PATTERNS OF OFFENDING BEHAVIOUR:

A new approach

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EXECUTIVE SUMMARY

The aim of the study

This study focuses on developing a typology of criminal activity. It aims to identify a fixed number of types of criminal behaviour separately for males and females. Age profiles for each type of criminal activity are also constructed. Finally, the study probes the notion of criminal pathways. What proportion of offenders are specialists within one sphere of activity? How many tend to migrate from one sphere to another as they become older?

The distinguishing feature of the analysis is that it attempts to describe criminal activity over a five-year period rather than the conventional approach of summarising a 'life-time' of crime. The five-year summaries of criminal activity are likely to have a greater practical use, for they will help practitioners, such as the police and probation officers, to understand a recent criminal history.

Methods

Data from the 1953 and 1958 birth cohorts drawn from the Offenders Index was analysed. Conviction histories for individuals were divided into five-year strips defined by the age of the offender at the date of conviction. Using latent class analysis, and examining males and females separately within each cohort, the approach succeeded in identifying clusters of offending behaviour.

Findings

Patterns of male offending behaviour

A 9-cluster model is the optimal solution for describing five-year criminal histories of the 1953 cohort of males. The nine clusters are termed (in order of frequency) 'Marginal lifestyle with versatile offending', 'Non-violent property, especially burglary', 'Fraud and general theft', 'General violence', 'Petty theft', 'Aggressive property offending and wide-ranging car crime', 'Vehicle theft', 'Wounding' and 'Shoplifting'.

The same procedure for the 1958 cohort of males produced the optimal solution of a 13-cluster model. The 13 clusters are termed, again in order of frequency - 'Non violent deceptive', 'Non-violent property, especially burglary', 'Wounding', 'Petty theft', 'Vehicle theft', 'Lifestyle offending', 'Property and deception with some violence', 'Damage and some wounding', 'Wide-ranging property and vehicles', 'Serious damage', 'Shoplifting', 'Violent offending' and 'Drug offences'.

Technical and substantive reasons are put forward to explain the differences between the 1953 and 1958 cohorts. However, changes to the optimal number of clusters are primarily a reflection of the *qualitative* changes of the data in these two cohorts. Emergence of new clusters of drugs offending and serious damage are indicative of social change. However the main core of offending remains the same between the two cohorts.

Patterns of female offending behaviour

Female criminal behaviour is less diverse than for the males. A 3-cluster model was identified as the optimal solution, and are termed (in order of frequency) 'Versatile offending', 'Shoplifting' and 'Trust violation'. For the 1958 cohort of females an optimal solution of a 5-cluster model was obtained. The 5 clusters are termed, again in order of frequency – 'Shoplifting', 'Violence with some property offending', 'Deception', 'Petty theft' and 'Trust violation'. There appears to be less versatility in offending for the females compared to their male counterparts.

Age profiles of offending

For the males each cluster had a distinct age profile. Some clusters showed a strong peak at an early age, with a steep tail off, others peaked later or tailed off more slowly. The female clusters showed much less variation with age.

Switching and specialisation behaviour

Analysis of switching behaviour between clusters allowed investigation of offending pathways through crime. Criminal conviction histories are comparatively short for the majority of the samples, with over 60 per cent of males and over 80 per cent of females being convicted only in a single five-year period.

The reconviction outcome for the clusters was varied. However, for the 1953 males, one cluster –'Aggressive property offending and wide-ranging car crime' - did particularly badly in terms of reconviction at every age group.

1. INTRODUCTION

Understanding patterns of offending behaviour in a rigorous manner has been curiously neglected. The recognition that 'age' and 'the number of previous convictions' are the best predictors for future criminal activity has had the unfortunate consequence of sidelining the *variation* of previous criminal activity as somehow lacking interest.

This summary of criminological prediction work is, of course, an exaggeration. Not only are there some classic examples of prediction work trying to identify the characteristics of criminal careers (Farrington, 1997) but also some work which has more recently developed as a response to the call (Burnett, 1996; HMI Probation, 1995) to improve the ability of the probation service to assess an offender's likelihood of reoffending. The development of the Home Office Offender Group Reconviction Scale (OGRS), which is an actuarial scale based primarily on criminal history variables for predicting reconviction within two years (Copas and Marshall, 1998), included a variable relating to the type of current offence. The revised Offender Group Reconviction Scale (OGRS2) includes other variables on past offending, including previous sexual, violence and burglary offending (Taylor, 1999). However, a focus on offence behaviour still remains comparatively unusual.

1.1 Typologies

Trying to summarise a person's criminal career has had a chequered history. One approach has been the development of typologies. This attempts to classify an offender into one of a series of types, either based on intensity of offending or

offending profiles. Past work involving typologies has tended to typecast each offender into a particular group; this implies rigidity over time. Such an approach fails to allow for an offender changing types, either because of age or changing social structure and criminal opportunity. There is perhaps more flexibility in criminal behaviour than is often recognised. It is both stereotypical and potentially misleading to call someone a 'robber', 'thief', 'druggie' and so on as though a crime necessarily marks out a person for life. Indeed, as we shall see, most persons have a comparatively short 'official' criminal career. An 'official' criminal career means the offences and convictions that come to the notice of official agencies. When people appear to desist from crime by their absence from official records, they may be doing one of two things - they may, of course, really have given up criminal activity or they may have become better criminals and no longer get caught. However, that is a Pandora's box that this study cannot open.

Having said that, a criminal history may still be complex and difficult to summarise in a few words. However, while looking back over a lifetime may be useful for reminiscing or developing academic theory, it has little impact on understanding the life chances of a particular individual at a particular point in time. In the real world of intervention - whether for punishment or reform - we need to know the current state-of-play, to be able to summarise the past and have some insight into the likely future. This study helps to prepare the ground for developing this issue more systematically. It attempts to go beyond simply predicting reconviction but resists the allure of typologies of offenders where there is an implicit rigidity imposed on individuals. Instead, the study explores the typology of *offending*, allowing

offenders to follow pathways between types of offending behaviour during their criminal career.

1.2 Pathways

The importance of the notion of 'pathways' is that pathways suggest a variety of different trajectories; even more importantly, it also suggests that anyone on one pathway can take another route on a different pathway. It avoids the potential rigidity of the typological approach by focusing on the criminal activity (the pathway) rather than the person. The 'pathway' metaphor has recently re-emerged in the important work of Sampson and Laub (1993) in their re-evaluation of the pioneering work of the Gluecks. The whole issue of turning points and discontinuities in criminal careers has a contemporary resonance (Tracy and Kempf-Leonard, 1996).

1.3 Types of activity

Focusing on offences will identify *types of activity* that persons may embrace – for a short while, for a long while or not at all. Over a period some people may be involved in a very diverse range of criminal activity while others over a similar period may be convicted for a much narrower range. Over time some people may increasingly specialise in their criminal activity while others may become increasingly diverse.

The task, then, is to develop some structure to these types of activity (or *clusters*) and to allow changes over time in terms of frequency and /or increasing specialisation (or increasing versatility in offending) to be assessed. We approach this problem by finding types of criminal activity within fixed *five-year periods* of the

offender's criminal history. The advantage of this approach is that an offender is allowed to change types if they are criminally active in more than one five year period. The five-year period is, however, long enough to be able to gain an understanding of the typology of an offender if they are offending within that period.

In this study we have taken six five-year periods based on the age of the offender - under 16, 16-20, 21-25, 26-30, 31-35 and 36-40. This allows cutpoints between the five-year periods (the ages of 16 years, 21 years, 26 years, 31 years, 36 years) to be thought of as decision-points. Of course, this is rather artificial, for decisions in reality will be taken at any point throughout the criminal career. These ages do, however, seem to represent possible watersheds. At the age of 16, young boys and young girls will be moving from their early teen years to their later teen years. At 21 years, the late teen years are being replaced by the prospect of early adulthood when many begin to settle down and move from more transitory relationships to more permanent ones.

An understanding of age groups is important. A typical pattern of criminal behaviour for someone aged between 10 and 15 may be very unusual for someone aged between 36 and 40. Understanding what is typical for an age group will contribute to an understanding of a particular offender at a particular time in his or her life. Is this person behaving like the general run of offenders for his or her age group or is he/she unusual?

This report has been titled, *Patterns of Offending Behaviour: A New Approach*. The characteristics of the new approach can be identified as follows:

1. The development of a typology of criminal activity. We will identify a fixed number of types, or *clusters*, of criminal behaviour for males and for females separately. Individuals will choose different pathways between these types as their criminal careers progress.
2. The identification of age profiles for each type of activity. Do certain activity types decline faster than other activity types?
3. The identification of activity profiles for each age group. Which type of activity is most common for the under 16s? Which at age 30-35?
4. The investigation of criminal pathways. What proportion of offenders are specialists within one sphere of criminal activity? How many tend to migrate from one sphere to another as they become older?

The structure of the report proceeds as follows. An outline of the methodology (Chapter 2) is followed by a description of some basic characteristics of the samples used (Chapter 3). A series of research questions are then addressed. The next two chapters investigate how many clusters of offending behaviour provide the optimum solution for describing five-year criminal histories for male and female (Chapter 4) offenders, and determine appropriate names for the clusters. Chapter 5 shows how the allocation of offenders to clusters varies between age groups, and Chapter 6 provides information on the extent to which offenders switch their criminal activity. The final section identifies the crucial issues emerging from the research and considers possible ways forward.

2. METHODS

A pre-requisite for the analysis for this project is that one needs to be able to construct a series of categories that summarise offending behaviour over a prescribed period of time. There are essentially two ways to approach the task. One can construct the categories *a priori*, that is, without direct reference to the data. In other words, one can invent a set of categories that seem likely to be appropriate to describe the data. Of course, rarely is such an exercise independent of experience, for one uses the knowledge of similar kinds of work in the past. However, the important point is that the chosen categories are imposed upon the data. Interpreting criminal histories in this way tends to be more like an art than a science, so that one person may classify in one way and another person may classify in another way. Alternatively, the categories can be constructed *a posteriori*, that is, inductively, constructing categories from the experience of the analysis. This project uses the latter approach. By embracing computational and statistical analyses that are essentially replicable, this approach begins to shift the interpretation of criminal histories from an art form to a science.

We want in the first instance to describe *the kind of criminal activity* taking place within any five-year period. We assume that certain offences cluster together; for example, breaking and entering will commonly co-occur with receiving and handling stolen goods. This is a different exercise to the *a priori* classification of offences into offence groups. In routine Home Office classifications of criminal statistics there are ten offence groups (violence, sexual, robbery, burglary, theft, fraud and forgery, criminal damage, drugs, other and motoring). Some clusters will fall within the same offence group (breaking into warehouses may fall within the same

cluster as breaking into houses in a burglary cluster); other clusters may straddle offence groups (such as criminal damage and violence).

We have assumed here that the clusters remain constant for each birth cohort examined – that the typologies do not change their definition over time. However, the likelihood of an offender belonging to a particular cluster will change as the offender ages. This is a simplifying assumption for this initial work, and we recognise that this may be an oversimplification. However we do allow offenders to move from one cluster to another as their criminal career progresses. In this way, we have identified clusters which appear to be predominantly teenage offending behaviour, and others which are more relevant to 35-40 year olds. However, one advantage of our approach is that it allows for the possibility of a 36-40 year old still being involved in teenage offending behaviour.

The next question is how one might usefully analyse these five-year 'strips' to describe the clusters of offences that may occur within them. There are many cluster analysis techniques which can be used to classify a set of offences. One danger is that in trying to capture the vast range of differences between offending patterns one can easily produce a vast number of groups that are not manageable in practice. To overcome this danger, one needs to appeal to some notion of parsimony – that is, developing no more groups than is strictly necessary. Latent class analysis has been chosen as a way of meeting this danger.

2.1 Latent Class Analysis

Latent class analysis is a probabilistic cluster analysis technique, which identifies clusters that group together periods of offending (strips) that share similar characteristics. The technique is thus different to most other clustering algorithms, which assign a strip absolutely to one cluster or another. Latent class analysis, in contrast, gives the probability of a strip belonging to each group or cluster, and can therefore be used to assign strips to clusters on the basis of the highest probability. In addition, latent class analysis is model based; there is a statistical model which underlies the clustering algorithm. McCutcheon (1987) provides an introduction to the method.

2.2 Uses of Latent Class Analysis in Criminology

Most uses of latent class analysis in criminology have been in two areas. The first is in classifying behavioural types of drug users, alcoholics and drivers under the influence (see McCutcheon and Thomas, 1995).

The second, more recent use is in classifying offending career trajectories in terms of the varying frequency of *total* offending or behavioural problems over time. The authors here are concerned with variation in volume of offending, rather than variation of types of offending, and again the emphasis is on classifying a criminal career into one of a number of typologies rather than a classification of a stage of that career. Recently, Maughan et al (2000) classified developmental trajectories of teenagers in America; Fergusson, Horwood and Nagin (2000) examined offending trajectories in a New Zealand cohort. Both are based on work by D'Unger et al (1998), who used latent class analysis to evaluate the optimal number of latent classes

for male cohorts taken from the cities of London, Philadelphia, and Racine. They found that, *"Four latent classes of offending careers is an appropriate number for the London cohort, but five classes can be justified for the Philadelphia data. In the case of the Racine cohorts, five classes may be detected for the 1942 and 1955 cohorts but only four for the 1949 cohort."* (p.1593). For example, one class identified on all 3 cohorts is the 'adolescent peaked trajectory', which represents a rapid acceleration of expected conviction rates from age 10 through age 16 and then a rapid drop to a zero level by age 24.

Certainly these authors have had some success in summarising the criminal careers of persons from the age of criminal responsibility up to age 30. The analyses of D'Unger and colleagues, for instance, provide evidence that there are similarities in patterns of offending behaviour among young males in different cities. However, it is also imprecise and, while criminologically important, it is operationally of limited use.

The outcome is imprecise because, for example, a chronic (either low-rate or high-rate) offender may be exhibiting a series of violent offences, on the one hand, or a series of property offences on the other. There is no attempt to make the important distinction between a person whose only criminal activity is violence and a person whose only criminal activity is theft, for both would be counted as the same.

Furthermore, the exercise is of limited use operationally for, while the approach provides a useful summary of most offenders' most active years, the game is essentially over in intervention terms. The analysis may provide an accurate

'summing up' but probation officers – and other agents of social control – need more guidance in the earlier chapters of an offender's life. That is what we are trying to achieve in this study.

2.3 Related work

The only related work which we know of attempts to determine delinquency types for young delinquents. This is equivalent to taking the first of our six strips and analysing this information separately. Goddard et al (2000) used information on delinquency behaviour as well as personality inventories and familial socialisation measures to identify six profiles of young delinquents: troubled students, marginal delinquents, general delinquents, petty thieves, violent extortionists, and extreme delinquents. No attempt was made to analyse male and females separately.

2.4 Databases

The project used the Offenders Index Cohort Data for the birth years 1953 and 1958; all offenders born in four specified weeks in the sampled years are included. The Offenders Index is a court–based reporting system of convictions for standard-list offences[1] in England and Wales; criminal histories, constructed from court records, are available from 1963. For this study, we chose to use the existing 1953 birth cohort sample which is available from the ESRC data archive, as it was important to have a set of offenders with complete criminal histories of the same generation. The 1958 birth cohort data was also analysed. This provided replication to the 1953 study and enabled some focus on changes over time.

The 1953 Cohort Data holds details of the convictions of 11,402 offenders, of whom 9,234 (81.0%) are male and 2,168 (19.0%) are female. The 1958 Cohort Data holds details of convictions of 12,465 offenders of whom 10,116 (81.2%) are male and 2,349 (18.8%) are female. For the 1953 cohort sample, the data were examined in six different age groups: <16, 16-20, 21-25, 26-30, 31-35 and 36-40. For the 1958 sample the same age groups were considered except that there was no scope to consider the oldest – 36-40 – age group. The main analysis was carried out on the 1953 cohort, while the 1958 cohort was largely used as a replication of the work. This enabled some additional information of changes over time. Separate analyses were also carried out for male offenders and female offenders. We did this for two reasons. The first was that we wanted to investigate whether different patterns of criminal behaviour emerged for males and females. Secondly, there is good evidence that the quality of the Offenders Index data is poorer for female offenders; in particular, two offence histories can be created for a female offender when she marries and changes her name.

2.5 Defining the offence categories

Two definitions of offence categories were used in this study. The first used a broad definition of offence types, whilst the second used a more precise definition.

[1] Standard list offences are all indictable offences (triable at Crown Courts, such as robbery, arson or rape), triable-either-way offences (which may be tried on indictment in either magistrates or crown court and include offences such as theft, drug offences and some less serious violence against the person) and some summary offences (normally tried in a magistrate's court). The sentencing details of standard list offences have been collected in the Offenders Index since 1963.

A) A broad definition of offence types.

This approach used the 10 broad offence categories identified in the *Criminal Statistics* and defined in the front of the Offenders Index code book (Research and Statistics Directorate, 1988 : pp 4-9). These categories are comprised mainly of standard list offences, but some summary list offences are also included.

The advantage of this approach was that offences were comparatively easy to define into offence categories as the routine classification in the codebook could easily be followed. A potential major disadvantage is that the offence categories were a robust but not a very sensitive measure of offending behaviour. So, for example, elsewhere (Soothill et al, 1999) we have suggested that the offence of 'bigamy' fits uneasily within the category of a sexual offence. Interestingly, if bigamists commit other offences, it is more likely to be a deception offence rather than another sexual offence. This reinforces our view that bigamy is more of a deception than sexual offence, but the broad classification 'traps' bigamy within the sexual offence category.

B) A more precise definition of offence types

This approach took the raw offence codes as used in the Offenders Index. A cut-off value was then defined, so that all those offences in a cohort with less than 10 occurrences were either ignored, or combined with other offences; for example, 'Riot' (offence code 64), 'Unlawful assembly' (offence code 65) and 'Other offences against the state and public order' (offence code 66) were combined into a single offence category. Similarly four dangerous driving offence codes were combined into a single 'dangerous driving' code. This left 71 separate codes for the 1953 males and 29 separate codes for the 1953 females. The 1958 sample, in contrast, provided 67 codes

for the males and 28 codes for the females. Details and descriptions of the offence codes (or their combinations) included in each analysis are given in Appendix A.

The advantage of this approach compared to the broader approach was that the offence categories more closely matched the actual offending behaviour of the individuals under study. A disadvantage is that the number of variables in the incidence matrix increases, making the latent class analysis more time consuming and less certain to converge to a single solution.

The broader definitions were used in pilot work and are not reported here. The more precise definitions were the basis for this analysis. However, the databases and the logic of the approach described below are identical whether broader or narrower definitions were used.

2.6 Developing 'strips' or age group profiles.

A set of variables for use in the analysis was created for each age group in which an offender had been convicted of at least one offence. So any one offender might have up to six records included in the analysis. For example, if an offender had been convicted of only two offences – one when they were 16 and then again when they were 25 - they would have two records (or 'strips') in the data to be analysed. If however, an offender had been convicted of many offences, but all within the ages 16 to 20, then they would have only one record in the data set.

The 9,232 males in the 1953 cohort provided 15,353 strips and the 2,168 females provided 2,596 strips (dates of conviction were not available for two of the

offenders). In the 1958 data there are 16,724 strips for 10,115 male offenders, and 2,951 strips for the 2,438 females.

2.7 Developing the incidence matrices

The input data to be analysed consisted of a set of binary indicators for each offence category (or code) within each 5-year 'strip' or age group (in which an offender has had at least one conviction). Within each strip, each indicator variable would be set to one if the offender had at least one conviction for that offence category (or code) and would be set to zero otherwise. The complete data for all offenders in each study therefore forms an '*incidence matrix*'.

Figure 2.1 shows the contribution that two example offenders make to the incidence matrix, using the broader offence categories to simplify the diagram. Individual A has been convicted of two offences – one when 16 and one when 25, and thus has two 'strips' in the matrix – in each of these strips only one of the indicator variables is therefore set to 1. In contrast, individual B has had a range of convictions, crossing three of the offence categories, but all within the age range 16 to 20. Thus individual B has only one strip in the incidence matrix, but three of the indicators have the value 1.

Figure 2.1 : Example strips contributing to incidence matrix (using the broad offence categories)

Offender	Age strip	Offence Category									
		1	2	3	4	5	6	7	8	9	10
A	16-20	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
A	21-25	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
B	16-20	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**

The complete incidence matrix thus has between one and six strips (or rows) for each offender. For the more precise offence code definitions the matrix contains indicator variables for each of the offence codes included in the analysis (as described earlier in section 2.5). For the analysis of males from the 1953 cohort, for example, there will be 71 columns and 15,353 rows in the matrix.

It should be pointed out that other ways of constructing the matrix exist. Rather than simply use a set of binary indicator variables, we could have chosen to use the number of different sentencing occasions, or the number of different convictions for each offence in a five year period. The latent class analysis would then take into account the volume of each offence code used as well as the variety. We leave this for future research.

2.8 Statistical issues in using latent class analysis

The latent class analysis carried out in this study is complex, with the largest analysis involving an incidence matrix with 71 columns and 15,353 rows or strips. Much latent class software for categorical data will attempt to form a cross-classifying table of all the incidence variables - in this example this would result in a 2^{71} table! The alternative solution is to construct the likelihood measures using the data at the individual (strip) level. We chose Latent Gold (Vermunt and Magidson, 2000) as it had this capability.

There has been much work and discussion on the appropriate measure to be used when determining the optimal number of latent classes or clusters; both the use

of the Akaike Information Criterion (AIC) statistic (Bozdogan, 2000) and the Bayesian Information Criterion (BIC) statistic (Kass and Raftery, 1995) have been suggested. Guidance is provided by the appendix to D'Unger et al. (1998), which suggests that the BIC should be used. The results discussed in this report are thus based on taking the solution which gives the minimum value of BIC.

In addition, latent class analysis, in common with all mixture models, needs starting values for the estimation procedure. The starting values provide a set of initial probabilities of a strip belonging to each of the clusters. The final solution is heavily dependent on the starting values chosen, and a different starting value will often lead to a different solution. For a fixed number of clusters K, the solution adopted here is to take a large number of different starting values, and to take the best solution with the minimum BIC value. We adopt this procedure over a grid of values of K, from K=2 up to a maximum of K=15.

Once the number of clusters had been determined, the solution was examined. Latent class analysis produces the probability of each strip belonging to each of the clusters. For most strips, there was a clear allocation to one of the clusters, with a probability close to one. An estimate of the cluster proportions is also provided by the technique – the proportion of strips estimated to belong to each cluster. Each strip was then assigned to a cluster on the basis of the highest probability of cluster membership. The size of each cluster (that is, in terms of the numbers of individuals assigned to each cluster) was then assessed. It is important to note that the cluster size after allocation will produce actual cluster sizes which will differ slightly from the

cluster proportions obtained directly from the probabilities. Flow diagrams were also developed to estimate switching behaviour between clusters over time.

The next section summarises some of the main characteristics of the two datasets being analysed.

3. A BRIEF DESCRIPTION OF THE 1953 AND 1958 OI COHORTS

Detailed statistical summaries of these two cohorts are incorporated in a Home Office Statistical Bulletin by Prime et al (2001); we summarise other features of the cohort samples below.

3.1 Males

The first question to consider is the proportions of each birth cohort population who have a criminal conviction. The estimates are that 33.0 per cent of the male population born in 1953 and 34.5 per cent of the male population born in 1958 have a criminal conviction by the age of 35 years[2]. This result suggests that there is little difference between the two cohorts.

While overall conviction rates are important, the subsequent analysis in this section focuses on when convictions occur and what kind of offending is taking place. The aim here is to consider whether the conviction profiles of the two cohorts are similar or different. One would expect the profiles to be fairly similar, for there are only five years between the start dates of the two cohorts. Nevertheless, one may be able to identify some shifts. So, for instance, the 1953 cohort would be just ten when Philip Larkin suggested that *"Sexual intercourse began / In nineteen sixty-three"*, 15 years of age during the student uprisings of 1968, and in their early twenties when drugs became more pervasive. In contrast, the 1958 cohort would have few memories of 1963 or even 1968 but would be in their more easily led teenage years when drug use became more widespread.

[2] The method for calculating this percentage was taken from the Home Office Statistical Bulletin by Prime et. al. (2001). The conviction figures were multiplied by 13 to give an estimate of the figures that would have been produced had we taken all offenders born in the year concerned. Figures for the general population (the number of live births in the year) were also taken from this bulletin.

Table 3.1 attempts to capture some of these possible shifts by considering the types of convictions within each age group by the males in each cohort, assessed as a rate per 1000 population. The offence categories are derived from the broad offence categories identified in the *Offenders Index Codebook* (Research Development and Statistics Directorate, 1998)[3]. It is important to stress that a versatile male in, say, the 1953 cohort could appear in *all* the cells; in other words, he could be convicted of an offence in each of the offence categories within each age-group. Table 3.1 simply aims to assess the conviction rates for each type of offence within each age group and cohort.

The rates in Table 3.1 are rates per thousand of the male population born in the cohort year. It reveals that an estimated one-tenth of the population (9.84% of the 1953 cohort and 10.2% of the 1958 cohort) have been convicted of at least one offence below the age of 16. Table 3.1 also shows that the proportion of the population convicted in their late teens (16-20) is much higher in the 1958 cohort (19.6%) compared with the 1953 cohort (16.7%).

[3] Note that these offence groupings are slightly different from those used in Criminal Statistics in that they generally include more summary list offences. The groupings are described in detail in pages 4 to 9 of the Codebook.

Table 3.1 : Male population convicted of offences grouped according to categories defined in the Offenders Index

(Pop_{1953} = 352,000 Pop_{1958} =381,000)		<16	16-20	21-25	26-30	31-35	36-40
No of offenders who have been convicted of at least one offence	1953	2665 (98.4)	4513 (166.7)	3402 (125.6)	2305 (85.1)	1541 (56.9)	924 (34.1)
(rate per 1000 population in brackets)	1958	3006 (102.6)	5747 (196.1)	4079 (139.2)	2493 (47.7)	1399 (47.7)	
		Rates per 1000 of the population					
Violence against the person	1953	3.70	28.60	28.40	21.10	13.20	8.50
	1958	8.73	46.06	39.82	22.38	13.34	
Sexual offences	1953	1.80	5.10	5.10	3.60	2.50	2.00
	1958	2.01	4.88	3.65	2.97	1.94	
Burglary	1953	38.20	41.70	23.60	13.80	7.20	2.80
	1958	48.04	51.86	27.77	13.24	5.43	
Robbery	1953	0.80	3.10	2.20	1.50	1.00	0.60
	1958	1.98	4.50	2.63	1.54	0.55	
Theft & handling stolen goods	1953	71.70	111.80	71.40	44.70	28.60	14.20
	1958	65.14	125.84	75.88	42.92	20.71	
Fraud & Forgery	1953	1.10	10.90	14.40	13.00	8.50	5.90
	1958	3.04	14.64	17.74	13.72	6.76	
Criminal Damage	1953	14.00	27.90	22.60	14.70	9.50	5.10
	1958	22.72	47.70	28.80	15.87	9.04	
Drug offences	1953	0.40	11.50	14.90	9.90	6.40	3.70
	1958	1.23	12.08	13.41	10.30	5.70	
Motoring offences	1953	0.00	1.00	6.40	1.60	1.50	0.40
	1958	0.00	5.43	3.07	2.63	0.68	
Other offences	1953	8.70	36.50	17.40	10.10	6.20	5.60
	1958	11.94	33.98	16.55	10.13	8.53	

Note : Offenders can appear in more than one category as they can have , for example, a burglary *and* a robbery conviction whilst within the same age group.

More relevant to this study are the type of offences for which males in the two cohorts are convicted. The most striking difference is that a much higher proportion of the population in the 1958 cohort are convicted of violence offences compared with the 1953 cohort. There is a slight increase of convicted young male in the 1958 cohort with an increase in both the under 16 and 16-20 age groups. Similar patterns emerge for robbery, fraud and forgery and drugs offences, with the offending rates more than doubling amongst the under 16 year olds. The figures for theft and handling stolen goods are only slightly higher for the 1953 cohort than for 1958, but the difference is consistent across all age groups. The proportion of offenders convicted of criminal damage is higher for the 1958 cohort across all age groups under 31, with the dramatic differences being in the younger ages (under 16 and 16-20). For motoring offending, there is a completely different pattern in the two cohorts, with increases in the 16-20 age group being balanced by decreases in the 21-25 age group. The proportions in each age group convicted of sexual offences is similar for the two cohorts.

Thus, while we have seen that the proportions of each cohort who eventually have a criminal conviction by the age of 35 are very similar (around one third in both cohorts), there appears to be some evidence that male offenders in the 1958 cohort are more active, particularly in relation to violence, criminal damage and teenage burglary. In fact, there is a general trend for increased offending among younger males – especially in the under-16 age group - the only offence category for which the proportion of offenders in the 1958 cohort had declined was theft and handling stolen goods. Hence, one can recognise that, while the core of offending remains essentially the same, there are some shifts emerging. Any rise in offending seems to relate to a

greater amount of criminal activity among those convicted rather than a higher proportion of the population being caught in the net of a criminal career.

3.2 Females

Among the females the estimates are that 8.0 per cent of the 1953 cohort and 8.5 per cent of the 1958 cohort have a criminal conviction by the age of 35 years. Both these proportions are considerably lower than for the males. As with the males, these figures indicate a similarity between the two cohorts.

With a focus on when convictions occur and what kind of offending is taking place, Table 3.2 shows that some differences do emerge.

When looking at convictions of those 20 years or younger, a substantially larger proportion of the 1958 cohort have been convicted of violent offences when compared to the 1953 cohort. Similarly, the proportions of offenders being convicted of theft and handling stolen goods is generally greater in the 1958 cohort than in the 1953 cohort, with particular differences being seen in the age groups under 26 years.

In the other offence categories changes are mainly small, although it is interesting to note that the proportion of the population convicted of fraud and forgery is over twice as high for the under 16s in the 1958 cohort as in the 1953 cohort, and generally raised for all other age groups up to age 30. Similarly the proportion of the population in both the under 16 and 16-20 age groups convicted of criminal damage is over twice as high in the 1958 cohort as in the 1953 cohort. Burglary too is higher for the under 21s in the 1958 cohort than for those in 1953.

Table 3.2 : Proportions of female offenders convicted of offences grouped according to categories defined in the Offenders Index

(Pop_{1953} = 332,000 : Pop_{1958} =360,000)		<16	16-20	21-25	26-30	31-35	36-40
No of offenders who have been convicted of at least one offence	1953	360 (14.1)	660 (25.8)	587 (23.0)	493 (19.3)	306 (12.0)	190 (7.4)
(rate per 1000 population in brackets)	1958	422 (15.2)	1004 (36.3)	751 (27.1)	467 (16.9)	207 (7.5)	
		Rates per 1000 of the population					
Violence against the person	1953	0.43	2.04	2.62	2.08	1.33	1.37
	1958	1.44	4.62	3.29	1.34	0.79	
Sexual offences	1953	0.00	0.08	0.31	0.04	0.04	0.12
	1958	0.00	0.18	0.04	0.11	0.04	
Burglary	1953	1.45	1.96	0.94	0.35	0.31	0.04
	1958	2.09	2.46	0.98	0.36	0.40	
Robbery	1953	0.08	0.16	0.08	0.00	0.12	0.12
	1958	0.07	0.25	0.14	0.04	0.04	
Theft/handling stolen goods	1953	12.69	20.79	16.09	14.21	8.38	4.23
	1958	12.10	27.73	19.64	11.81	4.91	
Fraud & Forgery	1953	0.20	3.41	3.92	3.95	2.66	1.72
	1958	0.54	4.84	5.49	4.62	1.48	
Criminal Damage	1953	0.35	0.90	1.29	1.49	1.14	0.86
	1958	1.12	2.60	1.59	1.05	0.79	
Drug offences	1953	0.04	1.53	1.72	1.29	0.90	0.59
	1958	0.18	1.55	2.06	1.44	0.87	
Motoring offences	1953	0.00	0.00	0.04	0.04	0.00	0.00
	1958	0.00	0.00	0.04	0.11	0.00	
Other offences	1953	0.55	2.00	1.33	1.06	0.82	0.59
	1958	0.43	1.81	2.02	1.30	0.58	

Note: Offenders can appear in more than one category as they can have, for example, a burglary *and* a robbery conviction whilst within the same age group.

In summary then it seems as though with both males and females, both violent and criminal damage convictions have increased within the 1958 cohort (especially in young offenders). There is also a general trend for increased offending among younger females – in the under 16 age group the only offence category for which the proportion of convictions had declined with the 1958 cohort was theft and handling stolen goods, but this trend is not so marked as it was among the males. As with males, however, there is little indication that a higher proportion of the female population is being caught in the criminal net; again there seems to be a greater amount and more diversity of criminal activity among those convicted in the later cohort.

4. PATTERNS OF OFFENDING BEHAVIOUR

We now wish to discuss the substantive results of the study. The aim of this chapter is to try to identify the patterns of offending behaviour using the approach we have outlined in the Methods chapter. This involves using latent class analysis to find the optimum number of clusters that best summarise the criminal offending patterns of the males and females in the sample, and then to describe the clusters. This then moves inexorably towards naming the clusters, but this is a more hazardous task than one might expect for reasons we explain. The discussion first focuses on the 1953 cohort and then moves on to consider the 1958 cohort with a view to identifying changes over time.

The essential problem of naming the clusters will easily be recognised by experienced police officers and probation officers. The vast majority of offenders, particularly the younger ones, are not very specialised in their offending behaviour. While property offences predominate, a young offender will perhaps dabble in many kinds of property offences - they may thieve, possibly burgle, certainly be tempted by stolen goods and may be seduced into shopbreaking by their peers. Also they do not necessarily restrict their criminal activity to property offences, they might get involved in fights, try drugs and regard themselves as unlucky when an underage girl becomes pregnant and the liaison comes to light. It is very difficult to describe such ranges of behaviour with a pithy phrase. In brief, the crime specialist, beloved of crime writers and portrayed in fictional representations of crime, may be unusual. Nevertheless, certain offenders may commit some crimes more than others and some kind of ‘specialisms’ do seem to emerge - so, for example, vehicle theft can be identified as a predominant activity among some males. The nature of the present

analysis tends to emphasise the *variety* of different kinds of offences committed rather than the *quantity* of particular offences within a five-year 'strip'. In other words, if someone is convicted of robbery on three occasions and a wounding on another occasion within a five-year 'strip' and someone else is convicted of a robbery on one occasion and a wounding on three separate occasions, both these offenders would be regarded the same in the present analysis - namely, that each had been convicted of a robbery and a wounding offence during the five-year 'strip'. As we suggest elsewhere (see Chapter 7), there is scope for further sophistication in the analysis. Focusing on both the variety *and* the quantity (that is, counting the volume of a particular activity over a five-year 'strip') is a promise for the future. However, what do the present results tell us?

4.1 Optimal solutions - the 1953 male cohort

The aim here is to consider for the 1953 cohort of males the optimal solution for describing five-year criminal histories. The 9,232 males in the 1953 cohort provided 15,353 'strips', and a nine-cluster model provided the best solution (The detailed results are shown in Appendix B1). The nine-cluster model has divided the strips reasonably evenly between the clusters, with cluster proportions as follows: - cluster A (18.5%); cluster B (16.6%); cluster C (12.4%); cluster D (11.8%); cluster E (9.9%); cluster F ((8.6%); cluster G (8.3%); cluster H (7.9%); and cluster I (6.0%). This was a pleasing outcome as the danger was that there would be one large and amorphous cluster and several small clusters.

Describing a cluster

There are basically two ways of trying to describe the outcome of an analysis involving 71 offence categories. While this section uses the example of the 1953 male cohort, the logic applies directly to the other three analyses - of the 1958 male cohort and of the 1953 and 1958 female cohorts.

Firstly, one can examine the probabilities of a strip in a cluster having a particular offence. So, for example, the estimated probability of a strip in cluster I having the offence of shoplifting is 0.9998; in other words, nearly all strips in cluster I from the 1953 male cohort will have offence 46 (shoplifting). The next highest probability for cluster I was for offence 49 (‘other’ theft) with just over a 5% chance (0.0546) of strips having this offence. There were only five other offences in this cluster with probabilities over 0.01. On this measure cluster I is unequivocally the specialist 'shoplifting' offender.

However, it would be misleading to believe that cluster I includes most of the shoplifting strips. While, in fact, they do include the majority (53%), the remaining 47% of 'strips' where shoplifting occurs is distributed across the remaining eight clusters - with some having many more shoplifters than others. Hence, in our terms around one-half (or 53%) of the five-year 'strips' involving shoplifting can be regarded as a specialist criminal activity (that is, not much other criminal activity emerges), while the other half (47%) of the five-year 'strips' involving shoplifting also include a vast range of other criminal activity - for this latter group, it is the other criminal activity, rather than the shoplifting offences, that define which cluster the 'strips' should fall into. In fact, this is the second way of describing the outcome of the

analysis, that is, the probability that a strip with a particular offence (or without a particular offence) belongs to a particular cluster (see Appendix C1b).

All this matches up to reality. There are certainly specialist shoplifters as well as many others for whom shoplifting is just part of their criminal repertoire. The first measure - examining the probability of different offences occurring *within* a cluster - identifies the main offence characteristics of the cluster, while the second measure - examining the probability of a particular offence *belonging to a particular* cluster - identifies which clusters capture the highest frequencies of a particular offence.

Cluster I - easily identified as 'shoplifting' - is unusual in being so clear and unequivocal. All the members of cluster I had been convicted of shoplifting (see Appendix C1a) and the majority of shoplifting (53%) is done by members of cluster I (see Appendix C1b). It would not be far amiss to call the individuals in these five-year periods 'pure shoplifters'.

In contrast, most of our offenders show patterns of offending behaviour that are much more diverse and complex. In other words, most of the other clusters are less easy to describe and name. However, it is instructive to pursue this process and to try to describe cluster A – the largest of the 1953 male clusters.

We first examine the probabilities of a strip in cluster A having an offence. The offences of ‘stealing by an employee’ (offence code 41), ‘receiving/handling stolen goods’ (code 54) , the summary offence of criminal damage (code 149) and drugs offending all have probabilities above 0.10, and are marked as bold in Appendix

C1a. In contrast to Cluster I, no probabilities are large – there are none above 0.2. Turning to the probabilities that a strip with a particular offence (or without a particular offence) belongs to cluster A, we see that most sexual and prostitution offences (codes 16, 17, 18, 19, 20, 21, 22, 23, 24, 27, 74, 139 and 187) have probabilities above 0.5 and are highly likely to belong to cluster A. Other offences with probabilities above 0.5 include riot and unlawful assembly (codes 64, 65, 66), attempting to pervert the course of justice (code 79), offences against the firearms act (code 81), and summary offences against the immigration act (code 194). The probability of an offence strip in Cluster A containing a homicide is low, but if a strip does contain murder and attempted murder, issuing threats to murder and manslaughter (codes 1&2,3,4), then it is most likely to be assigned to cluster A.

A name for cluster A does not emerge so clearly as for cluster I, for many more offences do seem to be relevant for this cluster. Nevertheless, most of the important offences for this cluster do have a common theme, reflecting a rather more marginal lifestyle involving drugs, illicit sexual behaviour, receiving stolen goods ('they just fell off a lorry'!) and being involved in less serious criminal damage. Apart from any violence involved in their sexual behaviour, these offenders are not routinely involved in the more serious property offending or in routine violence. Their criminal behaviour is largely opportunistic rather than planned; it is diverse rather than specialised. The members of cluster A seem to be on the margins of both the 'straight' and criminal worlds. The short description of 'Marginal lifestyle with versatile offending' may suffice, but coming up with appropriate names or labels is more of an art than a science!

We have now considered two of the clusters that emerged in the nine group solution for the 1953 males. All the clusters are now described with an attempt to provide suitable names. (The analysis from which the descriptions and the naming are derived is shown as Appendix C1):

Cluster A (18.5%) **Marginal lifestyle with versatile offending**	Offenders involved in drugs, sexual offences, receiving stolen goods and less serious criminal damage. Mainly in the 16-30 age groups.
Cluster B (16.6%) **Non-violent property, especially burglary**	Mainly involved in burglary of all types, with some petty theft. Unlikely to be violent. Interestingly this group is the one most likely to have arson. Under 20 year olds.
Cluster C (12.4%) **Fraud and general theft**	Involved in fraud & forgery, a variety of general theft including shoplifting, receiving and commercial burglary. All ages over 15.
Cluster D (11.8%) **General violence**	Involved in wounding, assault, and criminal damage. Also those most likely to be in possession of an offensive weapon. 16-25 year olds.
Cluster E (9.9%) **Petty theft**	Predominantly involved in 'Other theft'. All ages but mainly under 20 – numbers decrease with age once over 16.
Cluster F (8.6%) **Aggressive property offending and wide-ranging car crime**	Involved in all sorts of theft from burglary to shoplifting. Likely to be violent, with raised involvement in robbery, aggravated burglary and kidnapping. Involved in a variety of car crime (theft from vehicles, theft of vehicles, driving licence offences). Also involved in criminal damage. Aged 16-30
Cluster G (8.3%) **Vehicle theft**	Non-violent offenders involved in vehicle theft (with some 'other' theft but little other activity). Mainly 16-20 years olds although some under 16s and 21-25s.
Cluster H (7.9%) **Wounding**	Predominantly involved in malicious wounding. This group has the highest probability of having threats/incitement to murder and kidnap. All ages over 16 (although declines over 30).
Cluster I (6.0%) **Shoplifting**	Shoplifting – all ages although the numbers reduce as age increases.

4.2 Optimal solutions - the 1958 male cohort

The same procedure was carried out for the 1958 cohort of males. The 10,115 males in the 1958 cohort provided 16,724 'strips' and for this dataset a 13 cluster model provided the best solution (The detailed results are shown as Appendix B2). For this cohort, we label each of the 13 clusters with a lower case letter (a-m). The 13 cluster model again assigns the strips fairly evenly to clusters - cluster a (17.2%); cluster b (10.7%); cluster c (10.4%); cluster d (10.1%); cluster e (8.9%); cluster f (7.5%); cluster g (6.2%); cluster h (5.9%); cluster i (5.7%); cluster j (5.3%); cluster k (5.1%); cluster l (3.6%); and cluster m (3.6%).

There are some similarities to the outcome of the 9 cluster solution for the 1953 male cohort. So, for example, there is a cluster for the 1958 male cohort - this time cluster k - which is predominantly related to the offence of shoplifting. The lettering of the clusters is based solely on the frequency of the clusters, so it is not surprising that there is some re-ordering of the 13 clusters that describe the 1958 male cohort. What follows is an attempt to provide suitable names for the 13 clusters that were the outcome of the analysis for the 1958 male cohort. (The analysis from which the descriptions and the naming are derived is shown as Appendix C2):

Cluster a (17.2%) **Non-violent deceptive**	Involved in receiving, fraud and burglary in a dwelling. This group is most likely to have stealing by an employee and false accounting in their history. Non-violent. All ages.
Cluster b (10.7%) **Non-violent property, especially burglary**	Involved in burglary and theft (including some vehicle theft). Also some criminal damage but little personal violence. Mainly under 20, with over 40% being under 16.
Cluster c (10.4%) **Wounding**	Involved in malicious wounding, with some criminal damage. Over 16 year olds (mainly under 30).

Cluster d (10.1%) **Petty theft**	Predominantly involved in 'Other' (petty) theft. Mainly under 25s.
Cluster e (8.9%) **Vehicle theft**	Predominantly involved in vehicle theft. Under 30 year olds, mainly 16-20.
Cluster f (7.5%) **Lifestyle offending**	The group most likely to have sexual offences and misuse of drugs offences. They also assault police constables and are involved in dangerous driving. Over 16 year olds, mainly under 25.
Cluster g (6.2%) **Property/deception with some violence**	Involved in all types of theft and fraud. More violent than cluster b and are most likely to have firearms offences in their history. Mainly those over 20
Cluster h (5.9%) **Damage and some wounding**	Criminal Damage with some malicious wounding. (Also most likely of all clusters to have manslaughter in their history). Overwhelmingly over 20.
Cluster i (5.7%) **Wide-ranging property and vehicles**	Involved in all sorts of burglary, theft, shoplifting etc. Similar to cluster g, but includes a large probability of vehicle theft as well as theft from vehicles and motor licensing offences. Younger age groups (under 25).
Cluster j (5.3%) **Serious damage**	Involved in more serious criminal damage with little other activity. Under 20 year olds.
Cluster k (5.1%) **Shoplifting**	Shoplifting. All ages, although peaking at 16-20 and with numbers then decreasing with age.
Cluster l (3.6%) **Violent offending**	Involved in malicious wounding and criminal damage as well as burglary, vehicle theft etc. These also have assault and possession of an offensive weapon. This group is the most likely to have non-indictable firearms offences, blackmail, kidnapping, wounding endangering life and assault in their history. Under 20 year olds.
Cluster m (3.6%) **Drug offences**	Involved in drugs offences. Over 21 year olds. (OI Category – Drug offences)

The fact that there were 9 clusters as the best solution for the 1953 cohort and 13 clusters for the 1958 cohort merits some comment. There are probably both technical and substantive reasons why this difference occurs. One explanation is there

are slightly fewer offence categories participating in the latent class analysis for the 1958 data. This will reduce the number of parameters added when adding an extra cluster. Certainly it would be unexpected if the number of clusters was totally stable over time for the different experiences of a generation - such as a more pervasive drug culture and the development of alternative lifestyles - are likely to have an effect. It is also necessary to bear in mind that latent class analysis, in common with all methods of clustering, is likely to exhibit randomness in the number and composition of clusters even over similar samples of data generated from the same process. We discuss this later in the conclusions section.

The shift in the number of clusters between 1953 and 1958 raises a crucial issue. In brief, do these additional clusters represent a new type of offending activity or does an 'old' cluster simply splinter into two or more specialised types of criminal activity? The answer is, as often happens in research, more complex than the question. The dichotomy is not clear-cut. An activity such as drug-taking may emerge as a new type of offending behaviour (or, at least, move from a few involved to the many) and also impinge on the old familiar types of criminal activity, such as thieving or robbery, if drug-takers need to pay for their habit. Comparing the 1953 and 1958 cohorts helps to probe this conundrum.

4.3 Comparing the 1953 and 1958 clusters for males

There are at least two ways of comparing the results from the various analyses. Firstly, we investigated how the distribution of 1958 males appeared when the 9 cluster model derived from the 1953 cohort was applied to the 1958 cohort data. Table 4.1 presents this information in terms of the percentage of strips allocated to

each cluster. Statistically significant differences[4] are found in nearly all categories except for clusters B and C. The increased proportions in the two categories of general violence and wounding for the 1958 cohort are particularly noteworthy; one can see that the clusters more involving personal violence tend to have higher proportions in the 1958 cohort, while the proportions of clusters involving property offences tend to go downwards. The exception among the clusters mostly involving property offences is the cluster named 'Aggressive property offending and wide-ranging car crime'; the proportion in this cluster has moved markedly upwards. However, this is an acquisitive cluster who are also using violence. From this reading one can begin to claim that the 1958 cohort is slightly more violent and perhaps slightly more versatile in their property offending.

Table 4.1 : Comparison of the 1953 model applied to both cohorts

1953 Cluster	% of 1953 strips assigned to this cluster	% of 1958 strips that would have been assigned to this cluster
A. Marginal lifestyle with versatile offending	21.4	19.4
B. Non-violent property, especially burglary	16.2	15.5
C. Fraud and general theft	8.3	8.2
D. General violence	10.0	12.7
E. Petty theft	11.6	8.8
F. Aggressive property offending and wide-ranging car crime	7.9	11.0
G. Vehicle theft	9.2	8.4
H. Wounding	8.8	10.4
I. Shoplifting	6.7	5.8
Number of strips	15,353	16,724

[4] Statistical significance was determined by testing each cluster in turn compared to the other clusters

Table 4.1 highlights some shifts, but two points need emphasising. Firstly, Table 4.1 is about percentages or proportions and not actual numbers. What Table 4.1 identifies is that the clusters involving personal violence or aggressive property offending are rising disproportionately to the others. Secondly, it is important to recognise that changes in the proportions are *not* the source of any changes in the *number* of clusters. Changes to the optimal number of clusters are primarily a reflection of *qualitative* changes within the data. In other words, there are patterns of offending that the latent class analysis now wants to take account of that were either absent or less significant in the previous analysis. There can, of course, be fewer or more clusters that may reflect these qualitative changes. In the present study there was an increase with the optimal solution for the 1958 cohort involving 13 clusters compared with the optimal solution of nine clusters for the 1953 cohort.

Table 4.2 shows how the 1958 strips would be classified according to the 1953 classification rules. It provides the opportunity to identify which of the nine 1953 clusters are more volatile than others - volatile being those clusters that seem to split into two or more clusters in the 1958 analysis.

There are essentially two main outcomes for the nine 1953 clusters - clusters A, B, C, D and F seem to re-distribute quite markedly, while clusters E, G, H and I seem to retain their integrity. In fact, the 1953 clusters of E, G, H, I are quite clearly directly equivalent to the 1958 clusters d, e, c and k - well over 80% of the assignments coincide.

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through a chi-squared test of independence over cohort year

Table 4.2 : 1958 strips assigned to the 1953 clusters using the 1953 model

		Cluster based on 1953 rules								
		A	B	C	D	E	F	G	H	I
1958 cluster assigned to	a	1358	562	733	5	22	44	4		4
	b	17	1698	53	124		96	10	41	
	c	1	1	25	267		8		1423	
	d		111	204	91	1444	12			70
	e	1	24	6	41		120	1342	50	
	f	599	17	3	484	1	4		1	2
	g	11	37	268	9		477		25	
	h	677	43	17	86		6	25	157	28
	i	3	75	3		2	755	26		
	j	3	2	1	851		6			
	k		14	8	25		2			859
	l	11	2	1	139	1	299	1	5	
	m	557	1	43	1		3	3	29	

Note: Four strips could not be assigned to a 1953 cluster.

The clusters that seem to re-distribute markedly - A, B, C, D and F - tend to be the largest clusters from the 1953 cohort. Sadly, for easy understanding, these re-distributions do not take place between just two clusters in the 1958 cohort but, more typically, between three or four clusters in the later cohort. So, for example, cluster A of the 1953 cohort redistributes in the 1958 cohort as follows - 42% in cluster a, 18% in cluster f, 21% in cluster h, 17% in cluster m and the remaining 2% among the remaining nine clusters.

Returning to the example of cluster A in the 1953 cohort and its main re-distribution among four clusters, a, f, h, and m, for the 1958 cohort, one can say that

cluster A from the 1953 cohort is a close bedfellow of these four 1958 cohorts but has no practical relationship with the other nine clusters in the 1958 analysis.

Table 4.3 shows how the main re-distribution for each of the nine clusters in the 1953 cohort works out. 'Main re-distribution' relates only to the situations where 10 per cent or more of the 'strips' within a 1953 cluster have been re-distributed to a 1958 cluster.

Table 4.3 : Major effects in the comparison of the 1953 and 1958 male clusters

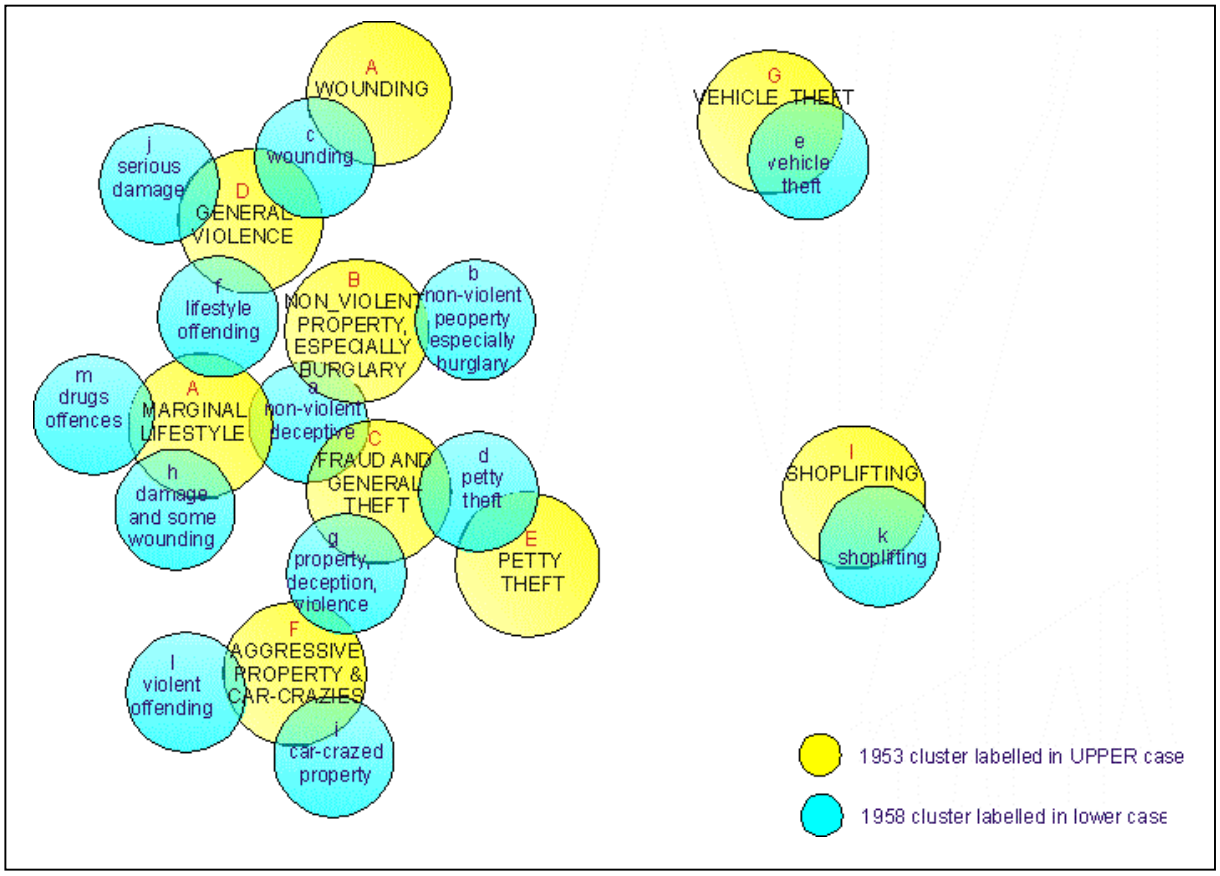
1958 COHORT		1953 COHORT								
		A Marginal lifestyle with versatile offending	B Non-violent property, especially burglary	C Fraud and general theft	D General violence	E Petty theft	F Aggressive property offending and wide-ranging car crime	G Vehicle theft	H Wounding	I Shoplifting
a	Non violent deceptive	42	22	54						
b	Non-violent property, especially burglary		66							
c	Wounding				13				82	
d	Petty theft			15		98				
e	Vehicle theft							95		
f	Lifestyle offending	18			23					
g	Property and deception with some violence			20			26			
h	Damage and some wounding	21								
i	Wide-ranging property and vehicles						41			
j	Serious damage				40					
k	Shoplifting									89
l	Violent offending						16			
m	Drug offences	17								
	Total %	100	100	100	100	100	100	100	100	100
	Total	3238	2587	1365	2123	1470	1832	1411	1731	963

* This table only includes re-distributions involving 10% or more of the 'strips' in a cluster

In this study we are concerned with the major redistributions rather than the more unusual re-distributions. Using this measure, cluster A derived from the 1953 study is re-distributed into four clusters in the 1958 analysis, cluster B into two clusters in the 1958 analysis, clusters C, D and F into three clusters each and clusters E, G, H and I into just one cluster.

The important point to grasp is that the overlap between the 1953 and 1958 clusters is both conceptually and practically close. Figure 4.1 visualises what is happening.

Figure 4.1 : Visualisation of male 1953 clusters (yellow) and 1958 clusters (blue)



The highlighted circles relate to the nine clusters identified from the 1953 cohort. They are distinct and cannot overlap each other. Two of the 1953 clusters - G (vehicle theft) and I (shoplifting) - 'translate' directly into two of the 1958 clusters respectively - e (vehicle theft) and k (shoplifting). In contrast, cluster B (non-violent property, especially burglary) from the 1953 cohort 'translates' into two of the 1958 clusters, namely, a (non-violent deceptive) and b (non-violent property, especially burglary). While the latter 1958 cluster is not linked to any other 1953 cluster, this is not the case for a (non-violent deceptive) that also has links to clusters A (marginal lifestyle with versatile offending) and C (fraud and general theft). These main links are displayed as Figure 4.1.

4.4 Optimal solution - the 1953 female cohort

A familiar cry is that females tend to be neglected in criminology. However, this is not the case for the present study. We carried out identical analyses for the females as those carried out for the males in the study. The 2,168 females in the 1953 cohort provided 2,596 'strips'. A three cluster model was suggested by the analysis (see Appendices B3 and C3).

Cluster A (59.4%) **Versatile offending**	This group has the highest probabilities of having *all* offences apart from shoplifting, stealing by an employee and false accounting in their history. Offenders mainly in the 16-30 age groups.
Cluster B (36.5%) **Shoplifting**	Shoplifting. All ages, although it does tend to tail off once over 30.
Cluster C (4.3%) **Trust violation**	Involved predominantly in stealing from an employee and false accounting. Mainly 16-20 year olds although there is a significant minority aged 21-30.

Again the brief 'pen-portraits' of each cluster are instructive. However, 'Trust violation' perhaps suggests a higher level of employment than the ages of the 'strips' in this cluster tend to indicate. 'Employee theft', which provides more of the flavour in terms of the likely level of employment, could misleadingly suggest that the cluster is limited to this one kind of offence activity only, but in fact 'false accounting' is also an important ingredient in the cluster.

Unlike the males, the cluster sizes were unequal: - cluster A (59.4%); cluster B (36.5%); and cluster C (4.3%). This indicates that six out of ten of the five-year 'strips' involve offence versatility (that is, a variety of different kinds of offences within a five-year 'strip') while, in contrast, four out of ten of the five-year 'strips' are much more specialised (that is, either shoplifting or trust violation).

4.5 Optimal solutions - the 1958 female cohort

The same procedure was carried out for the 1958 cohort of females. The 2,438 females in the 1958 cohort provided 2,851 'strips' (that is, five-year age-groups during which there was at least one conviction) and the analysis produced a five cluster model as the best solution (see Appendix B4 and C4). In contrast to the 1953 female cohort, this five cluster solution provided a much more even distribution in terms of the frequency of the 'strips' - cluster a (32.2%); cluster b (30.0%); cluster c (22.0%); cluster d (12.8%); and cluster e (3.0%). They can be described as follows:

Cluster a (32.2%) **Shoplifting**	Shoplifting. All ages although numbers decrease slightly with age.
Cluster b (30.0%) **Violence with some property offending**	Involved in malicious wounding with some theft and drugs offences (and criminal damage). Also most likely to have burglary and robbery and assault on a

	constable in their history. Mainly 16 to 25 year olds.
Cluster c (22.0%) **Deception**	Involved in fraud, forgery and receiving. 16-30 year olds.
Cluster d (12.8%) **Petty theft**	Involved in 'Other' theft. All ages, peaking at 16-20.
Cluster e (3.0%) **Trust violation**	Involved in stealing by an employee and false accounting. Mainly 16-20 with a significant number 21-25.

4.6 Comparing the 1953 and 1958 clusters for females

The main question is whether the additional clusters for the 1958 cohort represent a new type of female offending activity or an 'old' cluster that simply splinters into two or more specialised types of criminal activity? The answer is less complicated than for the males. However, we follow the same procedure as for the males. Firstly, we examined how the distribution of 1958 female strips would look if the three cluster model derived from the 1953 cohort had been applied to them. Despite the slight increase in proportions for cluster A and the decrease in proportions for cluster C, Table 4.4 still suggests that the proportions within each category are reasonably stable.

Table 4.4 : Comparison of the 1953 model applied to both cohorts

1953 Cluster	% of 1953 female strips assigned to this cluster	% of 1958 female strips who would have been assigned to this cluster
A. Versatile offending	59.4	62.4
B. Shoplifting	36.3	35.1
C. Trust violation	4.3	2.5

Table 4.5 shows how the 1958 strips would be classified according to the 1953 classification rules. It provides the opportunity to identify which of the three 1953 clusters are more volatile than others - volatile being those clusters that seem to split into two or more clusters in the 1958 analysis.

The outcome is remarkably straightforward. Cluster A (Versatile offending) - the main cluster of the 1953 female cohort - splits into three new clusters - b (Violence with some property offending), c (Deception) and d (Petty theft). Cluster B (Shoplifting) virtually retains its integrity as the main 1958 cluster a (Shoplifting), while cluster C retains its integrity totally as cluster e (Trust violation).

Table 4.5 : 1958 cohort females assigned to their 1953 cluster

		1953 cluster		
		A	B	C
1958 Cluster	a	11	947	
	b	872	6	
	c	534	1	
	d	350	46	
	e	12		72

In brief, the solution for the 1958 cohort is much more discriminating and the catch-all cluster of 'versatile offending' has disaggregated into three other meaningful clusters. This is vividly illustrated in Table 4.6 and Figure 4.2.

The re-distribution of cluster A (Versatile offending) is clear-cut - nearly one-half (49%) goes into the new cluster b (Violence with some property offending), 30 per cent into the new cluster c (Deception), and 20 per cent in the new cluster d (Petty

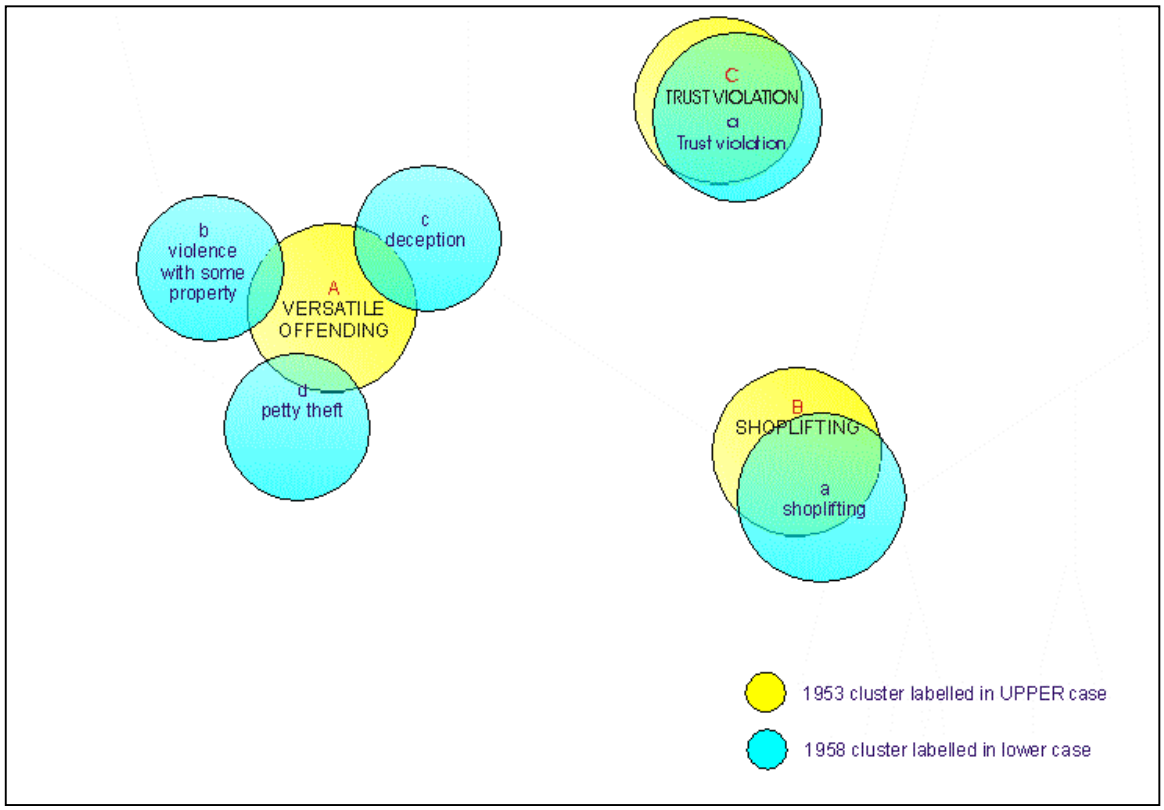
theft) - in fact, the remaining one per cent is split evenly between clusters a and e but, as stated earlier, we are only concerned here with the major shifts.

Table 4.6 : Major effects in the comparison of the 1953 and 1958 clusters

1958 COHORT		1953 COHORT A Versatile offending	B Shoplifting	C Trust violation
a	Shoplifting		95%	
b	Violence with some property offending	49%		
c	Deception	30%		
d	Petty theft	20%		
e	Trust violation			100%
Total N		1,779	1,000	72

* This table only includes re-distributions involving 10% or more of the 'strips' in a cluster

Figure 4.2 Visualisation of female 1953 and 1958 clusters



Ninety-five per cent of cluster B (Shoplifting) goes into cluster a (Shoplifting) with the remaining five per cent re-distributed between the other four 1958 clusters. Remarkably, 100 per cent of cluster C (Trust violation) is retained in cluster e (Trust violation). The 'Shoplifting' and 'Trust violation' are clearly robust clusters.

4.7 To sum up

This chapter has developed the framework by which the description and explanation of offending patterns for males and females can usefully emerge. For males the versatility of the offending behaviour is quite noteworthy. For example, general violence involves violence and criminal damage, and there are clusters of fraud and theft, and for theft and burglary. Two specialist groups of shoplifting and car theft are identified. Theft and burglary offenders can be divided into those using violence and those who do not - the former group can be subdivided into those who commit many car-related offences and those who do not. Minor changes between the 1958 and 1953 cohorts are identified, with the emergence of more specialist clusters of drug offending and serious criminal damage, but in general the clusters found in the two cohorts are remarkably similar.

For females it appears that there is more specialisation – both into shoplifting and trust violation offences. There is some evidence in the later cohort that the analysis identifies another specialised cluster in terms of deception. In fact, the increasing number of clusters in the 1958 cohort suggests that there may be generational changes in the females. Whether their behaviour is becoming more like the males is a moot point. Only one cluster in each of the cohorts has the versatile behaviour identified in the male analysis.

Comparing males and females, one important similarity does stand out - there is for both sexes a cluster which can without difficulty be interpreted as shoplifting. While common-sense has always suggested that there are specialist shoplifters on the one hand and those who engage in shoplifting among a variety of other offending behaviour on the other, this sort of validity is important.

There have been hints of the importance of age in the descriptions of both the male and female clusters. The task in the next chapter is to explore the relevance of age in more detail.

5. CLUSTERS AND AGE DIFFERENCES

Age is a crucial variable in predicting reconviction but it is also an important variable in understanding criminal histories. Age is legally important (e.g. some offences are linked to age) but, as well as gender and ethnicity, it is one of the principal ways that we describe people. In terms of criminal activity, people do behave differently at different ages. The most important difference, of course, is that as people get older they seem to give up criminal activity. However not only that but the criminal repertoire of the younger offender will tend to be different from the older offender. There will be exceptions: an 80-year-old pensioner who enjoys illicit joy-riding may get featured in the tabloids as may a 17-year-old precocious embezzler, but these are not typical. This study is more concerned with the typical rather than the atypical. So what is the typical offence behaviour within different age-groups? Does offence behaviour change over time? We consider these types of question by reference to the clusters we have identified for those born in 1953.

5.1 Males - 1953 cohort

The proportions of the various clusters for *males* vary within each age group as Table 5.1 demonstrates. We have considered the 'strips' within a particular age-group, which is identical to considering the individual offenders who have been convicted in that age group. This is because each offender will contribute at most one strip to each age group. So, for example, of those offenders 'aged under 16', almost one-half (43.7%) of those having a court conviction during this period emerge in cluster B (property offences, especially burglary). When the cohort is aged between 36 and 40 years, then only 3.1% are captured within cluster B.

Table 5.1 : Profile of 1953 males assigned to clusters – by age group

Cluster	Age group at conviction																	
	under 16			16-20			21-25			26-30			31-35			36-40		
	No.	%	Con%	No.	%	Con%	No.	%	Con%	No.	%	Con%	No.	%	Con%	No.	%	Con%
A: Marginal lifestyle with versatile offending	355	3.8	13.3	698	7.6	15.5	701	7.6	20.6	716	7.8	31.1	495	5.4	32.1	319	3.5	34.5
B: Non-violent property, especially burglary	1164	12.6	43.7	665	7.2	14.7	317	3.4	9.3	195	2.1	8.5	118	1.3	7.7	29	0.3	3.1
C: Fraud and general theft	58	0.6	2.2	224	2.4	5.0	290	3.1	8.5	320	3.5	13.9	221	2.4	14.3	164	1.8	17.7
D: General violence	57	0.6	2.1	604	6.5	13.4	580	6.3	17.0	132	1.4	5.7	98	1.1	6.4	62	0.7	6.7
E: Petty theft	475	5.1	17.8	565	6.1	12.5	346	3.7	10.2	183	2.0	7.9	140	1.5	9.1	65	0.7	7.0
F: Aggressive property offending and wide-ranging car crime	49	0.5	1.8	501	5.4	11.1	367	4.0	10.8	188	2.0	8.2	76	0.8	4.9	27	0.3	2.9
G: Vehicle theft	225	2.4	8.4	739	8.0	16.4	305	3.3	9.0	93	1.0	4.0	29	0.3	1.9	17	0.2	1.8
H: Wounding	53	0.6	2.0	322	3.5	7.1	310	3.4	9.1	307	3.3	13.3	209	2.3	13.6	147	1.6	15.9
I: Shoplifting	229	2.5	8.6	195	2.1	4.3	186	2.0	5.5	171	1.9	7.4	155	1.7	10.1	94	1.0	10.2
Total Convicted	2665	28.9	100.0	4513	48.9	100.0	3402	36.9	100.0	2305	25.0	100.0	1541	16.7	100.0	924	10.0	100.0
Not Convicted	6567	71.1		4719	51.1		5830	63.1		6927	75.0		7691	83.3		8308	90.0	
TOTAL	9232	100.0		9232	100.0		9232	100.0		9232	100.0		9232	100.0		9232	100.0	

% = percentage of all 9232 offenders.
Con% = percentage of those who had a conviction in that age group.
The shading in each column represents the largest cluster (dark shading) and next largest cluster (light shading) for each age group.

The difference is also dramatic when the actual numbers are compared. Whereas 1,164 (or 12.6%) of the 9,232[5] males in the sample are 'captured' within cluster B when aged under 16 years, only 29 (or 0.3%) of the 9,232 males are so 'captured' when aged 36 to 40 years. This decline in numbers reflects two major features. Firstly, there is a general decline in offending rates – whereas over one in four (28.9%) are convicted in the under 16 age group, only around one in ten (10.0%) are convicted in the 36-40 age group. Secondly Table 5.1 highlights the danger of confusing proportions of those convicted within an age range and the actual numbers identified in a particular cluster. So, for example, although – among those convicted– there seems to be a slight increase in cluster C (General theft) from 13.9% among

[5] The sample does not include all persons born within the 4 weeks of the 1953 cohort, but only those who appear in the Offenders Index, and thus have at least one conviction before the age of 40. Two of the 9234 offenders were dropped from the analysis because the dates of conviction (and therefore the ages at which the convictions were given) were not available.

those aged under 26-30 to 14.3% among those aged 31 to 35 years, this masks the decrease in actual numbers from 320 in the 26-30 age group to 221 in the 31-35 age group.

The age group of 16-20 years is the most active criminally with 48.9% of the total sample being convicted of at least one standard-list offence during this time. This is not unexpected as others have highlighted the large amount of criminal activity during this age period.

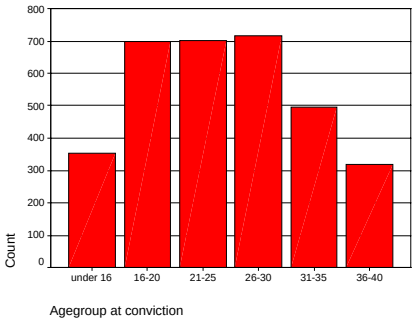
When looking at the cluster in each age group which has the highest number and proportion of offenders – represented by the heavier shading in Table 5.1 – Cluster A (Marginal lifestyle with versatile offending) has the highest in each age group over the age of 20. For the under 16 age group the equivalent cluster is Cluster B (Non-violent property, especially burglary) and for the 16-20 year olds it is Cluster G (Vehicle theft) that has the highest proportion. The second highest cluster within each age group (represented by the lighter shading) is not so consistent. For the under 16 age group Cluster E (Petty theft) is the second highest, for the age group of 16-20 years Cluster A retains second place but much more marginally; for the age group of 21-25 years Cluster D (General violence) emerges in second place and the theme of violence continues through to the next age group (26-30) where cluster H (Wounding) is the second highest. Cluster C (Fraud and general theft) takes second highest position in both of the over 30 age groups, although in both groups it is closely followed by Cluster H (Wounding). Thus it appears that the violent theme appears strongly in all age groups over 20; vehicle theft is concentrated in the 16-20 year old age group (with significant figures from the under 16s and the 21-25 year olds too);

and that the marginal lifestyle with versatile offending is prevalent across all age groups over 16, with the under 16 year olds being involved mainly in property offences.

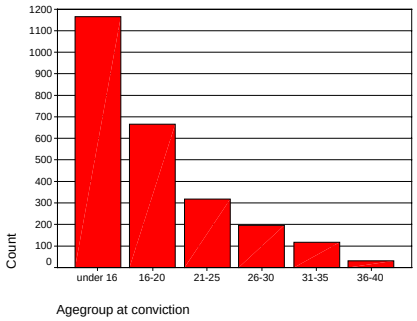
Another way of presenting Table 5.1 is to consider where the age peak is for each cluster. This is illustrated in Figure 5.1 where considerable differences are revealed.

Figure 5.1 : How offenders are assigned to clusters, by age group (1953 cohort, males)

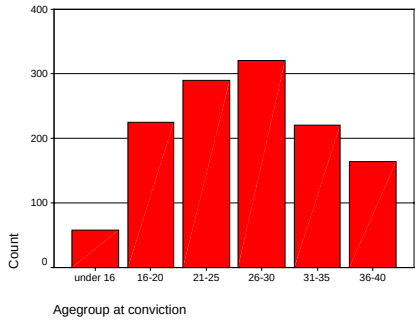
Cluster A : Marginal lifestyle with versatile offending



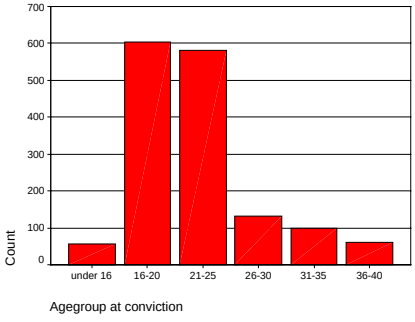
Cluster B: non-violent property, especially burglary



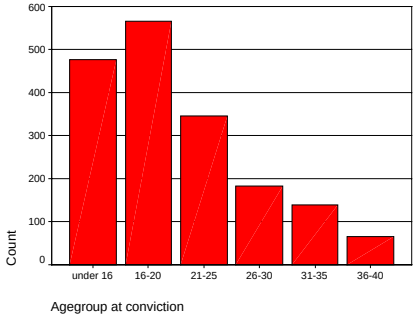
Cluster C: Fraud and general theft



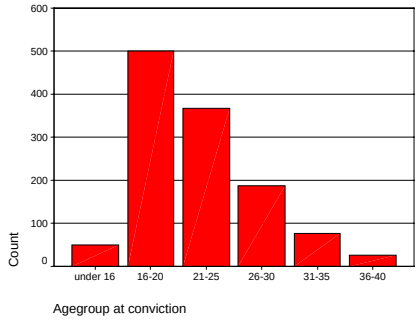
Cluster D : General violence



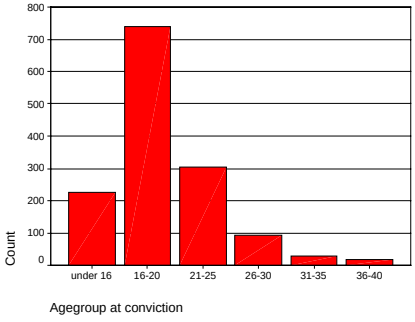
Cluster E: Petty theft



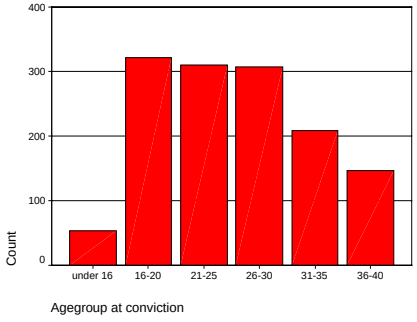
Cluster F: Aggressive property offending and wide-ranging car crime



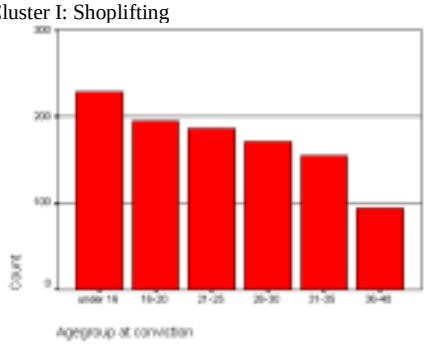
Cluster G: Vehicle theft



Cluster H: Wounding



Cluster I: Shoplifting



Cluster A (Marginal lifestyle with versatile offending) - the largest cluster - has a very similar proportion for the three age-groups from 16 to 30 and then begins a steady decline; cluster H (Wounding) displays a similar pattern. In contrast, cluster B (non-violent property offences, especially burglary) - the next largest cluster - has its highest peak for the under 16 age-group and then declines quite rapidly after that. Cluster C (Fraud and general theft) shows another pattern and builds up to a peak in the 26-30 age-group and then starts to decline. Cluster D (General Violence) is only really relevant for the decade between 16 and 25 years, while cluster G (Vehicle theft) has a major peak in the 16-20 age group. Cluster F (Aggressive property offending and wide-ranging car crime) is similar to cluster G although the decline does not start quite so sharply. Cluster E (Petty theft) principally involves the decade between 10 and 20 years before the fall in proportions starts. Cluster I (Shoplifting) has a peak age with the under 16 age-group, but the decline is not so dramatic as most of the other clusters.

So, in terms of peak offending, the clusters divide into three groups – Clusters B and I (Property offences, especially burglary and shoplifting) where the peak involves those aged under 16 years; Clusters D, E, F, G, and H, (general violence, petty theft, aggressive property offending and wide-ranging car crime, vehicle theft and wounding) where the peak involves those aged 16-20 years; and Cluster C (Fraud and general theft) where the peak involves those aged 21-25 years. The largest cluster - Cluster A (Marginal lifestyle with versatile offending) - also falls within this third group but, as Figure 5.1 shows, the peak is fairly sustained from the ages of 16 to 30 years (in fact, the same can be said of Cluster H).

We return to the discussion of these three groups when the focus is on switching behaviour between clusters. The main interest will be in discovering where the recruits for these peak years for each cluster come from and what do the offenders do in the years after the peak. Can patterns be discerned? Table 5.2 shows these peaks and indicates the actual numbers involved (also given in terms of the proportion of the sample):

Table 5.2: Which age group is the peak offending for each cluster? (1953 cohort, males)

Cluster	Peak age group	No. of persons	% of offenders
A: Marginal lifestyle with versatile offending	26-30	716	7.8
B: Non-violent property, especially burglary	Under 16	1164	12.6
C: Fraud and general theft	26-30	320	3.5
D: General violence	16-20	604	6.5
E: Petty theft	16-20	565	6.1
F: Aggressive property offending and wide-ranging car crime	16-20	501	5.4
G: Vehicle theft	16-20	739	8.0
H: Wounding	16-20	322	3.5
I: Shoplifting	Under 16	229	2.5
TOTAL	16-20	4513	48.9

5.2 Females - 1953 cohort

We now follow the same logic to analyse the outcomes for the females. However, as the optimal solution for the 1953 cohort was just three clusters, the argument and the displays are easier to follow. Again the proportions of the various clusters for *females* vary within each age group as Table 5.3 demonstrates.

The age group of 16-20 years is the most active criminally with 30.4% of the total sample being convicted of at least one standard-list offence during this time. Only 8.8% of the total sample were convicted in the age group 36-40.

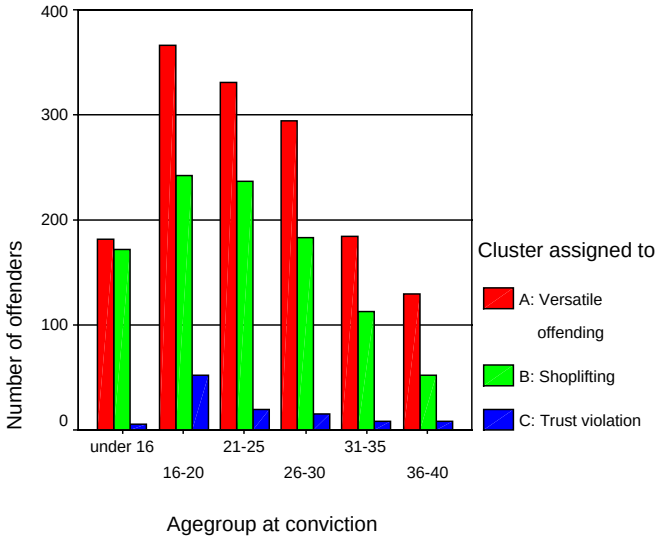
Table 5.3 : Profile of 1953 females assigned to clusters – by age group

Cluster	Age group at conviction																	
	under 16			16-20			21-25			26-30			31-35			36-40		
	No.	%	Con%	No.	%	No.	%	Con%	Con%	No.	%	Con%	No.	%	Con%	No.	%	Con%
A: Versatile offending	182	8.4	50.6	366	16.9	55.5	331	15.3	56.4	294	13.6	59.6	185	8.5	60.5	129	6.0	67.9
B: Shoplifting	172	7.9	47.8	242	11.2	36.7	236	10.9	40.2	183	8.4	37.1	113	5.2	36.9	52	2.4	27.4
C: Trust violation	6	0.3	1.7	52	2.4	7.9	20	0.9	3.4	16	0.7	3.2	8	0.4	2.6	9	0.4	4.7
Total Convicted	360	16.6	100.0	660	30.4	100.0	587	27.1	100.0	493	22.7	100.0	306	14.1	100.0	190	8.8	100.0
Not Convicted	1808	83.4		1508	69.6		1581	72.9		1675	77.3		1862	85.9		1978	91.2	
TOTAL	2168	100.0		2168	100.0		2168	100.0		2168	100.0		2168	100.0		2168	100.0	

If we now look at the number and proportions of persons in each age group – we can see a pattern which is consistent across all age groups. Cluster A (versatile offending) has the highest proportion of offenders, cluster B (Shoplifting) has the second highest and cluster C (trust violation) has the lowest of the three.

What might be more interesting then is to consider where the age peak is for each cluster. This is illustrated in Figure 5.2 where the patterns of the three clusters can be compared directly. Broadly, unlike the males, all the three clusters have the same shape - all peaking at the 16-20 age-group followed by a steady decline in each case. This figure also emphasises the point made above – that within each age-group cluster A - in terms of numbers - outstrips cluster B which in turn outstrips cluster C.

Figure 5.2 : How offenders are assigned to clusters, by age group (1953 cohort, females)



6. SWITCHING CRIMINAL ACTIVITY

We now turn our attention to an assessment of two issues – specialisation of offending, and assessment of switching behaviour. These topics are not new - interest in crime switching dates at least from the 1970s , when Wolfgang et al (1972) analysed data from the 1945 Philadelphia birth cohort. The basic technique suggested involved the construction of a transition matrix with the type of current offence cross-classified by the next offence. Tarling (1993) provides an excellent review of the transition matrix literature, and suggests that at the time of writing, there had been three British studies involving transition matrices (Phillpotts and Lancucki, 1979; Research and Statistics Department, 1985 and Stander *et al*, 1989). The 1985 study is the most relevant to our work, as it used the same data source of the Offenders Index birth cohorts. However, this work was limited to those with age of onset less than 16 and who reoffended within two years, with the first and second offence being compared. Interestingly, all of the three British studies concentrated entirely on male offenders.

This research study has re-evaluated the transition matrix methodology described above. The methodology appears to us to be simplistic and potentially misleading. It is simplistic, as the methodology takes no account of multiple offences within the same conviction date, which is a common occurrence in the datasets used. It is misleading as the term ‘specialisation’ is limited to offenders operating within only one domain of offending, and we have seen from earlier chapters that most offenders operate within more than one domain of activity. Someone operating only in the burglary and theft domains might be said to be specialised as much as an offender only operating in the burglary domain.

6.1 Defining and describing 'age-strip recidivists'

Our measure of recidivism in this chapter is different from the normal convention. Usually a person who, after a first appearance in court (and a conviction), has a further court appearance (and a conviction) for another subsequent offence is termed as a 'recidivist'. Our interest in this study is instead with five-year 'strips'. If a person has all their convictions within a five-year 'strip' but no other convictions outside this age-group, then, for that strip, he is *not* regarded as an 'age-strip recidivist'. If he has a further conviction in another 'age-strip', then he *is* regarded as an 'age-strip recidivist'. The primary aim of this approach is to consider the links between 'age-strips' rather than the transitions between one conviction and the next. However, it also helps to remind us that the time-span for most criminal careers is very short.

It is important to recognise from the outset is that it is only a minority of those convicted of offending who are involved in more than one of the age groups. As Table 6.1 shows, approaching two-thirds of the males (63.5% of the 1953 cohort and 62.3% of the 1958 cohort) have convictions in just one five-year 'strip' and then no more is heard of them in the official records. This proportion is even higher among the females where well over four out of five of the females (86.2% of the 1953 cohort and 83.3% of the 1958 cohort) have convictions in just one five-year 'strip'. For both males and females the proportions who are convicted in just one age group are declining - marginally for the males but more significantly for the females - and so perhaps suggesting that criminal careers have been getting longer.

Table 6.1 : No. of age groups in which offenders have had convictions

No. of 'strips'	1953 Cohort				1958 Cohort			
	male		female		male		female	
	No.	%	No.	%	No.	%	No.	%
1	5859	63.5	1869	86.2	6300	62.3	1955	83.3
2	1802	19.5	218	10.1	2022	20.0	305	13.0
3	801	8.7	48	2.2	1032	10.2	71	3.0
4	453	4.9	20	.9	521	5.2	12	.5
5	230	2.5	11	.5	240	2.4	5	.2
6	87	.9	2	.1				
Total	9232	100.0	2168	100.0	10115	100.0	2348	100.0

All those in the 1953 cohort have the risk of being convicted in six age-groups, but less than one in a hundred (0.9%) among the males and less than one in a thousand (0.1%) among the females have this length of a criminal career. There may, of course, be others who have started later but the cut-off point of 40 years prevents a display of their persistent criminal behaviour. Similarly, there may be others who are not convicted during an age-group because they are incarcerated for that period. Nevertheless, despite some further possible additions, continuous criminal activity - which fails in the sense of being caught and convicted at least once during each age-group - is comparatively rare.

Less rare are the proportions that appear in two, three, four or five 'strips'. At least this is the case for the males. In broad terms (and this is consistent for both the 1953 and 1958 cohorts) one in five of the males are convicted in just two age groups, one in ten are convicted in three age groups, one in twenty are convicted in four age groups and one in forty are convicted in five age groups. Hence, for males, there is an

interesting pattern of the proportions halving as the number of 'strips' involved increases. However, for the females there is a different pattern.

For the females, being involved in more than one 'strip' is a comparatively rare phenomenon. Around one in ten of the females in both cohorts are convicted in two age groups, around one in 40 are convicted in three age groups, less than one in a hundred are convicted in four age groups, and around one in two hundred are convicted in five age groups. In brief, there is a much lower proportion of 'age-strip recidivists' among the females and the difference between males and females widens as the number of 'strips' increases. However, we need to bear in mind that the shorter criminal histories for females may be in part an artefact of the poor quality of the Offenders Index data for females - a criminal history for a woman might be split into two histories - one under the maiden name, and one for the married name.

6.2 Number of clusters per offender

Up to now we have largely been considering the number of ‘age-strips’ where there is evidence of criminal activity. Another approach is to consider the number of distinct clusters that an offender is involved in. This assesses the number of spheres of activity that the offender has been involved in during their criminal career. So, for example, an offender in cluster B in the 16-20 age group, in cluster A in the 21-25 age group and back in cluster B in the 30-35 age group will be involved in two spheres of activity. Of course, the number of ‘age-strips’ and the number of clusters will be closely correlated – so, for instance, if a person has only been convicted in one age-strip’, then he/she will only have the opportunity to be in one cluster. Hence, there are

constraints. As there is a differing number of clusters for the 1953 and 1958 cohorts, we focus - for ease of presentation - on the results for the 1953 cohort.

Table 6.2 shows that the number of clusters that each offender falls into is small. Among the males around two/thirds (68.0%) of the 1953 cohort are involved in just one cluster. The figure is even higher for females (94.1%).

Table 6.2 : No. of clusters in which an offender appears

1953 Males

Number of distinct clusters	Number of strips	Percent
1	6276	68.0
2	1884	20.4
3	770	8.3
4	257	2.8
5	43	0.5
6	2	0.0
Total	9232	100.0

1953 Females

Number of distinct clusters	Number of strips	Percent
1	2040	94.1
2	127	5.9
3	1	0.0
Total	2168	100.0

However, Table 6.2 perhaps gives a misleading impression of specialisation for it appears that the majority of both the males and the females tend to stay just within one cluster - in other words, their criminal activity is fairly circumscribed. This is both true and untrue. However, to probe this one needs to combine the displays of Tables 6.1 and 6.2. This is effected in Table 6.3 that considers the 1953 cohort split by gender.

Table 6.3 demonstrates that the majority of offenders - both males and females - confine their criminal activity both to one cluster and one age group. Hence, for the males,- taking the top line of Table 6.3 - there are 6,276 who just feature in one cluster, but 5,859 (or 93%) of these also just feature in one age group.

Table 6.3: Number of age groups in which an offender has at least 1 conviction, by the number of distinct clusters they are involved in.

1953 Cohort, Males

No. of distinct clusters	No. of age groups in which offender has at least 1 conviction						Total
	1	2	3	4	5	6	
1	5859	364	43	6	2	2	6276
2		1438	332	81	25	8	1884
3			426	236	86	22	770
4				130	94	33	257
5					23	20	43
6						2	2
Total	5859	1802	801	453	230	87	9232

1953 Cohort, Females

No. of distinct clusters	No. of age groups in which offender has at least 1 conviction						Total
	1	2	3	4	5	6	
1	1869	138	19	10	2	2	2040
2		80	29	9	9		127
3				1			1
Total	1869	218	48	20	11	2	2168

In other words, there are only 417 males who feature in more than one age group but also feature in only one cluster; therefore, it is fair to say that specialising in just one cluster is a comparative rarity - this only happens to 417 (or 12%) out of the 3,373 males who are convicted in more than one age group.

The picture is similar but not the same for the females. There are 2,040 females who feature in just one cluster, but 1,869 (or 92%) of these also feature in just

one age group. In this respect the proportion is almost identical to the males. However, while there are only 171 females who feature in more than one age group but also feature in only one cluster, a much higher proportion can be regarded as one cluster specialists - in fact, this happens to 171 (or 57%) out of the 299 females who are convicted in more than one age group. So while it is comparatively rare for females - as with males - to be identified as criminally active in more than one age group, those that do are more likely to specialise in one cluster than is the case among the males. However, it is difficult to assess whether this high proportion of apparent specialists among the females is the result of there being far fewer clusters or the outcome of there actually being more specialists among the female offending population.

6.3 How likely is an 'age-strip recidivist' to switch clusters?

As stated earlier, a recidivist for the purposes of this study is someone who does not complete their offending career within one age group. As we have continually stressed, most do but understandably there is much concern about the minority who do not.

For the analysis here we are not concerned whether or not the 'age-strip recidivism' occurs in the next age-group or much later. In fact, when a person has a crime-free age-group(s) between two crime-active age-groups, there are at least three possibilities relating to the apparently crime-free period - the person may be genuinely crime-free, the person may not be getting caught during this period or he/she may be incarcerated (either in prison or secure hospital) with no real opportunity to display

reform or recidivism. The latter two possibilities make it unwise to assume that an apparently crime-free period is actually so.

The analysis is conducted separately for males and females, but the methodological issues are common to both. In one sense the methodological issues are straightforward. For the 1953 male cohort there are nine clusters for each of six age groups and the question is simply one of whether, say, those in cluster A aged under 16 who are reconvicted in a later age group continue to 'live' in cluster A in the next age-strip for which they have convictions. If, say, they are conviction-free in the 16-20 age group, but are convicted in the 21-25 age group, then it is this latter age group that would be subject to the analysis. If in this latter age group – in the example it is the age-group 21-25 – the calculation showed that they were still in cluster A, then straightforwardly they would be adjudged to have remained in the same cluster. If, on the other hand, the calculations show that their later criminal activity was summarised as a different cluster – say, cluster B – then they would be adjudged to have moved to a different cluster.

Ideally, it would be helpful to know *which* clusters that offenders move to rather than simply considering whether they move to another cluster. There is certainly no problem in identifying this, but the issue is a presentational one. In fact, just taking one transition of one cluster from one age group to the next produces 10 alternatives (that is, continuing in the same cluster, moving on to one of the 8 other offence clusters or to the 'no crime' outcome). Recognising that there are also 10 source clusters for each age group and five of these age-group transitions, this produces a total of 500 transition possibilities. While computationally

straightforward, understanding and presenting the output is more of a challenge, and simplification is necessary.

For the purposes of this report we have considered *for each cluster within each age-group,* three types of outcome – firstly, whether the next 'offending' age-strip is classified as within the *same* cluster; or, secondly, whether the next 'offending' age-strip moves a *different* cluster; or, thirdly, whether there are no further convictions for this offender up to the age of 40 (the 'no crime' category in our nomenclature). We consider this for both males and females separately using the 1953 cohort data for the analysis.

6.4 1953 male cohort - switching clusters?

Figure 6.1 shows for each cluster the transition to the next age group cluster – for which he has a conviction - in terms of whether the person retains a presence in the same cluster or moves to another cluster; if he is not convicted of any further crime by the age of 40, then he is put in the 'no crime' category.

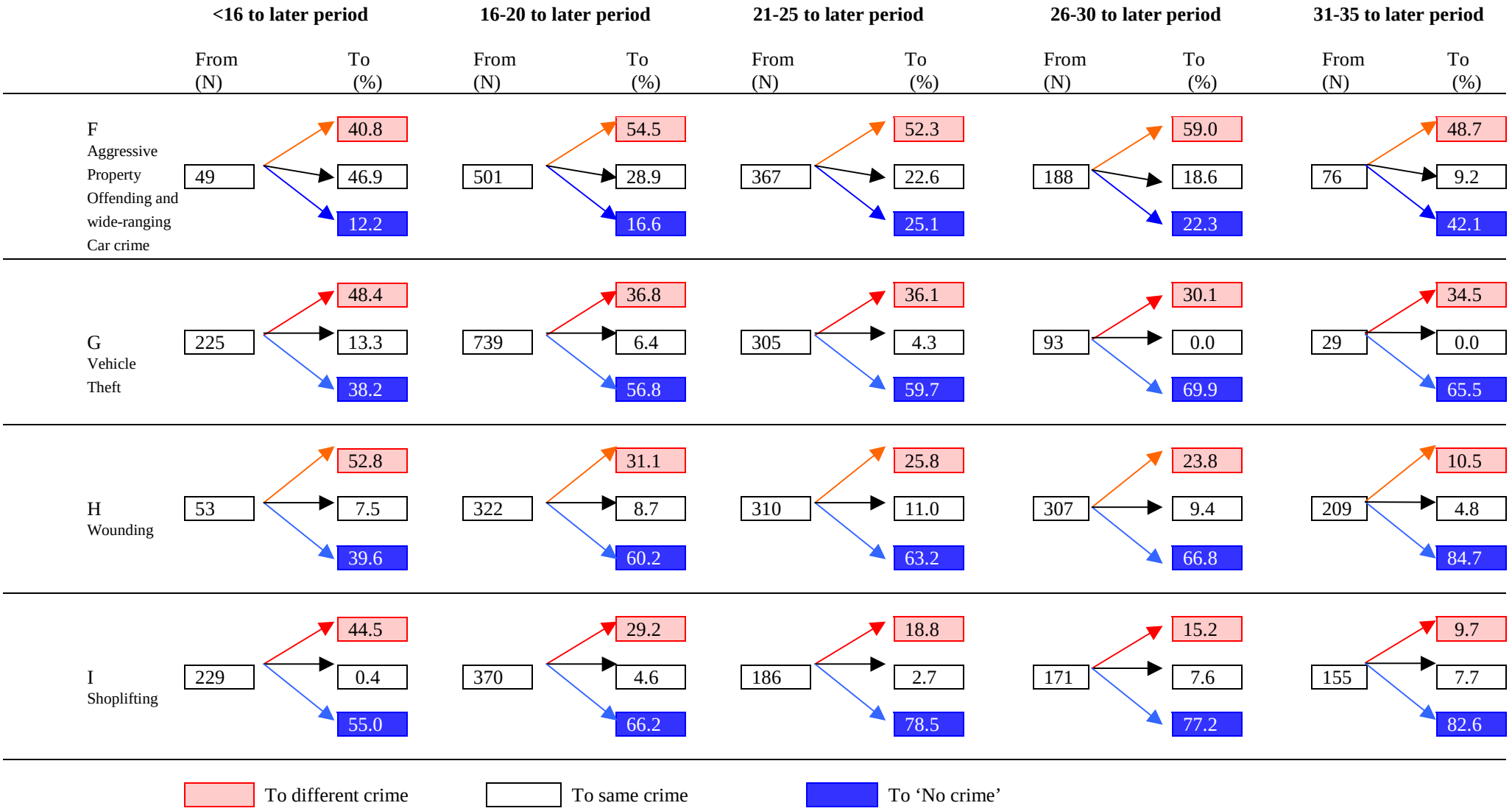
An example may help to clarify the structure of Figure 6.1. The top left hand corner shows that 355 males convicted in the under 16 age group were classified as cluster A (Marginal lifestyle with versatile offending). So what happens to these 355 males? The majority - or 54.9% - are not reconvicted by the age of 40 and thus appear (with the blue arrow) in the 'no crime' group, while the remainder (45.1%) are convicted on at least one further occasion in another age group. There may be crime-free periods in between but we are interested in the next cluster where there is offending behaviour registered. Figure 6.1 shows that 8.5% (of the original 355

males) are next classified in the same cluster (in this case, cluster A) and 36.6% (of the original 355 cases) are next classified in a different cluster.

There is much further information in Figure 6.1 that could be unpackaged. The Total' line is a useful port of call, for it summarises much of what we have been discussing. It shows that it is fairly rare for a person to move from a cluster in one age group to the *same* cluster in the next age group – just 2.9% of those in a crime cluster aged under 16 years continue in the same crime cluster in a later period; only 5.0% of those in a crime cluster in the 16-20 period continue in the same crime cluster in a later period. The proportions decline again when later age groups are considered – just 3.2% of those aged 21-25 and 2.5% of those aged 26-30 continue in the same crime cluster; while only around one male in a hundred (1.1%) of those aged 31-35 continue in the same crime cluster in the 36-40 age period.

These figures seem to militate against the idea of offence specialisation. While this is partially true, this analysis is also partially misleading. In brief, the figures are rather 'swamped' by the proportion that have committed no further crime.

Figure 6.1: 1953 Male offenders. Clusters offenders are assigned to (9 cluster model) : Movement from selected age groups to next offending in later age group


<16 to later period
16-20 to later period
21-25 to later period
26-30 to later period
31-35 to later period
From (N)
To (%)
F Aggressive Property Offending and wide-ranging Car crime
49
40.8
46.9
12.2
501
54.5
28.9
16.6
367
52.3
22.6
25.1
188
59.0
18.6
22.3
76
48.7
9.2
42.1
G Vehicle Theft
225
48.4
13.3
38.2
739
36.8
6.4
56.8
305
36.1
4.3
59.7
93
30.1
0.0
69.9
29
34.5
0.0
65.5
H Wounding
53
52.8
7.5
39.6
322
31.1
8.7
60.2
310
25.8
11.0
63.2
307
23.8
9.4
66.8
209
10.5
4.8
84.7
I Shoplifting
229
44.5
0.4
55.0
370
29.2
4.6
66.2
186
18.8
2.7
78.5
171
15.2
7.6
77.2
155
9.7
7.7
82.6
To different crime
To same crime
To 'No crime'

	<16 to later period		16-20 to later period		21-25 to later period		26-30 to later period		31-35 to later period	
	From (N)	To (%)	From (N)	To (%)	From (N)	To (%)	From (N)	To (%)	From (N)	To (%)
NO CRIME	6567	100.0	4719	77.5	5830	39.6	6927	19.2	7691	7.6
				22.5		60.4		80.8		92.4

To different crime To same crime To 'No crime'

		N	%	N	%	N	%	N	%	N	%
over all clusters:	**1**			1063	11.5	3519	38.1	5598	60.6	7107	77.0
	2	6567	71.1	3656	39.6	2311	25.0	1329	14.4	584	6.3
	3	1063	11.5	1600	17.3	2079	22.5	1509	16.3	1201	13.0
	4	266	2.9	457	5.0	298	3.2	235	2.5	101	1.1
	5	1336	14.5	2456	26.6	1025	11.1	561	6.1	239	2.6
TOTAL		9232		9232		9232		9232		9232	

1 : No crime to No crime
2: No crime to Crime
3: Crime to No crime
4: Crime to same crime/cluster
5: Crime to different crime/cluster

Using an outcome measure with three categories suggests that remaining in the same cluster is very unusual. In fact, in only one transition is it high - namely, in the under 16 age group, 46.9 per cent of cluster F remain in this cluster. However, while it is true that the proportions remaining in the same cluster are generally low, the inclusion of the 'no crime' category is misleading. In fact, in the focus on switching clusters, the main interest is whether - *if a person continues with criminal activity* - they then remain in the same cluster.

The danger of including the 'no crime' category in this analysis can be shown by a hypothetical example. If 95 per cent of cluster X are not convicted of another crime, while the remaining 5 per cent are next classified in cluster X - and there is no one who switches to another cluster - then the figure of cluster specialists (that is, remaining in cluster X) is still 5 per cent. However, compared with those who continue with some criminal activity, the proportions are 100 per cent who remain in cluster X (for no one switched to another cluster). The latter measure is perhaps a more appropriate way of considering the proportion that remain in the same cluster and the proportion who switch clusters - that is, without the varying influence of the 'no crime' figure. This is shown as Table 6.4.

This table is informative, for it does show different patterns for the various clusters. In broad terms, there is increasing specialisation - measured by the same cluster in the later period - as offenders get older among some clusters. This is certainly true for clusters A (marginal lifestyle with versatile offending), C (fraud and general theft), H (wounding) and I (shoplifting). Cluster B (non-violent property, especially burglary), in contrast, seems to have a similar proportion of 'specialists' at

Table 6.4 : Within cluster specialisation in the 1953 cohort (Males)

Age groups		Percentage of age-strip recidivists in each age group who remain in the same cluster								
		A	B	C	D	E	F	G	H	I
From	To	Marginal lifestyle with versatile offending	Non-violent property, especially burglary	Fraud and general theft	General violence	Petty theft	Aggressive property offending and wide-ranging car crime	Vehicle theft	Wounding	Shoplifting
<16	Later period	18.8%	17.8%	7.5%	18.8%	10.9%	53.5%	21.6%	12.5%	1.0%
16-20	Later period	25.4%	14.7%	21.2%	24.5%	17.4%	34.7%	14.7%	21.9%	13.6%
21-25	Later period	42.2%	17.6%	28.4%	6.5%	6.4%	30.2%	10.6%	29.8%	12.5%
26-30	Later period	42.6%	23.6%	39.3%	15.8%	4.2%	24.0%	0.0%	28.4%	33.3%
31-35	Later period	40.8%	17.1%	40.0%	6.7%	18.2%	15.9%	0.0%	31.3%	44.4%

each age group, perhaps representing a core of persistent offenders in this sphere of criminal activity. Clusters F and G , both related to vehicle crime, seem to decline markedly as a specialist activity.

Two examples may help to demonstrate how the meaning of the clusters can change over time - we will focus on, firstly, cluster I (shoplifting) and, secondly, cluster F (versatile property offending).

Figure 6.1 shows that the majority of those classified as cluster I will not be, whatever the age group, subsequently reconvicted by the age of 40. The prognosis gets better as the age group increases - so, 55 per cent of those in cluster I aged under 16 will not be reconvicted, while this rises to 83 per cent of those in cluster I aged 31-35. While the latter group has much less time to get reconvicted than the former group, this still reflects a more favourable picture as offenders get older. We discuss this more fully in the next section.

The last column of Table 6.4 tells another story focusing on the likelihood - for those reconvicted - of staying in the same cluster. There are dramatic differences between age groups - ranging from only one per cent for those aged under 16 to 44 per cent for those aged 31-35 years. In other words, one can say that only one out of a 100 boys aged under 16 classified as cluster I (shoplifting) and who are reconvicted will remain in the cluster I when they are next reconvicted, while the remaining 99 boys will be classified in another crime cluster. In contrast, of the 100 recidivists aged 31-35 years, 44 will be classified as cluster I when they are next reconvicted, while the remaining 56 men will be classified in another crime cluster. So, cluster I indicates a platform to other kinds of criminal activity among those aged under 16 years, but an indicator of specialist shoplifting among the older age groups.

In contrast, cluster F (aggressive property offending and wide-ranging car crime) tells the totally opposite tale. Figure 6.1 shows that it is only the *minority* of those classified as cluster F will not be, whatever the age group, subsequently reconvicted by the age of 40. While again the prognosis gets better as the age group increases - so, only 12 per cent of those in cluster F aged under 16 will not be reconvicted, while this rises to 42 per cent of those in cluster F aged 31-35 - this is always the cluster, whatever the age group, that shows the greatest likelihood of being reconvicted. We return to this more fully in the next section.

Table 6.4 focuses on the other story of the likelihood - for those reconvicted - of staying in the same cluster. Again there are dramatic differences between age groups - ranging from only 53.5 per cent for those aged under 16 to 15.9 per cent for those aged 31-35 years. One can say that out of those reconvicted, the majority - that is, 54 out of a 100 - of the boys aged under 16 classified as cluster F (versatile

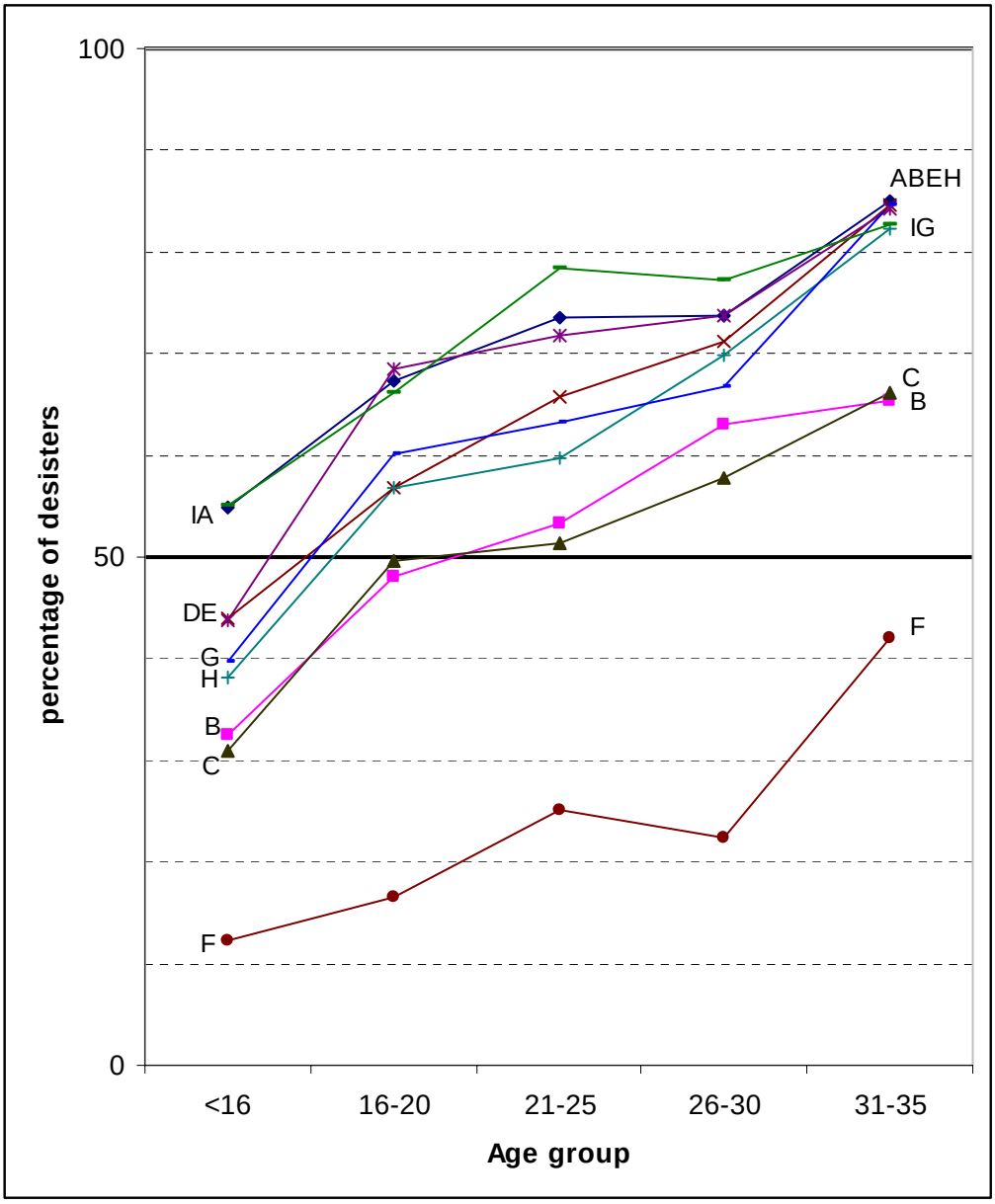
property offending) will remain in cluster F when they are next reconvicted, while the remaining 46 boys will be classified in another crime cluster. In contrast, of the 100 men aged 31-35 years, only 16 will be classified as cluster F when they are next reconvicted, while the remaining 84 men will be classified in another crime cluster. So, cluster F indicates what the majority of those carrying on crime are likely to do in the next age group, but an indicator of ever more versatility among the older age groups.

6.5 1953 male cohort - switching out of crime?

Figure 6.1 provides a rich pageantry of information. The last section has mostly concentrated on whether offenders are likely to remain in the same cluster when they get reconvicted or whether they tend to get classified in another cluster. This section is more concerned with the evidence of the ending of an official criminal career - that is, no reconvictions. Figure 6.1 demonstrates that the clusters have very different outcomes in this respect. So, for example, the majority (54.9%) of those classified as cluster A (Marginal lifestyle with versatile offending) when under 16 years of age will not be reconvicted by the age of 40 while, in contrast, only a small minority (12.2%) of cluster F will not be reconvicted by the age of 40. Clusters clearly have a relevance to the likelihood of reconviction.

Figure 6.2 summarises the information in relation to the likelihood of reconviction for each cluster by age group. While there are minor exceptions for some age groups, the pattern is quite clear. Whatever the cluster, as age increases, then the likelihood of being reconvicted gets less.

Figure 6.2 : Percentage of male desisters for each cluster and age group (1953 cohort).



However, the decreasing follow-up time needs to be taken into account in interpreting this – under 16s are followed up for at least 25 years, but 35 year olds are followed up only for five years. However, while there is a similar curve for each cluster in figure 6.2, there are at least three different patterns emerging. So, for instance, by the time of the 31-35 age group, over four out of five men in clusters A, D, E, G, H and I will not be reconvicted by the age of 40 (that is , in the next five

years); this is the case for two out of three men in clusters B and C; and well below one out of every two men in cluster F will not be convicted. Figure 6.2 demonstrates that the outcome is likely to be consistently bad for cluster F, whatever the age group, and similarly not at all good for clusters B and C at any point.

The highlighted line at 50% simply provides a cut-off point where below that line an offender is more likely to be reconvicted than not and above that line an offender is more likely *not* to be reconvicted. It dramatically shows how the clusters with boys under 16 are all likely to predict that they are more likely to be reconvicted than not - the exceptions are clusters A (marginal lifestyle with versatile offending) and I (shoplifting) where the likelihood is in the other direction. Beyond that age group, it is only cluster F (versatile property offending) where the chances of being reconvicted are significantly higher.

While there is still much work to do in fully understanding what is happening, there is certainly evidence that a focus on 'switching' is both academically interesting and practically important. It provides some clues as to specialisation - different age groups specialise in different criminal activities - and the likelihood of offenders switching to other forms of criminal activity. This section has begun to identify which clusters provide an indication of a greater persistence in crime.

6.6 1953 female cohort - switching clusters?

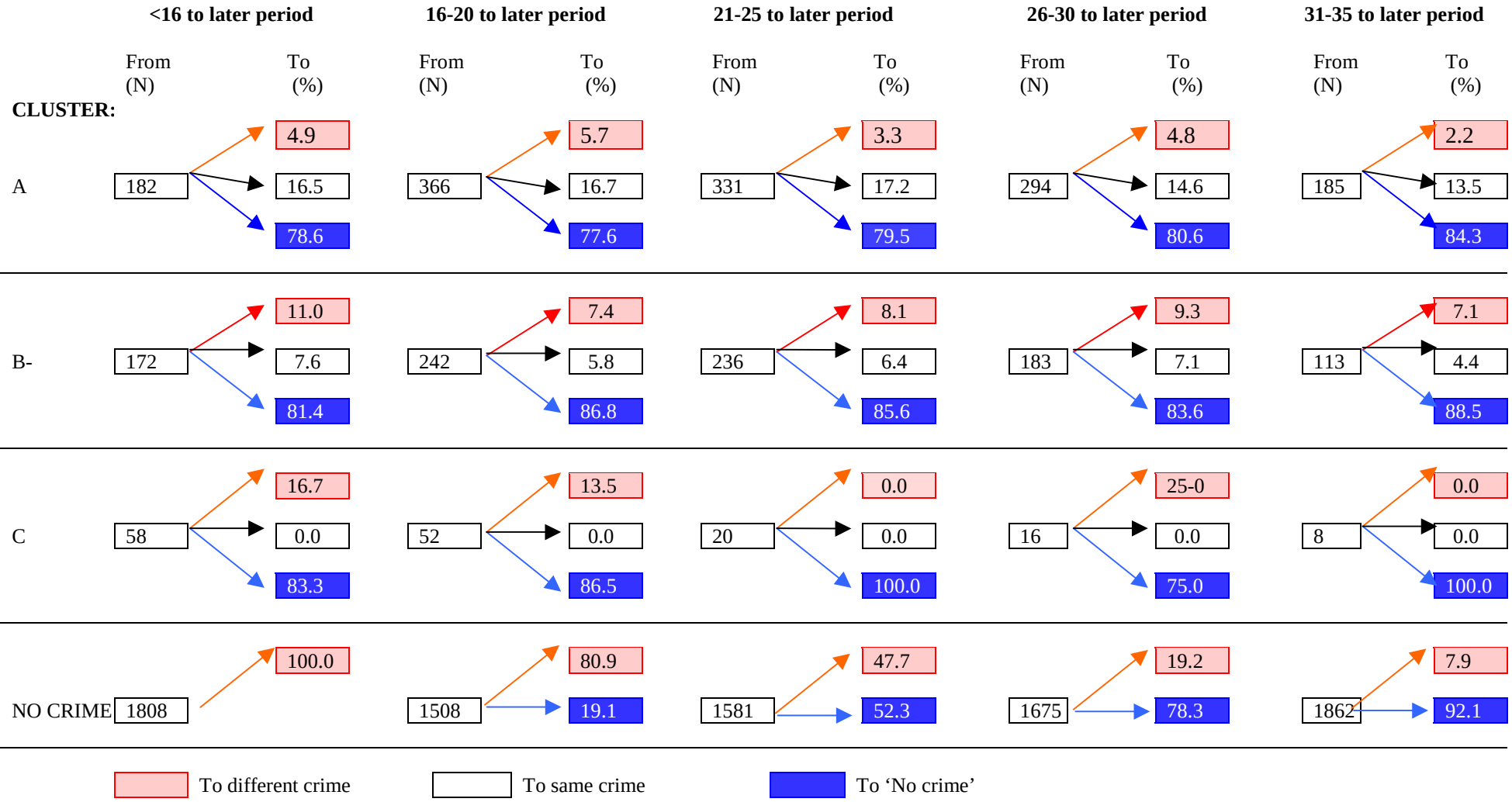
A similar type of analysis was carried out for the females. While the material was much less complex, the results were perhaps not so interesting. Figure 6.3 shows for each cluster the transition to the next age group cluster – for which she has a

conviction - in terms of whether the person retains a presence in the same cluster or moves to another cluster; if she is not convicted of any further crime by the age of 40, then she is put in the 'no crime' category. The presentation is similar to the males.

The Total' line is again a useful port of call. It shows - as with the males - that it is rare for a person to move from a cluster in one age group to the *same* cluster in the next age group – just 2.0% (compared to 2.9% of the males) of those in a crime cluster aged under 16 years continue in the same crime cluster in the 16-20 period; only 3.5% (compared to 5.0% the males) of those in a crime cluster in the 16-20 period continue in the same crime cluster in the 21-25 period. The proportions decline again when later age groups are considered – just 3.3% (compared with 3.2% of the males) of those aged 21-25 continue in the same crime cluster in the 26-30 period; only 2.6% (compared with 2.5% of the males) of those aged 26-30 continue in the same crime cluster in the 31-35 period; while around three females in two hundred (1.4% - compared with 0.6% of the males) of those aged 31-35 continue in the same crime cluster in the 36-40 age period.

The parallels with the earlier male figures are remarkable. Again one might comment that the results seem to militate against the idea of offence specialisation, but the earlier point that the figures are 'swamped' by the proportion that have committed 'no crime' in one age group and continue to commit 'no crime' in the next age group is even more pertinent with the females. In fact, among the females none of the transitions for the *same* cluster is high - the highest is in cluster A (versatile offending) in the 21-25 age group where 17.2% subsequently remain in this cluster.

Figure 6.3: 1953 females - Clusters offenders are assigned to (3 cluster model) : Movement from selected age groups to next offending in later age group



over all clusters:	N	%	N	%	N	%	N	%	N	%
1 : No crime to No crime			288	13.3	827	38.1	1312	60.5	1714	79.1
2: No crime to Crime	1808	83.4	1220	56.3	754	34.8	363	21.7	148	6.8
3: Crime to No crime	288	13.3	539	24.9	485	22.4	402	18.5	264	12.2
4: Crime to same cluster	43	2.0	75	3.5	72	3.3	56	2.6	30	1.4
5: Crime to diff cluster	29	1.3	46	2.1	30	1.4	35	1.6	12	0.6
TOTAL	2168		2168		2168		2168		2168	

However, while it is true that the proportions remaining in the same cluster are generally low, the inclusion of the 'no crime' category is once again misleading. However, in the focus on switching clusters, the main interest is whether - *if a female continues with criminal activity* - they then remain in the same cluster.

Table 6.5 shows the proportion of each cluster that remains in the same cluster as a percentage of all those who continue with criminal activity.

Table 6.5: Within cluster specialisation in the 1953 cohort (FEMALES)

Percentage of agestrip recidivists in each age group who remain in the same cluster				
Age groups		A	B	C
From	To	Versatile offending	Shoplifting	Trust violation
<16	Later period	76.9%	40.6%	0.0%
16-20	Later period	74.4%	43.8%	0.0%
21-25	Later period	83.8%	44.1%	-
26-30	Later period	75.4%	43.3%	0.0%
31-35	Later period	86.2%	38.5%	-

As with the males, Table 6.5 shows different patterns for the various clusters. However, the outcome is likely to be heavily influenced by the fact that there were only three clusters and one cluster attracted very much larger numbers than the others. Within each cluster the figures show a remarkable consistency. This is in contrast to the males where the age group was often very relevant. For cluster A (versatile offending) - of those that re-offend - around three-quarters or more are likely to remain within this cluster. For cluster B (shoplifting) this is likely to be the case for

around 40% - here the contrast with the males is especially telling for among the younger males they tended to move on to other types of criminal activity while among the older age groups there was a greater tendency to remain in the same cluster of shoplifting - but for the females the pattern is remarkably consistent for each age group. Finally, for cluster C (trust violation), another pattern emerges; there was no case of an offender identified as cluster C remaining in that cluster when reconvicted.

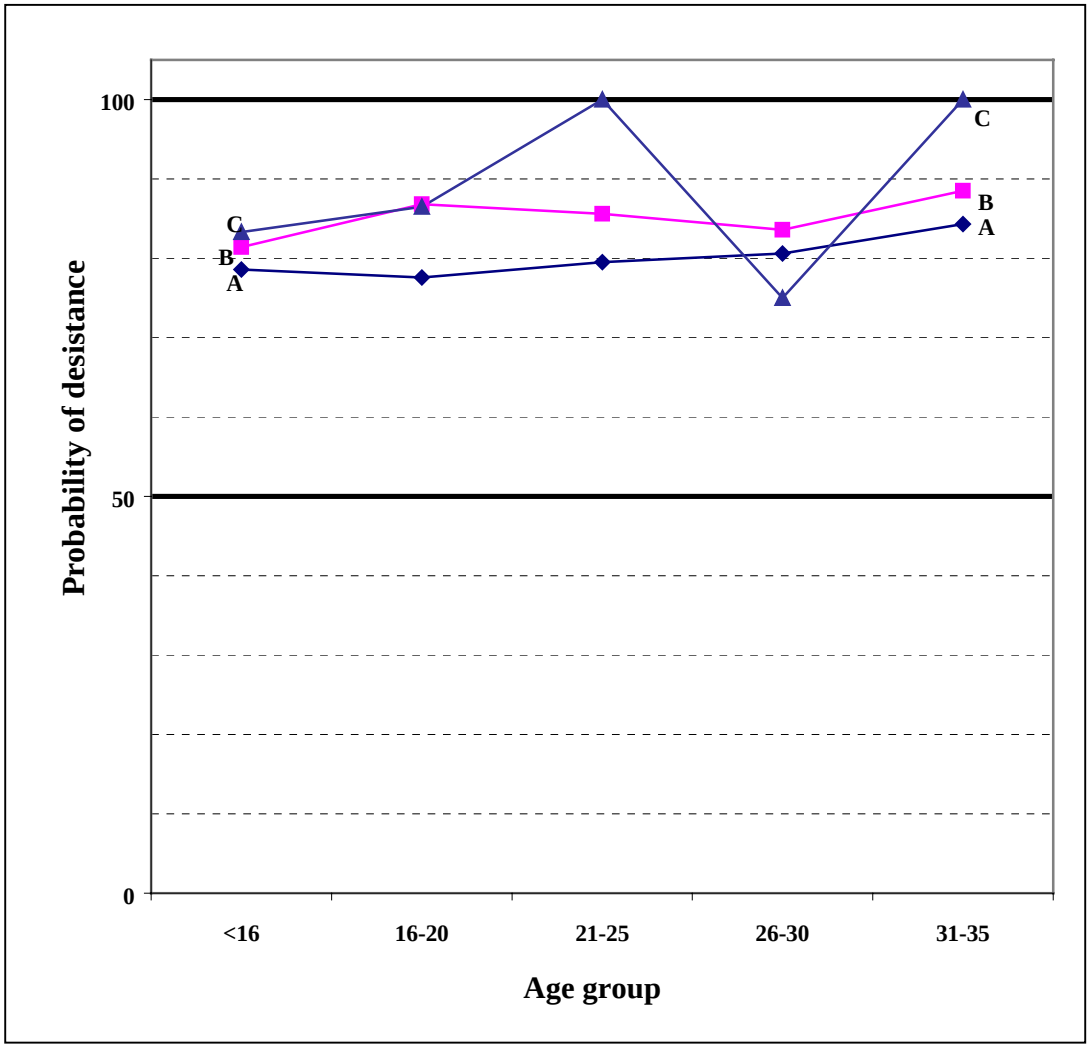
6.7 1953 female cohort - switching out of crime?

Figure 6.3 provides a source for further analysis. This section is concerned with the evidence of the ending of an official criminal career - that is, no further reconvictions. Unlike the males where some of the clusters had very different outcomes, the female clusters are much more similar in this respect.

Figure 6.4 summarises the information in relation to the likelihood of reconviction for each cluster by age group.

Unlike the males where, as the ages increased, then the likelihood of being reconvicted got strikingly less, this sort of pattern is much less in evidence among the females. In fact, for none of the clusters - at any age group - did the likelihood of *not* being reconvicted drop below 75%. While there are concerns about the validity of the data set (see Chapter 2 'Methods'), this is a dramatic difference to the males.

Figure 6.4 : Percentage of female desisters for each cluster and age group. (1953 cohort)



Using a highlighted line at 50% to provide a cut-off point where below that line an offender is more likely to be reconvicted than not and above that line an offender is more likely *not* to be reconvicted, none of the points in Figure 7.4 falls below the highlighted line.

The analysis of the 1953 female cohort is certainly less complex than for the males, but also perhaps less convincing. The clusters seemed less discriminating, although the 'switching' patterns were different for each cluster. Unlike the males there was little to suggest that age groups made much difference. This could be an

artefact of the technique or that female offenders are rather different from male offenders. Certainly male offenders seem to have a wider repertoire of criminal activity with ageing being an effective healer for many. In contrast, female offenders seem to fall more definitely into two groups - the vast majority who quickly give up offending and a significant minority who continue to re-offend; unlike the males, ageing does not seem to be the same healer as this significant minority seems to continue to persist in crime.

7. CONCLUSIONS

Following a comparatively modest study, our conclusions can still be quite bold. Over a quarter of a century ago Don Gibbons (1975) bemoaned the lack of progress in effecting *offender* typologies, while also pointing out that little attention had been paid in criminology to the development of typologies of *crime.* It is with the latter approach where we maintain that advances can now be made. Recent statistical and computational developments provide greater opportunities for analysis.

Our work points to the development of a typology of criminal activity. Such an approach is not totally new, for others have charted this route. However, there are ingredients in this study that are qualitatively different. Others have tended to focus on the totality of criminal activity during the active years of most offenders. They consider and attempt to summarise the 'life-time' (in fact, usually up to the early 30s) of their cohorts. However, while reporting on such 'life-time' activities is useful in developing a criminological understanding, it is of limited practical use. Certainly by the early 30s in an offender's life any thought of intervention is too late. Social control agents, such as the police and the probation service, are operating on a shorter time-scale. The issues are more pressing and more immediate. They need to summarise what has been happening in, say, the last five years of an offender's criminal career rather than waiting until one can look back at the previous twenty years. They need ways of describing criminal activity so that they can identify whether the patterns of particular offenders are routine or unusual. Within this framework they need to be able to recognise the criminal activity profiles for each age group. Which types of criminal activity are most prevalent for each age group? Knowledge about criminal pathways is also crucial. What proportion of offenders are

specialists within one sphere of criminal activity? How many tend to migrate from one sphere of activity to another as they become older? These were the kind of questions we set out to address and our study can provide some answers.

Those involved in planning may also garner some useful information from our approach. With the use of different birth cohorts one can begin to plot changes in criminal activity over time. Broadly, the core of criminal activity, mainly involving property offending, has remained the same, but there have been some important shifts in other activity, such as more violence and an increased use of illicit drugs, that have changed the crime profile of a generation or more. Understanding these patterns of change is crucial. Are these new offenders recruited into the criminal pool or are they 'old' offenders increasing their repertoire of criminal activity? Our work is a demonstration study that the approach of considering typologies of criminal activity can provide some useful insights. In this respect the study provides some glimpses of the potential of this approach as well as providing some actual examples of change.

We conclude by highlighting the major findings, identifying some practical uses, noting some technical points and, finally, providing the familiar call for more research.

Some findings

One of the major aims of this research was to develop typologies of crime. This has been successfully accomplished using five year age strips to summarise criminal activity at various stages of a criminal career. The strips were then examined by latent class analysis, which is a model-based clustering method. We found that

there was evidence of nine clusters for the 1953 birth cohort for males and thirteen clusters for the 1958 male cohort. In contrast , only three crime clusters were found for the 1953 female birth cohort, and five for the 1958 female cohort.

All the clusters were named. However, the clusters could also be grouped into the range of activity within each cluster. Both the male and female clusters separated into those defined by a single core activity (shoplifting, petty theft or wounding), those defined by two or three activities and those who appear to be much more versatile offenders.

For the males each cluster had a distinct age profile. Some clusters showed a strong peak at an early age, with a steep tail off, others peaked later or tailed off more slowly. The female clusters showed much less variation with age.

Analysis of switching behaviour between clusters allowed investigation of offending pathways through crime. The major point to recognise is that criminal conviction histories are comparatively short for the majority of the samples. Over 60 per cent of males and over 80 per cent of females are convicted only in a single five-year period. The reconviction outcome for the clusters was varied. However, for the 1953 males, cluster F (aggressive property offending and wide-ranging car crime) did particularly badly in terms of reconviction at every age group.

In this study, we have proposed a new method of examining specialisation, with individuals staying within the same *cluster* being classified as specialised. Using this definition for the 1953 males, we identify some clusters where specialisation

appears to increase with age, others where specialisation appears to decrease, and a third group showing no change with age. The relationship of specialisation to age appears to be more complex than the literature appears to suggest.

Technical issues and additional work

As a demonstration project, the approach we adopted was successful, but we recognise that it could be further refined. So, for example, measures of intensity (such as numbers of court appearances and numbers of convictions of a particular type) as well as binary measures of offending types could be constructed and used as input to the latent class analysis. More work is also needed to assess the robustness of the analysis. This would include splitting the sample, fitting the model to one half of the sample and assessing model fit on the remaining half. The analysis has considered birth year and gender as important variables, but there may be important additional omitted covariates. For example, are the clusters the same for those with a large number of court appearances compared for those with only one or two? This may lead to more complex statistical models but will also give greater understanding. Finally, the analysis presented here is somewhat historical, and needs to be repeated on more recent birth cohorts – the 2001 update to the Offenders Index cohort samples which is about to become available to researchers will help greatly. However, we maintain that these limitations do not undermine the important uses of this work.

Some practical uses

Potential uses of this research can be identified in three levels: the individual level, the information level and the strategic level.

The individual level. This project could provide the basis for a practical tool for practitioners such as probation officers to be able to summarise the recent criminal history of an offender, and from this summary, gain some understanding of his/her likely desistance or type of further criminal activity.

The information level. Criminal statistics provided by the Home Office currently classify offending into ten offence groups. While these are of great interest, they do not adequately reflect the diversity of offending behaviour by individuals. The clusters, as descriptive summaries of offending, could supplement and enhance the standard categorisation and provide an alternative view of offending which is closer to the reality of crime.

The strategic level. The technique developed in this project provides scope for examining changes and patterns of offending over time. Changes in the size and nature of clusters will identify shifts in core and peripheral offending. Identifying such dynamic changes in crime will inform policy makers of the scale of trends and fashions in criminal activity.

8. ACKNOWLEDGEMENTS

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APPENDIX A: Table of offence indicators used in the analysis with offence codes and descriptions

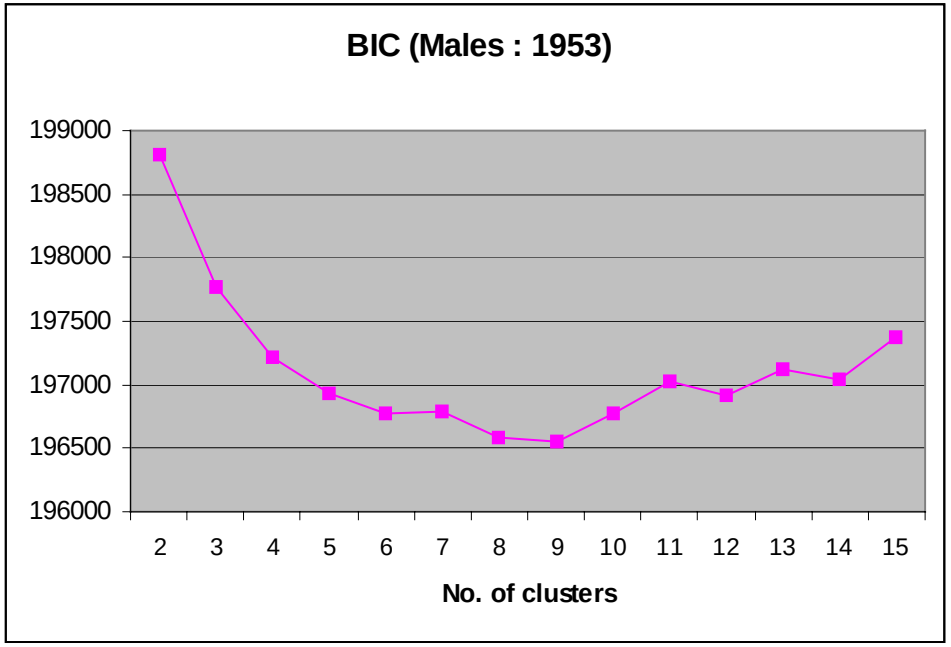
Name of Indicator (as used in analysis and Appendix C)	Codes of offences used to create this indicator	Description of offences used	Whether indicator used in analysis of ..			
			Male 1953 Cohort	Female 1953 Cohort	Male 1958 Cohort	Female 1958 Cohort
OFF1A2	1 & 2	Murder Attempted Murder	✓		✓	
OFF3	3	Threats / Incitement to Murder	✓		✓	
OFF4	4	Manslaughter	✓		✓	
OFF5	5	Wounding and acts endangering life	✓		✓	
OFF8	8	Malicious wounding	✓	✓	✓	✓
OFF9	9	Assault	✓		✓	
OFF16	16	Buggery	✓			
OFF17	17	Indecent assault on a male	✓		✓	
OFF18	18	Indecency between males	✓		✓	
OFF19	19	Rape	✓		✓	
OFF20	20	Indecent assault on a female	✓		✓	
OFF21A23	21 & 23	Unlawful sexual intercourse with a girl under 13 Incest with a girl under 13	✓		✓	
OFF22	22	Unlawful sexual intercourse with a girl under 16	✓		✓	
OFF24	24	Procuration	✓		✓	
OFF27	27	Soliciting by a man (from 1978 onwards)	✓		✓	
OFF28	28	Burglary in a dwelling	✓	✓	✓	✓
OFF29	29	Aggravated burglary in a dwelling	✓	✓	✓	
OFF30A27	30 & 27	Burglary (other than in a dwelling) Sacrilege (robbing places of worship)	✓	✓	✓	✓
OFF31	31	Aggravated burglary (other than in a dwelling)	✓			
OFF32	32	Breaking and entering with intent	✓			
OFF33	33	Possession of housebreaking tools/going equipped for stealing)	✓		✓	✓
OFF34	34	Robbery and assault with intent to rob	✓	✓	✓	✓
OFF35	35	Blackmail	✓		✓	
OFF36	36	Kidnapping			✓	
OFFFRAUD	37 & 51 & 53	Embezzlement (1963-1968) Frauds by agents, trustees, directors etc. 'Other' frauds	✓	✓	✓	✓
OFF39	39	Stealing from the person of another	✓	✓	✓	✓
OFF40	40	Stealing in a dwelling (not from automatic machines/meters)	✓	✓	✓	✓
OFF41	41	Stealing by an employee	✓	✓	✓	✓
OFF42A43	42& 43	Stealing mail / mail bags Other aggravated stealing punishable by life (1963-1968)	✓		✓	
OFF43	43	Abstracting electricity (from 1978 onwards)	✓	✓	✓	✓
OFF49	49	Other stealings and petty theft	✓	✓	✓	✓
OFF44	44	Stealing pedal cycles	✓	✓	✓	
OFF45	45	Stealing from vehicles	✓	✓	✓	✓
OFF46	46	Shoplifting	✓	✓	✓	✓
OFF47	47	Stealing from automatic machines / meters	✓	✓	✓	✓
OFFVEH	48 918 130	Theft of motor vehicle Taking a vehicle without permission (pre 1987) Unauthorised taking of a motor vehicle/conveyance (from 1989)	✓	✓	✓	✓
OFF50	50	Obtaining goods by false pretences	✓			
OFF52	52	Falsifying accounts	✓	✓	✓	✓
OFF54	54	Receiving / handling stolen goods	✓	✓	✓	✓
OFF56	56	Arson	✓	✓	✓	✓
OFFCDAM (indictable)	57 58 59	'Other' criminal damage 'Other' criminal damage (from 1972 onwards) Threats & possession with intent to cause criminal damage (from 1972)	✓	✓	✓	✓
OFFFGRY	60 61 58 59	Coining / Forgery Uttering / possession counterfeit coins Forgery and uttering (felony) (pre 1972) Forgery (misdemeanour) (pre 1972)	✓	✓	✓	✓
OFF64A65	64 65	Riot Unlawful assembly /violent disorder	✓			
OFF64TO66	64 65 66	Riot Unlawful assembly /violent disorder Other offences against the state and public order			✓	
OFF67	67	Perjury	✓			
OFF79	79	Attempting to pervert the course of justice	✓		✓	

Appendix A (continued)

Name of Indicator (as used in analysis and Appendix C)	Codes of offences used to create this indicator	Description of offences used	Whether indicator used in analysis of ..			
			Male 1953 Cohort	Female 1953 Cohort	Male 1958 Cohort	Female 1958 Cohort
OFF80A83	80 83	Absconding from lawful custody Bail act	✓	✓	✓	✓
OFF81	81	Firearms act	✓		✓	
OFF84	84	Trade descriptions act	✓		✓	
OFF99	99	'Other' indictable offences	✓	✓	✓	✓
OFF104	104	Assault	✓	✓	✓	✓
OFF115	115	Firearms act			✓	
OFF126	126	Interference with a motor vehicle	✓		✓	
OFF137	137	Cycling offences			✓	
OFFDDRIV	130 802 926 920	Dangerous driving (pre 1989) Reckless / dangerous driving Dangerous driving (pre 1987)	✓		✓	
OFF139	139	Indecent exposure with intent to insult any female	✓		✓	
OFF141	141	Alcohol offences	✓		✓	
OFF143	143	Licenced premises offences			✓	
OFF149	149	Criminal and malicious damage (non-indictable)	✓	✓	✓	✓
OFF162	162	Obscene material or language			✓	
OFF164	164	Public order offences			✓	
OFF165	165	Possession of offensive weapon	✓		✓	
OFF168	168	Public health offences	✓			
OFF169	169	Railway offences			✓	
OFF170	170	Vehicle licencing offences	✓		✓	
OFF177	177	Stealing / destroying or damaging with intent to steal (plants)	✓			
OFF181	181	Unlawful possession	✓			
OFF185	185	Found on enclosed premises possessing picklocks etc.	✓		✓	
OFF186	186	Suspected of intent to commit arrestable offence in public place	✓		✓	
OFF187	187	Living on prostitute's earnings	✓			
OFF193	193	Misuse of drugs	✓	✓	✓	✓
OFF194	194	Immigration act	✓	✓	✓	✓
OFF195	195	'Other' offences (not including motoring offences)	✓	✓	✓	✓
OFF800	800	Breach of suspended sentence	✓			
OFFDLIC	807 958 814	Driving whilst disqualified Driving licence offences Forgery of driving licence (sub-offence 1 only)	✓		✓	
OFF809	809	Vehicle insurance offences	✓			
OFF964	964	Vehicle registration and excise offences	✓		✓	
OFF74	74	Gross indecency with children	✓		✓	
OFFDRUG	77 92 93	Misuse of drugs Drug offences Permitting premises to be used for unlawful drug-related purposes	✓	✓	✓	✓

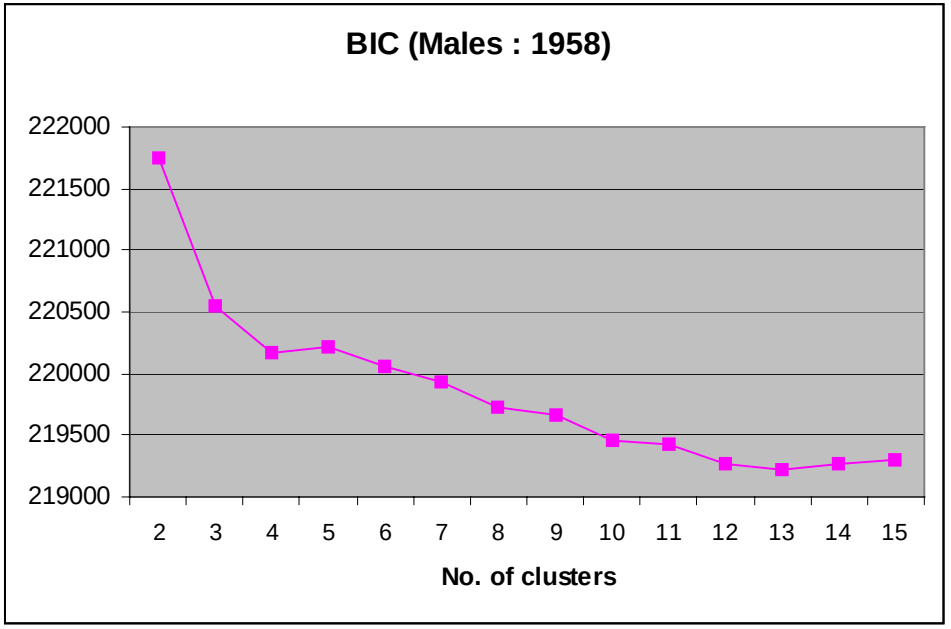
APPENDIX B1 : Males from 1953 cohort

	2 clusters	3 clusters	4 clusters	5 clusters	6clusters	7clusters	8 clusters	9 clusters	10 clusters	11 clusters	12 clusters	13 clusters
Number of cases	15353	15353	15353	15353	15353	15353	15353	15353	15353	15353	15353	15353
Number of parameters (Npar)	143	215	287	359	431	503	575	647	719	791	863	935
Log-likelihood Statistics:												
Log-likelihood (LL)	-98714.3553	-97846.7138	-97225.2859	-96739.3047	-96306.6091	-95974.4032	-95518.0048	-95160.7930	-94918.0983	-94702.2640	-94297.6203	-94051.3516
Log-prior	-8.5736	-9.3135	-9.6634	-11.3278	-11.4740	-12.5687	-14.1318	-14.8431	-14.4638	-15.6825	-16.0804	-17.4444
Log-posterior	-98722.9289	-97856.0273	-97234.9492	-96750.6324	-96318.0831	-95986.9718	-95532.1365	-95175.6361	-94932.5620	-94717.9465	-94313.7008	-94068.7961
BIC (based on LL)	**198807.0971**	**197765.8268**	**197216.9837**	**196939.0341**	**196767.6557**	**196797.2566**	**196578.4726**	**196558.0619**	**196766.6851**	**197029.0294**	**196913.7547**	**197115.2301**
AIC (based on LL)	197714.7106	196123.4276	195024.5717	194196.6093	193475.2181	192954.8063	192186.0096	191615.5861	191274.1965	190986.5280	190321.2406	189972.7033
CAIC (based on LL)	198950.0971	197980.8268	197503.9837	197298.0341	197198.6557	197300.2566	197153.4726	197205.0619	197485.6851	197820.0294	197776.7547	198050.2301



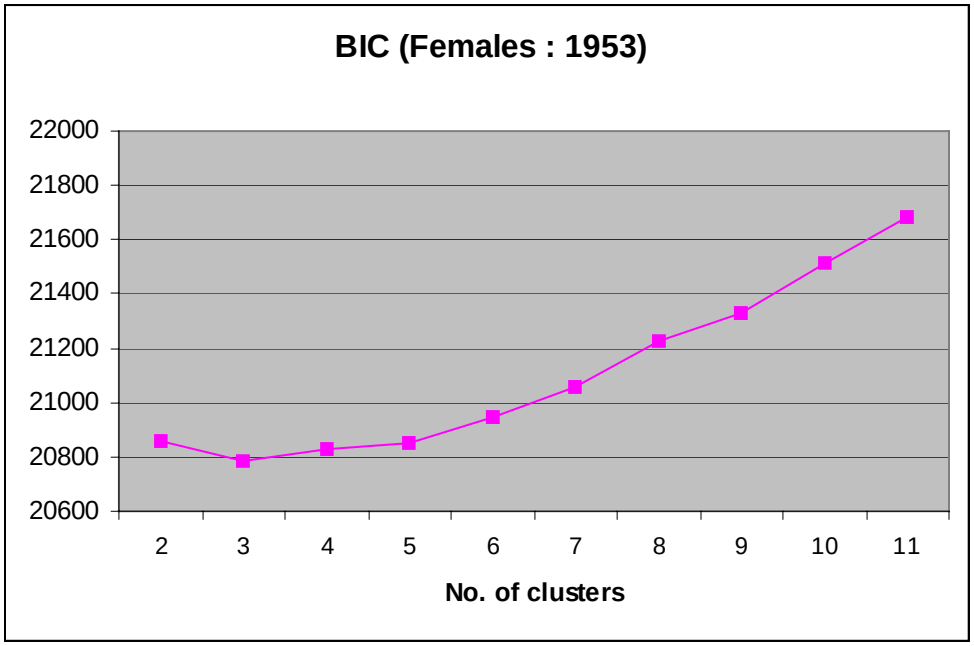
APPENDIX B2 : Males from 1958 cohort

	4 clusters	5 clusters	6clusters	7clusters	8 clusters	9 clusters	10 clusters	11 clusters	12 clusters	13 clusters	14 clusters	15 clusters
Number of cases	16724	16724	16724	16724	16724	16724	16724	16724	16724	16724	16724	16724
Number of parameters (Npar)	271	339	407	475	543	611	679	747	815	883	951	1019
Log-likelihood Statistics:												
Log-likelihood (LL)	-108769.9691	-108459.4006	-108049.8191	-107658.4916	-107224.9474	-106864.4739	-106428.0816	-106084.9387	-105668.0193	-105314.9777	-105012.958	-104696.2892
Log-prior	-9.7790	-10.1592	-12.0468	-14.1398	-14.5806	-15.1333	-16.6587	-16.7608	-16.5786	-17.2212	-17.6708	-18.6070
Log-posterior	-108779.7481	-108469.5598	-108061.8659	-107672.6314	-107239.5280	-106879.6072	-106444.7403	-106101.6995	-105684.5979	-105332.1989	-105030.629	-104714.8963
BIC (based on LL)	**220175.3048**	**220215.4406**	**220057.5504**	**219936.1682**	**219730.3527**	**219670.6785**	**219459.1667**	**219434.1536**	**219261.5877**	**219216.7772**	**219274.0120**	**219301.9459**
AIC (based on LL)	218081.9382	217596.8012	216913.6382	216266.9832	215535.8948	214950.9478	214214.1632	213663.8773	212966.0386	212395.9553	211927.9173	211430.5784
CAIC (based on LL)	220446.3048	220554.4406	220464.5504	220411.1682	220273.3527	220281.6785	220138.1667	220181.1536	220076.5877	220099.7772	220225.0120	220320.9459



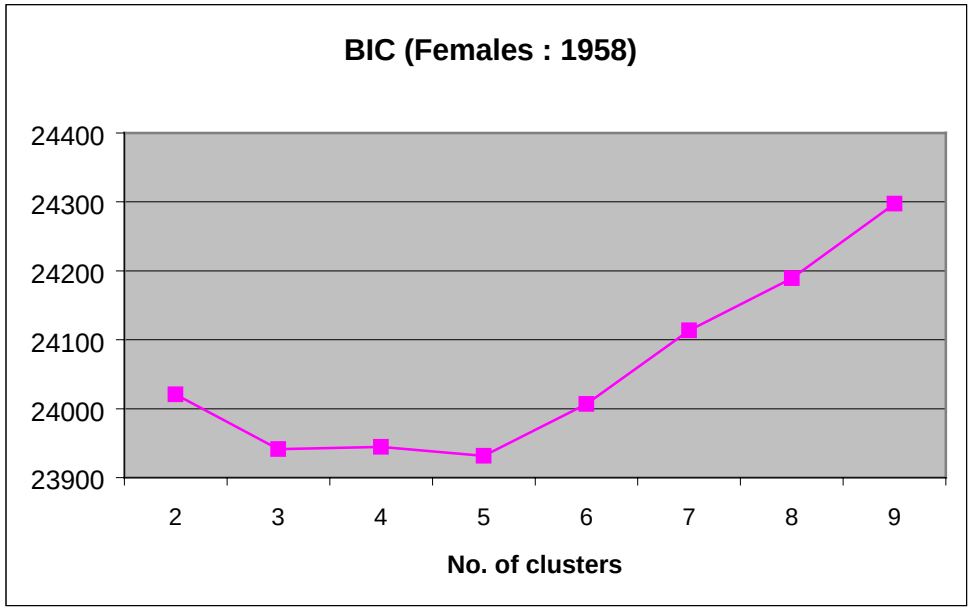
APPENDIX B3 : Females from 1953 cohort

	2 clusters	3 clusters	4 clusters	5 clusters	6clusters	7 clusters	8 Clusters
Number of cases	2596	2596	2596	2596	2596	2596	2596
Number of parameters (Npar)	59	89	119	149	179	209	239
Log-likelihood Statistics:							
Log-likelihood (LL)	-10195.3978	-10041.5915	-9946.2654	-9839.7656	-9771.0792	-9708.6616	-9674.1762
Log-prior	-8.0344	-10.5498	-10.1948	-10.7094	-11.2886	-11.7796	-11.9142
Log-posterior	-10203.4321	-10052.1414	-9956.4601	-9850.4750	-9782.3678	-9720.4412	-9686.0904
BIC (based on LL)	**20854.6374**	**20782.8768**	**20828.0763**	**20850.9286**	**20949.4075**	**21060.4242**	**21227.3052**
AIC (based on LL)	20508.7955	20261.1831	20130.5308	19977.5312	19900.1584	19835.3232	19826.3525
CAIC (based on LL)	20913.6374	20871.8768	20947.0763	20999.9286	21128.4075	21269.4242	21466.3052



APPENDIX B4 : Females from 1958 cohort

	2 clusters	3 clusters	4 clusters	5 clusters	6clusters	7 clusters	8 Clusters
Number of cases	2851	2851	2851	2851	2851	2851	2851
Number of parameters (Npar)	57	86	115	144	173	202	231
Log-likelihood Statistics:							
Log-likelihood (LL)	-11783.7043	-11628.5278	-11514.8918	-11392.9318	-11315.2537	-11253.2416	-11175.7197
Log-prior	-8.2071	-8.0080	-9.6831	-10.6399	-10.6792	-10.9301	-11.8639
Log-posterior	-11791.9114	-11636.5358	-11524.5749	-11403.5717	-11325.9330	-11264.1717	-11187.5836
BIC (based on LL)	**24020.8679**	**23941.2223**	**23944.6575**	**23931.4448**	**24006.7960**	**24113.4792**	**24189.1425**
AIC (based on LL)	23681.4087	23429.0557	23259.7836	23073.8635	22976.5075	22910.4833	22813.4394
CAIC (based on LL)	24077.8679	24027.2223	24059.6575	24075.4448	24179.7960	24315.4792	24420.1425



APPENDIX C1a : Profile of 9 cluster Model for 1953 Males (a)

Probabilities of a strip in each cluster having the specified offence

		ClusterA	ClusterB	ClusterC	ClusterD	ClusterE	ClusterF	ClusterG	ClusterH	ClusterI
Cluster Size		0.1850	0.1664	0.1236	0.1179	0.0993	0.0864	0.0826	0.0787	0.0601
OFF1A2	1	0.0024	0.0004	0.0007	0.0000	0.0000	0.0033	0.0006	0.0006	0.0000
OFF3	1	0.0014	0.0000	0.0017	0.0000	0.0000	0.0005	0.0000	0.0024	0.0010
OFF4	1	0.0019	0.0006	0.0000	0.0015	0.0000	0.0012	0.0000	0.0000	0.0000
OFF5	1	0.0051	0.0000	0.0001	0.0187	0.0002	0.0175	0.0000	0.0150	0.0000
OFF8	1	0.0030	0.0272	**0.0564**	**0.1857**	0.0001	**0.2864**	0.0120	**0.9998**	0.0001
OFF9	1	0.0029	0.0000	0.0033	0.0138	0.0014	0.0134	0.0012	0.0074	0.0000
OFF16	1	0.0049	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000
OFF17	1	0.0103	0.0013	0.0008	0.0000	0.0000	0.0009	0.0000	0.0016	0.0000
OFF18	1	0.0162	0.0000	0.0017	0.0000	0.0019	0.0009	0.0006	0.0000	0.0010
OFF19	1	0.0069	0.0000	0.0000	0.0000	0.0000	0.0080	0.0000	0.0039	0.0000
OFF20	1	0.0400	0.0055	0.0000	0.0126	0.0075	0.0185	0.0023	0.0082	0.0020
OFF21A23	1	0.0031	0.0004	0.0000	0.0000	0.0007	0.0015	0.0000	0.0000	0.0000
OFF22	1	0.0077	0.0010	0.0000	0.0018	0.0000	0.0131	0.0048	0.0006	0.0000
OFF24	1	0.0059	0.0000	0.0022	0.0000	0.0000	0.0008	0.0000	0.0008	0.0012
OFF27	1	0.0000	0.0067	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OFF28	1	0.0204	**0.1159**	**0.0894**	0.0296	0.0065	**0.3482**	0.0327	0.0112	0.0015
OFF29	1	0.0001	**0.1139**	0.0000	0.0017	0.0088	0.0074	0.0001	0.0027	0.0001
OFF30A27	1	0.0249	**0.5104**	**0.1002**	**0.1035**	0.0001	**0.4986**	0.0543	0.0169	0.0003
OFF31	1	0.0000	0.0309	0.0000	0.0000	0.0000	0.0019	0.0000	0.0000	0.0004
OFF32	1	0.0000	0.0412	0.0000	0.0000	0.0016	0.0007	0.0000	0.0004	0.0000
OFF33	1	0.0110	**0.0519**	0.0027	0.0035	0.0299	**0.1877**	0.0568	0.0015	0.0002
OFF34	1	0.0119	0.0130	0.0137	0.0132	0.0035	**0.0713**	0.0046	0.0218	0.0035
OFF35	1	0.0013	0.0000	0.0000	0.0028	0.0000	0.0083	0.0000	0.0003	0.0000
OFFFRAUD	1	0.0094	0.0000	**0.4356**	0.0166	0.0018	**0.2120**	0.0256	0.0001	0.0000
OFF39	1	0.0055	0.0143	0.0129	0.0021	0.0030	0.0261	0.0002	0.0006	0.0025
OFF40	1	0.0052	0.0334	0.0556	0.0037	0.0029	**0.0563**	0.0067	0.0000	0.0000
OFF41	1	**0.1004**	0.0055	0.0473	0.0043	0.0078	0.0286	0.0149	0.0070	0.0033
OFF42A43	1	0.0019	0.0033	0.0051	0.0009	0.0000	0.0068	0.0016	0.0000	0.0020
OFF43	1	0.0136	0.0000	0.0208	0.0007	0.0015	0.0061	0.0017	0.0014	0.0025
OFF49	1	0.0002	**0.3135**	**0.2998**	**0.0758**	**0.9999**	**0.5695**	**0.1174**	**0.0749**	**0.0546**
OFF44	1	0.0160	**0.0629**	0.0087	0.0015	0.0052	0.0226	0.0122	0.0026	0.0000
OFF45	1	**0.0921**	**0.0895**	0.0083	0.0074	0.0136	**0.2052**	**0.1095**	0.0042	0.0041
OFF46	1	0.0000	**0.0950**	**0.1285**	0.0242	0.0002	**0.1543**	0.0117	0.0335	**0.9998**
OFF47	1	0.0138	**0.0551**	0.0374	0.0098	0.0093	**0.0661**	0.0093	0.0054	0.0000
OFFVEH	1	0.0014	**0.1287**	0.0267	0.0555	0.0003	**0.5692**	**0.9997**	0.0300	0.0028
OFF50	1	0.0000	0.0054	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000
OFF52	1	0.0115	0.0000	0.0137	0.0000	0.0027	0.0038	0.0009	0.0000	0.0000
OFF54	1	**0.1404**	**0.0736**	**0.2034**	0.0258	0.0202	**0.2622**	0.0282	0.0137	0.0105
OFF56	1	0.0037	0.0114	0.0006	0.0104	0.0016	0.0095	0.0000	0.0019	0.0000
OFFCDAM	1	0.0053	0.0272	0.0197	**0.4130**	0.0118	**0.2263**	0.0332	0.0325	0.0000
OFFFGRY	1	0.0064	0.0025	**0.0959**	0.0026	0.0031	**0.0554**	0.0000	0.0006	0.0000
OFF64A65	1	0.0019	0.0000	0.0000	0.0010	0.0000	0.0008	0.0000	0.0016	0.0000
OFF67	1	0.0019	0.0000	0.0032	0.0000	0.0000	0.0005	0.0007	0.0008	0.0000
OFF79	1	0.0027	0.0000	0.0013	0.0008	0.0000	0.0010	0.0000	0.0008	0.0000
OFF80A83	1	0.0309	0.0000	**0.0919**	0.0067	0.0000	**0.0685**	0.0017	0.0233	0.0242
OFF81	1	0.0071	0.0000	0.0060	0.0007	0.0000	0.0049	0.0000	0.0006	0.0000
OFF84	1	0.0032	0.0000	0.0012	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000
OFF99	1	0.0110	0.0025	0.0088	0.0096	0.0012	0.0238	0.0011	0.0044	0.0005
OFF104	1	0.0126	0.0036	0.0214	**0.2188**	0.0000	**0.0818**	0.0024	0.0065	0.0041
OFF126	1	0.0017	0.0000	0.0000	0.0000	0.0000	0.0069	0.0002	0.0008	0.0000
OFFDDRIV	1	0.0115	0.0000	0.0011	0.0141	0.0002	0.0238	0.0041	0.0022	0.0000
OFF139	1	0.0312	0.0000	0.0029	0.0024	0.0006	0.0016	0.0000	0.0008	0.0081
OFF141	1	0.0000	0.0000	0.0000	0.0220	0.0018	0.0078	0.0000	0.0000	0.0000
OFF149	1	**0.1527**	**0.1071**	**0.0572**	**0.0934**	0.0099	**0.1252**	0.0134	0.0769	0.0250
OFF165	1	0.0186	0.0089	0.0022	**0.0784**	0.0078	0.0485	0.0178	0.0117	0.0014
OFF168	1	0.0029	0.0001	0.0000	0.0047	0.0000	0.0031	0.0000	0.0000	0.0000
OFF170	1	0.0074	0.0000	0.0000	0.0000	0.0035	0.0140	0.0031	0.0000	0.0000
OFF177	1	0.0022	0.0046	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
OFF181	1	0.0000	0.0035	0.0000	0.0000	0.0010	0.0000	0.0006	0.0006	0.0010
OFF185	1	0.0014	0.0084	0.0017	0.0020	0.0022	0.0167	0.0035	0.0006	0.0000
OFF186	1	0.0096	0.0083	0.0032	0.0079	0.0025	0.0360	0.0029	0.0014	0.0000
OFF187	1	0.0030	0.0005	0.0023	0.0000	0.0013	0.0000	0.0014	0.0000	0.0000
OFF193	1	**0.0632**	0.0000	0.0130	0.0173	0.0050	0.0377	0.0072	0.0007	0.0106
OFF194	1	0.0145	0.0000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010
OFF195	1	0.0022	0.0018	0.0071	**0.1129**	0.0041	0.0458	0.0000	0.0108	0.0035
OFF800	1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0173	0.0000	0.0000	0.0000
OFFDLIC	1	0.0045	0.0000	0.0104	0.0027	0.0003	**0.0998**	0.0221	0.0022	0.0000
OFF809	1	0.0003	0.0000	0.0000	0.0000	0.0000	0.0069	0.0000	0.0000	0.0000
OFF964	1	0.0048	0.0000	0.0016	0.0000	0.0041	0.0122	0.0000	0.0000	0.0000
OFF74	1	0.0053	0.0000	0.0000	0.0000	0.0019	0.0008	0.0000	0.0007	0.0000
OFFDRUG	1	**0.1457**	0.0024	**0.0591**	0.0003	0.0020	**0.0688**	0.0015	0.0171	0.0148

APPENDIX C1b : Profile of 9 cluster Model for 1953 Males (b)

Probability of specified offence belonging to a cluster

	Cluster								
	A	B	C	D	E	F	G	H	I
Cluster size	0.1850	0.1664	0.1236	0.1179	0.0993	0.0864	0.0826	0.0787	0.0601
OFF1A2	**0.4534**	0.0632	0.0894	0.0000	0.0000	0.2923	0.0526	0.0490	0.0000
OFF3	**0.3427**	0.0000	0.2723	0.0000	0.0000	0.0602	0.0000	0.2467	0.0782
OFF4	**0.4845**	0.1350	0.0000	0.2397	0.0000	0.1407	0.0000	0.0000	0.0000
OFF5	0.1596	0.0000	0.0012	**0.3753**	0.0036	0.2583	0.0000	0.2019	0.0000
OFF8	0.0040	0.0327	0.0503	0.1582	0.0000	0.1788	0.0072	**0.5687**	0.0000
OFF9	0.1188	0.0000	0.0890	**0.3570**	0.0310	0.2544	0.0217	0.1280	0.0000
OFF16	**0.8179**	0.0002	0.0000	0.0000	0.0000	0.1819	0.0000	0.0000	0.0000
OFF17	**0.7877**	0.0881	0.0405	0.0000	0.0000	0.0316	0.0000	0.0520	0.0000
OFF18	**0.8350**	0.0000	0.0594	0.0000	0.0525	0.0225	0.0136	0.0000	0.0170
OFF19	**0.5626**	0.0000	0.0000	0.0000	0.0000	0.3030	0.0000	0.1344	0.0000
OFF20	**0.5652**	0.0697	0.0000	0.1139	0.0568	0.1219	0.0143	0.0491	0.0091
OFF21A23	**0.6877**	0.0857	0.0000	0.0000	0.0764	0.1502	0.0000	0.0000	0.0000
OFF22	**0.4229**	0.0478	0.0000	0.0623	0.0000	0.3354	0.1174	0.0141	0.0000
OFF24	**0.6970**	0.0000	0.1720	0.0000	0.0000	0.0461	0.0000	0.0388	0.0461
OFF27	0.0000	**1.0000**	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OFF28	0.0523	0.2679	0.1535	0.0485	0.0089	**0.4179**	0.0375	0.0123	0.0013
OFF29	0.0011	**0.9063**	0.0000	0.0096	0.0419	0.0304	0.0003	0.0100	0.0004
OFF30A27	0.0282	**0.5209**	0.0760	0.0749	0.0001	0.2642	0.0275	0.0081	0.0001
OFF31	0.0000	**0.9636**	0.0000	0.0000	0.0000	0.0314	0.0000	0.0006	0.0044
OFF32	0.0000	**0.9647**	0.0000	0.0000	0.0219	0.0085	0.0000	0.0048	0.0000
OFF33	0.0577	0.2436	0.0095	0.0116	0.0838	**0.4577**	0.1325	0.0033	0.0004
OFF34	0.1338	0.1314	0.1031	0.0951	0.0209	**0.3755**	0.0230	0.1045	0.0128
OFF35	0.1815	0.0000	0.0001	0.2526	0.0000	**0.5487**	0.0000	0.0172	0.0000
OFFFRAUD	0.0223	0.0001	**0.6889**	0.0250	0.0023	0.2343	0.0270	0.0001	0.0000
OFF39	0.1275	**0.2971**	0.1987	0.0315	0.0367	**0.2818**	0.0022	0.0056	0.0189
OFF40	0.0496	0.2848	**0.3516**	0.0222	0.0146	0.2489	0.0284	0.0000	0.0000
OFF41	**0.5979**	0.0293	0.1882	0.0164	0.0248	0.0796	0.0397	0.0177	0.0064
OFF42A43	0.1403	0.**2234**	**0.2533**	0.0440	0.0000	**0.2386**	0.0524	0.0000	0.0479
OFF43	**0.4026**	0.0000	**0.4114**	0.0136	0.0237	0.0843	0.0230	0.0175	0.0239
OFF49	0.0002	0.1964	0.1395	0.0336	**0.3739**	0.1853	0.0365	0.0222	0.0123
OFF44	0.1615	**0.5697**	0.0589	0.0097	0.0281	0.1062	0.0548	0.0111	0.0000
OFF45	**0.2724**	**0.2382**	0.0163	0.0140	0.0216	**0.2835**	0.1447	0.0052	0.0039
OFF46	0.0001	0.1417	0.1424	0.0255	0.0001	0.1195	0.0087	0.0236	**0.5383**
OFF47	0.1011	**0.3618**	0.1826	0.0455	0.0366	0.2255	0.0302	0.0168	0.0000
OFFVEH	0.0016	0.1292	0.0199	0.0395	0.0001	0.2965	**0.4980**	0.0142	0.0010
OFF50	0.0000	**0.9817**	0.0000	0.0000	0.0183	0.0000	0.0000	0.0000	0.0000
OFF52	**0.4750**	0.0000	0.3759	0.0000	0.0607	0.0724	0.0159	0.0000	0.0000
OFF54	0.2732	0.1287	0.2644	0.0320	0.0211	0.2382	0.0245	0.0113	0.0066
OFF56	0.1357	0.3797	0.0157	0.2444	0.0312	0.1638	0.0000	0.0294	0.0000
OFFCDAM	0.0118	0.0547	0.0294	**0.5893**	0.0142	0.2365	0.0332	0.0309	0.0000
OFFFGRY	0.0622	0.0223	0.6273	0.0161	0.0163	0.2535	0.0000	0.0023	0.0000
OFF64A65	**0.5261**	0.0000	0.0000	0.1737	0.0000	0.1114	0.0000	0.1889	0.0000
OFF67	0.3822	0.0000	**0.4338**	0.0000	0.0000	0.0516	0.0642	0.0680	0.0000
OFF79	**0.5570**	0.0000	0.1766	0.1064	0.0000	0.0907	0.0000	0.0694	0.0000
OFF80A83	0.2103	0.0000	0.4174	0.0292	0.0000	0.2173	0.0051	0.0672	0.0535
OFF81	**0.5010**	0.0000	0.2851	0.0319	0.0000	0.1629	0.0000	0.0192	0.0000
OFF84	**0.7598**	0.0000	0.1876	0.0000	0.0000	0.0000	0.0525	0.0000	0.0000
OFF99	**0.2779**	0.0560	0.1488	0.1555	0.0158	**0.2815**	0.0124	0.0476	0.0045
OFF104	0.0591	0.0154	0.0671	**0.6548**	0.0000	0.1794	0.0050	0.0130	0.0062
OFF126	0.3140	0.0000	0.0000	0.0000	0.0000	**0.6102**	0.0133	0.0625	0.0000
OFFDDRIV	**0.3270**	0.0000	0.0204	0.2554	0.0035	**0.3156**	0.0514	0.0267	0.0000
OFF139	**0.8059**	0.0000	0.0497	0.0403	0.0078	0.0189	0.0000	0.0092	0.0681
OFF141	0.0000	0.0000	0.0000	**0.7501**	0.0531	0.1959	0.0000	0.0008	0.0000
OFF149	**0.3339**	0.2106	0.0835	0.1302	0.0116	0.1278	0.0131	0.0716	0.0177
OFF165	0.1575	0.0680	0.0122	**0.4226**	0.0354	0.1915	0.0670	0.0420	0.0037
OFF168	**0.3863**	0.0158	0.0000	**0.4029**	0.0000	0.1950	0.0000	0.0000	0.0000
OFF170	**0.4313**	0.0000	0.0000	0.0000	0.1091	**0.3800**	0.0795	0.0000	0.0000
OFF177	0.3449	**0.6472**	0.0000	0.0000	0.0000	0.0023	0.0056	0.0000	0.0000
OFF181	0.0005	**0.6971**	0.0000	0.0000	0.1176	0.0000	0.0574	0.0592	0.0682
OFF185	0.0632	**0.3416**	0.0516	0.0578	0.0525	**0.3522**	0.0695	0.0116	0.0000
OFF186	0.2170	0.1691	0.0479	0.1137	0.0302	**0.3795**	0.0290	0.0136	0.0000
OFF187	**0.4729**	0.0730	0.2425	0.0000	0.1118	0.0000	0.0997	0.0000	0.0000
OFF193	**0.5737**	0.0001	0.0791	0.1000	0.0246	0.1596	0.0291	0.0026	0.0312
OFF194	**0.9134**	0.0000	0.0656	0.0000	0.0000	0.0000	0.0000	0.0000	0.0210
OFF195	0.0197	0.0151	0.0432	**0.6551**	0.0200	0.1949	0.0000	0.0418	0.0103
OFF800	0.0000	0.0000	0.0000	0.0000	0.0000	**1.0000**	0.0000	0.0000	0.0000
OFFDLIC	0.0631	0.0000	0.0985	0.0245	0.0021	0.6589	0.1394	0.0135	0.0000
OFF809	0.0906	0.0000	0.0000	0.0000	0.0000	**0.9094**	0.0000	0.0000	0.0000
OFF964	**0.3468**	0.0000	0.0756	0.0000	0.1614	**0.4162**	0.0000	0.0000	0.0000
OFF74	**0.7556**	0.0000	0.0000	0.0000	0.1445	0.0558	0.0000	0.0442	0.0000
OFFDRUG	**0.6241**	0.0094	0.1691	0.0008	0.0046	0.1377	0.0028	0.0311	0.0205

APPENDIX C2a : Profile of 13 cluster Model for 1958 Males (a)

Probabilities of a strip in each cluster having the specified offence

	Cluster1	Cluster2	Cluster3	Cluster4	Cluster5	Cluster6	Cluster7	Cluster8	Cluster9	Clust10	Clust11	Clust12	Clust13
Size	0.1715	0.1067	0.1036	0.1012	0.0889	0.0748	0.0618	0.0588	0.0568	0.0526	0.0513	0.0363	0.0359
OFF1A2	0.0007	0.0000	0.0006	0.0005	0.0000	0.0048	0.0000	0.0000	0.0000	0.0011	0.0000	0.0034	0.0000
OFF3	0.0000	0.0000	0.0028	0.0000	0.0000	0.0040	0.0000	0.0020	0.0000	0.0000	0.0000	0.0020	0.0000
OFF4	0.0016	0.0000	0.0011	0.0000	0.0000	0.0010	0.0000	0.0020	0.0012	0.0000	0.0000	0.0000	0.0016
OFF5	0.0040	0.0008	0.0162	0.0004	0.0000	0.0133	0.0201	0.0024	0.0183	0.0010	0.0009	0.0351	0.0054
OFF8	0.0036	0.0411	0.9999	0.0039	0.0501	0.0077	0.3352	0.1567	0.1699	0.0002	0.0002	0.5381	0.0473
OFF9	0.0031	0.0013	0.0117	0.0030	0.0029	0.0131	0.0226	0.0040	0.0000	0.0023	0.0009	0.0399	0.0027
OFF17	0.0000	0.0016	0.0000	0.0000	0.0006	0.0167	0.0025	0.0000	0.0000	0.0000	0.0013	0.0061	0.0000
OFF18	0.0003	0.0002	0.0004	0.0004	0.0000	0.0214	0.0000	0.0000	0.0016	0.0011	0.0022	0.0053	0.0000
OFF19	0.0000	0.0006	0.0017	0.0005	0.0013	0.0183	0.0061	0.0023	0.0017	0.0000	0.0000	0.0052	0.0000
OFF20	0.0000	0.0024	0.0104	0.0051	0.0070	0.0864	0.0111	0.0000	0.0106	0.0011	0.0022	0.0271	0.0000
OF21A23	0.0013	0.0000	0.0000	0.0000	0.0000	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0086	0.0000
OFF22	0.0003	0.0021	0.0000	0.0005	0.0012	0.0105	0.0058	0.0000	0.0065	0.0020	0.0000	0.0126	0.0000
OFF24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0096	0.0018	0.0000	0.0010	0.0000	0.0000	0.0022	0.0066
OFF27	0.0000	0.0000	0.0000	0.0005	0.0000	0.0072	0.0010	0.0000	0.0000	0.0011	0.0000	0.0000	0.0016
OFF28	0.1531	0.1394	0.0089	0.0378	0.0470	0.0301	0.2784	0.0028	0.4473	0.0227	0.0057	0.2623	0.0247
OFF29	0.0010	0.0008	0.0006	0.0011	0.0006	0.0000	0.0061	0.0008	0.0050	0.0000	0.0000	0.0015	0.0000
OF30A27	0.0260	0.9998	0.0236	0.0006	0.0364	0.0001	0.4173	0.0270	0.6642	0.0078	0.0003	0.4020	0.0177
OFF33	0.0392	0.0351	0.0002	0.0167	0.0492	0.0000	0.0678	0.0016	0.1928	0.0034	0.0014	0.0833	0.0029
OFF34	0.0124	0.0127	0.0182	0.0041	0.0102	0.0316	0.0579	0.0021	0.0758	0.0000	0.0005	0.0664	0.0037
OFF35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0412	0.0000
OFF36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0412	0.0000
FRAUD	0.1967	0.0186	0.0106	0.0702	0.0286	0.0137	0.3257	0.0125	0.1942	0.0133	0.0066	0.0712	0.0099
OFF39	0.0229	0.0054	0.0028	0.0021	0.0000	0.0000	0.0443	0.0000	0.0316	0.0045	0.0027	0.0436	0.0060
OFF40	0.0259	0.0074	0.0014	0.0042	0.0018	0.0003	0.0508	0.0026	0.0549	0.0000	0.0024	0.0310	0.0000
OFF41	0.0901	0.0094	0.0073	0.0052	0.0085	0.0367	0.0210	0.0024	0.0255	0.0000	0.0015	0.0000	0.0054
42A43	0.0046	0.0013	0.0000	0.0014	0.0000	0.0000	0.0019	0.0000	0.0053	0.0000	0.0000	0.0000	0.0000
OFF43	0.0260	0.0005	0.0016	0.0027	0.0020	0.0000	0.0228	0.0038	0.0021	0.0011	0.0000	0.0000	0.0065
OFF44	0.0220	0.0132	0.0021	0.0090	0.0055	0.0110	0.0160	0.0022	0.0611	0.0000	0.0109	0.0321	0.0000
OFF45	0.1218	0.0309	0.0058	0.0126	0.0903	0.0263	0.0730	0.0067	0.3090	0.0187	0.0062	0.1012	0.0077
OFF46	0.0373	0.0724	0.0375	0.0585	0.0329	0.0116	0.3303	0.0463	0.1798	0.0111	0.9999	0.1437	0.0004
OFF47	0.0364	0.0112	0.0020	0.0089	0.0036	0.0055	0.0562	0.0067	0.0624	0.0045	0.0012	0.0394	0.0000
VEH	0.0238	0.1141	0.0258	0.0012	0.9998	0.0001	0.2603	0.0306	0.6936	0.0002	0.0001	0.4183	0.0114
OFF49	0.1150	0.1948	0.0584	0.9999	0.1279	0.0198	0.5669	0.0392	0.6309	0.0325	0.0007	0.4037	0.0293
OFF52	0.0197	0.0000	0.0000	0.0026	0.0004	0.0000	0.0046	0.0000	0.0035	0.0000	0.0005	0.0000	0.0000
OFF54	0.2753	0.0648	0.0245	0.0380	0.0347	0.0170	0.2775	0.0083	0.2351	0.0185	0.0260	0.1324	0.0248
OFF56	0.0130	0.0129	0.0005	0.0060	0.0028	0.0209	0.0018	0.0020	0.0363	0.0081	0.0000	0.0166	0.0014
CDAM	0.0000	0.1065	0.1025	0.0351	0.0741	0.0000	0.1273	0.0304	0.2573	0.9999	0.0188	0.5233	0.0046
FGRY	0.0374	0.0000	0.0000	0.0179	0.0018	0.0021	0.0932	0.0036	0.0474	0.0009	0.0000	0.0141	0.0094
64T066	0.0044	0.0030	0.0296	0.0009	0.0010	0.0464	0.0145	0.0055	0.0032	0.0102	0.0000	0.0579	0.0034
OFF74	0.0007	0.0000	0.0000	0.0000	0.0000	0.0112	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DRUGS	0.0139	0.0046	0.0041	0.0000	0.0000	0.0000	0.1938	0.0199	0.0001	0.0000	0.0243	0.0214	0.9997
OFF79	0.0000	0.0004	0.0006	0.0000	0.0000	0.0023	0.0128	0.0000	0.0000	0.0013	0.0004	0.0000	0.0012
80A83	0.0434	0.0103	0.0169	0.0114	0.0113	0.0402	0.2940	0.0555	0.0159	0.0043	0.0218	0.0062	0.0528
OFF81	0.0039	0.0025	0.0082	0.0000	0.0000	0.0092	0.0185	0.0062	0.0063	0.0011	0.0009	0.0043	0.0122
OFF84	0.0000	0.0000	0.0000	0.0000	0.0000	0.0096	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0016
OFF99	0.0035	0.0000	0.0012	0.0004	0.0025	0.0152	0.0060	0.0020	0.0049	0.0011	0.0000	0.0126	0.0000
OFF104	0.0005	0.0057	0.0451	0.0103	0.0233	0.2802	0.0906	0.0542	0.0258	0.0283	0.0000	0.2725	0.0251
OFF115	0.0000	0.0000	0.0032	0.0000	0.0000	0.0007	0.0000	0.0000	0.0041	0.0023	0.0000	0.0061	0.0000
OFF126	0.0064	0.0002	0.0005	0.0001	0.0005	0.0021	0.0182	0.0031	0.0000	0.0000	0.0000	0.0000	0.0016
DDRIV	0.0000	0.0000	0.0026	0.0004	0.0120	0.0247	0.0138	0.0000	0.0407	0.0000	0.0021	0.0244	0.0027
OFF137	0.0012	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0053	0.0027	0.0000	0.0034	0.0000
OFF139	0.0000	0.0027	0.0000	0.0008	0.0000	0.0507	0.0034	0.0011	0.0000	0.0021	0.0008	0.0104	0.0000
OFF141	0.0000	0.0000	0.0000	0.0013	0.0000	0.0072	0.0000	0.0000	0.0039	0.0097	0.0000	0.0801	0.0000
OFF143	0.0000	0.0000	0.0007	0.0026	0.0022	0.0036	0.0000	0.0000	0.0031	0.0141	0.0000	0.0284	0.0000
OFF149	0.0054	0.0302	0.0197	0.0094	0.0174	0.0000	0.2495	0.9998	0.0342	0.0001	0.0001	0.0697	0.0001
OFF162	0.0000	0.0000	0.0022	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0039	0.0000	0.0210	0.0000
OFF164	0.0000	0.0000	0.0009	0.0000	0.0000	0.0015	0.0010	0.0000	0.0015	0.0030	0.0000	0.0041	0.0000
OFF165	0.0078	0.0062	0.0089	0.0029	0.0029	0.0664	0.0000	0.0000	0.0268	0.0128	0.0043	0.1458	0.0035
OFF169	0.0009	0.0000	0.0007	0.0003	0.0000	0.0005	0.0010	0.0000	0.0011	0.0000	0.0000	0.0064	0.0000
OFF170	0.0000	0.0000	0.0000	0.0005	0.0024	0.0015	0.0000	0.0000	0.0193	0.0020	0.0000	0.0094	0.0000
OFF185	0.0011	0.0031	0.0000	0.0023	0.0022	0.0079	0.0100	0.0000	0.0109	0.0023	0.0022	0.0080	0.0000
OFF186	0.0173	0.0042	0.0019	0.0005	0.0015	0.0015	0.0171	0.0023	0.0353	0.0040	0.0000	0.0370	0.0024
OFF193	0.0085	0.0031	0.0014	0.0034	0.0081	0.0609	0.0104	0.0000	0.0000	0.0024	0.0053	0.0164	0.0089
OFF194	0.0000	0.0000	0.0000	0.0003	0.0000	0.0357	0.0000	0.0010	0.0000	0.0000	0.0009	0.0000	0.0000
OFF195	0.0000	0.0000	0.0114	0.0003	0.0000	0.0267	0.0000	0.0000	0.0089	0.0128	0.0009	0.2046	0.0016
DLIC	0.0049	0.0000	0.0019	0.0009	0.0206	0.0033	0.0479	0.0000	0.1203	0.0010	0.0000	0.0197	0.0000
OFF964	0.0006	0.0000	0.0000	0.0000	0.0020	0.0000	0.0013	0.0000	0.0339	0.0008	0.0000	0.0017	0.0000

APPENDIX C2b : Profile of 13 cluster Model for 1958 Males (b)

Probability of specified offence belonging to a cluster

	Cluster1	Cluster2	Cluster3	Cluster4	Cluster5	Cluster6	Cluster7	Cluster8	Cluster9	Cluster10	Cluster11	Cluster12	Cluster13
Proby	0.1715	0.1067	0.1036	0.1012	0.0889	0.0748	0.0618	0.0588	0.0568	0.0526	0.0513	0.0363	0.0359
Indicators													
OFF 1&2	0.1617	0.0000	0.0751	0.0655	0.0000	0.4619	0.0000	0.0000	0.0000	0.0761	0.0000	0.1598	0.0000
OFF3	0.0000	0.0000	0.3672	0.0000	0.0000	0.3866	0.0000	0.1550	0.0000	0.0000	0.0000	0.0912	0.0000
OFF4	0.3875	0.0000	0.1647	0.0000	0.0000	0.1056	0.0001	0.1660	0.0943	0.0000	0.0000	0.0000	0.0817
OFF5	0.0923	0.0121	0.2239	0.0053	0.0000	0.1329	0.1664	0.0188	0.1388	0.0068	0.0059	0.1706	0.0260
OFF8	0.0036	0.0251	0.5924	0.0023	0.0255	0.0033	0.1185	0.0527	0.0552	0.0001	0.0000	0.1117	0.0097
OFF9	0.0783	0.0206	0.1795	0.0442	0.0380	0.1449	0.2065	0.0345	0.0000	0.0182	0.0069	0.2142	0.0142
OFF17	0.0000	0.0869	0.0000	0.0000	0.0274	0.6533	0.0801	0.0000	0.0000	0.0000	0.0359	0.1165	0.0000
OFF18	0.0227	0.0092	0.0207	0.0190	0.0000	0.7223	0.0000	0.0000	0.0420	0.0272	0.0508	0.0863	0.0000
OFF19	0.0000	0.0232	0.0689	0.0190	0.0459	0.5318	0.1472	0.0534	0.0370	0.0000	0.0000	0.0737	0.0000
OFF20	0.0001	0.0221	0.0947	0.0451	0.0551	0.5684	0.0603	0.0000	0.0528	0.0051	0.0099	0.0866	0.0000
O21A23	0.2990	0.0000	0.0000	0.0000	0.0000	0.2659	0.0000	0.0000	0.0000	0.0000	0.0000	0.4350	0.0000
OFF22	0.0229	0.0904	0.0000	0.0188	0.0421	0.3123	0.1433	0.0000	0.1461	0.0415	0.0000	0.1825	0.0000
OFF24	0.0000	0.0000	0.0000	0.0000	0.0000	0.5978	0.0909	0.0000	0.0467	0.0000	0.0000	0.0680	0.1967
OFF27	0.0000	0.0000	0.0000	0.0699	0.0000	0.6964	0.0812	0.0000	0.0000	0.0769	0.0000	0.0000	0.0757
OFF28	0.2454	0.1391	0.0086	0.0357	0.0390	0.0211	0.1609	0.0015	0.2375	0.0112	0.0027	0.0890	0.0083
OFF29	0.1355	0.0709	0.0518	0.0860	0.0448	0.0000	0.3007	0.0397	0.2279	0.0000	0.0000	0.0427	0.0000
30A27	0.0226	0.5398	0.0124	0.0003	0.0164	0.0000	0.1305	0.0080	0.1908	0.0021	0.0001	0.0738	0.0032
OFF33	0.1912	0.1066	0.0006	0.0480	0.1243	0.0000	0.1192	0.0026	0.3114	0.0051	0.0021	0.0860	0.0030
OFF34	0.1081	0.0691	0.0961	0.0210	0.0460	0.1203	0.1826	0.0063	0.2196	0.0000	0.0012	0.1229	0.0068
OFF35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
OFF36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000
FRAUD	0.4046	0.0238	0.0131	0.0852	0.0305	0.0123	0.2416	0.0088	0.1323	0.0084	0.0041	0.0310	0.0043
OFF39	0.3353	0.0491	0.0251	0.0180	0.0000	0.0000	0.2338	0.0000	0.1533	0.0200	0.0120	0.1351	0.0183
OFF40	0.3257	0.0577	0.0105	0.0311	0.0117	0.0014	0.2303	0.0114	0.2285	0.0000	0.0092	0.0824	0.0000
OFF41	0.6335	0.0410	0.0309	0.0214	0.0311	0.1125	0.0533	0.0058	0.0594	0.0000	0.0032	0.0000	0.0079
42A43	0.5323	0.0951	0.0000	0.0938	0.0000	0.0000	0.0776	0.0000	0.2012	0.0000	0.0000	0.0000	0.0000
OFF43	0.6221	0.0082	0.0231	0.0374	0.0248	0.0001	0.1962	0.0313	0.0164	0.0081	0.0000	0.0000	0.0323
OFF44	0.2712	0.1009	0.0154	0.0652	0.0350	0.0592	0.0711	0.0093	0.2492	0.0000	0.0401	0.0835	0.0000
OFF45	0.3277	0.0517	0.0094	0.0200	0.1259	0.0308	0.0708	0.0061	0.2753	0.0154	0.0050	0.0576	0.0044
OFF46	0.0542	0.0654	0.0329	0.0501	0.0248	0.0073	0.1729	0.0230	0.0864	0.0049	0.4338	0.0441	0.0001
OFF47	0.3388	0.0648	0.0113	0.0491	0.0173	0.0222	0.1888	0.0212	0.1924	0.0129	0.0034	0.0777	0.0000
OFFVEH	0.0225	0.0674	0.0148	0.0007	0.4915	0.0001	0.0890	0.0099	0.2179	0.0000	0.0000	0.0840	0.0023
OFF49	0.0785	0.0828	0.0241	0.4027	0.0452	0.0059	0.1396	0.0092	0.1426	0.0068	0.0001	0.0583	0.0042
OFF52	0.8067	0.0000	0.0000	0.0627	0.0087	0.0000	0.0684	0.0000	0.0472	0.0000	0.0064	0.0000	0.0000
OFF54	0.4546	0.0665	0.0244	0.0370	0.0297	0.0123	0.1652	0.0047	0.1285	0.0094	0.0128	0.0463	0.0086
OFF56	0.2360	0.1456	0.0055	0.0647	0.0266	0.1654	0.0115	0.0123	0.2185	0.0448	0.0000	0.0638	0.0054
CDAM	0.0001	0.0881	0.0823	0.0275	0.0510	0.0000	0.0610	0.0139	0.1132	0.4072	0.0075	0.1471	0.0013
FGRY	0.3542	0.0000	0.0000	0.1002	0.0088	0.0088	0.3181	0.0117	0.1487	0.0027	0.0000	0.0282	0.0186
64T66	0.0634	0.0264	0.2568	0.0079	0.0074	0.2900	0.0752	0.0269	0.0153	0.0447	0.0000	0.1757	0.0103
OFF74	0.1174	0.0000	0.0000	0.0000	0.0000	0.8203	0.0622	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
DRUGS	0.0438	0.0090	0.0077	0.0001	0.0000	0.0000	0.2205	0.0215	0.0001	0.0000	0.0229	0.0143	0.6599
OFF79	0.0000	0.0349	0.0490	0.0000	0.0000	0.1431	0.6644	0.0000	0.0000	0.0576	0.0161	0.0000	0.0348
80A83	0.1803	0.0267	0.0423	0.0280	0.0244	0.0728	0.4406	0.0790	0.0218	0.0055	0.0271	0.0054	0.0460
OFF81	0.1315	0.0536	0.1681	0.0000	0.0000	0.1365	0.2280	0.0720	0.0712	0.0115	0.0094	0.0308	0.0873
OFF84	0.0000	0.0000	0.0000	0.0000	0.0000	0.7978	0.1363	0.0000	0.0000	0.0000	0.0000	0.0000	0.0658
OFF99	0.1739	0.0000	0.0369	0.0124	0.0662	0.3342	0.1090	0.0344	0.0822	0.0167	0.0000	0.1340	0.0000
OFF104	0.0017	0.0116	0.0900	0.0200	0.0398	0.4032	0.1078	0.0613	0.0282	0.0286	0.0000	0.1903	0.0173
OFF115	0.0000	0.0000	0.3412	0.0000	0.0000	0.0586	0.0000	0.0000	0.2446	0.1237	0.0000	0.2319	0.0000
OFF126	0.4007	0.0079	0.0194	0.0030	0.0163	0.0571	0.4081	0.0668	0.0000	0.0000	0.0000	0.0000	0.0207
DDRIV	0.0000	0.0000	0.0364	0.0048	0.1422	0.2472	0.1142	0.0000	0.3095	0.0000	0.0145	0.1182	0.0129
OFF137	0.2754	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3876	0.1802	0.0000	0.1568	0.0000
OFF139	0.0000	0.0584	0.0000	0.0162	0.0000	0.7642	0.0424	0.0126	0.0000	0.0218	0.0086	0.0757	0.0000
OFF141	0.0000	0.0000	0.0000	0.0313	0.0000	0.1250	0.0000	0.0000	0.0509	0.1179	0.0000	0.6750	0.0000
OFF143	0.0000	0.0000	0.0270	0.0969	0.0711	0.0972	0.0000	0.0000	0.0647	0.2686	0.0000	0.3746	0.0000
OFF149	0.0105	0.0369	0.0234	0.0109	0.0177	0.0000	0.1766	0.6726	0.0222	0.0000	0.0001	0.0290	0.0000
OFF162	0.0000	0.0000	0.1776	0.0000	0.0000	0.0505	0.0000	0.0000	0.0000	0.1653	0.0000	0.6066	0.0000
OFF164	0.0000	0.0000	0.1407	0.0000	0.0000	0.1663	0.0949	0.0000	0.1316	0.2426	0.0000	0.2240	0.0000
OFF165	0.0821	0.0406	0.0567	0.0177	0.0161	0.3053	0.0001	0.0000	0.0936	0.0412	0.0135	0.3254	0.0077
OFF169	0.2255	0.0048	0.1136	0.0528	0.0000	0.0558	0.0975	0.0000	0.0982	0.0000	0.0000	0.3519	0.0000
OFF170	0.0000	0.0000	0.0000	0.0279	0.1115	0.0578	0.0000	0.0000	0.5717	0.0537	0.0000	0.1775	0.0000
OFF185	0.0557	0.1003	0.0000	0.0702	0.0585	0.1796	0.1871	0.0000	0.1887	0.0372	0.0345	0.0880	0.0000
OFF186	0.3396	0.0508	0.0225	0.0053	0.0154	0.0125	0.1208	0.0156	0.2297	0.0242	0.0000	0.1539	0.0098
OFF193	0.1526	0.0349	0.0153	0.0364	0.0760	0.4790	0.0674	0.0000	0.0000	0.0135	0.0287	0.0626	0.0337
OFF194	0.0000	0.0000	0.0000	0.0125	0.0000	0.9489	0.0000	0.0213	0.0000	0.0000	0.0173	0.0000	0.0000
OFF195	0.0000	0.0000	0.0988	0.0022	0.0000	0.1676	0.0000	0.0000	0.0423	0.0565	0.0038	0.6239	0.0049
DLIC	0.0608	0.0000	0.0140	0.0068	0.1329	0.0177	0.2153	0.0000	0.4967	0.0039	0.0000	0.0519	0.0000
OFF964	0.0459	0.0000	0.0000	0.0000	0.0726	0.0000	0.0327	0.0000	0.8046	0.0185	0.0000	0.0256	0.0000

APPENDIX C3a : Profile of 3 cluster Model for 1953 Females (a)

Probabilities of a strip in each cluster having the specified offence

	Cluster		
	A	B	C
Cluster Size	0.5943	0.3625	0.0432
OFF8	0.1011	0.0010	0.0002
OFF28	0.0304	0.0031	0.0101
OFF29	0.0066	0.0051	0.0000
OFF30A27	0.0439	0.0003	0.0090
OFF34	0.0091	0.0000	0.0000
OFF39	0.0136	0.0000	0.0000
OFFFRAUD	0.1876	0.0078	0.0373
OFF40	0.0384	0.0019	0.0269
OFF41	0.0011	0.0016	0.9886
OFF43	0.0313	0.0008	0.0001
OFF49	0.3048	0.0284	0.0363
OFF44	0.0065	0.0000	0.0000
OFF45	0.0110	0.0000	0.0000
OFF46	0.1054	0.9997	0.0052
OFF47	0.0378	0.0017	0.0001
OFFVEH	0.0382	0.0000	0.0090
OFF52	0.0056	0.0019	0.1743
OFF54	0.1361	0.0127	0.0003
OFF56	0.0065	0.0000	0.0000
OFFCDAM	0.0415	0.0000	0.0001
OFFFGRY	0.0670	0.0005	0.0100
OFF80A83	0.0291	0.0032	0.0001
OFF99	0.0153	0.0005	0.0000
OFF104	0.0512	0.0022	0.0001
OFF149	0.0545	0.0031	0.0090
OFF193	0.0226	0.0011	0.0000
OFF194	0.0058	0.0000	0.0092
OFF195	0.0162	0.0000	0.0000
OFFDRUG	0.0544	0.0032	0.0001

APPENDIX C3b : Profile of 3 cluster Model for 1953 Females (b)

Probability of specified offence belonging to a cluster

	Cluster		
	A	B	C
OFF8	0.9939	0.0061	0.0000
OFF28	0.9203	0.0576	0.0221
OFF29	0.6777	0.3223	0.0000
OFF30A27	0.9811	0.0045	0.0144
OFF34	1.0000	0.0000	0.0000
OFF39	1.0000	0.0000	0.0000
OFFFRAUD	0.9620	0.0242	0.0138
OFF40	0.9252	0.0278	0.0469
OFF41	0.0147	0.0133	0.9719
OFF43	0.9846	0.0154	0.0000
OFF49	0.9388	0.0532	0.0080
OFF44	1.0000	0.0000	0.0000
OFF45	1.0000	0.0000	0.0000
OFF46	0.1472	0.8524	0.0004
OFF47	0.9734	0.0266	0.0000
OFFVEH	0.9833	0.0000	0.0167
OFF52	0.2897	0.0591	0.6512
OFF54	0.9462	0.0538	0.0000
OFF56	1.0000	0.0000	0.0000
OFFCDAM	0.9998	0.0002	0.0000
OFFFGRY	0.9852	0.0042	0.0106
OFF80A83	0.9366	0.0634	0.0000
OFF99	0.9824	0.0175	0.0000
OFF104	0.9746	0.0254	0.0000
OFF149	0.9560	0.0327	0.0113
OFF193	0.9702	0.0298	0.0000
OFF194	0.8975	0.0000	0.1025
OFF195	1.0000	0.0000	0.0000
OFFDRUG	0.9650	0.0350	0.0000

APPENDIX C4a : Profile of 5 cluster Model for 1958 Females (a)

Probabilities of a strip in each cluster having the specified offence

	Cluster				
	A	B	C	D	E
Cluster Size	0.3221	0.3002	0.2201	0.1280	0.0295
OFF8	0.0062	0.2184	0.0181	0.0353	0.0134
OFF28	0.0027	0.0604	0.0495	0.0241	0.0001
OFF30A27	0.0000	0.0702	0.0331	0.0247	0.0134
OFF33	0.0008	0.0078	0.0057	0.0000	0.0000
OFF34	0.0020	0.0095	0.0033	0.0080	0.0000
OFFFRAUD	0.0057	0.0176	0.4988	0.0855	0.0539
OFF39	0.0005	0.0133	0.0094	0.0143	0.0000
OFF40	0.0000	0.0307	0.0697	0.0081	0.0001
OFF41	0.0041	0.0000	0.0058	0.0001	0.9090
OFF43	0.0000	0.0499	0.0275	0.0000	0.0001
OFF45	0.0012	0.0187	0.0046	0.0000	0.0000
OFF46	0.9998	0.1078	0.1679	0.1778	0.0027
OFF47	0.0019	0.0383	0.0118	0.0138	0.0119
OFFVEH	0.0001	0.1031	0.0280	0.0059	0.0001
OFF49	0.0004	0.0623	0.2421	0.9989	0.0586
OFF52	0.0021	0.0000	0.0041	0.0032	0.3005
OFF54	0.0262	0.0220	0.3409	0.0003	0.0002
OFF56	0.0005	0.0198	0.0052	0.0010	0.0000
OFFCDAM	0.0018	0.1138	0.0103	0.0094	0.0130
OFFFGRY	0.0000	0.0093	0.1331	0.0421	0.0133
OFFDRUGS	0.0024	0.1095	0.0511	0.0000	0.0001
OFF80A83	0.0121	0.0245	0.0567	0.0035	0.0127
OFF99	0.0000	0.0137	0.0035	0.0029	0.0000
OFF104	0.0022	0.0970	0.0071	0.0037	0.0135
OFF149	0.0031	0.0762	0.0186	0.0007	0.0001
OFF193	0.0000	0.0197	0.0107	0.0012	0.0000
OFF194	0.0038	0.0115	0.0025	0.0000	0.0000
OFF195	0.0006	0.0152	0.0000	0.0066	0.0122

APPENDIX C4b : Profile of 5 cluster Model for 1958 Females (b)

Probability of specified offence belonging to a cluster

	Cluster				
	A	B	C	D	E
Overall Probability	0.3221	0.3002	0.2201	0.1280	0.0295
Indicators					
OFF8	0.0262	0.8577	0.0520	0.0590	0.0051
OFF28	0.0263	0.5496	0.3307	0.0933	0.0000
OFF30A27	0.0000	0.6606	0.2281	0.0989	0.0124
OFF33	0.0690	0.6079	0.3230	0.0001	0.0000
OFF34	0.1229	0.5440	0.1382	0.1949	0.0000
OFFFRAUD	0.0140	0.0407	0.8485	0.0845	0.0122
OFF39	0.0210	0.4967	0.2558	0.2265	0.0000
OFF40	0.0001	0.3604	0.5990	0.0405	0.0000
OFF41	0.0451	0.0001	0.0432	0.0003	0.9114
OFF43	0.0001	0.7123	0.2875	0.0001	0.0000
OFF45	0.0537	0.8014	0.1448	0.0000	0.0000
OFF46	0.7777	0.0781	0.0892	0.0549	0.0001
OFF47	0.0360	0.6833	0.1546	0.1052	0.0209
OFFVEH	0.0004	0.8173	0.1625	0.0197	0.0000
OFF49	0.0006	0.0926	0.2642	0.6341	0.0085
OFF52	0.0623	0.0002	0.0830	0.0381	0.8165
OFF54	0.0937	0.0734	0.8326	0.0003	0.0000
OFF56	0.0208	0.8057	0.1562	0.0173	0.0000
OFFCDAM	0.0150	0.8856	0.0585	0.0310	0.0099
OFFFGRY	0.0002	0.0733	0.7738	0.1424	0.0103
OFFDRUGS	0.0172	0.7323	0.2505	0.0000	0.0000
OFF80A83	0.1590	0.2993	0.5081	0.0184	0.0152
OFF99	0.0000	0.7823	0.1467	0.0709	0.0000
OFF104	0.0221	0.9025	0.0483	0.0148	0.0123
OFF149	0.0353	0.8155	0.1460	0.0032	0.0000
OFF193	0.0000	0.7030	0.2794	0.0175	0.0000
OFF194	0.0341	0.7639	0.0000	0.1416	0.0603

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