3

*= N of ranks varied by Qr:
Q5= 317
Q6= 332
Q7= 344
Q8= 347.

Figure 7.4: Theft careers of a selection of the most stolen phones throughout 2004 and 2005



The December 2005 Theft Index

A count-based Theft Index was produced using NMPCU data for December 2005, which at the time of analysis represented the latest complete month's worth of data. The original month data set consisted of 10349 cases. After recoding, the valid sample size for analysis was 6172 cases. Table 7.4 below shows the twenty phone models most frequently stolen in December 2005.

Table 7.4: Top 20 stolen phones in December 2005

Rank	**Make and Model**	**Frequency**	**Valid percent (n=6172)**	**Cum valid percent**
1	Nokia 6230	849	13.8	13.8
2	Motorola Razr	647	10.5	24.2
3	Samsung D500	519	8.4	32.6
4	Sony E K750i	244	4.0	36.6
5	Nokia 6680	202	3.3	39.9
6	Sony E K700i	199	3.2	43.1
7	Samsung D600	175	2.8	45.9
8	Sony E W800i	163	2.6	48.6
9	Nokia 6630	156	2.5	51.1
10	Nokia N70	109	1.8	52.9
11	Nokia 3310	88	1.4	54.3
12	Nokia 6100	81	1.3	55.6
13	Nokia 6310	81	1.3	56.9
14	Sony E K608i	81	1.3	58.2
15	Nokia 6610	79	1.3	59.5
16	Samsung E720	77	1.2	60.8
17	Nokia 8800	66	1.1	61.8
18	Nokia 1100	65	1.1	62.9
19	Motorola C975	63	1.0	63.9
20	Sony E T610	62	1.0	64.9
Other*		2166		35.1

*****Total N of ranks was 301 for December 2005

Table 7.4 shows that together, the top 20 models accounted for nearly 65 percent of phones stolen in December 2005. The remaining ranks (n=281) accounted for just 35 percent of stolen phones. The Nokia 6230 alone accounted for almost 14 percent of thefts. The Motorola Razr ranked second, but accounted for only three quarters as many thefts as the Nokia 6230. Together the top nine ranks accounted for just over half of all reported thefts in December 2005.

Cases which were 'no crimed'

Exploratory analysis to develop a risk-base methodology began by using data from 2004 and 2005. The full methodology and results for the 2006 risk-based Theft Index are presented in Chapter 8 but some initial results from the exploratory analysis affected the count-based Theft Index and so are described here. Initial analysis leading to the development of the risk-based methodology explored the relationships between the models of phone taken and the type of offence in which they were taken. Therefore the 2004-05 NMPCU data files 'Property.txt' and 'Crimes.txt' were merged.

Merging revealed that 6.07 percent (n=12177) of recoded phones within the 2004-05 NMPCU data set 'Property' did not have crime types associated with them in the NMPCU file 'Crimes'. A sample of these cases were emailed to NMPCU in order to determine why this was so. It transpired that the cases were those which had been originally recorded as offences on the NMPCU recording system but had subsequently been altered to 'no crime'. Incidents were defined as 'no crime' if there was insufficient evidence that an offence had taken place or if there was evidence that a claim of theft was false. Neither NMPCU nor the researcher had realised that the data needed checking for cases which had been 'no crimed' before the 2005 count-based Theft Indices had been produced and published in Mailley et al. (2006b). The implication of this was that just over six percent of the cases used in the analysis and publication of results for the count-based Theft Index should have been omitted. Since six percent is a relatively small proportion, omission of these should not drastically alter the results. The key lesson learnt was that queries conducted by NMPCU in order to produce the 2006 data set checked for and omitted cases where an incident had been 'no crimed'. Furthermore, NMPCU added variables describing the offence type to the 2006 Property dataset, meaning all the variables required for analysis were present in one dataset, removing the need for the researcher to merge datasets before data cleaning could begin.

Discussion and conclusions

Theft numbers

Production of a count-based Theft Index for December 2005 demonstrated that the number of handsets stolen at any one time varied greatly between phone models. This was possibly in part due to differences in the availability and usage patterns of different models. It was likely that many more Nokia 6230s were stolen because there were many more Nokia 6230s available for theft. Therefore a more meaningful measure of theft risk would control for what is available for theft. The methodology and results for developing a risk-based Theft Index are described in the next chapter.

Patterns of phone thefts

Examination of the theft careers of various models demonstrated that stolen mobile phones follow a theft career similar to the life cycle of legitimate goods. For the most commonly stolen models such as the Nokia 6230, Motorola Razr, and the Samsung D500, distinct stages of a theft career (Felson and Clarke, 1998) were evident. The most commonly stolen models of phone exhibited relatively slow increases in theft during the equivalent of the legitimate innovation stage, when ownership is restricted to a specialist group of consumers and is probably not well known. Innovation is followed by rapid and then almost exponential increases in theft numbers during growth and mass marketing stages. During these stages more people are aware of the products and desire or own one, increasing theft demand and theft opportunities respectively. Finally the models reach a plateau, where theft numbers even out and then tail off. At this stage most people who desired that model presumably had one, or the price had reduced to the extent as to no longer outweigh the risks of theft. As evidenced by the Nokia 6230 superseding the Nokia 7250, newer and more valuable or desirable models soon fill the niche of being the most demanded and available for theft.

It is likely that purchase price has an effect on the theft risks of different models of phone, since price is interlinked with demand (Wellsmith and

Burrell, 2005). Further research into the relationship between mobile phone price and theft levels could be carried out by tracking the price of popular models throughout their legitimate life cycle and comparing the data with NMPCU generated theft career charts.

Practicalities of producing a Theft Index

When developing the count-based Theft Index, the greatest demand on time came from the need to recode each permutation of phone make and model one at a time. Syntax development took several months of full time work representing hundreds of hours of labour. Clearly the syntax for makes is more stable than for models - new models of phone are frequently introduced to the market - but the key manufacturers remain reasonably consistent (see Chapter 4). Therefore if a Mobile Phone Theft Index was ever to be routinely produced in an efficient manner, syntax development would need to be minimised. Syntax development for each Theft Index could be minimised by NMPCU incorporating drop down menus for at least phone make within their crime recording system, or by using 'justified' fields rather than free-text. The field justification could be monitored for repetition and error. This system is relatively simple and used in many such computing practices (such as road names which also used freetext fields at one time), and would reduce the need for data cleaning while also decreasing data lost due to unresolved data entries. Furthermore a drop down make menu would eliminate the possibility of the scenario where the make and model were entered together in the same field. In the absence of such technological progress in the database, an alternative option for efficient production of a Theft Index would be that uncleaned (raw) data is used if the representativeness of missing data can be understood. The feasibility of such an approach is explored in the next chapter following a description of the development of a risk-based Theft Index.

Potential bias introduced when recoding the data

It was possible that there was some inherent bias in the recoded data sets due to the varying propensity of different make and model names to be inputted correctly and recoded accurately. Entries which are longer, more complex or less well known are predicted to be inputted inaccurately more frequently than shorter, less complex, or better known entries. The more complex and error prone entries might have been recoded as missing more frequently than more simple or recognisable entries. Similarly, those models such as the Nokia 6330 and 6300 which closely match each other might have been recoded as missing in higher proportions than unambiguous entries such as the Nokia 6230 or the Motorola Razr examples given above. This is because where two model names were judged to be equally likely as the ‘correct’ entry, the case was recoded as missing. However the instances of these unresolved cases were relatively low compared to the many thousands of entries which were resolved relatively easily. Furthermore, the count-based Theft Index focuses on only the 20 most stolen types of handsets. Handsets within these ranks numbered in the hundreds, and so the effect of any slight bias towards recoding longer make and model entries as missing would be minimal.

Defining a suitable time period for Theft Indices

Figures 7.3 and 7.4 demonstrate how the numbers of handsets stolen in 2004-2005 altered over a matter of months for many models, particularly for those ranking lower in the count-based Theft Index. Therefore any Theft Index should present data for relatively short time periods. Analysis covering theft in a one month period would be a reasonable possibility in the absence of a continual rolling or automated index that was updated on a daily basis. Aggregation over time masks underlying patterns and trends among quickly changing models. When a particular model dominates the count-based rankings for long periods of time it will still be represented if shorter time periods are analysed.

Bulk thefts

As described in Chapters 2 and 3, the rational choice perspective of Situational Crime Prevention necessitates the study of specific subtypes of crime. In parallel with car theft (Clarke and Harris, 1992), it is likely that mobile phone theft is a generic term that masks sub-types of theft which vary in modus operandi and in the motivation for the theft. The analysis presented here has focused on personal thefts, while commercial robberies which typically involve ‘bulk thefts’ were omitted from all NMPCU data queries. If bulk thefts were included it is likely that the Index results would be altered, perhaps being dominated by a few models where many units had been taken in a small number of offences. Further research could explore whether a separate Theft Index focused on commercial thefts would be warranted by the data held by NMPCU, and whether it would prove useful if produced.

In the case of car thefts, Clarke and Harris (1992) produced different indices to reflect the different motivations for theft: The Index which ranked cars according to risk of temporary theft differed from the Index which ranked cars according to risk of permanent theft. They argued that this differentiation between motivations allowed the ‘choice structuring properties’ of different types of cars to be identified. The models at most risk of permanent theft were the more powerful and luxurious models, presumably because these were stolen with a view to resale and so likely profit was an important consideration for thieves. Further analysis of NMPCU data might reveal whether there is any gain in producing mobile phone Theft Indices according to crime type. The first step would be to include bulk thefts and repeat the analysis presented here. Pearson’s correlation analysis would test whether there were significant differences in the Indices produced by grouping different crime types together.

Chapter 8: Development of a risk-based and practical Theft Index

Introduction

This chapter describes the development of a risk-based Theft Index that was practical for the UK police to produce on a regular basis. The risk-based Theft Index aimed to address the shortcomings of the count-based Theft Index described in Chapter 7. It was possible that the count-based Theft Index simply reflected varying theft opportunities, rather than offenders' preferences for certain handsets over others. Furthermore, the time taken to produce the count-based Theft Index meant that routine production by the NMPCU remained unfeasible. The chapter begins with a short section on an analysis of risk at the manufacturer level which preceded the risk-based Index production. After this, the methodology and results of the risk-based Theft Index are described, followed by a concluding section describing the publications resulting from this work, and industry reaction to those publications.

Exploring risk at the manufacture level

Before the risk-based Theft Index was produced, an analysis was carried out to explore whether different phone manufacturers conveyed different levels of risk to their customers. This aggregate level analysis suggests that theft risk might vary at the model level.

Sales information was available for the UK's major manufacturers, from the market research company Mintel, and this acted as the denominator for calculating risk. Sales data were not absolutely ideal as a measure of availability, but they provided a solid starting point for exploring risk at the manufacturer level. The numerator for calculating theft risk at the manufacturer level was NMPCU data. The risk of theft for each of the main manufacturers was calculated for two years, 2004 and 2006.

Table 8.1 below shows the Theft Ratio for 2004 and 2006 at manufacture level. The Theft Ratio is the percentage theft share divided by the percentage sales share for the appropriate year, for each manufacturer. A ratio greater than one means the make is represented in greater proportions in the theft data than in the sales data, i.e. it confers increased risk to consumers. A ratio less than one means that the proportion of thefts is less than the proportion of sales.

Table 8.1: Theft Ratio by manufacturer, 2004 and 2006.

Make	**% Stolen 2004**	**% Stolen 2006**	**% Sold 2004**	**% Sold 2006**	**Theft Ratio 2004**	**Theft Ratio 2006**
Nokia	55.3	42.4	41	30	1.3	1.4
Samsung	11.4	14.8	10	23	1.1	0.6
Sony Ericsson	12.4	19.9	12	28	1.0	0.7
Motorola	7.4	13.2	9	8	0.8	1.7
LG	1.6	2.8	4	5	0.4	0.6

Source for sales data: Mintel (2007a, figure 22).
Source for theft data: analysis of NMPCU data.

Comparing the Theft Ratios reveals variance in theft risk according to phone manufacturer. Ratios ranged from 0.4 for LG in 2004 to 1.7 for Motorola in 2006. In 2004 Nokia handsets were at higher risk of theft per phone bought than all other makes. Nokias had a risk of theft 1.2 times higher than the next riskiest manufacturer, Samsung, and a risk more than three times higher than the risk for LG (1.3 divided by 0.4 is 3.25). Theft Ratios also changed over time within manufacturer: Samsung's ratio decreased from 1.1 in 2004 to 0.6 in 2006.

The variation over time is almost certainly caused by the rise and fall of different models in their theft careers. It is likely that the models responsible for Nokia's Theft Ratio of greater than one include the frequently stolen models 7250 and 6230 evidenced in Figure 7.4 of the previous chapter, which describes the theft careers of these models. One reason for the popularity of Nokias with mobile phone thieves was the familiarity of their software menus and subsequent ease of use (see Chapter 6). This might explain why they were targeted more frequently in both years than every make except Motorolas in 2006.

The Theft Ratio for Motorola increased considerably from 0.8 in 2004 to 1.7 in 2006, meaning that the relative risk of theft of Motorolas doubled in this time (1.7/0.8= 2.1). The Motorola Razr was arguably responsible for the majority of this increase, if not all of it. Razrs began being stolen in the latter quarter of 2004 and theft numbers were still on the rise by the end of 2005 (see Figure 7.4 describing theft careers).

Clearly sales data do not give a full picture of what was available for theft. Phones sold outside the sales data recording period were not represented in the sales data, but were still available for theft. Conversely, some phones sold would be thrown away and not be available for theft. Phones available for theft would constitute all phones either in use within the UK, and therefore exposed to risk of theft while in use, and those stored away as spares and therefore exposed to risk of theft in offences such as burglary.

Nevertheless, the strong patterns seen in both Nokia and Motorola models, and the fact that these can be sensibly (if not categorically) attributed to certain models lends support to the hypothesis that certain types of phone are preferred by thieves over other types. Differential risk by model is the premise upon which a risk-based Index is based, and so it is important that this aggregate analysis did nothing to counter the prediction that differential risk would be displayed at the model level.

Calculating Risk at the model level

Development of a risk-based Theft Index consisted of establishing a measure of phone availability within the UK population, and minimising the resources needed to produce a risk-based Theft Index. The development and results of each stage are presented in this chapter in the same order that the research progressed, as depicted in Figure 8.1 below.

Figure 8.1: Stages of developing a risk-based Theft Index

1. Phone availability was controlled for and a measure of 'theft risk' devised.
2. A preliminary risk based theft index was produced.
3. The robustness of the methodology was tested by comparing the Indices produced by different permutations of offence types.
4. A more efficient way of producing the risk-based Theft Index was tested by comparing the Index produced using recoded data with the Index produced using the NMPCU data in its original and non-recoded state, as received from NMPCU.

The methodology for each of these four stages is described below, followed by a results section. The chapter concludes with a section describing the publications resulting from the theft index work, and the industry reaction to these publications.

Methodology

1. Controlling for phone availability

The aim of a risk-based Theft Index was to compare the relative risk of theft between different models of phone. In the Car Theft Index, car availability is controlled for by referring to the DVLA's records of registered vehicles (Laycock, 2004). Put simply, the Car Theft Index compares what is stolen to what is available for theft. The measure is not perfect, since registration with the DVLA is not the only factor affecting car availability for theft. Availability and suitability for theft will vary according to situational factors such as car usage and storage, as well as by factors describing the car itself, such as its age, and the effectiveness of any security measures present. Suitability for theft will also vary according to the motivation for the theft (Clarke and Harris, 1992). Nevertheless the Car Theft Index is accepted as a sound measure of car theft risk. The key to developing a risk based methodology was therefore to decide on an available and suitable denominator for risk calculations. The numerator for risk calculations (the number of handsets stolen) was restricted to the data already available from the NMPCU, which meant that there was a geographical restriction to the Greater London area.

Three options presented themselves as contenders for the denominator in controlling for phone availability. These options were sales data, usage data based on the records of phones active according to the UK CEIR, and thirdly the phones contained within the NMPCU data set and therefore available to thieves. Table 8.2 below summarises these three options and the population of phones each one describes, together with its limitations. Ultimately, the only data available to the team were those contained within the NMPCU data set, but the process of deciding on a denominator for risk calculations warrants a brief description, since sales or usage data might be believed to be suitable denominators, until the reasons why this is so are fully explained.

Table 8.2: Three options for controlling for phone availability

Data source	**Describes**	**Limitations**
Sales data	Phones sold in a given time period	Omits phones sold outside the time period, Is not restricted to Greater London area. Data are not available.
Usage (CEIR)	Phones in use in the UK	Omits phones inactive but available for theft (e.g. a spare kept in a drawer at home), Might be skewed by reprogrammed IMEIs, Is not restricted to Greater London area. Data are not available
Stolen by chance	Phones available to phone thieves	Crimes not reported to or recorded by NMPCU.

Sales data

Sales data would have identified the proportions of sales accounted for by various models, within the time period that the sales data were collected. They would have allowed comparison of the number of models sold with the numbers stolen, in order to assess the risk of theft per phone sold, for different models of phone. However, given that the numerator for risk calculations (the number of each handset stolen) was based on NMPCU data, and NMPCU data recorded thefts within the Greater London area only, any sales data provided would had to have been restricted to the same geographical area as the NMPCU data. Since many people commute to London for work and leisure, and London is visited by many tourists, there is no sensible way to restrict the sales data to the same geographical area as that covered by NMPCU records.

Usage data

In order to ascertain which models of phone were *in use* by the UK public, it was theoretically possible to deduce the model type from the IMEI numbers of all phones active on the UK SEIR, which is the IMEI database of the UK network providers. In theory, the database could provide for phones the same data that the DVLA register provides for vehicles. Two practical issues would need to be overcome but are not insurmountable:

Firstly, IMEI records on the SEIR would allow identification of the population of phones in use within the UK, but not those stored away as spares. Secondly, inaccurate IMEIs might be present on the SEIR due to the illegal activity of reprogramming. If an IMEI had been altered to enable a blacklisted phone to be used on the UK networks, the make and model associated with that IMEI might not accurately reflect the actual make and model of the handset in question. The extent of IMEI reprogramming in the UK is not well understood but thought to be considerable in terms of total numbers. Kaplankiran et al. (2008) estimate that a minimum of 5 percent of the UK mobile population might have had their IMEI tampered with.

Finally, the issue of geographic restriction of the data would again be an issue: it would take a great deal of analysis to determine which phones had ever been available for theft in the Greater London area and within the time period covered by the latest Index.

Industry non-cooperation

Attempts to access sales data at the model level from manufacturers through contacts within the Carphone Warehouse, the GSM Association and the Mobile Industry Crime Action Forum were unsuccessful despite Home Office support for this research. It was claimed that sales data were commercially sensitive. When the GSM Association was approached for usage data based on UK CEIR records, their response was that these data effectively reflected sales and so were also commercially sensitive. It is worth noting that the GSMA was aware that the research involved the analysis of police crime records, arguably as sensitive as sales data. Furthermore the GSMA claimed that a good deal of work was needed in order to identify make and model from IMEI numbers. For an ICT based company this is a poor excuse. The final 'excuse' for not providing CEIR data was that the issue of reprogramming was so great that it would skew results. In reality, if reprogramming was such a common event, then this implied that IMEIs were not secure and that the GSMA's attempts to decrease thefts by securing IMEIs were failing. Arguing that reprogramming was a large scale issue was not consistent with earlier claims that the GSMA and manufacturers were doing everything possible to decrease phone theft levels. It also contrasted with England's (2005) conclusions that duplicate IMEIs were not a significant problem on the UK SEIR.

While it is not possible to state categorically the motives of the GSMA, whether it was fully supportive of the research is questionable. As soon as it was apparent that the research was heading in the direction of producing empirical evidence of the nature of phone theft, cooperation stalled. This and other issues concerning industry (non)cooperation are discussed further in the concluding section of this chapter.

NMPCU data: phones stolen by chance

The third and most practical option for assessing model availability was to use data already contained within the NMPCU dataset. The measure of availability used for the denominator of the risk-based Theft Index was the proportion of each model taken in offences where the phone was taken with other items. When phones were taken with other items, they were arguably taken by chance rather than being consciously chosen. For example a phone within a handbag which is snatched will be taken because it was within the bag; a phone taken during a burglary will be taken because it was in the house and available for theft. Therefore these crimes acted as a sampling procedure of phones available to phone thieves. As recorded in Table 8.1 above, the limitations of the NMPCU data were that all the NMPCU records were restricted to those offences both reported to the NMPCU and recorded by them as offences. The proportion of phone thefts not reported to the police could be around half: According to the British Crime Survey 46 percent of mobile phone thefts suffered in the year prior to the 2002/03 BCS were not reported to the police (Allen et al. 2005: 24).

Numerator for theft risk calculations

The numerator used in the final theft risk calculation was the proportion of each model taken in incidents where only the phone was taken (phone-only thefts). The logic of using this numerator was that when the phone is the only item taken, it is likely that the intention of that offence was to take that specific model of phone and nothing else.

These measures will not be perfect: some offences where a phone was the only item taken might have been interrupted before other items were taken. Examples might include hypothetical scenarios in which a victim was less compliant than the offender assumed, or when a larger theft was interrupted. Conversely if other items were taken along with the phone, they might have been taken despite the fact that the phone was the main target of the theft. A hypothetical scenario would include a victim who was particularly compliant and offered up an entire bag or their wallet in fear when asked for his or her phone.

However, on aggregate, those offences where the phone was the only item taken will represent offences where offenders have had the opportunity to make a choice to take that specific phone. Offences where other items were also taken (not phone-only thefts) will sample phone availability within the victimised population. This measure does not provide any information about the availability of phones within the non-victimised population.

The measure of risk decided upon

For each model of phone within the NMPCU 2006 data set, a Risk Ratio was calculated. The Risk Ratio compares the proportion of each model specifically targeted in thefts with the proportion available for thefts and is summarised below. The SPSS™ based methodology to calculate the Risk Ratio is then described.

$$\text{Risk Ratio} = \frac{\text{Proportion taken in targeted crimes (phone-only)}}{\text{Proportion taken in acquisitive crimes (not phone-only).}}$$

2. Producing a risk-based Theft Index using 2006 data

At the time of analysis leading to the risk-based Theft Index, the most recent and complete year of NMPCU data was 2006. Development of a risk-based Theft Index therefore began with the acquisition and recoding of NMPCU crime records from 1st January 2006 to December 31st 2006 inclusive. Data acquisition was much easier compared to gaining access to the original 2004-2005 data set because a relationship with NMPCU was already established. NMPCU repeated the Property query as they had for 2004-05 with the slight revision of adding variables describing the offence type, and removing ‘no crimed’ cases. Including the offence type, a variable based on Home Office Counting Rules for crime, saved the need for merging Property and Crimes files by the researcher. Removal of the ‘no crimed’ cases reflected the lesson learnt from the production of the count-based Theft Index, where it was discovered that some cases initially recorded as crimes by the NMPCU were later deemed to be false reports and labelled as not crimes, as described in Chapter 7.

Recoding the data consisted of running the syntax developed for the 2004-2005 data set and then updating this syntax to include new makes and models of phone, following the iterative process already described in Figure 7.1 of Chapter 7. As with the count-based Theft Index, the resulting SPSS™ data set consisted of rows of cases. Each row represented a mobile phone, with variables describing the nature of the incident and the make and model of phone taken. The steps necessary to calculate the Risk Ratio for each model of handset are described below:

Counting the number of phones per offence

It was necessary to ascertain the number of phones taken in each crime within the data set in order to define those cases where only the phone was taken. The number of phones per offence was counted by using the SPSS™ command ‘aggregate’ and defining the NMPCU crime number (CrimeID) as the break variable. The break variable defines the sets of cases within which addition occurs. The resultant new variable was named PhoneCount. This count relied on each line of NMPCU data representing an individual stolen phone.

Identifying offences where only the phone was taken

The next stage of calculating a Risk Ratio required labelling those cases where the phone was the only item which had been stolen. This involved comparing the count of phones stolen per crime, as calculated in the previous section, with the total amount of property recorded as stolen by the NMPCU. The 2006 dataset contained the NMPCU variable GENTotalProperty which recorded the total number of items reported stolen. Therefore, identifying which offences had involved the theft of only a mobile phone consisted of labelling those cases where the number of phones (PhoneCount computed as above) equalled the NMPCU variable GENTotalProperty. The syntax to achieve this is presented below in Figure 8.2.

Figure 8.2 Syntax to identify 'phone-only' offences.

```
Compute PhoneOnly = 0 .
Execute.
IF(GENTotalProperty=PhoneCount)PhoneOnly=1.
Value labels PhoneCount 1 'Phone only'.
Execute.
```

Calculating Risk Ratios for each model of phone

Once cases were labelled as being taken in targeted (phone-only) or in not phone-only offences, calculation of the Risk Ratio was relatively simple. A cross tabulation of the variables PhoneOnly and recoded MakeModel produced SPSS™ output which was exported to Microsoft Excel™. The counts of each model were then summed and the proportion of each model stolen in phone only offences calculated. The Risk Ratio was then calculated by dividing the proportion of each model taken in phone-only offences by the proportion taken in not phone-only offences. Note that analysis was conducted at the item level because the risk-based Theft Index ranks different models of phones according to their risk of theft. The SPSS™ syntax to produce the initial cross tabulation is presented in Figure 8.3 below.

Figure 8.3 Syntax to produce Risk Ratio output for import to Microsoft Excel.

```
Crosstabs tables= MakeModel by PhoneOnly.
Execute.
```

4. Comparing the risk-based Theft Indices produced by different permutations of offence types.

As mentioned in the Introduction to this chapter, the robustness of the methodology used was tested by assessing if there were any significant differences in the risk-based Indices produced if various permutations of offence type were used. The original risk-based Theft Index for phones stolen in 2006 included all types of crime. The advantage of including all offence types was that the number of cases was maximised, and that all theft opportunities were controlled for. However, if variation had been found between the Indices using various offence permutations, this would have implied that the proportions of phone-only thefts differed between crime types, and that the methodology might have needed refinement to take this into account. If a large majority of the offences which were assumed to be due to specific choices (phone-only offences) were in fact simply due to availability, then altering the composition of offence types included in the analysis should have altered the final Risk Ratios and resultant rankings of different phone models.

Two potential alternative Indices were compared to the original risk-based Theft Index. The first alternative Index considered the Risk Ratios of phones stolen in ‘street crimes’. Street crimes were defined as those where offenders were thought to have had the best chance of seeing the phone and therefore to have made a choice about whether to take it. The offence types within the category street crimes were: robbery of personal property, snatch theft and other theft.

The second alternative Index considered the four crime types which were most common within the 2006 data set. These were: robbery of personal property, burglary dwelling, snatch theft and other theft.

In total, the robustness of the risk-based Theft Index was tested by comparing the Indices produced by using three combinations of crime type: all crimes types, street crimes, and the four most prevalent offence types. Because the Indices consisted of ranked order data, a two-tailed Spearman’s rank correlation was carried out to assess whether there was significant difference in the rank order of models between the three Indices. The test was two-tailed since there was no assumption about which, if either, of the Indices would result in higher or lower ranking of models compared to the others.

5. Addressing the efficiency of Index production.

As discussed in Chapter 7 the ideal Theft Index should be easy for NMPCU to produce without committing to the many hours of data recoding and analysis that were required to develop the initial Theft Indices. In order to assess the minimum recoding required to produce a meaningful Theft Index, the correlation was measured between Indices resulting from the raw data as it was received from NMPCU, and the same data after it was recoded using the methodology described in Chapter 7. Again the overall aim of the analysis was to use Spearman's rank correlation to assess the degree of similarity between the model ranking order produced by the recoded and the original data set. In order to assess this correlation it was necessary to merge together the raw 2006 data as it was received from NMPCU, with the recoded data.

Merging raw and recoded data

Producing Theft Indices using raw data required retracing the methodology described in Chapter 7 to create a data set which included both the raw and recoded versions of the variables Make and Model. By matching each case on its unique identifier, it was relatively simple to extract raw Make and raw Model from previous working data files, and to merge them using a slightly altered Modelmerge syntax. The final data file for comparison of the raw and recoded Theft Indices consisted of the raw and the recoded variable Make, and the raw and the recoded variable Model. Risk Ratios were then calculated for each model using raw Make and raw Model (the Raw Theft Index), and the recoded Make and recoded Model (the Recoded Theft Index).

Results

1. Recoding the 2006 NMPCU data set

The 2006 data set was recoded using the same iterative development of syntax to recode phone Make and Model as described in Chapter 7. The syntax developed using the 2004-05 data provided a solid starting point for recoding the 2006 data, meaning less work was needed than when starting from scratch with the 2004-05 data. However the syntax to recode the variable Model still required several weeks of development because of the rapidly changing pool of models available for theft.

The original 2006 Property data set consisted of 111877 cases. Further development of the 2004-05 SPSS™ syntax to recode Make resulted in 91.8

percent of the 2006 dataset (n= 102786) being recoded into a valid Make. The remaining 9091 cases were recoded as Missing. Table 8.3 below shows the frequencies and proportions of recoded Make within the 2006 dataset.

Table 8.3: Recoded Make within the 2006 dataset

Make	Frequency	Valid %	Cum valid %
Nokia	43762	42.58	42.58
Sony Ericsson	20534	19.98	62.55
Samsung	15107	14.70	77.25
Motorola	13534	13.17	90.42
LG	2886	2.81	93.23
Siemens	1625	1.58	94.81
Sagem	821	0.80	95.61
Blackberry	816	0.79	96.40
O2	546	0.53	96.93
Sharp	526	0.51	97.44
Orange	479	0.47	97.91
NEC	462	0.45	98.36
T-Mobile	383	0.37	98.73
Panasonic	280	0.27	99.00
Vodafone	272	0.26	99.27
Hutchinson	255	0.25	99.52
Virgin	107	0.10	99.62
Alcatel	103	0.10	99.72
Phillips	79	0.08	99.80
Palm	61	0.06	99.86
i-mate	33	0.03	99.89
Sanyo	33	0.03	99.92
Toshiba	24	0.02	99.94
BT	18	0.02	99.96
Amoi	14	0.01	99.97
Qtek	7	0.01	99.98
Bang & Olufsen	5	0.00	99.99
Mitsubishi	4	0.00	99.99
Other	10	0.01	100.00
Valid total	102786	100.00	

In 2006 the proportion of cases accounted for by the top four makes Nokia, Sony Ericsson, Samsung and Motorola was comparable to the proportion they accounted for in 2004-05. In 2006 these four makes (n=92937) accounted for just over 90 percent of valid makes; in 2004- 05 they accounted for 87 percent.

2. The 2006 count-based Theft Index

Model recoding was then carried out on the four most prevalent makes of phone, as it had been for the 2004- 05 data set to produce the count-based Theft Index. Again, models were validated against manufacturers' websites and using wider internet searches. The four data sets were then re-merged with all other makes from the 2006 data. The resulting set contained all 2006 cases, with the four most commonly stolen makes recoded to the model level, and all other makes recoded to the make level. The makes ranking fifth to eighth were also checked for models which, with some recoding, might rank within the top 20 most stolen models in any quarter. The makes ranking fifth to eighth were LG, Siemens, Sagem and Blackberry. The model LG Chocolate, a new and reasonably iconic model, was the only model identified as likely to rank within the top 20 stolen models in any given quarter.

The final 2006 recoded data set consisted of 65926 cases containing validated model data (excluding models recoded as missing). Thus validated and recoded models were present for 58.9 percent of the original 2006 NMPCU property data set; 64.1 percent of recoded makes, and 66.5 percent of cases within the eight most stolen makes in 2006. The syntax ModelMerge.sps was then run to enable the production of a count-based Theft Index for 2006. Table 8.4 below shows the top 20 models of the 2006 count-based Theft Index.

Table 8.4: The top 20 models in the 2006 count-based Theft Index

Rank	Recoded Make and Model	Frequency	Valid % (n=65926)	Cum valid %
1	Nokia 6230	7525	11.4	11.4
2	Motorola Razr	6191	9.4	20.8
3	Samsung D600	3425	5.2	26.0
4	Samsung D500	3335	5.1	31.1
5	Sony Ericsson W800i	2781	4.2	35.3
6	Sony Ericsson K750i	2573	3.9	39.2
7	Nokia N70	2154	3.3	42.4
8	Nokia 6280	2114	3.2	45.7
9	Sony Ericsson W810i	1641	2.5	48.1
10	Sony Ericsson K700i	1534	2.3	50.5
11	Sony Ericsson K800i	1310	2.0	52.5
12	Nokia 8800	1304	2.0	54.4
13	Nokia 6680	1264	1.9	56.4
14	Nokia 6630	900	1.4	57.7
15	Nokia 6111	867	1.3	59.0
16	Nokia 3310	773	1.2	60.2
17	Samsung E900	738	1.1	61.3
18	Nokia 6310	723	1.1	62.4
19	LG Chocolate	706	1.1	63.5
20	Nokia 6210	608	0.9	64.4
Other*		23460	35.6	100

*N of validated models in 2006 was 522.

3. The 2006 risk-based Theft Index

Table 8.5 below shows the twenty models of phone with the highest Risk Ratios in 2006. The results presented below are for those models of mobile phone where over 100 phones were taken during 2006. Inclusion of models with numbers less than 100 produced large variations in Risk Ratios which were presumed to be due to low numbers of cases rather than reflecting a genuine measure of theft risk. Further research would ideally identify the cut-off number of cases where Risk Ratios become highly sensitive to variation due to small numbers. The LG Chocolate, at rank number 14, demonstrates the relevance of checking for models within lower ranking makes which were stolen in sufficient numbers to rank alongside those models from the four most commonly stolen makes, as described in Chapter 7 stage 5.

Table 8.5 The 20 most theft-prone phone models in 2006.

Rank	Phone Make and Model	Total Stolen in 2006	Risk Ratio 2006
1	Sony Ericsson W850i	196	2.70
2	Sony Ericsson W810i	1641	2.27
3	Samsung E900	738	2.11
4	Sony Ericsson W550i	379	1.98
5	Sony Ericsson W800i	2781	1.94
6	Nokia 8800	1304	1.90
7	Samsung E370	113	1.83
8	Samsung D900	551	1.81
9	Sony Ericsson K800i	1310	1.81
10	Samsung D600	3425	1.79
11	Sony Ericsson D750i	520	1.77
12	Nokia N80	448	1.68
13	Sony Ericsson K610i	112	1.60
14	LG Chocolate	706	1.57
15	Nokia 3250	128	1.56
16	Samsung D800	176	1.51
17	Nokia N91	252	1.50
18	Nokia N73	335	1.48
19	Motorola L6	419	1.45
20	Nokia 6280	2114	1.42
Other*		44623	

*N of ranks with over 100 phones stolen in 2006 was 90.

4. Testing the robustness of the methodology

Offence types within the 2006 dataset

As described above, the rationale for testing whether using different crime types resulted in different Indices was that the level of targeting of specific handsets might vary across crime types. If this were the case, the inclusion of different crime types would result in different Indices. The first step in assessing the robustness of the methodology was to assess the distribution of crime types within the 2006 dataset. Table 8.6 below shows the proportions of each offence type within the 2006 data set. In line with earlier Home Office research described in Chapter 4, the majority of cases (nearly 60 percent) were due to robbery and other theft.

Table 8.6 Offence types within the 2006 data set

Offence type	Frequency	Valid Percent	Cumulative Valid Percent
Other Theft	39826	38.7	38.7
Robbery Personal Property	21176	20.6	59.3
Burglary Dwelling	9937	9.7	69.0
Snatch Theft	9629	9.4	78.4
Theft from M/V	8230	8.0	86.4
Picking Pockets etc	8128	7.9	94.3
Burglary Other Buildings	2122	2.1	96.4
ABH	1063	1.0	97.4
Theft Shops	666	.6	98.0
Theft/Taking of M/V	418	.4	98.5
Robbery Business Property	379	.4	98.8
Common Assault	323	.3	99.1
Handling Stolen Goods	201	.2	99.3
Fraud/Forgery Counted per person	165	.2	99.5
GBH	101	.1	99.6
Other Notifiable Other	82	.1	99.7
Rape	56	.1	99.7
Other Sexual	49	.0	99.8
Other Accepted Crime-Other	45	.0	99.8
Theft/Taking Pedal Cycles	28	.0	99.8
Criminal Damage Motor vehicle	28	.0	99.9
Criminal Damage Dwelling	24	.0	99.9
Violence vs person Harassment	23	.0	99.9
Criminal Damage Other	22	.0	99.9
Violence vs person Other	18	.0	100.0
Drug Possession	14	.0	100.0
Violence vs person Offensive Weapon	8	.0	100.0
Murder	7	.0	100.0
Criminal Damage Other Building	6	.0	100.0
Fraud/Forgery Other	4	.0	100.0
Other Notifiable Going Equipped	4	.0	100.0
Drug Trafficking	2	.0	100.0
Motor vehicle Interference Tampering	1	.0	100.0
Missing	1		
Total	102786		

Spearman's Rank correlation between the risk-based, Street Crime and Top 4 Crimes Indices.

Two-tailed tests were carried out to assess if there was any significant difference between the Indices produced using the three permutations of offence type:

- All crimes (the usual risk-based methodology)
- Street crimes (robbery of personal property, snatch theft and other theft)
- Top four crime types (robbery of personal property, burglary dwelling, snatch theft and other theft)

Spearman's rank correlation showed that there was strong agreement between the Indices produced using these three combinations of offence type. The full results of the SPSS™ based test are depicted in Table 8.7 below.

Table 8.7: SPSS™ output from Spearman's Rank Correlation of three alternative risk-based Theft Indices.

Risk Ratio Type		**All Crimes**	**Top Four Crime Types**	**Street Crimes**
All Crimes	Correlation Coefficient	1	**0.913647665**	**0.917397984**
	Sig. (2-tailed)	.	0.000001	0.000001
	N	560	479	479
Top 4 Crime Types	Correlation Coefficient	**0.9136477**	1	**0.992312213**
	Sig. (2-tailed)	0.000001	.	0.000001
	N	479	479	479
Street Crimes	Correlation Coefficient	**0.917398**	**0.992312213**	1
	Sig. (2-tailed)	0.000001	0.000001	.
	N	479	479	479

The results show significant correlation between the three Indices when compared to each other: the correlation coefficient (in bold) is higher than 0.9 for all comparisons.

Specifically, the correlation between the Theft Index using all types of offence and the Theft Index using the four most common crime types is significant (r=0.91, n=479, p<0.000001, two tailed). Similarly the correlation between the Theft Index using all type of offence and using just 'street crimes' was significant (r=9.17, n=479, p<0.000001, two tailed). The correlation between the Top Four Theft Index and the Street Crimes Theft Index was significant (r=99, n=479, p<0.000001, two tailed).

In some senses the results are not particularly surprising: all the Indices tested included both Other theft and Robbery of personal property, which together accounted for nearly 60 percent of cases. If in the future other Indices are produced where the distribution of crime types is not as skewed, it would be prudent to check for between-crime-type differences in targeting in order to check that the Index is robust.

5. Increasing the efficiency of Index production

Two tailed Spearman's rank correlations were carried out to assess whether or not there were significant differences between the Indices produced when recoded and when raw police data were used. The rationale was that if there were no significant differences, then NMPCU could empirically justify using their raw data to produce risk-based Indices and therefore save considerable resources when producing an Index. Spearman's Rank correlation showed significant correlation between the Raw Theft Index and the Recoded Theft Index ($r=0.99$, $n=89$, $p<0.01$, two tailed).

The results showed that NMPCU could justify production of a risk-based Theft Index using their raw data. However this is only justifiable if the *relative ranking* of each model in comparison to other models is the statistic of interest. If the Risk Ratio per se were the statistic of interest, other tests would need to be performed to assess the correlation between the Risk Ratios produced using recoded and raw data.

Publications and the reaction of the mobile phone industry

The count-based Theft Index was published in Mailley et al. (2006a) in the practitioner journal Justice of the Peace. The report was picked up widely by the media and was reported in, among other newspapers, the London Evening Standard (Prigg, 2006), The Daily Telegraph (Steele, 2006), The Mirror (Thornton, 2006) and The Western Mail (Livingstone and Carey, 2006).

The results of the risk-based Theft Index were first published in the practitioner journal Police Review (Farrell and Mailley, 2007) and this elicited a response from the mobile industry. Jack Wraith, the head of MICAF, personally responded. The following is a direct quote from Farrell and Mailley (2007):

"There has been a dramatic rise in the ownership of mobile phones but this has not been matched by the theft of mobile phones,' says Jack Wraith, chairman of the mobile phone crime action forum. The body represents members of the industry, including the phone networks and high street retailers, and the Home Office. He says he would question 'the usefulness and the viability' of the phone theft index, which he compared to a vehicle crime index, adding: 'A thief, in the main, steals a phone because the opportunity is there or the phone is a by-product of a robbery. I do not believe a thief stands on a street corner thinking: 'I am going to steal that because it is a Samsung and not that one because it is a Nokia'.' Mr Wraith says the industry has encouraged mobile phone users to register their phones at www.immobilise.com and ensures all stolen phones are blocked from use on all UK networks within 48 hours of being reported."

Jack Wraith further demonstrated a lack of awareness of criminological thinking in the response below, which was a comment made by email on a draft of the 2008 Security Journal publication (Mailley et al., 2008):

"Mobile phone theft will NEVER go away. This shows a lack of understanding of the underlying problems of mobile phone theft. The authorities including Government, Police and industry can only put in place measures to impact on the post theft environment – phones will always be the subject of theft – FACT" (Jack Wraith, 2007 via personal correspondence to the author).

Several points are worth iterating regarding Mr Wraith's comments. Firstly, the comparison with the UK Car Theft Index was made originally by the research team, and Mr Wraith argued in person that cars and phones are so different that there is no common ground on which to make comparisons. This ignores the methodological similarities of the Indices (comparing what is stolen to what is available), and the overarching purpose of increasing consumer awareness in order to stimulate demand for safer products. The similarities are at the macro level and are most clearly seen in terms of routine activity theory (Cohen and Felson, 1979: Sampson et al., 2010). The micro level differences which he refers to (for example in target type, length of product life cycle and value of products) are real, but apply to the rational choice perspective (Cornish and Clarke, 1986).

Secondly, the comment that thieves do not discern between different models of mobile phone is in direct contrast to both rational choice theory (Cornish and Clarke, 1986), and to the evidence obtained during this research and reported in Chapter 6. Mobile phone thieves themselves reported that they often discerned between handsets when they could, and some had even given phones back to victims because the phones were so undesirable. To state publicly that rational choices are not made shows at the least a lack of awareness of current criminological literature and evidence, which is worrying when displayed by such an influential figure as the chair of MICAF. At worst this statement could be interpreted as turning a blind eye to the evidence which builds a case for compelling industry to take steps to secure mobile phones.

Finally and critically, the claim that 'all mobiles are blocked within 48 hours' is itself untrue. A full rebuttal of this claim has been given in Chapter 4 of this thesis.

Discussion and conclusions

This chapter has described how the count-based Theft Index methodology was developed to produce a risk-based Theft Index that was practical for NMPCU to produce on a regular basis. An initial analysis at the manufacturer level had revealed that the risk of theft, based on sales data, differed between manufacturers and over time. This justified a more detailed exploration of risk at the model level.

In the absence of sales data, phone availability was approximated using data available within the NMPCU data set. This removed the need for NMPCU to rely on any external organisation to provide data for the risk-based Theft Index. Furthermore, the use of NMPCU data removed the complications associated with using either sales or usage data.

Phone availability was approximated by relying on the sampling effect of offences where phones were taken as a by-product of the offence. This measure had the advantage over sales data of representing phones regardless of their age (i.e. when they were sold), and removed the need to interrogate the SEIR to assess usage patterns based on IMEI records.

The risk-based Theft Index was restricted to models of phone where over 100 had been taken according to NMPCU data, since numbers below 100 were predicted to produce unreliable results.

Spearman’s rank correlation showed that the theft risk rankings did not significantly alter when the types of offences considered were altered. Therefore all crime types were included to maximise the number in the sample.

Spearman’s rank correlation showed that the rankings produced by the recoded data were significantly similar to the rankings produced by raw data. Therefore NMPCU could justify the production of risk-based Indices using their raw data.

A key recommendation from this research for NMPCU was the adoption of drop down menus within their crime recording system for at least the variable phone make. This would minimise data entry errors. Gratifyingly, NMPCU have since adopted drop down menus for at least the key mobile manufacturers in the UK. It would also be possible for models to be organised into drop down menus if phone manufacturers would provide NMPCU with regularly updated lists of current models. However, the implementation of drop down menus for the variable Make means that, in effect, the data now produced by NMPCU are half recoded. The potential bias of underrepresentation of long or difficult make names will be removed by using drop down menus. This reduces even further any objections that might be raised if NMPCU produced risk-based Theft Indices using their raw data, since it is now in effect semi recoded.

In conclusion, there seems to be no practical reason why NMPCU can not regularly produce a risk-based Theft Index using their raw data, including all types of crime, for models where 100 or more phones were stolen.

Future research could focus on honing the methodology as required. The remaining issues, albeit minor ones, are those of whether a separate Theft Index for bulk thefts of phones is justified and useful, and an analysis to estimate the minimum number of cases needed to produce a reliable Risk Ratio if time intervals between Indices are varied.

The reactions of key personnel within the GSMA and MICAF to the academic publications resulting from this work suggest that the industry is against investing in more efficient IMEI blacklisting. The fact that the methodology for testing the efficacy of the SEIR is questionable to say the least, supports the hypothesis that industry is resisting the internalisation of crime costs, while publicly claiming that it is doing everything possible to protect customers from the risk of victimisation.

Chapter 9: Conclusions, recommendations and predictions.

Introduction

This chapter summarises the outcomes of the research presented in this thesis. Headline observations and recommendations are highlighted in bold. Normal text is used to expand upon and give evidence for the conclusions and recommendations. The results are presented in the order of a summary of progress in mobile phone theft prevention to date; an analysis of mobile phone theft in the UK through the lens of routine activity theory (Cohen and Felson, 1979; Sampson et al, 2010) and applying the notion of crime as pollution (Roman and Farrell, 2002). Evidence for the rationality of mobile phone thieves is then summarised and the implications for the rational choice perspective (Cornish and Clarke, 1986) are clarified. The chapter concludes by specifying the implications of this research for macro level policy, and for designing-out crime from mobile phone handsets. The final table presents some predictions of how theft patterns for various motivations of mobile phone theft will alter in the future if the two key practical recommendations of this thesis are implemented. These are:

1) A Mobile Phone Theft Index is published which stimulates market demand for increased security features in phones, resulting in incremental improvements in phone security.

2) Blacklisting efficiency is independently reviewed and subsequently increased.

A SUMMARY OF THE PROBLEM OF MOBILE PHONE THEFT AND ITS PREVENTION IN THE UK

Mobile phone theft has been a chronic problem in the UK since the early 1990s (POST, 1995) and is estimated to cost the UK in excess of £1.2 billion each year (Mailley and Farrell, 2006). It can be viewed as a form of pollution (Roman and Farrell, 2002) where industry profits and society bears the costs of crime consequences.

Future research should aim to triangulate sources such as the British Crime Survey and NMPCU data to provide a more up to date estimate of annual theft levels for England and Wales. A thorough analysis of a variety of sources led to an estimate of 710 000 mobile phone thefts in England and Wales during 2000 (Harrington and Mayhew, 2001). The majority of these thefts occurred while the phones were unattended, such as when left on tables or in vehicles. Females were at slightly higher risk of victimisation than were males. Offenders were almost all male, and there was evidence of groups acting together and accounting for an increase in 'street crimes' (Harrington and Mayhew, 2001). Data from NMPCU (Higgins, 2007) suggest that theft levels decreased in 2007 following a peak in 2004 and 2005.

The mobile phone industry has acted as a monopoly when responding to government and media demands for increased phone security. Industry has resisted government calls to effectively design-out crime from its products, by blaming offenders and phone users, and by claiming that phone thieves take any phone available to them. The implication is that any prevented crime will be displaced.

The UK government has been successful in coercing the mobile phone industry to take some action. Home Office minister Hazel Blears' meeting in 2004 resulted in security standards for IMEIs (via the GSMA's 9 Principles for IMEI Security), and a target for UK blacklisting efficiency (via the 2006 Mobile Phone Industry Crime Reduction Charter). In addition, the UK government invested considerable resources by establishing the NMPCU, initiating the Mobile Phones (Reprogramming) Act 2002, and addressing street crime via the Street Crime Initiative.

A status quo exists where the UK government is being told that all possible prevention measures have been taken by industry, and that blacklisting targets are being met. The government therefore has little leverage with which to reasonably demand further action from industry. The critique of industry's self-funded and self-directed research (see Cooper et al., 2007) in Chapter 4 of this thesis shows how the government has been misled. Blacklisting is not likely to be as efficient as claimed by industry, and furthermore it would not decrease phone thefts where the phone is sold abroad, sold for parts, for recycling, or when they have taken place as part of a bullying act. Therefore an alternative fresh initiative is needed to break the unfavourable stalemate in which industry continues to pollute.

A MACRO-LEVEL ANALYSIS OF MOBILE PHONE THEFT: ROUTINE ACTIVITY THEORY AND CRIME AS POLLUTION

1. Mobile phones are the crime target in mobile phone theft. The role of guardian (of the phone) can be filled by the phone owner, members of the public, and by technological or physical security features of the phone. Manufacturers are the supercontrollers who define the supply of suitable technological or physical security features, and therefore they define the supply of suitable targets.

2. The government, police and the public can be seen as supercontrollers who interact with phone manufacturers to create demand for increased security. The current status quo of industry pollution exists because the goals of government and the police (to decrease phone thefts) do not align with the goals of industry (to maximise profit). The public have little power to create demand for increased security because they are currently unaware of the variation in, or perhaps the presence of, theft risk conferred according to model choice.

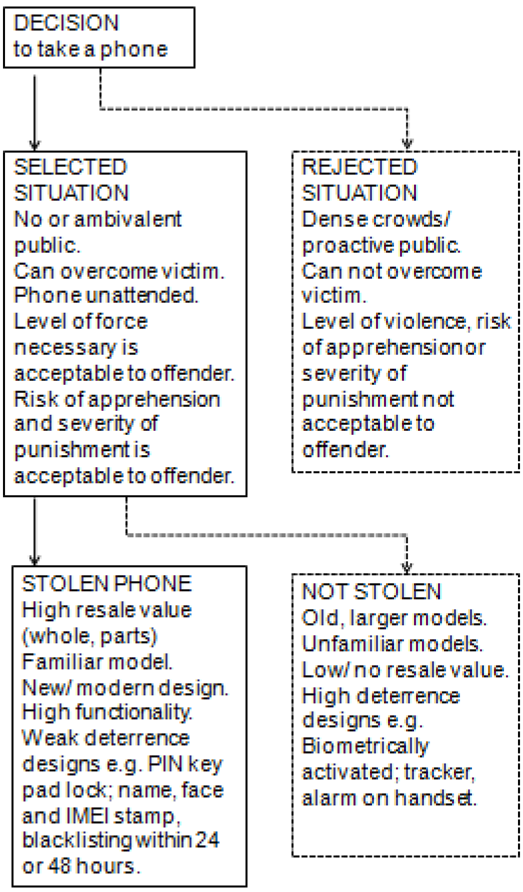
3. One means of aligning the incentives of all supercontrollers is to create public demand for increased security. Security would become a marketable commodity and therefore of interest to phone manufacturers. The role of government as supercontroller would be minimised as a market for security evolved, thereby minimising demand on government resources. An acceptable level of pollution (phone theft) should emerge, once a threshold is reached above which consumers are not prepared to pay for further increased security.

4. One method for creating a market for phone security is to inform consumers of the variance in theft risk across handsets. This would achieve market barrier reduction (Stavins, 2000). The UK Car Theft Index (Laycock, 2004) provides an example of a previously successful market barrier reduction initiative.

A MICRO-LEVEL ANALYSIS OF MOBILE PHONE THEFT: THE RATIONAL CHOICE PERSPECTIVE

Mobile phone thieves display rationality in their choice of victim and their choice of phone target. This headline conclusion is based on the sub-conclusions and evidence listed below. The choice-structuring properties of mobile phones and some of the wider situational factors considered by phone thieves are depicted in a novel rational choice event model for mobile phone theft, reproduced below as Figure 9.1. This is a copy of Figure 6.5 of this thesis.

Figure 9.1: A rational choice event model for mobile phone theft



1. Mobile phone thieves prefer to take some models of phone rather than others. Thieves are not, on aggregate, opportunists who take any phone available.

a) There exists a population of offenders who specialise in taking only phones rather than other objects such as iPods. Approximately half (46%) of the offenders interviewed take only phones. One third (34%) of the interviewed offenders are generalists and vary their choice of theft object depending on the situation.

b) Mobile phone thieves make choices about which phones they wish to take. Some mobile phone thieves even give back phones which they perceive to have little or no value. Three quarters of offenders interviewed stated that they make active choices at the point of theft.

c) The choice-structuring properties of the wider phone theft situation include the likelihood of retaliation by victims; the likelihood of public intervention; and the modus operandi necessary to remove a phone from the victim. These properties inform assessments of the likelihood of theft events being successful; of personal injury; and of the likelihood and severity of punishment by the police.

2. Different handsets are at varying risk of theft, and theft risk varies over time.

a) Hypothetical scenarios presented to offenders during interviews led to measurable group preferences within six matched pairs of phones. The strongest preference ratio within a pair was 100 percent, where all offenders chose the Nokia 6010 over the older and larger Nokia 5110. The pair which elicited a split opinion among the sample consisted of the Sony Ericsson K700i and its very similar upgrade, the Sony Ericsson T630.

b) These stated preferences are backed by empirical analysis of crime records held at the National Mobile Phone Crime Unit. Handset models display ‘theft careers’ mirroring the four stage product life-cycle of legitimate products (Felson and Clarke, 1998). Controlling for phone availability allows the most theft-prone models to be identified. In 2006 the four most theft-prone phone models were the Nokia 6230, the Motorola Razr, the Samsung D600 and the Samsung D500 (Mailley et al., 2008).

c) The variance in theft risk of certain models confers variance in theft risk to the manufacturer level. For example the theft ratio (percent stolen over percent sold) for Motorola phones doubled from 0.8 in 2004 to 1.7 in 2006. The iconic ‘Motorola Razr’ was arguably responsible for the majority of this increase, if not all of it.

3. The main factor which increases risk of theft is resale value, which is assessed using the properties of handset moderness and functionality.

a) The choice-structuring properties of mobile phones include how modern the phone looks and its functionality, as well as how familiar the model is to the offender. These properties inform assessments of the likely resale value and personal enjoyment of the phones.

4. Increased experience of mobile phone theft leads to faster decision-making, because elements of the decision-making process are automatic.

a) Expert phone thieves are more likely to recognise and name the models of phone presented at interview than are novices. Their preference ratios within the six matched pairs of phones are the same as or higher than the preference ratios of novices.

b) Expert offenders are more likely to mention resale value than are novices. Novices are slightly more likely to mention functionality and moderness than are experts. These results suggest that experienced thieves by-pass or carry out automatically an assessment of moderness and functionality, providing support for the hypothesis that experience leads to automatic progression along a familiar crime script (Cornish, 1994).

c) Increased experience can be modelled as embedding more firmly the option of phone theft as a perceived solution in Clarke and Cornish's (1985) involvement model. In contrast, the responses of non-offenders highlight that they are not in the possession of the three characteristics which predict continuance in crime (professionalism, life-style changes and peer networks). This has implications for the use of non-offenders in decision-making research.

5. Experienced thieves are less easily deterred than are novices, and are more resourceful in finding methods to overcome security measures.

a) The average percentage of experts deterred across the 23 design solutions was 33.3 percent compared to 37.1 percent of novices. The significance of this variation did not reach statistical significance (two sample $t(37)= 0.63, p>0.5$).

b) Experienced offenders are more likely than novices to report that they can overcome security measures or that they can find someone who can; and that they will find an alternative use for a stolen phone even if it cannot work in the UK. Alternative uses include sale abroad, personal use and sale of parts.

IMPLICATIONS FOR GOVERNMENT POLICY

1. A Mobile Phone Theft Index should be produced using NMPCU data on a quarterly basis.

Newman (2004) concluded that publicity which increased consumer demand for safety and security was the most influential mechanism resulting in vehicle re-designs in the US. The example of the UK Car Theft Index (2004) shows how effective Indices can be in stimulating market demand for security. Consumers do not routinely consider theft risk when purchasing electronic items (Learmount, 2005), and this is probably because crime is an orthogonal (unrecognised) externality (Farrell and Roman, 2006).

a) The routine production of a Mobile Phone Theft Index which assesses risk of theft for different models of phones is feasible and methodologically justifiable using data which already exist within the crime records held by the UK's National Mobile Phone Crime Unit.

b) The equation for assessing theft risk for each phone model is:

$$\textbf{Risk Ratio} = \frac{\textbf{Proportion taken in targeted crimes (phone-only)}}{\textbf{Proportion taken in acquisitive crimes (not phone-only).}}$$

The denominator for the Index should be offences where a phone is taken along with other items, which controls for phone availability and negates the need for industry cooperation in supplying phone pool data. The numerator is the number of phones taken in offences where the phone is the only item taken.

c) The Index can use non-cleaned NMPCU data, saving on the resources necessary for routine production.

The model ranking orders produced using raw and recoded police data were significantly similar (rho=0.99, n=89, p<0.01, two tailed). This implies that raw police data can be used in Index production. This is justifiable only if the *relative ranking* of each model in comparison to other models is the statistic of interest.

d) The Index should include all offence types apart from bulk thefts. Commercial and bulk thefts were omitted from the analysis of NMPCU data. Bulk thefts would disproportionately increase the representation of stolen models in theft data, assuming that large volumes of a single model are taken. They are arguably not of interest to the general public who are concerned with personal victimisation, rather than commercial victimisation.

Correlation between the Theft Index using all types of offence and the Theft Index using the four most common crime types was significant (rho=0.91, n=479, p<0.000001, two tailed). Future research should assess whether bulk thefts occur in sufficient quantities to warrant a separate Index.

e) The Index should include only models of phone where at least 100 handsets have been taken, but further analysis should reassess this threshold over time.

It is likely that the risk ratios of handsets where fewer than 100 phones are taken will be overly sensitive to changes in small numbers. However, an element of common sense is needed. If, for example, a new model is released which is predicted to be at high risk of theft, this should be included in in-house horizon-scanning for signs of the product progressing along a theft career.

f) The Index should initially be produced on a three-monthly (quarterly) basis, but this time period should be reassessed depending on the theft trajectories or 'theft careers' of the most frequently stolen phones.

The appropriate time period for Index production will rely partly on the distribution of theft risk among models. If, for example, a large proportion of thefts are of one particular model, then the numbers of other models stolen will be low, meaning that it might make sense to produce an Index only every six months. The appropriate time period will also rely on the time span of theft careers of different models. If in the future the rate of model turnover in the stolen population increases and theft careers shorten, it will make sense to decrease the time intervals between Indices.

2. The effectiveness of the Index should be assessed by NMPCU.

The effectiveness of the proposed Index should be assessed at the macro level by measuring aggregate phone theft levels, and at the micro level by assessing the product life-cycles or theft careers of different models of phone. The effectiveness of new security measures can be assessed by comparing the theft risk of models incorporating the new technologies with those which do not. Very effective security measures would result in no discernable theft career.

3. It is imperative that an independent review of blacklisting efficiency is carried out.

a) The claim by industry that they are meeting blacklisting targets agreed under the Mobile Phone Industry Crime Reduction Charter (2006) is doubtful.

The UK government is currently ill-informed about how efficiently stolen phones are cut off (blacklisted), and this lack of information allows the status quo of crime pollution to continue. The methodology for testing the UK SEIR used by Cooper et al. (2007) is questionable. Issues include the possibility that time-slippage occurred, meaning that handsets were tested at minimum time intervals as opposed to absolute intervals; the absence of internal controls for validity; and the involvement of MICAF in the testing process.

b) Previous research has shown that industry tends to act in its own interests unless severe pressure is applied (Laycock, 2004; Newman, 2004; Clarke and Newman, 2005).

To date, the phone industry has shown reluctance to fully engage in crime-proofing phones against physical theft, and has instead done the minimum required to avoid legislation by government. If the issue of blacklisting efficiency is not investigated fully, it is likely that the status quo will not alter.

IMPLICATIONS FOR DESIGNING-OUT CRIME FROM MOBILE PHONES

1. Blacklisting should not be the sole focus of future crime prevention efforts. More efficient blacklisting of stolen phones would decrease aggregate phone theft levels in the UK but there are three further considerations:

a) Blacklisting within 24 and 48 hours deterred fewer than a fifth of offenders. Even immediate blacklisting deterred only forty percent. Alternative deterrents should be sought.

b) Blacklisting would not remove the incentives for stealing phones and selling their parts; nor for stealing phones to sell abroad; nor for stealing phones for the data which they hold. Furthermore, blacklisting would be unlikely to deter any thefts which result from bullying in schools.

c) Blacklisting is only effective while IMEIs (the phone's identity number) remain secure against hacking. Insecure IMEIs would reintroduce the incentive to steal phones for resale in the UK. Thus an ongoing arms race between IMEI hackers and security experts should be anticipated and paid for by industry.

2. Future designs which aim to deter thieves should greatly reduce the resale value of handsets, perhaps by using advanced technology. It is imperative that technological solutions cannot be easily bypassed; and that tracking devices result in a swift and negative consequence.

a) The four designs which had the strongest deterrent effect on offenders in interviewed can be grouped in to two design types: those which use reasonably advanced technology (the biometrically activated phone, and a tracking device) and those which greatly decrease the financial value of the handset (the disposable and the ubiquitous phone).

b) In interview some offenders immediately considered if and how they could circumvent the technological deterrents, and were certain that somebody somewhere will soon invent a solution.

c) Some offenders believed that the police did not have the resources to follow up on a large volume of tracking devices. Others believed they could sell the phone on quickly before being detected. These offenders were not deterred by the tracking device.

3. Non-offenders are not necessarily suitable substitutes for offenders when predicting the crime consequences of new products.

a) The preferences of non-offenders for phones within the six matched pairs did not reflect real-world relative theft risk as accurately as did offender preferences. Non-offenders underestimated the preference of thieves for certain handsets, and underestimated the strength of preference for other handsets. However these differences did not reach statistical significance. For example the offender preference ratios 'predicted' that the risk of theft for the Samsung D500 was 4.6 times that of the Nokia 7610. The non-offender preference ratios predicted the D500 would be at a risk of theft 0.5 times that of the Nokia 7610. Analysis of NMPCU records of thefts in 2006 revealed that the D500 was at 3.5 times the risk of thefts as the Nokia 7610.

b) Non-offenders were on average more easily deterred than offenders. For 5 of the 23 design solutions, this difference reached significance. The average deterrence rate across the 23 designs was 58 percent for students, and 36 percent for offenders. The difference in the percentage of students and offenders deterred by the 23 designs was significant (two-sample t (82)= 6.5, $p<0.001$).

c) Non-offenders were less 'ready' to offend (Clarke and Cornish, 1985) than were offenders, and when imagining the crime event they gave different weight to target characteristics than did offenders. The differential deterrence of offenders and non-offenders was due to four elements: an increased tendency in students to report guilt compared to offenders; a lack of student focus on the financial resale value of the phone; a lack of knowledge among students of ways to circumvent security technology (such as reprogramming IMEIs); and the possibility that some students 'got into character' as they progressed through the hypothetical scenarios and so did not produce consistent answers.

4. The deterrent effects of the 23 designs which were assessed in the offender interviews reported here should be used to refine the weighting of Clarke and Newman's (2005) checklist of product security when considering mobile phones. For example, Clarke and Newman (2005) advocate that a PIN code scores the maximum on the product security checklist, whereas the deterrent effect of a PIN code was minimal according to offenders' responses

IMPLICATIONS FOR FUTURE RESEARCH

1. The efficiency of blacklisting phones needs to be assessed, via an independent and blind test. The results should be compared to those reported by System Concepts who carried out previous tests of blacklisting efficiency (see Pimm et al., 2005; Cooper et al., 2007).

2. Further assessments of the different responses given by offenders and non-offenders to questions concerning deterrence are warranted. The majority of the non-offender population used in this research were design students, and a wider variety of non-offenders should be assessed to develop a more representative model of non-offender responses.

3. Further assessments of a wider variety and greater number of mobile phone thieves are needed, in order to verify the validity of the initial rational choice event model proposed here.

4. Future research should consider whether the questions asked in the interview schedules used here could be randomised in order to minimise any order effects created by the interview design.

5. The research presented here has focused on stated preferences between phone models, and used police crime data to explore ‘real world’ preferences. Future research should utilise mock-up theft scenes, and technology such as eye-scanning tools, to assess offender and non-offender responses to potential theft targets in the context of more complex environments. Observing the eye movements of offenders and non-offenders, as well as novice and more experienced thieves, would be an ideal way to assess how accurate are hypotheses that aspects of target recognition becoming more swiftly recognised with increased theft experience.

6. Since the empirical work for this thesis was undertaken, a key development is that the UK Home Office is considering regular production of the Mobile Phone Theft Index. Future independent research should measure theft rates, theft MO, and geographic patterns of thefts before and after Index publication, to test for preventive and possible displacement effects of the Index on phone thefts. There remains the question of how swiftly any decrease in theft rates would translate from Index, through to manufacturers, and onto the ground where consumers experience decreased risk of theft. This will in part depend upon manufacturer responses to the Index. It will also depend in part on whether the publicity alone from the Index has a positive effect and prevents some phone thefts before any newly designed models are released. Further desk-based research is needed to assess the probable timescales of the initial and longer term effects of the Index.

7. If an Index is to be produced regularly, the methodology used to produce it should be refined according to the recommendations made under the section ‘Implications for government policy’.

8. Further research should explore the nature of the phones which were discarded in the lost property sections of Loughborough Police and

University, and could be expanded to a wider variety of lost property depots. Industry data describing the profile (market share) of handsets sold around the dates that the lost handsets were handed in, should be compared to the profile of the handsets handed to lost property departments. This would allow an assessment of whether or not the discarded phones were the older and less valuable models of their day, which is the result predicted by the research presented in this thesis.

9. Data held by the National Mobile Phone Crime Unit should be mined further in order to assess the nature of several aspects of the 'theft careers' of different handsets. It appears from the initial analyses presented here that different models display theft careers of varying length and scale; and quantification of these factors would help to predict future theft patterns if those factors could be linked to some measurable aspect of the handset. It is likely that those measurable aspects will reflect the characteristics of CRAVED (Clarke, 1999) but operationalising (quantifying) these characteristics requires further research.

TENTATIVELY PREDICTING THE FUTURE

Ken Pease (1997) has rightly lamented the absence of predictions within criminological literature in general. A sound theory should arguably be able to predict with some accuracy as well as to explain with hindsight. The final section of this thesis considers how increased blacklisting efficiency and increased in-built security technology would, in the future, affect various motivations for mobile phone theft. These predictions are presented in Table 9.1 below.

.

Table 9.1: Some predictions about future patterns of phone theft if blacklisting is increased, and if security is designed-in to handsets.

***Predicted aspect of theft patterns**:*	**Increased blacklisting**	**Better security in specific models**
Aggregate phone theft levels	Decrease	Decrease
Theft levels of specific models	Smaller decrease in theft rates of models stolen for sale abroad; for sale of parts; recycling; and due to bullying.	Greatest decrease in the newly secured models. Specifically, crime-proof models will not have a theft cycle.
Displacement	Target displacement to other goods (e.g. iPods; iPads). Tactical displacement to sale abroad (low risk); or sale for parts (low risk)	Possible target displacement to non-secured models of phones. Displacement is highly unlikely to be absolute.
Diffusion of benefits	More casual robbers stop all together, therefore thefts in general decrease. Ditto for muggings.	High probability that all phones are perceived as more secure, therefore thefts of all models decrease. As with blacklisting, this may then diffuse to decreases in thefts in general. Some less secure models may then suffer a second crime wave as knowledge about these more vulnerable models spreads.

Emerging and future crime forms?	Theft for data: blacklisting will have little effect on crimes where data, to inform identity theft or to sell on the black market, is the target. Recycling: blacklisting will have no effect on whole-phone-recycling-driven thefts unless checks are carried out on authenticity of ownership by recycling companies. Blacklisting would not decrease recycling of phone components, to the extent that increased recycling opportunities could drive an increase in recycling-of-parts-driven thefts.	Security aimed specifically at protecting stored data (e.g. biometrics) would probably decrease risk of theft for data. Recycling: new security technologies may increase recycling-of-parts-driven thefts if the technology uses precious materials. Different technologies will have different or no effect on whole-phone-recycling driven thefts, according to their security mechanisms.

The different motivations for mobile phone theft are treated separately, in line with Clarke and Harris' (1992) observations that differential motivations for car theft warranted separate analyses. Changes in theft patterns are predicted for aggregate phone theft; theft for resale abroad; theft for sale of parts; thefts as part of bullying; and thefts where recyclable components are the main target. The likely effects of increased blacklisting and increased security features in handsets are considered for each motivation. In addition, the likelihood of displacement and diffusion of benefits are considered.

In general, increased blacklisting will decrease aggregate theft levels, but not deter thefts motivated by anything other than use in the UK. Blacklisting might produce some target displacement, to iPods or other valuable consumer items, but previous research (e.g. Guerette and Bowers, 2009) suggests displacement will not be complete. There is the potential that removing the rewards of phone theft will decrease the numbers of offenders recruited into a criminal career, if phone theft is a debut crime.

Incremental improvements in phone security would confer varying levels of protection depending on the nature of the security feature and the motivation for theft. The greatest decreases in theft risk would be seen in models incorporating new security measures, but there may be initial diffusion of benefits to all models of phone if security implementation is ubiquitous. A second mini-crime harvest may occur as knowledge of how to circumvent specific security measures spreads through the offending population (Ekblom, 2007).

It would be a useful exercise to review, perhaps in a few years, the accuracy of these predictions. If they prove to be inaccurate, this might signify that a crucial choice-structuring property has not been identified in this research. A major caveat of any future assessment has to be that other factors which may affect crime patterns should be controlled for. Such factors include changing economic conditions, or an as yet unimagined revolution in the way that mobile services are delivered and charged for. Clarke and Newman (2005) describe how predictions about a crime harvest of television set-top boxes were incorrect because the boxes were given away for free instead of being sold as originally planned. Financial revenue was generated from the services they provided rather than from sales.

If the Index proposed herein is produced, and the knowledge gained from interviews about the choice structuring properties of phones is used by designers, the resultant innovation race by industry to produce more secure phones should produce incremental security improvements. It is commonly said about predictions that ‘the proof of the pudding is in the eating’. It is hoped that in the case of a Mobile Phone Theft Index, that the proof of the Index will be in the prevention.

References and bibliography

Allen,J., Forrest, S., Levi, M., Roy, H., Sutton, M., and D. Wilson (eds) (2005) Fraud and technology crimes: findings from the 2002/03 British Crime Survey and 2003 Offending, Crime and Justice Survey. Home Office Online Report 34/05.

Anselin, L; Griffiths, E. and Tita, G. (2008) Crime mapping and hot spot analysis. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Armitage, R. and Pease, K. (2008a) Design and crime: Proofing electronic products and services against theft. European Journal of Criminal Policy and Research, 14:1-9.

Armitage, R. and Pease, K. (2008b) Predicting and preventing the theft of electronic products. European Journal of Criminal Policy and Research, 14:11-37.

BABT (2004) ‘GSM IMEI number allocation’: BABT website. Last accessed November 2005 at: http://www.babt.com/gsm-imei-number-allocation.asp

Barr, R. and Pease, K. (1990) Crime placement, displacement and deflection. Crime and Justice, 12:277-318.

BBC News 24 (2005) ‘Mobiles rack up 20 years of use’. 1st January 2005. Last accessed December 2007 at: http://news.bbc.co.uk/1/hi/technology/4138449.stm

Bennett, T., & Wright, R. (1984), Burglars on burglary. Aldershot : Gower. In Nee, C and Meenaghan, A. (2006)

Bernasco, W. and Block, R (2009) Where Offenders Choose to Attack: A Discrete Choice Model of Robberies in Chicago. Criminology, 47(1):93-130.

Blacksmith Institute (2007) The World’s Worst Polluted Places: The Top Ten of the Dirty Thirty. September 2007, Blacksmith Insitute, New York. URL: www.blacksmithinstitute.org

Bouffard, J. (2007) Predicting differences in the perceived relevance of crime’s costs and benefits in a test of rational choice theory. International Journal of Offender Therapy and Comparative Criminology, 51 (4):461-485.

Bouffard, J.; Bry, J.; Smith, S. and Bry, R. (2008) Beyond the 'science of sophomores': Does the rational choice explanation of crime generalize from university students to an actual offender sample? International Journal of Offender Therapy and Comparative Criminology 52:698-721.

Bouhana, N. (2004) Profiling Arson. Unpublished Ph.D. thesis, University of Cambridge, Cambridge, UK.

Bowers, K. and Johnson, S. (2005) Using Publicity for Preventive Purposes. In Tilley, N. (ed.) Handbook of Crime Prevention and Community Safety, Cullompton: Willan Publishing

Brantingham, P. and Brantingham, P. (1981) Notes on the Geometry of Crime. In Brantingham, P. and Brantingham, P. (eds.) Environmental Criminology, 1991 reissue. Illinois: Waveland Press

Brantingham, P. and Brantingham, P. (2008) Crime pattern theory. In Wortley, R. and Mazerolle, L. (eds.) Environmental Criminology and Crime Analysis. Devon: Willan Publishing

Briscoe, S. (2001) The Problem of Mobile Phone Theft. Crime and Justice Bulletin: Contemporary Issues in Crime and Justice No 56. NSW Bureau of Crime Statistics and Research.

Brookson, C., G. Farrell, J. Mailley, S. Whitehead, D. Zumerle (2007) ICT Product Proofing Against Crime. ETSI White Paper No. 5. Sophia Antipolis Cedex, France: European Telecommunications Standards Institute

Broadbridge, Sally (2002) The Mobile Telephones (Re-programming) Bill. Research Paper 02/47. Home Affairs Section, House of Commons Library.

Brown, R. and Thomas, N. (2003) Aging vehicles: Evidence of the effectiveness of new car security from the Home Office Car Theft Index. Security Journal, 16(3):45-54.

Brown, R. (2004) The effectiveness of electronic immobilisation: Changing patterns of temporary and permanent vehicle theft, in M.G. Maxfield and R.V.

Carroll, X and Weaver, F. (1986) Shoplifters' Perceptions of Crime Opportunities: A Process-Tracing Study. In: Cornish, D. and R.V. Clarke (eds.),The Reasoning Criminal: Rational Choice Perspectives on Offending. New York: Springer-Verlag.

Chenery, S., Henshaw, C. and Pease, K. (1999) Illegal Parking in Disabled Bays: A Means of Offender Targeting. Home Office, Policing and Reducing Crime Unit, Briefing Note 1/99.

CJS online (2008) 'Offenders: Prison'. Last accessed July 2008 at: http://www.cjsonline.gov.uk/offender/prison/

Clarke, R.V. (1980) "Situational" Crime Prevention: Theory and Practice, British Journal of Criminology, 20 (2):136-147.

Clarke, R.V. (1997) Introduction: In Clarke, R.V. (ed), Situational Crime Prevention: Successful Case Studies. Second Edition. Guilderland New York: Harrow and Heston Publishers.

Clarke, R.V. (1999) Hot Products: understanding, anticipating and reducing demand for stolen goods. Police Research Series Paper 112. London: Home Office

Clarke, R.V. (2004) Technology, Criminology and Crime Science, European Journal on Criminal Policy and Research, 10:55-63.

Clarke, R.V. (2008) Situational crime prevention. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Clarke, R.V. and Cornish, D.B. (1985) Modeling Offenders' Decisions: A Framework for Research and Policy. Crime and Justice, 6:147-178.

Clarke, R.V. and Harris, M. (1992) A rational choice perspective on the targets of automobile theft. Criminal Behaviour and Mental Health, 2(1):25-42.

Clarke, R. V. and Mayhew, P.(1988) The British Gas Suicide Story and its Implications for Prevention. In Michael Tonry and Norval Morris (eds.), 1988. Crime and Justice: A Review of Research, Vol.10. Chicago: University of Chicago Press, Clarke, R.V.; Kemper, R. and Wyckoff, L. (2001) Controlling Cell Phone Fraud in the US - Lessons for the UK "Foresight' Prevention Initiative. Security Journal 14:7-22.

Clarke, R.V. and Newman, G. (2005) (eds) Designing out crime from products and systems, volume 18 of Crime Prevention Studies, Monsey, NY: Criminal Justice Press.

Clarke, R.V. and Weisburd, D. (1994) Diffusion of Crime Control Benefits: Observations on the Reverse of Displacement. In R.V. Clarke (ed.), volume 2 of Crime Prevention Studies, pp. 165-182. Monsey, NY: Criminal Justice Press.

Clements, R.; Rayan, D.M; Zafir, A.; Venkataraman, A.; Alfred, R.; Payne, J.; Ambu, L. and Sharma, D. (2010) Trio under threat: can we secure the future of rhinos, elephants and tigers in Malaysia? Biodiversity conservation, published online 23 January 2010: DOI 10.1007/s10531-009-9775-3

Cohen, L.E and Felson, M. (1979) Social Change and Crime Rate Trends: A Routine Activity Approach. Urbana American Sociological Review 44:588-608.

Conway, L., and Morgan, D. (eds) (2001) Mobile Phones and Health: an Interim Report. British Medical Association, Board of Science and Education: BMA Publications Unit. Last accessed 25 November 2006 at: http://www.iegmp.org.uk/report/text.htm

Cooper, C., Ek, A., Heasman, T. and Stewart, T. (2007) Report for Mobile Industry Crime Action Forum on testing the processes for blacklisting mobile phones reported as stolen to the UK mobile networks. System Concepts, February 2007. (Commercial in confidence)

Copes, H. and Cherbonneau, M. (2006) The key to auto theft: emerging methods of auto theft from the offenders' perspective. British Journal of Criminology, 46(5):917-934.

Cornish, D.B. (1994) The Procedural Analysis of Offending and its Relevance for Situational Prevention. In R.V. Clarke (ed.), volume 3 of Crime Prevention Studies, pp. 151-196. Monsey, NY: Criminal Justice Press.

Cornish, D.B. and Clarke, R.V. (1986) The Reasoning Criminal: Rational Choice Perspectives on Offending, New York: Springer-Verlag.

Cornish, D.B. and R.V. Clarke (1987) Understanding Crime Displacement: An Application of Rational Choice Theory. Criminology 25 (4):933-947.

Cornish, D.B. and Clarke, R.V. (2003) Opportunities, precipitators and criminal dispositions: a reply to Wortley's critique of situational crime prevention. In M.J. Smith and D.B. Cornish (eds), Theory for practice in Situational Crime Prevention, volume 16 of Crime Prevention Studies, Monsey, NY: Criminal Justice Press.

Cornish, D.B. and Clarke, R.V. (2008) The Rational Choice Perspective. In Wortley, R. and Mazerolle, L. (eds.) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Cozens, P. (2008) Crime prevention through environmental design. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Decker, S. H.(2005) Using offender interviews to inform police problem solving. Problem-oriented guides for police; problem solving tools series No. 3. US Department of Justice. Accessed March 2006 at: http://www.popcenter.org/

De Vaus, D. (2002) Survey research. In Greenfield, T. (Ed) (2002) Research methods for postgraduates. Second edition, London: Arnold.

DTi (2000) Turning the Corner. London : Department of Trade and Industry, Crime Prevention Panel.

DTi (2004) The CSR competency framework. CSR academy, funded by the Department of Trade and Industry. URN 04/1306.

DTi (2003) Sustainability and business competitiveness: measuring the benefit for business competitive advantage from social responsibility and sustainability. Executive summary. In association with Forum for the Future. Department of Trade and Industry; London. URN 03/1560

Dubourg and Hamed (2005) The economic and social costs of crime against individuals and households 2003/04. Home Office Online Report 30/05. Research Development and Statistics Directorate, London: Home Office.

Dugan et al (2005) Rat choice aeroplane hijacking

Dugan, L., Lafree, G., and Piquero, A. (2005). Testing a rational choice model of airline hijackings. Criminology, 43(4):1031-1070.

Eck, J. (1994) Drug markets and drug places: A case control study of the spatial structure of illicit drug dealing. Unpublished doctoral dissertation, University of Maryland, College Park. As cited in Felson, M. (1995) Those Who Discourage Crime. In: Crime and Place, volume 4 of Crime Prevention Studies, Monsey, NY: Criminal Justice Press.

Eck, J. (1993) The Threat of Crime Displacement. Criminal Justice Abstracts 25:527-546.

Ekblom, P. (1997) Gearing up against Crime: a Dynamic Framework to Help Designers Keep up with the Adaptive Criminal in a Changing World. International Journal of Risk, Security and Crime Prevention, 2:249-265.

Ekblom, P. (2005) Designing products against crime. In: Tilley, N. (ed) (2005) Handbook of Crime Prevention and Community Safety, Devon: Willan Publishing.

Ekblom, P. (2008a) Designing products against crime. In Wortley, R. and Mazerolle, L. (eds.) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Ekblom, P. (2008b) Gearing up against crime. Design against crime paper. University of the Arts, London Central St Martin's.

Ekblom, P. and Sidebottom, A. (2008) What do you mean, 'Is it secure?' Redesigning language to be fit for the task of assessing the security of domestic and personal electronic goods. European Journal on Criminal Policy and Research, 14:61-87.

England, K. (2005) Duplicate IMEI Report. Internal unpublished GSMA report, provided by the GSMA via personal correspondence.

EPSRC EP/C52036X/1. Iconography and Semantics of Technological Deterrence within Mobile Telephones: A Crime Feasibility Study. Project details. Last access November 2010 at:
http://gow.epsrc.ac.uk/ViewGrant.aspx?GrantRef=EP/C52036X/1

Erol, R.; Press, M.; Cooper, R. and Thomas, M. (2002) Designing-out crime: Raising awareness of crime reduction in the design industry, Security Journal 15(1):49-61.

ETSI (2008a) ‘About ETSI’. Last accessed January 2008 at:
http://www.etsi.org/WebSite/AboutETSI/AboutEtsi.aspx

ETSI (2008b) ‘Our role in Europe’. Last accessed January 2008 at:
http://www.etsi.org/WebSite/AboutETSI/RoleinEurope/OurroleinEurope.aspx

EUCPN (2002) EUCPN Good Practice Description 2002: National action to tackle mobile phone theft, UK. Last accessed October 2005 at:
http://europa.eu.int/comm/justice_home/eucpn/docs/aalborguk1.pdf

Farrell, G. (1992) Multiple victimisation: its extent and significance. International Review of Victimology, 2:85-102.

Farrell, G. (2007) Preventing iPod Theft. Justice of the Peace, 171(11):191-2.

Farrell, G. (2010) Situational crime prevention and its discontents: Rational choice and harm reduction versus ‘cultural criminology’. Social Policy and Administration: An International Journal of Policy and Research, 44(1):40-66.

Farrell, G. and Mailley, J. (2007) Phone alert. Police Review, 27 July 2007:30-31.

Farrell, G. and Pease, K. (1993) Once Bitten Twice Bitten: Repeat Victimisation and Its Implications for Crime Prevention. Police Research Group, Crime Prevention Unit Paper 46. London: Home Office.

Farrell, G. and Pease, K. (2007) Crime in England and Wales: More Violence and More Chronic Victims. Civitas Review, 4(2).

Farrell, G. and Pease, K. (2008) Repeat victimisation. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Farrell, G. and Roman, J. (2006) Crime as Pollution: Proposal for Market-Based Incentives to Reduce Crime Externalities, in M. R. Stephens and K. Moss (Eds.) Crime Reduction and the Law (pp. 135-155): Routledge Press.

Farrell, G., N. Tilley, A. Tseloni and J. Mailley. (2011). The crime drop and the security hypothesis. Journal of Research in Crime and Delinquency, online access February 22, 2011, DOI: 10.1177/0022427810391539.

Feeney, F. (1986). Robbers as Decision Makers. In: D. Cornish and R. Clarke (eds.), The Reasoning Criminal Rational Choice Perspectives on Offending. New York, NY: Springer-Verlag.

Felson, M. (1986) Linking Criminal Choices, Routine Activities, Informal Control, and Criminal Outcomes. In Cornish, D.B. and Clarke, R.V. (eds.) The Reasoning Criminal: Rational Choice Perspectives on Offending. New York: Springer-Verlag.

Felson, M. (1995) Those Who Discourage Crime. In J.E. Eck and D. Weisburd (eds.), volume 4 of Crime Prevention Studies, New York: Criminal Justice Press.

Felson, M. (2002) Crime and Everyday Life. Third Edition, London: Sage

Felson, M. (2006) Crime and Nature. London: Sage Publications Ltd.

Felson, M. (2008) Routine activity approach. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Felson, M. and Clarke, R.V. (1997) The Ethics of Situational Crime Prevention. In Newman, G., Clarke, R.V. and Shoham, S.G. (eds) (1997) Rational Choice and Situational Crime Prevention, Dartmouth: Ashgate.

Felson, M. and Clarke, R.V. (1998) Opportunity Makes The Thief: Practical theory for crime prevention. Police Research Series Paper 98. London: Home Office.

Filatotchev, I., Jackson, G., Howard, G. and Allcock, D. (2007) Key drivers of 'good' corporate governance and the appropriateness of UK policy responses : final report. The Department of Trade and Industry and King's College London, London, UK.

Francis, B.; Soothill, K. and Fligelstone, R. (2004) Identifying patterns and pathways of offending behaviour: a new approach to typologies of crime, European Journal of Criminology, 1(1):47-87.

Gamman, L. and Hughes, B. (2003) ‘Thinking thief’: Designing out misuse, abuse and ‘criminal’ aesthetics. Ingenia, 15:36-43.

Greenfield, T. (Ed) (2002) Research methods for postgraduates. Second edition. London: Arnold.

GSMA (undated a) Security Principles Related to Handset Theft. GSMA and EICTA. EICTA ref 04cc100.

GSMA (undated b) IMEI Weakness Reporting and Correction Process. Published by GSMA and EICTA. EICTA ref 05mt101.

GSMA (1992) Recommendation GSM 02.16: International MS Equipment Identities. Released by ETSI/PT 12, February 1992.

GSMA (2004) Further measures to reduce handset theft. Last accessed 25 November 2005 at: http://www.cellular.co.za/news_2004/feb/021004-further_measures_to_reduce_hands.htm

GSMA (2007a) 'Brief History of GSM and the GSMA'. Last accessed December 2007 at: http://www.gsmworld.com/about/history.shtml

GSMA (2007b) 'About GSMA'. Last accessed December 2007 at: http://www.gsmworld.com/about/index.shtml

Guerette, R.T. and R.V. Clarke (2003) Product Life Cycles and Crime: Automated Teller Machines and Robbery. Security Journal 16(1):7-18.

Guerette, R. T. and Bowers, K. (2009) Assessing the extent of crime displacement and diffusion of benefit: A systematic review of situational crime prevention evaluations. Criminology 47(4):1331-1368.

Harrington, V. and Mayhew, P. (2001) Mobile Phone Theft. Home Office Research Study 235. Home Office Research, Development and Statistics Directorate.

Harris, R.J.(1973) Answering questions containing marked and unmarked adjectives and adverbs. Journal of Experimental Psychology, 97: 399-401. In Milne and Bull (1999) Investigative Interviewing: Psychology and Practice. Wiley Series in the psychology of crime, policing and law. Chichester: John Wiley and Sons Ltd.

Hayward, K. (2007) Situational Crime Prevention and its Discontents: Rational Choice Theory versus the 'Culture of Now'. Social Policy and Administration, 41(3):232 – 250.

Hearnden, I. and Magill, C. (2004) Decision-making by house burglars: offenders' perspectives. Home Office Findings 249. Research, Development and Statistics Directorate, London: Home Office.

Hesseling, R. (1994) Displacement: A Review of the Empirical Literature. In Clarke, R.V. (ed.), volume 3 of Crime Prevention Studies, NY: Monsey.

Higgins, A. (2007) 'NMPCU PIB Mobile Phone Data Sept07'. Excel spreadsheet received from NMPCU via personal correspondence, September 2007.

Hilton, K. and Irons, A. (2006) A 'criminal personas' approach to countering criminal creativity. Crime Prevention and Community Safety, (8):248-259.

HMPS Research (2008) Research. Last accessed July 2008 at: http://www.hmprisonservice.gov.uk/resourcecentre/research/

Hoare, J. (2007) Mobile phones: ownership and theft in mobile phone theft, plastic card and identity fraud. Findings from the 2005/06 British Crime Survey. Home Office Statistical Bulletin 10/07. Research, Development and Statistics Directorate. London: Home Office.

Hochstetler, A. (2001) Opportunities and decisions: interactional dynamics in robbery and burglary groups. Criminology, 39(3):737-764.

Home Office (2002) The Bike Theft Index 2002 . London: Home Office .Last accessed July 2006 at: http://www.crimereduction.gov.uk/bti2002.pdf

Home Office (2002) Street Crime Action Home Page: Last accessed September 2005 at: http://www.crimereduction.gov.uk/streetcrime01.htm

Home Office (2004a) Counting Rules for Recorded Crime: 34B Robbery of Personal Property Classification. Home Office Research Development and Statistics Directorate, London: Home Office.

Home Office (2004b) Counting Rules for Recorded Crime: 39 Theft From the Person Classification. Home Office Research Development and Statistics Directorate, London: Home Office.

Home Office (2004c) Counting Rules for Recorded Crime: 49 Other Theft Classification. Home Office Research Development and Statistics Directorate, London: Home Office.

Home Office (2005a) The Car Theft Index 2004 . London: Home Office Communications Directorate . Last accessed July 2006 at: http://www.crimereduction.gov.uk/vehiclecrime47.htm

Home Office (2005b) The Bike Theft Index . London: Home Office . Last accessed July 2006 at: http://www.crimereduction.gov.uk/vehiclecrime54.htm

Home Office (2006) Changing behaviour to prevent crime: an incentives-based approach. Economics and Resource Analysis Strategic Policy Team, Home Office Online Report 05/06, London: Home Office.

Home Office Communications Directorate (2003) Streets Ahead: a joint inspection of the street crime initiative. London: Home Office.

Home Office Crime Reduction (2002) Street Crime: Mobile Phone Barring Database launched. Last accessed 27 September 2005 at: http://www.crimereduction.gov.uk/stolengoods5.htm

Home Office Crime Reduction (2002) Street Crime: Mobile Phone Barring Database launched. Last accessed 27 September 2005 at: http://www.crimereduction.gov.uk/stolengoods5.htm

Home Office UK Acts (undated) Mobile Telephones Re-Programming Act. Last accessed 04 December 2005 at: http://www.opsi.gov.uk/acts/acts2002/20020031.htm

Houghton, G. (1992) Car Theft in England and Wales: The Home Office Car Theft Index. Crime Prevention Unit Paper 33. London: Home Office.

Hughes, M. (2002) Interviewing. In Greenfield, T. (Ed) (2002) Research methods for postgraduates. Second edition, London: Arnold.

Indermaur, D. (1996) Reducing the Opportunities for Violence in Robbery and Property Crime: The Perspectives of Offenders and Victims. In R. Homel (ed.), The Politics and Practice of Situational Crime Prevention, volume 5 of Crime Prevention Studies, Monsey, NY: Criminal Justice Press.

Kaplankiran, T., J. Mailley, S. Whitehead and G. Farrell. (2008) Mobile phone reprogramming: Its extent and prevention. Crime Prevention and Community Safety: An International Journal, 10(4); 271-279.

Karmen, A.A. (1981) Auto theft and corporate irresponsibility. Contemporary Crises, 5:63-81.

Kempf, K. (1986) Offense Specialization: Does It Exist? In D. B. Cornish and R. V. Clarke (eds) The Reasoning Criminal: Rational Choice Perspectives on Offending, NY: Springer-Verlag.

Kriven, S. and Ziersch, E. (2007) New car security and shifting vehicle theft patterns in Australia. Security Journal, 20(2):111-122.

Laycock, G. (2003) Launching Crime Science. London: Jill Dando Institute of Crime Science, University College London.

Laycock, G. (2004) The U.K. Car Theft Index: An Example Of Government Leverage.In Maxfield, M. and Clarke, R.V. (eds), volume 17 of Crime Prevention Studies, pp. 25-44, Monsey, NY: Criminal Justice Press.

Learmount, S. (2005) Promoting design against crime. In Newman and Clarke (2005) (eds), volume 18 of Crime Prevention Studies, pp. 141-178, Monsey, NY: Criminal Justice Press.

Leary, R. (2005) Reducing and Detecting Mobile Phone Insurance Fraud. Presentation to MICAF in June 2005. Supplied via personal correspondence, December 2005.

Livingstone. T. and Carey, P. (2006) "'Hot model' mobile phones being stolen to order, say researchers." The Western Mail, 2nd August 2006.

Loftus, E.F. and Zanni, G. (1975) Eyewitness testimony: the influence of the wording of a question. Bulletin of Psychonomic Society, 5: 86-88. In Milne and Bull (1999) Investigative Interviewing: Psychology and Practice. Wiley Series in the psychology of crime, policing and law. John Wiley and Sons Ltd.: Chichester.

Logie, R.H., Wright, R.T. and Decker, S. (1992) Recognition memory performance and residential burglary, Applied Cognitive Psychology, 6:109-123.

Lords Hansard (2002) House of Lords Discussion of Reprogramming Act 2002. Last accessed 27 November 2005 at: http://www.publications.parliament.uk/pa/ld200102/ldhansrd/vo020516/text/20516-15.htm#20516-15_head0

Madensen, T. and Knutsson, J. (eds) (2011) Preventing crowd violence. Volume 26 of Crime Prevention Series, London: Lynne Rienner Publishers.

Mailley, J. and G. Farrell. (2006) UK mobile phone theft costs at least £1Bn. NMPCU Newsletter 1(2):6. Metropolitan Police: National Mobile Phone Crime Unit.

Mailley, J., Garcia, R., Whitehead, S. and G. Farrell. (2008) Phone theft index. Security Journal, 21(3):212-227.

Mailley, J., Whitehead, S. and G. Farrell. (2006a) Progress and Prospects in the Prevention of Mobile Phone Theft. Justice of the Peace, 170(22):404-407.

Mailley, J., S. Whitehead and G. Farrell. (2006b) Bring on the Safety Razr: The Top-10 Stolen Mobile Phones. Justice of the Peace, 170(30):564-566. (ISSN 1351-5756)

Maxfield and Clarke (eds.) Understanding and preventing car theft, volume 17 of Crime Prevention Studies, Monsey, NY: Criminal Justice Press.

May, T. (1997) Social Research: Issues, methods and process. Second Edition, Open University Press: Buckingham.

MICAF (2008) Welcome to the web site of the Mobile Industry Crime Action Forum. Last accessed January 2008 at: http://www.micaf.co.uk/new/micaf/home.asp?page_info=11

Milne, R. and Bull, R. (1999) Investigative Interviewing: Psychology and Practice. Wiley Series in the psychology of crime, policing and law. John Wiley and Sons Ltd.: Chichester.

Mintel (2007a) Telecoms Retailing –UK- May 2007.

Mintel (2007b) Mobile Phone and Network Providers -UK- November 2007. Last accessed 20 January 2009 at:

http://academic.mintel.com/sinatra/oxygen_academic/search_results/show&/display/id=114630/display/id=227726/display/id=220123/display/id=304138

Mobile Phone Industry Crime Reduction Charter (2006) Provided by MICAF to the author.

Moran, J. (2006) 'Market Penetration.' Unpublished excel spreadsheet received via personal correspondence, March 2006.

Moss, K and Pease, K., (1999) Crime and Disorder Act 1998: Section 17. A wolf in sheep's clothing. Crime Prevention and Community Safety: An International Journal, 1(4):15-19.

Mobile Magazine (23rd June 2006) "It is time for retailer, manufacturers and operators to stop this happening". Mobile magazine, 2006.

Munro, E.R. (2008) Research Governance, Ethics and Access: A Case Study Illustrating the New Challenges Facing Social Researchers. International Journal of Social Research Methodology 11(5): 429-439.

Nee, C. and Meenaghan, A. (2006) Expert Decision Making in Burglars. The British Journal of Criminology, 46(5):935-949.

Newman, G. (2004) Car Safety and Car Security: An Historical Comparison. In Maxfield, M. and Clarke, R.V. (eds) (2004), volume 17 of Crime Prevention Studies. Monsey, NY: Criminal Justice Press.

Newman, O. (1973) Defensible Space: People and Design in the Violent City, London: Architectural Press.

Newman, G. and Clarke, R.V. (2003) Superhighway robbery: preventing e-commerce crime. Cullompton, UK: Willan Publishing.

NMPCU (2004) National Mobile Phone Crime Unit Report 10: 12 February 2004. Supplied by Roni Garcia, lead intelligence analyst of the NMPCU, March 2004.

Nokia (2007a) Consolidated profit and loss accounts, IFRS. Nokia Corporation and Subsidiaries. Last accessed June 2008 at:

http://www.nokia.com/NOKIA_COM_1/About_Nokia/Financials/Financial_Statements/pdf_2007/Prof_loss_acc.pdf

Ofcom (2006a) Unpublished Excel sheet on UK Mobile Subscriptions. Provided in response to Freedom of Information Request FOI 2664892.

Ofcom (2006b) The Communications Market: Interim Report February 2006.

Ofcom (2007a) UK Frequency Allocation Table 2007. Last accessed December 2007 at: http://www.ofcom.org.uk/radiocomms/isu/ukfat/

Ofcom (2007b) The Communications Market 2007: Telecommunications. Last accessed December 2007 at: http://www.ofcom.org.uk/research/cm/cmr07/telecoms/

Ofcom (undated) Mobile Phones: Jargon Explained. Last accessed 4 December 2007 at: http://www.sitefinder.radio.gov.uk/jargon.htm

Patel, R. (2003) Tackling mobile phone theft in the UK: A Partnership Approach. Last accessed 29 November 2005 at: forum.europa.eu.int/Public/irc/infso/cocom1/library?1=presentation/cocomseeetings11sjune20/_EN_1.0_&a=d

Pease, K. (1997) Predicting the future: the roles of routine activity and rational choice theory. In Newman, G; Clarke, R.V. and Shohan, S. (Eds.) Rational Choice and Situational Crime Prevention: Theoretical Foundations. Dartmouth, UK: Ashgate.

Phonesec (2005) Phonesec Newsletter From November 21st to December 20th 2005.

Pimm, A., Durham, S. and Heasman, T. (2005) Report for Mobile Industry Crime Action Forum on independent testing of UK mobile network shared equipment identity register. System Concepts, 2005.

Pires, S. and Clarke, R.V. (2011) Are Parrots CRAVED? An assessment of parrot poaching in Mexico. Journal of Crime and Delinquency. Online access March 15, 2011, DOI: 10.1177/0022427810397950

Portney, P. (2000) EPA and the evolution of federal regulation. In Portney, P. and Stavins, R. (2000) Public Policies for Environmental Protection, Washington DC: Resources For the Future Press.

Portney, P. and Stavins, R. (2000) Public Policies for Environmental Protection, Washington DC: Resources For the Future Press.

POST (1995) POSTnote 64: Mobile Telephone Crime. Parliamentary Office of Science and Technology, London: Home Office. Accessed at: http://www.parliament.uk/post/pn064.pdf

Potter, B. (2004) Securing the mobile device. Network Security, February 2004 (2):4-5.

Prigg, M. (2006) "Half of all stolen mobiles are Nokias." London Evening Standard, 2nd August 2006.

Question Bank Factsheet 2: Methods of data collection in social surveys. The Question Bank; ESRC Economic and Social Sciences Research Council. Last accessed May 2011 at: http://surveynet.ac.uk/

Question Bank Factsheet 4: Evaluating survey questions. The Question Bank; ESRC Economic and Social Sciences Research Council. Last accessed May 2011 at: http://surveynet.ac.uk/

Question Bank Factsheet 6: Mode effects. The Question Bank; ESRC Economic and Social Sciences Research Council. Last accessed May 2011 at: http://surveynet.ac.uk/

Ramsay, M. (1990) Lagerland Lost: An Experiment in Keeping Drinkers Off the Streets in Central Coventry and Elsewhere. Crime Prevention Unit; Paper 22. London: Home Office, Crime Prevention Unit. (#155)

Ratcliffe, J. (2008) Intelligence-led policing. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing

Repetto, T. A. (1976) Crime prevention and the displacement phenomenon. Crime and Delinquency, 22:166 - 167.

Roach, J. (2004) From Major to Minor: The Case for Offender Self-Selection. Police Professional, December 2004:22-25.

Roach, J. (2007) Those Who do Big Bad Things Often Also do Little Bad Things: Identifying Active, Serious Offenders Using Offender Self-Selection. International Journal of Police Science and Management:9 (1)

Roman, J. and G. Farrell. 2002. Cost-benefit analysis for crime prevention: Opportunity costs, routine savings, and crime externalities. In N. Tilley (Ed.) Evaluation for Crime Prevention, volume 14 of Crime Prevention Studies, pp. 53-92, Devon: Willan Publishing.

Rossmo, K. And Rombouts, S. (2008) Geographic profiling. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing.

Rowlands, J. (2002) Problems of measurement. In Greenfield (2002) Research methods for postgraduates. Second edition. London: Arnold.

Salent, P. and Dillman, D. A. (1994) How to conduct your own survey. John Wiley: New York.

Sampson, R., Eck, J. and Dunham, J. (2010) Super Controllers and Crime Prevention: A Routine Activity Explanation of Crime Prevention Success and Failure, Security Journal, 23 (1):37-51.

Saraga, P. (2008) The need for effective dialogue. European Journal of Criminal Policy and Research, 14:89-90.

Scott, M. (2005) Shifting and sharing police responsibility to address public safety problems. In Tilley, N. (ed) (2005) Handbook of Crime Prevention and Community Safety. Willan Publishing.

Scott, M.; Eck, J; Knutsson, J. and Goldstein, H. (2008) Problem-oriented policing and environmental criminology. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing.

Sidebottom, A. and Bowers, K. (2010) Bag theft in bars: An analysis of relative risk, perceived risk and modus operandi. Security Journal, 23(3): 206–224.

Sidebottom, A, Belur, J., Bowers, K, Tompson, L. and Johnson, S. (2010) Theft in price-volatile markets: On the relationship between copper price and copper theft. Journal of Research in Crime and Delinquency: 48(3):396-418.

Sloan-Howitt, M., and Kelling, G.L.(1997) Subway Graffiti in New York City. In Situational Crime Prevention: Successful Case Studies (Second Edition), edited by Ronald V. Clarke. Albany, NY: Harrow and Heston.

Smith, J. (2003) The nature of personal robbery. Home Office Research Study 154. London: Home Office.

Smith, M., Clarke, R. V. and Pease, K. (2002) Anticipatory Benefits in Crime Prevention. In N. Tilley (ed.), Analysis for Crime Prevention, Monsey, NY: Criminal Justice Press.

Stavins, R.N. (2000) Market-Based Environmental Policies. In Portney, P. and Stavins, R. (2000) Public Policies for Environmental Protection, Washington DC: Resources For the Future Press.

Steele, J. (2006) “Nokia phones top theft list”. The Daily Telegraph, 2nd August 2006.

Sutton, M. (1998) Handling stolen goods and theft: a market reduction approach. Home Office Research Study, No. 178. London: Home Office.

Svensson, R. (2002) Strategic Offences in the Criminal Career Context, British Journal of Criminology, 42: 395- 432.

Tech.co.uk (2008) “Nokia owns 40% of global mobile phone market.”' Last accessed January 2008 at: http://www.tech.co.uk/gadgets/phones/mobile-phones/news/nokia-owns-40-per-cent-of-global-mobile-phone?articleid=2111425382

The Evening Standard (2002a) “Are the police doing enough?” The Evening Standard, 2 Jan 2002.

The Evening Standard (2002b) “Shot for her mobile phone.” The Evening Standard, 13 February 2002.

Thornton, L. (2006) “Nokia is no1 for thieves” The Mirror, 2nd August 2006.

Tilley, N.; Smith, J.; Finer, S.; Erol, R.; Charles, C.; and Dobby, J. (2004) Problem-solving street crime: practical lessons learnt from the Street Crime Initiative. RDS, Home Office publications.

Topalli, V. (2005) Criminal expertise and offender decision-making: an experimental analysis of how offenders and non-offenders differentially perceive social stimuli, British Journal Of Criminology, 45:269-295.

Transparency International (2010) Corruption Perceptions Index 2010. URL: http://www.transparency.org/policy_research/surveys_indices/cpi/2010/results

UK Parliament Internet Publications (2005) Violent Crime Reduction Bill 2005. Last accessed 01 December 2005 at: http://www.publications.parliament.uk/pa/ld200506/ldbills/041/06041.51-57.html#j3001

UK Public Telecommunication Networks Unit (2001) How Mobile Phone Networks Work: Last accessed 04 December 2005 at: http://www.sitefinder.radio.gov.uk/mobilework.htm

Walsh, D. (1986) Victim Selection Procedures Among Economic Criminals: The Rational Choice Perspective. In Cornish, D. B. and Clarke, R. V. (eds) The Reasoning Criminal Rational Choice Perspectives on Offending. New York, NY: Springer-Verlag.

Webb, B. (2005) Preventing car crime. In N. Tilley (ed.) Handbook of Crime Prevention and Community Safety, Cullompton: Willan.

Wellsmith, M. and Burrell, A. (2005) The Influence of Purchase Price and Ownership Levels on Theft Targets. British Journal of Criminology 45:741-764.

Whitehead, S., J. Mailley, I. Storer, J. McCardle, G. Torrens and G. Farrell. 2008 (advanced access version). Mobile phone anti-theft designs: A review. European Journal on Criminal Policy and Research, 14(1): 39-60.

Wortley, R. (1997) Reconsidering the role of opportunity in situational crime prevention. In G. Newman, R.V. Clarke and S.G. Shohan (eds) Rational Choice and Situational Crime Prevention. Crime Prevention Studies, vol. 5. Monsey, NY. Criminal Justice Press.

Wortley, R. & Smallbone, S. (eds) (2006), Situational prevention of child sexual abuse Crime Prevention Studies, Vol. 19. Monsey, NY: Criminal Justice Press.

Wortley, R. (2008) Situational precipitators of crime. In Wortley, R. and Mazerolle, L. (2008) (eds) Environmental Criminology and Crime Analysis, Devon: Willan Publishing.

Wortley, R. and Mazerolle, L. (2008) Environmental Criminology and Crime Analysis: situating the theory, analytical approach and application. Devon: Willan Publishing.

YJB (2008) Youth Offending Teams. Last accessed July 2008 at: http://www.yjb.gov.uk/en-gb/yjs/YouthOffendingTeams/

Appendix 3.1: FOI response

Home Office

Direct Communications Unit

2 Marsham Street, London SW1P 4DF

Switchboard 020 7035 4848 Fax: 020 7035 4745 Textphone: 020 7035 4742

E-mail: xxxxxx.xxxxxxxxx@xxxxxxxxxx.xxx.xxx.xx Website: www.homeoffice.gov.uk

xxxxxxxxxxxxxxxxxxxxxx@xxxxxxxxxxxxxxx.xxx

Mr Gareth Oakley

Reference: T23587/8

Dear Mr Oakley,

Thank you for your e-mail of 04/11/2008 23:01:09 about the Car Theft Index.

I can confirm that the 2006 Car Theft Index is the most up-to-date version of the document available.

There is a possibility that a 2008 version of the document will be produced during 2009 however the plans to do so are not confirmed.

DEBBIE MOON

Appendix 4.1 People met during the research

These included in-person visits to: Panasonic; Three (3);Vodafone headquarters at Newbury, Vodafone Callcentre at Addelsbury; 02 (2 meetings); Virgin Mobile; the Mobile Industry Crime Action Forum (MICAF, 2 meetings); National Mobile Phone Crime Unit (NMPCU, 8 meetings); Global System Mobile Association (GSMA, 2 meetings); the Department of Trade and Industry (DTI), European Telecommunications Standards Institute (ETSI); the Home Office Acquisitive Crime Team (3 meetings); Home Office Street Crime Action Team; Home Office Robbery Team; Derbyshire Police Intelligence Unit (2 meetings); Leicestershire Police Intelligence Unit; Loughborough Police Station Lost Property (4 meetings); Applied Forensic Solutions (AFS); and Argos retailers. In addition, we communicated by phone and email with Phonesec (a French company who monitor phone software hacking), and Recipero (the company who run the CheckMEND website to trace stolen phones).

Appendix 5.1: Application to HMPS to interview

APPLICATION TO UNDERTAKE RESEARCH IN HER MAJESTY'S PRISON SERVICE

Researcher Details

Surname: Mailley **Title:** Miss.

Forename(s): Jennifer Clare

Contact Address:
Midlands Centre for Criminology and Criminal Justice,
Department of Social Sciences,
Brockington Building,
Loughborough University.
Leicestershire.
LE11 3TU

Contact Telephone Number: 01509 223616/ 07956 459 156
Contact Email Address: J.C.Mailley@lboro.ac.uk

Name, Status and Address of Research Supervisor (if appropriate)**:**
Professor Graham Farrell,
Director, Midlands Centre for Criminology and Criminal Justice,
Department of Social Sciences,
Brockington Building,
Loughborough University,
Leicestershire.
LE11 3TU

Name and Address of Sponsoring Body (if appropriate)**:**

Engineering and Physical Sciences Research Council
(EPSRC)
Crime and Technology Programme,
Polaris House
North Star Avenue
Swindon
Wiltshire
SN2 1ET
England

If more than one researcher will be engaged on the project, please copy this page and provide details on all.

Please attach a CV for all researchers:
1. Please find attached CVs for Jennifer Mailley, Graham Farrell, and Shaun Whitehead.
2.

3.
4.
<u>Researcher Details</u>

Surname: Whitehead **Title:** Mr

Forename: Shaun

Contact Address:
Department of Design and Technology,
Loughborough University,
Leicestershire.
LE11 3TU

Contact Telephone Number: 01664 810009/ 07729 410561
Contact Email Address: shaun@creationeer.co.uk

Name, Status and Address of Research Supervisor (if appropriate)**:**
Professor Graham Farrell,
Director, Midlands Centre for Criminology and Criminal Justice,
Department of Social Sciences,
Brockington Building,
Loughborough University,
Leicestershire.
LE11 3TU

Name and Address of Sponsoring Body (if appropriate)**:**

Engineering and Physical Sciences Research Council
(EPSRC)
Crime and Technology Programme,
Polaris House
North Star Avenue
Swindon
Wiltshire
SN2 1ET
England

---

5. ADDITIONAL OBSERVER:

6. In addition to the 2 researchers named above, Peter Hamerton from the Home Office Acquisitive Crime Team plans to attend a selection of the interviews as an observer. Please see attached letter of support also. He is contactable on his mobile: 07984 493077

All research is to be overseen by Professor Graham Farrell, who has previous experience of interviewing offenders, and will be heavily involved in the analysis and dissemination of the work, and will attend at least the initial interviews.

7. <u>Proposed Research – Aims and Objectives</u>

8. Research title:

Iconography and Semantics of Technological Deterrence within Mobile Telephones: A Crime Feasibility Study

9. Reason for undertaking research project:

Academic research as part of the Midlands Centre for Criminology's normal academic activities. We have an EPSRC (Engineering and Physical Sciences Research Council) grant to look into the problem of mobile phone theft, and interviewing offenders is part of that EPSRC funded project. Goals of the project include publications in relevant journals, such as the British Journal of Criminology, and more importantly tangible, practical solutions actionable by the Home Office, mobile phone industry and Criminal Justice System to lower mobile phone theft.

Mobile phone theft remains high, due to continued demand on the black market for the newer models released. Understanding exactly how such thefts occur, where the phones go, who fences them, who buys them and how offenders might be deterred or more easily detected will aid the development of crime prevention policy and of policing strategies, ultimately lowering the crime rate.

The reason for interviewing offenders is twofold:

Firstly, to gain in depth knowledge of the 'Who What When Where and Why' of the thefts committed. Previous research in this area is scarce, and the main text, Harrington and Mayhew 2001, is out of date, since new technologies and methods of selling phones (abroad, and over the internet) have emerged since this research was undertaken.

Secondly, to ask offenders if they would be deterred from repeat offending by the new phone designs we will present to them. These designs range from simply warning the thief that the phone can and will be blocked (and so be worthless) if it is stolen, to incorporating biotechnology making it much more difficult for the phone to be used by anyone apart from the rightful owner. Thus we will be able to assess which, if any, of these solutions are worth considering further in working groups consisting of the Home Office, National Mobile Phone Crime Unit, handset manufacturers (e.g. Nokia) and network operators (e.g O2).

The Home Office Acquisitive Crime Team agrees that the problem of mobile theft is an ongoing and expensive issue, and welcome out independent and academic but practically based input- see letter of support from Peter Hamerton attached.

Furthermore, the U.K has already put in place a system (where stolen phones are cut off), to tackle the issue of mobile phone theft, but there is no documentation of the good practice used and the lessons learned during the process of setting up this system, nor of any issues remaining. Our initial research suggests there are implementation issues which if resolved could greatly improve the efficacy of the system at cutting off stolen phones, and therefore deterring theft for resale within the U.K. Thus another aim of this research is to bring together this previous work and communicate it to the relevant parties- other criminologists, the Home Office Acquisitive Crime Team, the network operators and handset manufacturers, and working groups concerned with security such as MICAF (Mobile Industry Crime Action Forum) and the GSMA (Global Systems Mobile Association).
This aspect of the research (which is separate from but intertwined with the interviews sought here) presents an opportunity to document good practice, in order to spread the lessons learnt, while identifying implementation issues, and building on this to make recommendations to increase the efficacy of the system and ultimately lower the rate of mobile phone thefts in the U.K.

Finally, this research has implications for other ‘crime waves’: if a solution to drive down the thefts of mobile phones can be found, then the same ideas can be applied to the emerging wave of thefts of PDAs, SatNav, MP3 players and other new portable technologies (‘Hot Products’).

What is (are) the research question(s)?

Overall project questions:
1) What is the nature and extent of mobile phone theft in the U.K now, in 2006?
2) What happens once a phone is reported stolen- is it cut off? How? If not, why not?
3) What would act as a deterrent to potential thieves, to lower the incidents of mobile phone theft?
4) Is there evidence that by cutting off phones stolen within the U.K, the criminal market has changed to selling more phones abroad (where the phones still function)?

Questions to be addressed by interviewing offenders:
A list of specific proposed interview questions is attached, which we are happy to revise based on any guidance from you, but in general the interviews aim to find out:
1) The detail of an offenders last incidence of taking a phone- how, where, when, why that phone/ that person.

2) Whether they are aware that phones can be cut off in the U.K once they're reported as stolen.
3) If so, whether this put them off stealing phones at all.
4) Whether they think any of our proposed design changes would lower the crime rate- we aim to show them two or three proposed design solutions and ask their opinion about effectiveness in terms of deterrence.
5) Whether our proposed design solutions therefore have the potential to decrease repeat offending- if a thief steals 3 phones upon release and they are all useless within 24 hours, would this deter them from stealing again or would they continue on the off chance that some may still work?

Will the research address any of the following issues, including when analysing data?

Gender	X☐	Ethnicity	☐
Religion	☐	Sexuality	☐
Young/ elderly prisoners	X☐	Other diversity issues (please state)	☐

In order to capture the appropriate offender population, it will be necessary to interview offenders under 21, including juveniles.
Gender and age would ideally be recorded as part of the data set. However, neither names nor date of birth are needed, ensuring anonymity.

What are the potential benefits of the research:

- **to the Prison Service?**

Put simply, effective Crime Prevention techniques will lower the future inmate population. Our research seeks to maximise the effectiveness of both current and new Crime Prevention techniques. Our research to date suggests that the cost of mobile phone theft to the U.K as a whole is in the region of a billion pounds per year- some of this cost is borne by the prison service.
The knowledge gained from the prisoners will inform us (Criminologists, Home Office, Police) how best to lower the rate of mobile phone theft. The prevention techniques analysed would deter many currently active thieves and inmates from re-offending, and also prevent novices from committing initial offences, since it would be known that stolen phones were worthless in terms of resale value.

In addition, the interviews themselves will show current offenders that action is being taken, and so may deter them from offending upon release, thus immediately decreasing repeat offending on release.

Furthermore, the work would inform Home Office future research and policy (see attached letter of support from Peter Hamerton of the Home Office Acquisitive Crime Team.)

- **to academic knowledge in the field of study?**

Over all the research will further our knowledge of the specific and ongoing issue of mobile phone theft within the U.K, which has been high and remained high since the inception of the Street Crime Initiative in 2001.
The interviews in particular will add the level of detail necessary to unpick the different types of mobile theft, and therefore allow us to identify tailored crime prevention measures. As stated before, the seminal text on the subject is now outdated and other research is scarce.
The opinions of the interviewees about the potential deterrence effect of the proposed designs will increase knowledge of offenders perceptions and thought processes.

---

10. Research Plan and Methodology

Briefly describe the research methodology:

1. Identifying suitable offender population:
With the help of prison personnel, it is anticipated that a screening procedure will be necessary to identify offenders who have stolen mobiles, unless some institutions have records at this level of detail, in which case these records could be used.

2. Approach offenders and obtain consent.
Please see attached Consent Form and Participant Information Sheet, both based on HMP templates.

3. Interview offenders:
a) 60 - 70% of interview time on gaining rapport, asking about the details of one offence, and discussing the deterrent effect of cutting off stolen mobiles within the U.K.
b) 30- 40% of interview time on asking offenders' opinions about deterrent effect of our novel designs.

Anonymity: there appear to be 2 options:

a) Once identified by the screening procedure, offenders will be anonymised by allocating a unique reference number to each named individual. The records of the names and reference numbers will be stored securely at Loughborough, separately from the interview results, so that any person accessing the interview results can not identify individuals from the interview results.
b) The list of names and reference numbers are kept by HMP and so do not leave the institutions, making it impossible for researchers to identify who gave which interview results. HMP staff have access to the list.

Either option is acceptable to us, as is whatever suits each establishment that we work with.

4. Data analysis:
Analysis will be both qualitative and quantitative, as appropriate.

5. Dissemination of results:
a) Findings: Via reports to EPSRC, to Home Office, to HMP, to mobile phone operators and manufacturers, and papers published in peer reviewed journals (e.g. British Journal of Criminology).
b) Applications of the research: via working groups with H.O, GSMA, MICAF, CJS and other

appropriate bodies.

11. What data will be collected during the research?
Please include with this application any research tools that will be used in the research

1. Offender age and gender.
2. Answers to interview questions- please see attached questions.
3. Opinions on deterrent effect of design solutions- please see attached mock up of one proposed solution. Ideally we would show the offenders models of mobile phones with the design solutions on them; failing this we would want to show them 3D computer images on a laptop. If a laptop is not acceptable, we can use large posters/ cutouts.

Which (if any) measurement tools will be used?

None.

Please list any equipment, which you are intending to bring into the prison establishment.
E.g. tape recorders etc…

Dictaphone, stationary to take notes during interviews, laptop to display proposed design solutions.

What is the proposed timetable for the research?

Interviews conducted: May to mid-June.
Results analysis: mid-June to mid-July.
Report writing and further analysis: mid-July to end of August.

When will the research be completed?

Fieldwork: end of June 2006.

Report: 31 August 2006.

---

12. Research Analysis and Dissemination

How will the research results be analysed?

Results from the rating of the deterrent effect of the proposed design solutions will be analysed quantitatively using SPSS.
Results from conversations describing the nature of offences and choices of phone will be summarised qualitatively, and quantitative analysis carried out if the data are suitable. It is envisaged that if a suitable number of interviews are conducted, the results could be analysed using the same methodology employed by Allen et al. 2005 (Fraud and

Technology Crimes: findings from the British Crime Survey and 2003 Offending, Crime and Justice Survey, pg22) Here, victims of mobile phone theft were asked about the circumstances of the incident, and the results presented both qualitatively and quantitatively.

Will the research include a reconviction study? If yes, please state how this will be conducted

NO.

NB. Governors/ Area Psychologists reviewing an application, which includes a reconviction element should forward it to the Reconviction Analysis Team in RDS-NOMS.

How long will the research materials be retained?
1 year after interview.

How will the results of the research be disseminated? e.g. thesis, article, book etc...
1) Initial report to the EPSRC (funding body) of the project outcomes.
2) To HMP, CJS and Home Office Acquisitive Crime Team via meetings and report.
3) As paper(s) in academic peer reviewed journals, such as The British Journal of Criminology.
4) To the mobile phone security industry through reports to and meetings with key contacts within relevant institutions/ bodies. E.g The GSMA, MICAF.

Please state how the results will be made available to the Prison Service.

The final report for the EPSRC would be made available to the Prison Service. Also, outcomes from the research will filter down via Home Office Acquisitive Crime Team, in terms of recommendations, further research etc.
13.

14. Access to Prison Establishments, Prisoners and Staff

What establishment(s) is access being sought for? Please state name(s) or type(s) of establishment?

Birmingham,
Brockhill,
Swinfen Hall,
Stoke Heath.

NOTE: this list is not exhaustive- we would interview anyone suitable regardless of which establishment they were in. In part our choice of establishment is to be guided by your knowledge of how we might identify people who have been involved in mobile phone theft.

Please state your reasons for choosing this establishment(s)?

Previous research shows that the perpetrators of mobile phone theft tend to be young:
Smith (2003; pg 22) described the majority of robbery offenders as under 21yrs.
Harrington and Mayhew (2001; pg 37)) described the majority of mobile phone thieves offenders as between 15 and 18.
Thus it is important that we interview a cross-section of juveniles under 18, and young offenders under 21.
The institutions listed are those geographically based in the Midlands area, purely for ease of access/ travel etc by the research team. Again this is an ideal scenario, and not set in stone.

References:

Allen et al (2005) *Fraud and Technology Crimes: findings from the 2002/03 British Crime Survey and the 2003 Offending, Crime and Justice Survey*. Home Office Online Report 34/05.

Harrington, V. & Mayhew, P. (2001) *Mobile Phone Theft.* Home Office Research Study 235.

Smith, J. (2003). *The Nature of Personal Robbery*. Home Office Research Study 254.

If you wish to conduct your research in more than four prisons, please provide further details on why this number of prisons is required?
As before, the exact number of establishments will depend on how easy it is to identify offenders involved in mobile phone theft. Ideally, the number of establishments will be kept at a minimum to save both HMP and Loughborough resources.
The research aims to conduct 40 offender interviews.

Have any establishments been approached separately about this research? If so, please provide details:
Initially we were unaware of this central form to request permission at the regional level, and so have sent individual letters to the Governors of the following institutions:
Ashwell, Foston Hall, Glen Parva, Leicester, Norwich, Onley, Brinsford, Brockhill, Shanley, Stoke Heath, Swinfen Hall, Werrington.

The response has been mixed and we will communicate to each one that we are now following the central NRC approval route.

How long will the researcher(s) need to be inside each prison establishment)? Number of days and numbers of hours per day.

15 hours total per institution, spread over 2.5 days.

<u>Rationale</u>:
Ideally we would interview 40 prisoners, averaging ten at each of four establishments.

Each interview will last approximately one hour, with an allowance of 30 minutes between interviews for overspill, breaks and for offenders to be found and escorted to the interview room.
40 x 1.5 hrs = 60 hours total, between the 4 institutions.

How many prisoners would be involved? Please state if any types of prisoner, sampling of prisoners is required
40 in total.
Sample: those involved in mobile phone theft from the person/ robbery, and theft from warehouses/shops**. We are not focusing on those who committed burglary and took a phone as a by product of that burglary.**

How will you identify the prisoners to be involved in the research?
If possible, prisoners responsible for mobile phone theft will be identified by Area Psychology or other HMP personnel with knowledge of offender's crimes, or access to records of such.
If this is not possible, we will conduct a screening visit to each institution to discuss how best to identify offenders.

How long will the researcher(s) need to be in contact with prisoners?
One hour per offender.

How many staff would be involved? Please state if any types of staff, sampling of staff is required
As many as necessary to follow internal procedures to identify relevant offenders, for sitting in on interviews/ escorting both us and offenders around the establishments. Estimate 3 or 4 at each institution?**.**

Will the researcher(s) need to be in contact with prison staff?
<u>Planning</u>: one x 2 hour meeting to identify suitable offenders.
<u>Ongoing</u>: one hour on phone calls/ miscellaneous communications. (e.g. to arrange interview dates).
<u>Interviews</u>: 10 interviews per institution, each taking 1.5 hours average, giving 15 hours of staff time per staff member present for escorting offenders/ us at any one time during interviews.

Are there any resource implications for Prison Service Headquarters? e.g. anticipated demands on staff time, office requirements, information etc…

As above, the resource demands would be initially to identify a suitable offender population, and then during interview for escorting/ access to buildings etc.

---

15. <u>Research Ethics</u>

Please state how informed consent will be obtained? If a consent form will be used, please include this with your application.
See attached form- we are happy to revise this as advised by you.

Has a relevant Ethics Committee approved the research? If so, please attach a copy of the submission to the Ethics Committee and its response:

Attached is a copy of the ethics approval form sent to Loughborough University Ethics Committee, concerning specifically the interview stage of this research. We are currently waiting for their response.

Please confirm that:

- **the research will comply with the Prison Service's Statement of Professional principles, and provide any relevant consent forms that will be used in the research**
- **only one copy of this application has been sent to the Prison Service**

Signature: **Date:**

Please return this form, together with

- **Copies of the CVs of all researchers**
- **Copies of any submission to an Ethics Committee and its response**
- **Copies of any questionnaires, topic schedules, and consent forms etc…**

To ONE of the following:

☐ **Prison Governor/ Research Contact**
☐ **Area Psychologist**
☐ **Prison Service Headquarters – Psychology Group**

Please refer to PSO 7035 at: http://www.hmprisonservice.gov.uk/resourcecentre
For details of who application forms should be sent to.

If you have any questions about this form, please contact:
AppliedPsychologyGroup@hmps.gsi.gov.uk

Appendix 5.2 Interview questionnaire

Interview Schedule - Mobile Phones
Loughborough University

I'm a researcher from Loughborough University. We're doing research into mobile phones and mobile phone theft. I'm going to ask you some questions about different issues relating to mobile phones. This will cover your use of mobile phones, different phone designs, and different things that are done to stop mobile phone theft.

The interview will probably take about 40 minutes or so - the time it takes varies from one person to the next.

Let me reassure you I am not writing down you your name. Everything you say is confidential. Any reports we write about the research will not identify you or any individual person.

SECTION I: INTRODUCTION

1. <u>If in prison</u>: 'We know you're not allowed mobiles in here, but before you were here, did you own a mobile phone?'

<u>Not prison</u>: 'Do you have a mobile phone?'

No……………………………….0→ Go to Q7
Yes, 1……………………………1→ Go to Q2
Yes, 2..…………………………..2→ Go to Note 1a
Yes, more than 2………………..3→ Go to Note 1a

Note 1a: If phone user: *From now on we'd like to talk about the phone you use the most.*

---

2. What make is/was it?

Alcatel……...	1	Orange………	18
BlackBerry…	2	Panasonic.......	19
BlueBerry….	3	Philips………	20
Bosch………	4	Qtek…………	21
BT………….	5	Sagem……….	22
BT Cellnet…	6	Samsung…….	23
EG…………	7	Sanyo……….	24
Fujitsu……..	8	Seconda…….	25
Hutchinson..	9	Sendo……….	26
Hutchinson 3.	10	Sharp……….	27
i-mate……..	11	Siemens.........	28
LG…………	12	Sony Ericsson	29
Motorola….	13	T-mobile.......	30
NEC………	14	Toshiba…….	31
Nikon……..	15	Virgin………	32
Nokia……..	16	Vodafone…..	33
O2………...	17	Any other…..	34

3. What model is/was it? (If outside: If you are unsure would you mind if we checked it now?)

(specify)______________________________

4. How long have/did you /have it?

0-6 months………….. 1 13-18 months……….. 3
7-12 months………… 2 19-24 months………. 4
>24 months………… 5

5. Do/did you mainly use it for texting or for voice calls?

Text… …….. 1
Voice………. 2
Mixture…….. 3

6. Do you feel it is important to have all the bells and whistles like camera, video or music for example?

No (calls text only)….. 0
Yes…………………... 1
[If yes] please explain……..………………………………………………………….

……………………………………………………………………………………………

7. Did you know that phones can be blocked, so they can't make calls?

No…………………………………………………..0 (If no go to note 2, and Q9)
Yes…………………………………………………1 (If yes go to Q 8)
Note 2: basically, if you called up say O2 or Vodafone, and told them that your phone had been stolen, they can block it so that it can't be used by the thief to make any calls.

8. [If yes] Can you tell me what you know?
……………………………………………………………………………………

……………………………………………………………………………………

…………………………………………………………………………………….

(If confused between SIM lock and blocking/blacklisting, explain difference- SIM lock makes sure you're phone will only work on a particular network, whereas blacklisting means the whole phone doesn't work.)

9. Have you ever heard of the IMEI, the phone's serial number?

No………………………………………0 (Go to note 3)
Yes……………………………………. 1 (Go to Q10)

10. [If yes] Can you tell me what you know?

…………………………………………………………………………………

…………………………………………………………………………………

…………………………………………………………………………………

Note 3: You remember we just talked about phone companies could block your phone so it can't make calls? The IMEI is the number they use so they know it's your phone they're blocking. It's a bit like a car number plate- there's usually only one number so its easy to tell which phones are which.

---

11. Are you familiar with the idea of mobile phone reprogramming?

No……………………………………………………….0 (Go to note 4)
Yes……………………………………………………1

12. [If yes] Can you tell me what you know?………………………………………………..

………………………………………………………………………………………………

………………………………………………………………………………………………

Note 4: Reprogramming is another word for changing the serial number, or IMEI. So it changes the phone's identity. If your phone is blocked, for example because it's reported as stolen, one way to get it working again is to reprogram or change the serial number. It's illegal but it happens!

SUMMARY: in summary then, are you O.K with the idea that phones can be blocked so they don't work, and that the way the phone company knows which phone to block is to use its serial number, the IMEI? One way that people can get round a blocked phone is to change that IMEI, so that the phone works again. This is called reprogramming the IMEI.

SECTION II: COMPARING PAIRS OF PHONES

I'm going to show you some pictures of mobile phones, two at a time. Each time I'm going to ask you which of the two phones you would steal if they were both available (easy to steal, no risk) but you could only take one of them. There's only 6 pairs in total.

13. Given that an easy opportunity arose to steal one of these phones, with no risk, which would you choose? Which is more **attractive** to take? **[SHOW PAIR 1 – OLD/NEW]**

Phone on Left …… 1
Phone on Right…… 2
Neither……………. 3
Don't know……….. 4

IF LEFT OR RIGHT CHOSEN: Why did you chose that one rather than the other? (prompt for specifics as necessary if first response is just ‘because it looks better’ etc. E.g. ‘In what way does it look better?’)

14. ……………………………………………………………………………………………………
……………………………………………………………………………………………………
…………………………………………………………………………………..

---

15. Given that an easy opportunity arose to steal one of these phones, with no risk, which would you choose? Which is more **attractive** to take? **[SHOW PAIR 2 – Sony Ericcsons - older and newer]**

Phone on Left ……	1
Phone on Right……	2
Neither…………….	3
Don’t know………..	4

IF LEFT OR RIGHT CHOSEN: Why did you chose that one rather than the other? (prompt for specifics as necessary if first response is just ‘because it looks better’ etc.)

16. ……………………………………………………………………………………………………
……………………………………………………………………………………………………
………………………………………………………………………………………

---

17. Given that an easy opportunity arose to steal one of these phones, with no risk, which would you choose? Which is more **attractive** to take? **[SHOW PAIR 3 – silver Nokias, square and curved]**

Phone on Left ……	1
Phone on Right……	2
Neither…………….	3
Don’t know………..	4

IF LEFT OR RIGHT CHOSEN: Why did you chose that one rather than the other? (prompt for specifics as necessary if first response is just ‘because it looks better’ etc.)

18. ……………………………………………………………………………………………………
……………………………………………………………………………………………………
………………………………………………………………………………………

---

19. Given that an easy opportunity arose to steal one of these phones, with no risk, which would you choose? Which is more **attractive** to take? **[SHOW PAIR 4 – black sliders -Nokia and Samsung]**

Phone on Left ……	1
Phone on Right……	2
Neither…………….	3
Don’t know………..	4

IF LEFT OR RIGHT CHOSEN: Why did you chose that one rather than the other? (prompt for specifics as necessary if first response is just ‘because it looks better’ etc.)

20. ……………………………………………………………………………………………………
……………………………………………………………………………………………………
………………………………………………………………………………………

---

21. Given that an easy opportunity arose to steal one of these phones, with no risk, which would you choose? Which is more **attractive** to take? **[SHOW PAIR 5 – silver clamshells]**

Phone on Left …… 1
Phone on Right…… 2
Neither……………. 3
Don't know……….. 4

IF LEFT OR RIGHT CHOSEN: Why did you chose that one rather than the other? (prompt for specifics as necessary if first response is just 'because it looks better' etc.)

22. ……………………………………………………………………………………………………
……………………………………………………………………………………………………
………………………………………………………………………………………

---

23. Given that an easy opportunity arose to steal one of these phones, with no risk, which would you choose? Which is more **attractive** to take? **[SHOW PAIR 6 – Fortress/concept]**

Phone on Left …… 1
Phone on Right…… 2
Neither……………. 3
Don't know……….. 4

IF LEFT OR RIGHT CHOSEN: Why did you chose that one rather than the other? (prompt for specifics as necessary if first response is just 'because it looks better' etc.)

24. ……………………………………………………………………………………………………
……………………………………………………………………………………………………
………………………………………………………………………………………

SECTION III: DESIGN SOLUTIONS

Now I'd like to ask your opinion about different ways that people try to stop having their mobile phones taken. Some of them are just ideas so they might seem new, but it's all part of our work.

I'd like you to pretend you were thinking of taking a mobile phone. Then, for each question I ask, can you tell me if there is anything about the idea that would put you off taking the phone.

For each question I will ask: 'Is this a good idea-would it put you off?' and I would like you to chose one of these four answers:

Show SHOWCARD A

['Identifiable' solutions]

25. The phone has someone's name written on it with a marker pen? Would that put you off?

Not at all………. 1

A little………… 2
Quite a lot……... 3
Completely……. 4

26. Why is that?..………………………………………………………………………………

…………………………………..………………………………………………………

---

27. The phone has someone's name stamped on the cover, but it is not one of those covers you can replace easily, so you can't get rid of the name? Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

28. Why is that?..………………………………………………………………………………

…………………………………..………………………………………………………

---

29. The phone has someone's *face* stamped on the cover, and again its not one of those covers you can replace easily, so you can't get rid of the picture? Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

30. Why is that?..………………………………………………………………………………

…………………………………..………………………………………………………

['Seen' solutions]

31. Now I'm going to show you a picture, and I'd like you to tell me what you'd think if you saw that on a phone- what's your gut reaction? Would it put you off? **[SHOW PICTURE OF EYE?]**

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

32. Why is that?..………………………………………………………………………………

…………………………………..………………………………………………………

---

33. If I told you that the eye, this symbol, means the phone won't work if it's reported stolen. Would that put you off ?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

34. Why is that?..………………………………………………………………………………

……………………………………….……………………………………………………

---

35. Now imagine that the phone's serial number, the IMEI, is stamped on the outside of phone so that people such as the police or a potential buyer can check to see if it's been changed. Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

36. Why is that?..………………………………………………………………………………

……………………………………….……………………………………………………

[‘Attached’ solutions]

37. This phone is attached by a chain to someone's trousers (**SHOW PICTURE OF LANYARD CHAIN**) Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

38. Why is that?..………………………………………………………………………………

……………………………………….……………………………………………………

---

39. This picture shows a phone which is worn on the wrist like a bracelet (**SHOW WRIST BAND PHONE**). Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

40. Why is that?..………………………………………………………………………………

……………………………………….……………………………………………………

---

41. Imagine a phone where the handset communicates with another part on the wristband of the owner. When the handset is taken more than a few feet away from the user, a loud alarm goes of on the handset. Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

42. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

---

43. Imagine the same phone where the handset and wristwatch communicate. What if, when the handset is taken away, the alarm goes off on the wristwatch of the owner? Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

44. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

('Findable' solutions)

45. Imagine that the mobile phone is fitted with a tracking device - like a tracker on a car - so it can be located when it's stolen. Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

46. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

('Executable' solutions)

47. Imagine that the mobile phone handset will definitely be blocked in the UK within 48 hours of being reported stolen, so it cannot be used. Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

48. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

---

49. What if it would be blocked even quicker, say within 24 hours? Would that put you off?

Not at all………. 1

A little………… 2
Quite a lot……... 3
Completely……. 4

50. Why is that?..………………………………………………………………………………

……………………………………..………………………………………………………

---

51. What if you knew that the phone would be blocked immediately in the UK? Would that put you off?
Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

52. Why is that?..………………………………………………………………………………

……………………………………..………………………………………………………

Notes: do they mention abroad? Aware of selling abroad? If so, probe further……………….

……………………………………………………………………………………………

('Necessary' solutions)
53. Imagine that the mobile phone will definitely be cut off when stolen, but it will still work as a camera and MP3 player. Would that put you off?
Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

54. Why is that?……………………………………………………………………

……………………………………..………………………………………………………

('Secure' solutions)
55. Imagine that the phone was likely to be cut off, but that your friend had the equipment to unblock it by changing its identity [*if necessary*: its serial number, the IMEI number], so that it worked again. Would the blocking (still) put you off?
Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

56. Why is that?..………………………………………………………………………………

……………………………………..………………………………………………………

---

57. What if the phone would be cut off and the only way to reactivate it was to get inside and change some of the chips inside it, which is quite difficult to do. Would that put you off?

Not at all……….	1
A little…………	2
Quite a lot……...	3
Completely…….	4

58. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

(Back to 'necessary' solutions)

59. Imagine that the mobile phone can only be activated with something unique to the owner, like a fingerprint, an eye scan, or face recognition. Would that put you off?

Not at all……….	1
A little…………	2
Quite a lot……...	3
Completely…….	4

60. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

---

61. Imagine that the handset is locked by a PIN code, so you need to take it to someone who can unlock it before it works. Would that put you off?

Not at all……….	1
A little…………	2
Quite a lot……...	3
Completely…….	4

62. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

('Detectable' solutions)

63. Imagine you're in a public place and you see an unguarded mobile phone but there's some other people watching. Would that put you off?

Not at all……….	1
A little…………	2
Quite a lot……...	3
Completely…….	4

64. Why is that?..………………………………………………………………………………

……………………………………….………………………………………………………

('Hidden' solutions)

65. Imagine that you know somebody is carrying a mobile phone because you can see the headset they're wearing, so you know the phone is in their pocket. Would that put you off?

Not at all………. 1

A little………… 2
Quite a lot……... 3
Completely……. 4

66. Why is that?..………………………………………………………………………………

……………………………………….…………………………………………………………

('Reduced Value' solutions)

67. Imagine that people only carry very cheap 'disposable' mobile phones. They can only be used for voice calls and text. They don't have a screen. They can't be reprogrammed. They can have up to £5 worth of call credit on them. Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

68. Why is that?..………………………………………………………………………………

……………………………………….…………………………………………………………

---

69. Let's say that handsets in the future are all free, and are just left lying around in bars, restaurants etc. They don't hold any personal information on them, they are just used to connect to say the internet, so there's no money or personal details on them. Would that put you off?

Not at all………. 1
A little………… 2
Quite a lot……... 3
Completely……. 4

70. Why is that?..………………………………………………………………………………

……………………………………….…………………………………………………………

---

71. Right, and finally on the subject of ideas to stop people taking phones- let's say that you were employed by the mobile phone industry to come up with an idea for a mobile phone that wouldn't get stolen. Do you have any ideas?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

SECTION IV: EXPERIENCE OF TAKING PHONES

Next I'm going to ask you a few questions about your experiences of taking mobile phones. This is the last set of questions.

72. Now as you know, the reason we're asking your opinion on these ideas is because you know a bit about taking phones. That's fine. It's actually very useful for us, because you're the expert. Can you tell us, from your experience, do you prefer to steal phones rather than other things?

Yes (mobile phones)……….. 1
No (other things)……………. 2
Don't know/ no opinion…….. 3
Depends on situation……….. 4

---

73. Can you tell us why you say that? [*Probe as necessary if only a general response given:* - 'Is there something in particular about mobiles that makes them good to take?' Or: 'Is anything better than a mobile?')

………………………………………………………………………………………

………………………………………………………………………………………

………………………………………………………………………………………

---

74. Would you say, in general, that some types of mobile phone are more attractive to steal than others? In your experience did you make a choice about which ones to steal, or take any type that was available?

Choice made yes…………….. 1
Anything that was available…. 2
Depends……………………… 3

---

75. What choices did you make, and why?

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

['Who what when where and why' of last offence]
The next set of questions relate to <u>the last time</u> you took a mobile phone. The last time you took a mobile phone,

76. What make of phone was it?

Alcatel……..	1	Orange………	18
BlackBerry…	2	Panasonic.......	19
BlueBerry….	3	Philips………	20
Bosch………	4	Qtek…………	21
BT………….	5	Sagem……….	22
BT Cellnet…	6	Samsung…….	23
EG…………	7	Sanyo……….	24
Fujitsu……..	8	Seconda…….	25
Hutchinson..	9	Sendo……….	26
Hutchinson 3.	10	Sharp……….	27
i-mate……..	11	Siemens.........	28
LG…………	12	Sony Ericsson	29
Motorola….	13	T-mobile.......	30
NEC………	14	Toshiba…….	31
Nikon……..	15	Virgin………	32
Nokia……..	16	Vodafone…..	33
O2………..	17	Any other…..	34

77. What model of mobile phone was it?…………………………………..

78. Who did it belong to?

Stranger……………………………….. 1
Don't know……………………………. 2
Relative (specify)……………………… 3
Friend…………………………………. 4
Partner……………………………….... 5
Work colleague……………………….. 6
Other (specify)..……………………...... 7

79. How did you steal it?…

Robbery street……………………………………	1
Robbery public space not street…………………..	2
Snatch theft………………………………………	3
Burglary………………………………………….	4
Part of a fight…………………………………….	5
Left unattended in a bar………………………….	6
Left unattended public transport………………...	7
Left unattended other (specify)…………………	8
Pickpocket………………………………………..	9
Other (specify)…………………………………..10	

……………………………………………………………………………………………..

……………………………………………………………………………………………...

80. What year and month was it: YR ………   MON ….……..

Jan ………….. 1   Jul…………….. 7

Feb…………	2	Aug…………..	8
Mar…………..	3	Sep…………..	9
Apr………….	4	Oct…………….	10
May…………	5	Nov…………..	11
Jun……….. ….	6	Dec…………….	12

81. What time of day was it? (to nearest hour) ……………

82. Where was it? ………………………………………………

83. Why did you take that particular mobile phone? ……………………………

……………………………………………………………………………………

……………………………………………………………………………………

---

84. How many mobile phones would you say you have taken, in total? (prompt as necessary: *If it is a lot, can you give me a rough estimate*?)

Total number taken ………….(If 1 go to 80)

85. Over what time period were these taken?: …………YRS …………… MONTHS

86. If you took mobile phones more than once, did you ever take them from the same person, business, property?

Yes … 1 (Go to 80 below)
No….. 2 (Go to 81)

87. IF YES: Can you tell me a bit more about why you took them from the same person/place:

……………………………………………………………………………

……………………………………………………………………………

88. Did you look for a certain type of phone? Was the type of phone important to you? Would you steal one model but leave another?

Choice made yes……………. 1
Anything that was available… 2
Depends…………………….. 3
Not applicable………………. 4

89. Why was that? ……………………………………………………………….

…..…………………………………………………………………………

……..………………………………………………………………………….

---

90. What happened to make you decide to take a phone that day? (If needed prompt for specifics - but do not lead) *E.g. When did you make the decision to take that phone? Can you tell me in words what you were thinking? ->What sort of day was it? What were you doing before you took it? Then what happened…*

………………………………………………………………………………

………………………………………………………………………………

………………………………………………………………………………

[Selling on]

91. And can I ask about you- when you took a phone, did you sell it on to anyone else?

Yes……..1 (Go to Q85)
No……….2(Go to Q90)

92. Who did you sell it on to?

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

93. How did you find out they wanted a phone? (Prompt: What happened to end up with you selling it to them?)

…………………………………………………………………………………………………

…………………………………………………………………………………………………

…………………………………………………………………………………………………

---

94. Did you do anything to the phone before you passed it on? Probe: When you took the phone, was it the same when you sold it on?

Change cover………………………..	1
Reprogramme IMEI…………………	2
Disable SIM lock……………………	3
New SIM in………………………….	4

Other (specify)……………………… 5

95. Do you know what they (the buyer) was planning to do with the 'phone?

………………………………………………………………………………

………………………………………………………………………………

96. (If bought to sell on again-) Was the buyer planning to alter the phone in any way before passing it on?

………………………………………………………………………………

………………………………………………………………………………

[Fence knowledge]

Thank you, and we're nearly done now.

97. Are you aware of anyone who regularly buys phones from thieves to sell them on, a fence?
Yes…………………………………… 1 (go to 90)
No…………………………………… 0 (go to 96)

98. Where do they sell them on? …………………………………………………………..

…………………………………………………………………………………………………

99. Who buys the handsets?...

…………………………………………………………………………………………………

100. How much do they charge for a handset?..

…………………………………………………………………………………………………

101. How much do they pay for a handset? …………………………………………………

…………………………………………………………………………………………………..

102. Do they ask for specific types of handset?

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

[False claims]

103. Right, a slight change of subject here- would you ever consider making a false claim to the insurance company to upgrade your model of mobile phone?

Yes……………………… 1
No…………………………. 2

………………………………………………………………………

[Snowballing to identify other interviewees]

104. We are interested in speaking to other people about mobile phones. Is there anyone you know of (in here or outside) who we might talk to? We're interested in speaking to people who have specialised in stealing phones, reprogramming, or selling or fencing stolen phones.

(Person a)…………………………………………………………………

(Person b) …………………………………………………………………

(Person C) …………………………………………………………………

105. Have you got any questions for us?

Demographics

106. Respondent is:

Male……….. 1
Female ……. 2

107. Can I ask you your age?:

Age:

15 and under……….1
16-20………………2
21-25………………3
26-30………………4
31-35………………5
36-40……………….6
41-45……………..…7
46-50……………….8
51 and over…………9

108. Let me remind you that this is all confidential and anonymous. Can I ask you which of these categories you would put yourself into?: (Show SHOWCARD B).

Ethnic Origin: White/British……………………….1
White/Irish………………………….2
White other……….………………...3

Mixed- White/Black Caribbean…….4
Mixed- White/Black African………..5
Mixed- White/Asian………………...6

Mixed- Other………………………..7

Asian/Asian British- Indian…………8
Asian/Asian British- Pakistani………9
Asian/Asian British- Bangladeshi…...10
Asian/Asian British- Other…………..11

Black/Black British- Caribbean……...12
Black/Black British- African………...13
Black/Black British- Other…………..14

Chinese……………………………….15
Other (specify)………………………..16

Region you live in: Anglia………………1 Scotland………………….7
Home Counties……..2 South East/ Southern….…8
London ……………..3 South West………………9
Midlands……………4 Tyne-Tees……………….10
North West………….5 Yorkshire………………...11
Northern Ireland…….6 Wales…………………….12

Other (please specify) ………………………13

109. Where interviewed (list the YOT, prison, or Uni)…………………………………

110. Student, prisoner or young offender/ other (specify)…....................

………………………………………………………………………………………………

NOTE DATE AND QUESTIONNAIRE NUMBER ON FRONT OF QUESTIONNAIRE.

Thank you very much for your time. If you've got any questions about any of this once we've gone you can contact who ever it was that arranged this interview.
Do you have any questions for me?
Is there anything else you'd like to tell me about mobile phones that you think I've missed?

……………………………………………………………………………………………….

………………………………………………………………………………………………

Appendix 5.3 Loughborough University's internal Ethical Advisory Committee form.

1. **ETHICAL ADVISORY COMMITTEE**

Loughborough University

RESEARCH PROPOSAL FOR HUMAN BIOLOGICAL OR PSYCHOLOGICAL AND SOCIOLOGICAL INVESTIGATIONS

This application should be completed after reading the University Code of Practice on Investigations Involving Human Participants (found at http://www.lboro.ac.uk/admin/committees/ethical/ind-cophp.htm).

2. **1. Project Title**

   Iconography and Semantics of Technological Deterrence within Mobile Telephones: A Crime Feasibility Study

3. **2. Brief lay summary of the proposal for the benefit of non-expert members of the Committee**

   Mobile phone theft is an ongoing crime problem in both the U.K and abroad. This project aims to review the progress to date, to recommend how to improve on current systems designed to cut off mobiles if they are reported as stolen, and to suggest novel design solutions which might further lower the crime rate. The Ethics Committee approval requested here is specifically for interviewing Young Offenders who have been involved in mobile phone theft, in order to find out how they committed such thefts, and to ask their opinion about the potential deterrent effect of several novel designs supplied by the Design and Technology arm of this research team.

   For example, if there were a symbol on the phone warning that the phone would be cut off if stolen, would offenders be deterred by this or indifferent to it?

   40 offenders will be interviewed in the various HMP Institutions where they are held, with each interview lasting 1 hour. In addition to this Loughborough Ethical approval, the HMP Central Research Office also require a separate Ethics

submission from the team, which must be approved before arrangements to interview can be made. Both forms are to be submitted in parallel to minimise delays.

4. 3. Details of responsible investigator (supervisor in case of student projects)

Title	**Professor**	Surname	**Farrell**	Forename	**Graham**

Department	Director, Midlands Centre for Criminology and Criminal Justice, Dept Social Sciences, Loughborough University.
Email address	G.Farrell@lboro.ac.uk

Personal experience of proposed procedures and/or methodologies.

Professor of Criminology, with lecturing including crime prevention. Previous experience includes many research projects and publications, including a range of experience in survey/interview research.

5. 4. Names, experience, department and email addresses of additional investigators

Jennifer Mailley, Research Associate, Midlands Centre for Criminology and Criminal Justice, Dept Social Sciences.

Email: J.C.Mailley@Lboro.ac.uk

Jen worked as a Forensic Scientist in the Forensic Science Service for 5 years before completing an MSc in Crime Science. Research at Loughborough has involved interviewing many people about mobile phone crime, ranging from Fraud and Security specialists to Home Office personnel. While volunteering for Tamworth Volunteer Bureau interviewed a wide range of people about their experiences of volunteering.

Shaun Whitehead, Research Associate, Dept of Design and Technology.

Email: Shaun@creationeer.co.uk

Shaun has interviewed many types of people in the course of his work as an Engineer and Project Manager, ranging from TV Executives to NASA scientists

.

6. 5. Proposed start and finish date and duration of project

Start date	1 Sep 2005	Finish date	31 Aug 2006	Duration	12 months

7. 6. Location(s) of project

Interviews of offenders: various Young Offenders Institutes in the Midlands area.

Data analysis/ write up: Midlands Centre for Criminology, Dept of Social Sciences, Loughborough University.

8. 7. Reasons for undertaking the study (eg contract, student research)

EPSRC (Engineering and Physical Sciences Research Council) Grant funded research.

9. 8. Do any of the investigators stand to gain from a particular conclusion of the research project?

No

9a. Is the project being sponsored? **Yes** ✓ **No** ☐

If yes, please state source of funds including contact name and address.

Engineering and Physical Sciences Research Council

(EPSRC)

Crime and Technology Programme,

Polaris House
North Star Avenue
Swindon
Wiltshire
SN2 1ET
England

9b. Is the project covered by the sponsors insurance? **Yes** ✓ **No** ☐

If no, please confirm details of alternative cover (eg University cover).

University standard cover

10.10. Aims and objectives of project

Specifically, for the approval sought here, to interview offenders in Young Offender Institutes to ascertain details of past crimes they committed where a mobile phone was stolen, and to seek their opinions about the efficacy of proposed design based solutions.

11.11. Brief outline of project

Interview 40 offenders who have stolen mobile phones either in 'Street Crime' style offences (robbery or theft from person), or from more organised bulk thefts from warehouses, lorries etc. We are not interested in phones taken as a by product of burglary, i.e. where the phone was not the primary target.

The details of the 'Who What When Where and Why' of the crimes committed will add to current understanding of offender behaviour and choices made. Gaining their views of the proposed solutions will inform whether any proposed solutions warrant further research.

12. A) STUDY DESIGN

Structured interview, with qualitative and quantitative analysis, as appropriate.

13. B) MEASUREMENTS TO BE TAKEN

Some measurements will be quantitative and some qualitative, depending on the specific question and to some extent the offenders' responses.

For example, 'Describe how you chose which person to approach' requires qualitative analysis, and 'Please rate the deterrent potential of this design on a scale of 1 to 10' requires quantitative.

14. **12. Please indicate whether the proposed study:**

Involves taking bodily samples **Ye** ☐ **No** ✓

	s			
Involves procedures which are physically invasive (including the collection of body secretions by physically invasive methods)	Yes		No	✓
Is designed to be challenging (physically or psychologically in any way), or involves procedures which are likely to cause physical, psychological, social or emotional distress to participants	Yes		No	✓
Involves intake of compounds additional to daily diet, or other dietary manipulation / supplementation	Yes		No	✓
Involves pharmaceutical drugs (please refer to published guidelines)	Yes		No	✓
Involves testing new equipment	Yes		No	✓
Involves procedures which may cause embarrassment to participants	Yes		No	✓
Involves collection of personal and/or potentially sensitive data	Yes	✓	No	
Involves use of radiation (Please refer to published guidelines. Investigators should contact the University's Radiological Protection Officer before commencing any research which exposes participants to ionising radiation – e.g. x-rays)	Yes		No	✓
Involves use of hazardous materials (please refer to published guidelines)	Yes		No	✓
Assists/alters the process of conception in any way	Yes		No	✓
Involves methods of contraception	Yes		No	✓
Involves genetic engineering	Yes		No	✓

If Yes - please give specific details of the procedures to be used and arrangements to deal with adverse effects.

Details of offenders past offences are inherently sensitive data. However, the names of offenders will not be recorded, nor will their date of birth, ensuring anonymity.

Data will be stored securely at Loughborough and accessed only by the relevant named researchers.

15. 13. Participant Information

Details of participants (gender, age, special interests etc)

40 offenders aged between 15 and 21. This age group is necessary because past Home Office research shows the majority of offences are committed by people in this age range.

Number of participants to be recruited: 40

How will participants be selected? Please outline inclusion/exclusion criteria to be used.

Following advice from HMP personnel, suitable interviewees will be identified and approached according to the various HMP Institutions' internal procedures. If HMP personnel can not identify suitable offenders, it will be necessary for the Loughborough University research team to screen potential interviewees with a brief questionnaire.

How will participants be recruited and approached?

As above- by HMP Personnel according to internal procedures. No incentives are offered for participation. Experience from previous interviews suggests that many will participate simply for a break in their every day routine.

Please state demand on participants' time.

One hour per interviewee.

16. 14. Control Participants

Will control participants be used?	**Yes**		**No**	✓

If Yes, please answer the following:

Number of control participants to be recruited:

How will control participants be selected? Please outline inclusion/exclusion criteria to be used.

N/A

How will control participants be recruited and approached?

N/A

Please state demand on control participants' time.

N/A

17. 15. Procedures for chaperoning and supervision of participants during the investigation

HMP personnel will chaperone interviewees to and from the interviews, and will be present either at each interview or just outside the room, depending on the requirement of each HMP Institution.

18. 16. Possible risks, discomforts and/or distress to participants

Possible embarrassment/ shame at recounting past illegal activities, but participation is voluntary.

19. 17. Details of any payments to be made to the participants

None

18. Is written consent to be obtained from participants? **Yes** ✓ **No** ☐

If yes, please attach a copy of the consent form to be used.

If no, please justify.

N/A

20. **19. Will any of the participants be from one of the following vulnerable groups?**

Children under 18 years of age **21** ✓ **No** ☐

People over 65 years of age	Yes		No	✓
People with mental illness	Yes		No	✓
Prisoners/other detained persons	Yes	✓	No	
Other vulnerable groups	Yes		No	✓

If you have selected yes to any of the above, please answer the following questions:

a) what special arrangements have been made to deal with the issues of consent?

We are in the process of submitting a full Ethics Approval form to HMP Central Research Office, and as part of this procedure we are seeking advice from them as to the suitability of our consent form.

The absence of any incentive to participate should ensure that participation is truly voluntary.

b) have investigators obtained necessary police registration/clearance? (please provide details or indicate the reasons why this is not applicable to your study)

If HMP indicate that clearance of any form is needed we will of course obtain it, and inform Loughborough Ethics Committee of this.

22. 20. How will participants be informed of their right to withdraw from the study?

Verbally at the stage of selection, in the Participants Information sheet, and by us at the start of each interview.

23. 21. Will the investigation include the use of any of the following?

Audio recording	Ye		No	✓

	s			
Video recording	Yes		No	✓
Observation of participants	Yes		No	✓

If yes to any, please provide detail of how the recording will be stored, when the recordings will be destroyed and how confidentiality of data will be ensured?

N/A

24. 22. What steps will be taken to safeguard anonymity of participants/confidentiality of personal data?

The names of participants are not needed- we will assign a unique reference number to each interviewee and the cross reference of this to named individuals could be kept by HMP personnel. Similarly, date of birth is not needed by the research team and so will not be part of the data set taken away from the interviews and stored at Loughborough.

Data will be stored securely on password protected computer systems in locked offices, in accordance with the Data Protection Act.

25. 23. What steps have been taken to ensure that the collection and storage of data complies with the Data Protection Act 1998? Please see University guidance on Data Collection and Storage and Compliance with the Data Protection Act.

As above, secure storage of anonymised data, and archiving of the data after the maximum period of 6 years.

26. 24. INSURANCE COVER:

It is the responsibility of investigators to ensure that there is appropriate insurance cover for the procedure/technique.

The University maintains in force a Public Liability Policy, which indemnifies it against its legal liability for **accidental** injury to persons (other than its employees) and for accidental damage to the property of others. Any **unavoidable** injury or damage therefore falls outside the scope of the policy.

Will any part of the investigation result in **unavoidable** injury or damage to participants or property?	**Yes**		**No**	✓

If yes, please detail the alternative insurance cover arrangements and attach supporting documentation to this form.

N/A

The University Insurance relates to claims arising out of all **normal** activities of the University, but Insurers require to be notified of anything of an unusual nature

Is the investigation classed as **normal** activity?	**Yes**	✓	**No**	

If no, please check with the University Insurers that the policy will cover the activity. If the activity falls outside the scope of the policy, please detail alternative insurance cover arrangements and attach supporting documentation to this form.

N/A

27.25. Declaration

I have read the University's Code of Practice on Investigations on Human Participants and have completed this application. I confirm that the above named investigation complies with published codes of conduct, ethical principles and guidelines of professional bodies associated with my research discipline.

I agree to provide the Ethical Advisory Committee with appropriate feedback upon completion of my investigation.

Signature of applicant:

Signature of Head of Department:

Date

PLEASE ENSURE THAT YOU HAVE ATTACHED COPIES OF THE FOLLOWING DOCUMENTS TO YOUR SUBMISSION.

- Participant Information Sheet
- Informed Consent Form
- Health Screen Questionnaire*
- Advertisement/Recruitment material*
- Evidence of consent from other Committees*

*where relevant

Appendix 5.4 Application form for undertaking interviews within HM Prison Service.

APPLICATION TO UNDERTAKE RESEARCH IN HER MAJESTY'S PRISON SERVICE

Researcher Details

Surname: Mailley **Title:** Miss.

Forename(s): Jennifer Clare

Contact Address:

Midlands Centre for Criminology and Criminal Justice,

Department of Social Sciences,

Brockington Building,

Loughborough University.

Leicestershire.

LE11 3TU

Contact Telephone Number: 01509 223616/ 07956 459 156

Contact Email Address: J.C.Mailley@lboro.ac.uk

Name, Status and Address of Research Supervisor (if appropriate)**:**

Professor Graham Farrell,

Director, Midlands Centre for Criminology and Criminal Justice,

Department of Social Sciences,

Brockington Building,

Loughborough University,

Leicestershire.

LE11 3TU

Name and Address of Sponsoring Body (if appropriate)**:**

Engineering and Physical Sciences Research Council

(EPSRC)

Crime and Technology Programme,

Polaris House
North Star Avenue
Swindon
Wiltshire
SN2 1ET
England

If more than one researcher will be engaged on the project, please copy this page and provide details on all.

Please attach a CV for all researchers:

15.1.1. ***<u>Please find attached CVs for Jennifer Mailley, Graham Farrell, and Shaun Whitehead.</u>***

15.1.2.

15.1.3.

15.1.4.

Researcher Details

Surname: Whitehead **Title:** Mr

Forename: Shaun

Contact Address:

Department of Design and Technology,

Loughborough University,

Leicestershire.

LE11 3TU

Contact Telephone Number: 01664 810009/ 07729 410561

Contact Email Address: shaun@creationeer.co.uk

Name, Status and Address of Research Supervisor (if appropriate)**:**

Professor Graham Farrell,

Director, Midlands Centre for Criminology and Criminal Justice,

Department of Social Sciences,

Brockington Building,

Loughborough University,

Leicestershire.

LE11 3TU

Name and Address of Sponsoring Body (if appropriate)**:**

Engineering and Physical Sciences Research Council

(EPSRC)

Crime and Technology Programme,

Polaris House
North Star Avenue
Swindon
Wiltshire
SN2 1ET
England

15.1.5. ADDITIONAL OBSERVER:

15.1.6. In addition to the 2 researchers named above, Peter Hamerton from the Home Office Acquisitive Crime Team plans to attend a selection of the interviews as an observer. Please see attached letter of support also. He is contactable on his mobile: 07984 493077

All research is to be overseen by Professor Graham Farrell, who has previous experience of interviewing offenders, and will be heavily involved in the analysis and dissemination of the work, and will attend at least the initial interviews.

Proposed Research – Aims and Objectives

15.2. Research title:

Iconography and Semantics of Technological Deterrence within Mobile Telephones: A Crime Feasibility Study

15.3. Reason for undertaking research project:

Academic research as part of the Midlands Centre for Criminology's normal academic activities. We have an EPSRC (Engineering and Physical Sciences Research Council) grant to look into the problem of mobile phone theft, and interviewing offenders is part of that EPSRC funded project. Goals of the project include publications in relevant journals, such as the British Journal of Criminology, and more importantly tangible, practical solutions actionable by the Home Office, mobile phone industry and Criminal Justice System to lower mobile phone theft.

Mobile phone theft remains high, due to continued demand on the black market for the newer models released. Understanding exactly how such thefts occur, where the phones go, who fences them, who buys them and how offenders might be deterred or more easily detected will aid the development of crime prevention policy and of policing strategies, ultimately lowering the crime rate.

The reason for interviewing offenders is twofold:

Firstly, to gain in depth knowledge of the 'Who What When Where and Why' of the thefts committed. Previous research in this area is scarce, and the main text, Harrington and Mayhew 2001, is out of date, since new technologies and methods of selling phones (abroad, and over the internet) have emerged since this research was undertaken.

Secondly, to ask offenders if they would be deterred from repeat offending by the new phone designs we will present to them. These designs range from simply warning the thief that the phone can and will be blocked (and so be worthless) if it is stolen, to incorporating biotechnology making it much more difficult for the phone to be used by anyone apart from the rightful owner. Thus we will be able to assess which, if any, of these solutions are worth considering further in working groups consisting of the Home Office, National Mobile Phone Crime Unit, handset manufacturers (e.g. Nokia) and network operators (e.g O2).

The Home Office Acquisitive Crime Team agrees that the problem of mobile theft is an ongoing and expensive issue, and welcome out independent and academic but practically based input- see letter of support from Peter Hamerton attached.

Furthermore, the U.K has already put in place a system (where stolen phones are cut off), to tackle the issue of mobile phone theft, but there is no documentation of the good practice used and the lessons learned during the process of setting up this system, nor of any issues remaining. Our initial research suggests there are implementation issues which if resolved could greatly improve the efficacy of the system at cutting off stolen phones, and therefore deterring theft for resale within the U.K. Thus another aim of this research is to bring together this previous work and communicate it to the relevant parties- other criminologists, the Home Office Acquisitive Crime Team, the network operators and handset manufacturers, and working groups concerned with security such as MICAF (Mobile Industry Crime Action Forum) and the GSMA (Global Systems Mobile Association).

This aspect of the research (which is separate from but intertwined with the interviews sought here) presents an opportunity to document good practice, in order to spread the lessons learnt, while identifying implementation issues, and building on this to make recommendations to increase the efficacy of the system and ultimately lower the rate of mobile phone thefts in the U.K.

Finally, this research has implications for other 'crime waves': if a solution to drive down the thefts of mobile phones can be found, then the same ideas can be applied to the emerging wave of thefts of PDAs, SatNav, MP3 players and other new portable technologies ('Hot Products').

What is (are) the research question(s)?

Overall project questions:

1) What is the nature and extent of mobile phone theft in the U.K now, in 2006?

2) What happens once a phone is reported stolen- is it cut off? How? If not, why not?

3) What would act as a deterrent to potential thieves, to lower the incidents of mobile phone theft?

4) Is there evidence that by cutting off phones stolen within the U.K, the criminal market has changed to selling more phones abroad (where the phones still function)?

Questions to be addressed by interviewing offenders:

A list of specific proposed interview questions is attached, which we are happy to revise based on any guidance from you, but in general the interviews aim to find out:

1) The detail of an offenders last incidence of taking a phone- how, where, when, why that phone/ that person.

2) Whether they are aware that phones can be cut off in the U.K once they're reported as stolen.

3) If so, whether this put them off stealing phones at all.

4) Whether they think any of our proposed design changes would lower the crime rate- we aim to show them two or three proposed design solutions and ask their opinion about effectiveness in terms of deterrence.

5) Whether our proposed design solutions therefore have the potential to decrease repeat offending- if a thief steals 3 phones upon release and they are all useless within 24 hours, would this deter them from stealing again or would they continue on the off chance that some may still work?

Will the research address any of the following issues, including when analysing data?

Gender	X☐	Ethnicity	☐

Religion	☐	Sexuality	☐
Young/ elderly prisoners	X☐	Other diversity issues (please state)	☐

In order to capture the appropriate offender population, it will be necessary to interview offenders under 21, including juveniles.

Gender and age would ideally be recorded as part of the data set. However, neither names nor date of birth are needed, ensuring anonymity.

What are the potential benefits of the research:

- **to the Prison Service?**

Put simply, effective Crime Prevention techniques will lower the future inmate population. Our research seeks to maximise the effectiveness of both current and new Crime Prevention techniques. Our research to date suggests that the cost of mobile phone theft to the U.K as a whole is in the region of a billion pounds per year- some of this cost is borne by the prison service.

The knowledge gained from the prisoners will inform us (Criminologists, Home Office, Police) how best to lower the rate of mobile phone theft. The prevention techniques analysed would deter many currently active thieves and inmates from re-offending, and also prevent novices from committing initial offences, since it would be known that stolen phones were worthless in terms of resale value.

In addition, the interviews themselves will show current offenders that action is being taken, and so may deter them from offending upon release, thus immediately decreasing repeat offending on release.

Furthermore, the work would inform Home Office future research and policy (see attached letter of support from Peter Hamerton of the Home Office Acquisitive Crime Team.)

- **to academic knowledge in the field of study?**

Over all the research will further our knowledge of the specific and ongoing issue of mobile phone theft within the U.K, which has been high and remained high since the inception of the Street Crime Initiative in 2001.

The interviews in particular will add the level of detail necessary to unpick the different types of mobile theft, and therefore allow us to identify tailored crime prevention measures. As stated before, the seminal text on the subject is now outdated and other research is scarce.

The opinions of the interviewees about the potential deterrence effect of the proposed designs will increase knowledge of offenders perceptions and thought processes.

15.3.1.1. *<u>Research Plan and Methodology</u>*

Briefly describe the research methodology:

1. Identifying suitable offender population:

With the help of prison personnel, it is anticipated that a screening procedure will be necessary to identify offenders who have stolen mobiles, unless some institutions have records at this level of detail, in which case these records could be used.

2. Approach offenders and obtain consent.

Please see attached Consent Form and Participant Information Sheet, both based on HMP templates.

3. Interview offenders:

a) 60 - 70% of interview time on gaining rapport, asking about the details of one offence, and discussing the deterrent effect of cutting off stolen mobiles within the U.K.

b) 30- 40% of interview time on asking offenders' opinions about deterrent effect of our novel designs.

Anonymity: there appear to be 2 options:

b) Once identified by the screening procedure, offenders will be anonymised by allocating a unique reference number to each named individual. The records of the names and reference numbers will be stored securely at Loughborough, separately from the interview results, so that any person accessing the interview results can not identify individuals from the interview results.
c) The list of names and reference numbers are kept by HMP and so do not leave the institutions, making it impossible for researchers to identify who gave which interview results. HMP staff have access to the list.

Either option is acceptable to us, as is whatever suits each establishment that we work with.

4. Data analysis:

Analysis will be both qualitative and quantitative, as appropriate.

5. Dissemination of results:

a) Findings: Via reports to EPSRC, to Home Office, to HMP, to mobile phone operators and manufacturers, and papers published in peer reviewed journals (e.g. British Journal of Criminology).

b) Applications of the research: via working groups with H.O, GSMA, MICAF, CJS and other appropriate bodies.

15.4. What data will be collected during the research?

Please include with this application any research tools that will be used in the research

1. Offender age and gender.

2. Answers to interview questions- please see attached questions.

3. Opinions on deterrent effect of design solutions- please see attached mock up of one proposed solution. Ideally we would show the offenders models of mobile phones with the design solutions on them; failing this we would want to show them 3D computer images on a laptop. If a laptop is not acceptable, we can use large posters/ cutouts.

Which (if any) measurement tools will be used?

None.

Please list any equipment, which you are intending to bring into the prison establishment.

E.g. tape recorders etc…

Dictaphone, stationary to take notes during interviews, laptop to display proposed design solutions.

What is the proposed timetable for the research?

Interviews conducted: May to mid-June.

Results analysis: mid-June to mid-July.

Report writing and further analysis: mid-July to end of August.

When will the research be completed?

Fieldwork: end of June 2006.

Report: 31 August 2006.

15.4.1.1. <u>Research Analysis and Dissemination</u>

How will the research results be analysed?

Results from the rating of the deterrent effect of the proposed design solutions will be analysed quantitatively using SPSS.

Results from conversations describing the nature of offences and choices of phone will be summarised qualitatively, and quantitative analysis carried out if the data are suitable. It is envisaged that if a suitable number of interviews are conducted, the results could be analysed using the same methodology employed by Allen et al. 2005 (Fraud and Technology Crimes: findings from the British Crime Survey and 2003 Offending, Crime and Justice Survey, pg22) Here, victims of mobile phone theft were asked about the circumstances of the incident, and the results presented both qualitatively and quantitatively.

Will the research include a reconviction study? If yes, please state how this will be conducted

NO.

NB. Governors/ Area Psychologists reviewing an application, which includes a reconviction element should forward it to the Reconviction Analysis Team in RDS-NOMS.

How long will the research materials be retained?

1 year after interview.

How will the results of the research be disseminated? e.g. thesis, article, book etc...

1) Initial report to the EPSRC (funding body) of the project outcomes.

2) To HMP, CJS and Home Office Acquisitive Crime Team via meetings and report.

3) As paper(s) in academic peer reviewed journals, such as The British Journal of Criminology.

4) To the mobile phone security industry through reports to and meetings with key contacts within relevant institutions/ bodies. E.g The GSMA, MICAF.

Please state how the results will be made available to the Prison Service.

The final report for the EPSRC would be made available to the Prison Service. Also, outcomes from the research will filter down via Home Office Acquisitive Crime Team, in terms of recommendations, further research etc.

15.4.1.2.

15.4.1.3. Access to Prison Establishments, Prisoners and Staff

What establishment(s) is access being sought for? Please state name(s) or type(s) of establishment?

Birmingham,

Brockhill,

Swinfen Hall,

Stoke Heath.

NOTE: this list is not exhaustive- we would interview anyone suitable regardless of which establishment they were in. In part our choice of establishment is to be guided by your knowledge of how we might identify people who have been involved in mobile phone theft.

Please state your reasons for choosing this establishment(s)?

Previous research shows that the perpetrators of mobile phone theft tend to be young:

Smith (2003; pg 22) described the majority of robbery offenders as under 21yrs.

Harrington and Mayhew (2001; pg 37)) described the majority of mobile phone thieves offenders as between 15 and 18.

Thus it is important that we interview a cross-section of juveniles under 18, and young offenders under 21.

The institutions listed are those geographically based in the Midlands area, purely for ease of access/ travel etc by the research team. Again this is an ideal scenario, and not set in stone.

References:

Allen et al (2005) *Fraud and Technology Crimes: findings from the 2002/03 British Crime Survey and the 2003 Offending, Crime and Justice Survey*. Home Office Online Report 34/05.

Harrington, V. & Mayhew, P. (2001) *Mobile Phone Theft.* Home Office Research Study 235.

Smith, J. (2003). *The Nature of Personal Robbery*. Home Office Research Study 254.

If you wish to conduct your research in more than four prisons, please provide further details on why this number of prisons is required?

As before, the exact number of establishments will depend on how easy it is to identify offenders involved in mobile phone theft. Ideally, the number of establishments will be kept at a minimum to save both HMP and Loughborough resources.

The research aims to conduct 40 offender interviews.

Have any establishments been approached separately about this research? If so, please provide details:

Initially we were unaware of this central form to request permission at the regional level, and so have sent individual letters to the Governors of the following institutions:

Ashwell, Foston Hall, Glen Parva, Leicester, Norwich, Onley, Brinsford, Brockhill, Shanley, Stoke Heath, Swinfen Hall, Werrington.

The response has been mixed and we will communicate to each one that we are now following the central NRC approval route.

How long will the researcher(s) need to be inside each prison establishment)**?** Number of days and numbers of hours per day.

15 hours total per institution, spread over 2.5 days.

<u>Rationale</u>:

Ideally we would interview 40 prisoners, averaging ten at each of four establishments.

Each interview will last approximately one hour, with an allowance of 30 minutes between interviews for overspill, breaks and for offenders to be found and escorted to the interview room.

40 x 1.5 hrs = 60 hours total, between the 4 institutions.

How many prisoners would be involved? Please state if any types of prisoner, sampling of prisoners is required

40 in total.

Sample: those involved in mobile phone theft from the person/ robbery, and theft from warehouses/shops**. We are not focusing on those who committed burglary and took a phone as a by product of that burglary.**

How will you identify the prisoners to be involved in the research?

If possible, prisoners responsible for mobile phone theft will be identified by Area Psychology or other HMP personnel with knowledge of offender's crimes, or access to records of such.

If this is not possible, we will conduct a screening visit to each institution to discuss how best to identify offenders.

How long will the researcher(s) need to be in contact with prisoners?

One hour per offender.

How many staff would be involved? Please state if any types of staff, sampling of staff is required

As many as necessary to follow internal procedures to identify relevant offenders, for sitting in on interviews/ escorting both us and offenders around the establishments. Estimate 3 or 4 at each institution?**.**

Will the researcher(s) need to be in contact with prison staff?

<u>Planning</u>: one x 2 hour meeting to identify suitable offenders.

<u>Ongoing</u>: one hour on phone calls/ miscellaneous communications. (e.g. to arrange interview dates).

<u>Interviews</u>: 10 interviews per institution, each taking 1.5 hours average, giving 15 hours of staff time per staff member present for escorting offenders/ us at any one time during interviews.

Are there any resource implications for Prison Service Headquarters? e.g. anticipated demands on staff time, office requirements, information etc…

As above, the resource demands would be initially to identify a suitable offender population, and then during interview for escorting/ access to buildings etc.

15.4.1.4. *<u>Research Ethics</u>*

Please state how informed consent will be obtained? If a consent form will be used, please include this with your application.

See attached form- we are happy to revise this as advised by you.

Has a relevant Ethics Committee approved the research? If so, please attach a copy of the submission to the Ethics Committee and its response:

Attached is a copy of the ethics approval form sent to Loughborough University Ethics Committee, concerning specifically the interview stage of this research. We are currently waiting for their response.

Please confirm that:

- the research will comply with the Prison Service's Statement of Professional principles, and provide any relevant consent forms that will be used in the research
- **only one copy of this application has been sent to the Prison Service**

Signature: **Date:**

Please return this form, together with

- *Copies of the CVs of all researchers*
- *Copies of any submission to an Ethics Committee and its response*
- *Copies of any questionnaires, topic schedules, and consent forms etc…*

To ONE of the following:

☐ *Prison Governor/ Research Contact*

☐ *Area Psychologist*

☐ *Prison Service Headquarters – Psychology Group*

Please refer to PSO 7035 at: http://www.hmprisonservice.gov.uk/resourcecentre

For details of who application forms should be sent to.

If you have any questions about this form, please contact:

AppliedPsychologyGroup@hmps.gsi.gov.uk

Appendix 5.6 Interviewee consent form

Participant Information Number for Study:

CONSENT FORM

Title of Project: Mobile Phone Theft

Name of Researcher: Jen Mailley

Please initial box

1. I confirm that I have read and understand the information sheet, dated ___________ for the above study, and have had an opportunity to ask questions.

☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my care or rights being affected.

☐

3. I understand that notes taken during this interview may be looked at by appropriate members of the University of Loughborough research team, where it is relevant to my taking part in research. I give permission for these individuals to have access to my records.

☐

4. I agree to take part in the above study. ☐

___________________________ ___________________ __________________________

Name of Participant Date Signature

___________________________ ___________________ __________________________

Name of Person taking consent Date Signature

(if different from researcher)

__Jen Mailley_____________ ____________________ __________________________

Researcher Date Signature

One for participant, one for researcher; one to be kept with HMP files

Appendix 7.1. Formal request for access to NMPCU data, October 2005.

Note: the real letter was printed on official University headed note paper

Commander Delbar

Metropolitan Police TPHQ,

Victoria Embankment,

London,

SW1A 2JL.

cc. Det Supt. Eddie Thomson, NMPCU

Emma-Louise Avery, Home Office (Acquisitive Crime Team)

28 October 2005

Re: Research into Mobile Phone Crime

Dear Commander Delbar,

Further to my letter of 29th September 2005, and following more recent discussions and meeting with Roni Garcia of NMPCU, I am writing to request access to NMPCU data on mobile phone crime. With sponsorship from the Engineering and Physical Sciences Research Council, I am working with a team at Loughborough University that is seeking to address the issue of mobile phone crime. I attach a brief outline of the research project and a copy of my *curriculum vitae* for information.

The attached overview of the research outlines why an analysis of recorded mobile crime data will be an integral part of the research. It will allow us, we hope, to identify patterns and trends in mobile phone theft and robbery (changes in the nature of offences, changes in the characteristics of victims, possible shift to thefts for the international rather than domestic re-sale market, etc.). Access to individual-level crime record data would allow us to conduct this type of analysis.

I am also writing to clarify any data confidentiality issues. The standard procedure we undertake at the university with respect to any confidential data and information is:

- To keep all confidential information on secure password-protected systems, and any hard copies are kept under lock-and-key.

Appendix 7.2 Letter of general support from Home Office to NMPCU

Home Office

- Any reports produced do not use any individual identifiers. The bulk of the analysis will be aggregate-

bStreet Crime Action Team

Fourth Floor, Peel, 2 Marsham Street
London SW1P 4DF
0207-035-4560
peter.hamerton@homeoffice.gsi.gov.uk
www.homeoffice.gov.uk

level information. Any case studies or illustrations will be appropriately changed to ensure individual anonymity.
- We would be happy for any of our analysis that uses NMPCU records to be approved by you prior to any publications that may result from the research.

It is my hope that our research evolves to become a two-way street and that we are able to produce work that is of use to NMPCU. With your permission, I would like to arrange to meet Mr Garcia of NMPCU in the near future to discuss any technical issues that might relate to the data.

I would be very happy to answer any questions you may have about our research, or to meet you to discuss them.

Yours sincerely,

Professor Graham Farrell

Director, Midlands Centre for Criminology and Crime Prevention

Appendix 7.3: Letter of support for research from HO SCAT

10th October, 2005

Dear Roni,

Further to our earlier conversation I would like to confirm that we have been in discussions with 2 researchers from Loughborough University, Jennifer Mailley and Professor Graham Farrell about the possibility of undertaking a pre-funded research project on mobile phone theft.

As far as I am aware, the precise nature of the project is unclear at this stage however numerous possibilities have been discussed.

Again, depending on the precise nature of the project, I believe that it would be helpful for them to have access to data held by the NMPCU on this issue although this will be dependent on what types of data, the nature of the research project and operational/other concerns within the unit that you would be best placed to decide.

However, broad expectations should include that data is treated in confidence and that the research would not be published without prior approval.

If you have any further questions please feel free to contact me.

Yours Sincerely,

Peter Hamerton
Street Crime Action Team