

Durham E-Theses

The cognitive effects of long term imprisonment

P. A. Banister

How to cite:

Banister, P. A. (1978) The cognitive effects of long term imprisonment. Doctoral thesis, Durham University.

Use policy

The full-text may be used and/or reproduced, and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not-for-profit purposes provided that:

- a full bibliographic reference is made to the original source
- a <https://etheses.durham.ac.uk/id/eprint/8102/> is made to the metadata record in Durham E-Theses
- the full-text is not changed in any way

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

Please consult the [full Durham E-Theses policy](#) for further details.

THE COGNITIVE EFFECTS OF LONG TERM IMPRISONMENT

P.A. BANISTER

Thesis presented for part fulfilment of the
degree of Ph.D., University of Durham, 1978

The copyright of this thesis rests with the author.
No quotation from it should be published without
his prior written consent and information derived
from it should be acknowledged.

P.A. Banister

The Cognitive Effects of Long Term Imprisonment

ABSTRACT

This thesis presents data on the psychological correlates of long term imprisonment for a representative sample of men serving either indeterminate or determinate sentences of ten years or over in a number of English prisons. Four groups of prisoners matched for age but differing in mean length of total imprisonment served were tested on a battery of cognitive tests, comprising tests of reaction time, the Gibson Spiral Maze, the General Aptitude Test Battery Form Matching subtest, the Wechsler Memory Scale Associate Learning and Visual Reproduction subtests, the Purdue Pegboard and the Wechsler Adult Intelligence Scale. The 154 men left from the initial sample of 175 prisoners after a mean interval of 19.08 months were retested, thus permitting two cross-sectional analyses and a longitudinal analysis of the results. The results indicated no straightforward relationship between test performance and length of imprisonment; there was no decline in general intellectual capacity, but there was a reduction in perceptual-motor speed. In addition, there was evidence of an increased reliance on verbal skills. These results were discussed in relation to showing similarities to those derived from studies of ageing. A number of possible moderating variables which could provide alternative explanations for the results found were also investigated, and it was found that the results could not be accounted for in terms of differential release on parole,

differential use of prison educational or other facilities, or differences between the groups in terms of their offence category or criminal history. The quantitative approach used in this study was also critically analysed, and compared to an alternative qualitative approach to the same area, it being concluded that both methods were of use in the study of the effects of long term imprisonment.

THE COGNITIVE EFFECTS OF LONG TERM IMPRISONMENT

P.A. BANISTER

Thesis presented for part fulfilment of the
degree of Ph.D., University of Durham, 1978

INDEX

	<u>PAGE</u>
GUIDE TO THE STRUCTURE OF THE THESIS	
PART I	
INTRODUCTION	1
The History of Prison	2
The Purposes of Imprisonment	6
Theorizing on the Effects of Imprisonment	11
Sociological Findings	13
Psychological Findings	16
Other Relevant Fields	20
(a) Institutionalization	20
(b) Prisoner of War and Concentration Camp Studies	24
(c) Isolation Studies	27
(d) "Sensory Deprivation" Studies	28
Conclusions of Introduction	33
PROCEDURE	36
Experimental Design	36
Selection of Sample	36
(i) The First Cross-Sectional Sample	37
(ii) The Longitudinal Sample	43
(a) The Prison Sample (including the Second Cross-Sectional Sample)	43
(b) The Groups of Subjects Paroled and Detained	45
(iii) The Control Group	48

	<u>PAGE</u>
Selection of the Tests	51
(i) The Reaction Time Tests	53
(a) Introduction	53
(b) Administration	53
(c) Scoring	54
(ii) The Gibson Spiral Maze	54
(a) Introduction	54
(b) Administration	55
(c) Scoring	56
(iii) The Form Matching Test	57
(a) Introduction	57
(b) Administration	59
(c) Scoring	59
(iv) Visual Reproduction and Associate Learning	59
(a) Introduction	59
(b) Administration	61
(c) Scoring	61
(v) Purdue Pegboard	62
(a) Introduction	62
(b) Administration	63
(c) Scoring	64
(vi) Wechsler Adult Intelligence Scale	64
(a) Introduction	64
(b) Administration	67
(c) Scoring	68
(d) Derived Scores	69
Administration of the Tests	72

	<u>PAGE</u>
RESULTS	75
General Introduction	75
The Problems of Control	76
Statistical Analysis: a Note	78
Results	80
(i) The First Cross-sectional Results	80
(ii) The Longitudinal Results	90
(a) The Longitudinal Analysis	90
(b) The Second Cross-Sectional Results	97
(iii) The Prisoners Paroled and Detained	103
Summary of Statistically Significant Results	108
DISCUSSION	111
Introduction	111
(i) The First Cross-Sectional Results	111
(a) Summary of Results	111
(b) Control Results	112
(c) Discussion	113
(ii) The Longitudinal Results	122
(iia) The Longitudinal Analysis	122
(a) Summary of Results	122
(b) Control Results	123
(c) Discussion	124
(A) Test-Retest Correlations	124
(B) Discussion of the Longitudinal Results	126
(iib) The Second Cross-sectional Analysis	132
(a) Summary of Results	132
(b) Control Results	133
(c) Discussion	134

	<u>PAGE</u>
PART IV	
IMPLICATIONS OF THIS STUDY	241
Introduction	241
Generalizability of Findings	242
Implications for Research in Criminology	243
Research in Prisons	243
Future Research into the Effects of Long Term Imprisonment	244
Implications for the Treatment of Long Term Prisoners	246
 BIBLIOGRAPHY	 250
 APPENDICES	 266

ACKNOWLEDGEMENTS

Grateful thanks are due to Dr. Neil Bolton, Dr. Ken Heskin, Mrs. Olive Kinsley and Professor F.V. Smith, all of whom have been a great help and inspiration to me in both the field work and the writing of this thesis. Thanks are also due to all the unnamed prisoners and controls who kindly agreed to take part in this project.

GUIDE TO THE STRUCTURE OF THE THESIS

For the sake of clarity of exposition, this thesis is divided into four main parts, as follows:

PART I

This is the main part of the thesis; it commences with a critical review of relevant previous work in both the area of long term imprisonment and in related fields, outlines the reasons for carrying out this particular study, and puts forward the main hypotheses of this thesis. The sample selection and the tests used in this study are then described in detail. The main results are presented, and are then discussed in relation to the initial hypotheses. Unexpected findings are also discussed in this part, and further hypotheses are developed in an attempt to account for these results. Part one concludes with a brief summary of the major findings of this section.

PART II

This part develops from the main findings of part one, and the hypotheses put forward in that part to account for the results; a number of moderating variables are investigated in this part, to investigate the possibility that the major findings can be explained by alternative hypotheses to those put forward in part one. Again, this part concludes with a summary of its findings.

PART III

This part critically considers in detail the methodology used in this study; it could well be that the results found in part one are due not to changes occurring during long term imprisonment, but are merely

a reflection of the inadequacies of either the tests used in this study or the general methodology adopted. An alternative approach to the same area is considered in detail, and is critically compared with the approach used in this thesis.

PART IV

This part discusses the implications of this study for the treatment of prisoners and for future research in this area.

Imprisonment can be defined (Oxford English Dictionary, 1976) as the holding of a person in captivity, and it is now (for all but a few offences) the severest sanction of the criminal law in this country. As this introduction will endeavour to show, at the present moment very little is known about its effects on psychological functioning, and the research reported in this paper is an attempt to provide some information on any changes in cognition that may occur to prisoners serving long sentences, by comparing their scores on various psychological tests after they have been imprisoned for varying lengths of time. This study is limited to prisoners in this country, but reference will be made to literature in general, as there has been a lot of work carried out in other countries which may help the understanding of the problem. Before going on to describe this research, the introduction reviews related literature in an attempt to show what, on a priori grounds, one might expect such research to indicate. This introduction is organized into sections, each section dealing with a slightly different aspect of the field, in order to fulfil this purpose. It starts off with a history of prison, reviewing what its stated purposes are, and to what extent they are carried out. It then goes on to look at suppositions, theorizing, and research findings in this area, both from a sociological and from a psychological angle. It continues with a brief resume of other indirectly related research in the areas of "institutionalization" (mainly in hospitals), prisoner of war and concentration camp studies, isolation work (including Antarctic and space studies), and finally what may loosely be called "sensory deprivation" work, and its related theorizing. Conclusions are then drawn from the above researches as to what might be expected to occur during incarceration in prison for a long time.

The History of Prison

To understand the present-day functions of prison, it is necessary to briefly look at its historical development, as this has had a marked effect on the prison system's current practices. The use of imprisonment as a penalty for criminal and political offenders is now universally accepted as an essential part of the penal method, but it is a comparatively modern practice. "In ancient times, crime was regarded as a wrong done to an individual, and compensation or retribution could be exacted by the victim or his family. As primitive communities developed, however, the right to private revenge was abolished, experience having shown that it was an obstacle to the maintenance of an ordered social life. Gradually the idea evolved that the community should assume the function of protecting society by punishing the wrong-doer, and, if possible, preventing the repetition of the crime." (HMSO, 1968b p.4). The sanctions that were most frequently used were compensatory, financial, corporal, or capital (and, later, transportation), prisons being mainly used merely as places of detention, for offenders awaiting punishment, trial or appeal, and to ensure the safe-keeping of hostages.

Prisons have been used for such purposes throughout history; Genesis, for instance, mentions that Joseph was incarcerated by Pharoah in 2000 BC, and the Romans used them to ensure safe custody. Plato suggested that prisons could be used for punishment, but his idea was never taken up in this country until Saxon times, when it was occasionally used as punishment; later Henry II and Henry III used imprisonment for perjury and for infringement of forest laws, and the 13th century ecclesiastical authorities used it too, as they could not use the death penalty. These instances were, however, the exception rather than the rule, and even in the 18th Century, prison was used as a penal institution only for some petty offenders and debtors, alternative methods of punishment still being the most frequently used.

The first real use of a prison in the way in which it is now understood to be occurred in the USA, where Rush in 1787 proposed that imprisonment itself should be used as a penalty for crime; he suggested that criminals should be classified and segregated, and put to work in prisons where their sentences would be indeterminate, their release dependent on their progress. In 1790, a law was passed in the United States which led to the building of Walnut Street Gaol, Philadelphia, in 1792 on the above lines. This prison was soon followed by others, by and large erected on solitary confinement principles, but this development did not occur in Britain until about 50 years later.

Unlike America, English developments in the use of prisons were slow and piecemeal. In the late 18th century, English prisons were generally unhygienic, often damp, and not subject to any form of inspectorate; prisoners were often ill fed, and more men are reputed to have died of fever in 18th century prisons than were actually executed. In some gaols, prisoners had to pay for their treatment, as many prisons were privately owned; this system also led to a lot of abuse. Reformers such as John Howard and Jeremy Bentham advocated prison reforms, and Inquiries such as the 1816 Buxton Inquiry commented that men are "returned to the world impaired in health, debased in intellect, and corrupted in principles". (Howard 1960, p.30). Despite these and similar comments, and the fact that Millbank Prison had to be closed in 1823, only two years after its completion, due to an outbreak of scurvy and cholera, little was done about the situation. An act was passed in 1823 to generally reform prisons, but it was not effective until the creation of an inspectorate in 1835 ensured that it was carried out; gaol keepers were made the paid servants of the local authority, and prisons were made sanitary and more secure. It was not until 1842, exactly 50 years after the completion of Walnut Street Gaol, that Pentonville, based on USA solitary confinement lines, was built, to be followed by the building of 54 other new prisons.

The introduction of the prison sentence in England, and the concomitant prison construction, had occurred through the force of circumstances, and this haphazard and gradual development accounts in part at least, for the system's current-day conflicting purposes (for instance, a large number of buildings in use today are still the Victorian ones built on solitary confinement lines, and this has severely limited possible alterations to prison regimes). The reasons cited for this gradual change are many, and include the colonies' opposition to transportation, which meant alternative punishments had to be found, society's growing opposition to corporal and capital punishment (e.g. juries often acquitted people on minor capital offences, when they felt that the offences did not merit capital punishment), leading to the use of imprisonment as a more humane alternative (a gradual reduction in capital offences occurred throughout this period, the number decreasing from 200 offences punishable by death to 4 by 1861), and general changes in the society as a whole; the attraction of the combination of punishment and profitable penal labour that imprisonment offered to a society in the industrial revolution, the advantage that imprisonment can be varied, thus giving different punishments for different crimes, and the growth of real liberty in the society meant that loss of that liberty was of more importance.

From these varied roots, present day prison and the use made of it gradually developed. From the middle of the 19th century, considerable stress was laid on the reformatory aspects of prison, initially through solitary confinement, the idea being that calm contemplation would bring repentance. Useful occupation was provided during the latter part of the sentence, and considerable emphasis was laid on the importance of good behaviour and good work, to earn such things as privileges and remission. Under the 1877 prison act, all prisons were "nationalized" (some were previously financed from local rates), with one body of rules, under the supervision of the Home Secretary. The first prison commission chairman,

Edmund du Cane was appointed, and under him, the regimes of English prisons changed to produce what has been described as "the most blatantly deterrent regime ever instituted in British prisons, a regime of such severity that it was criticized even in Tsarist Russia" (Howard, 1960 p.106); this was achieved through "the punishment of hard, dull, useless, uninteresting monotonous labour" - all offenders were treated alike, the crank, the treadmill, and oakum picking being universally applied. This regime, despite its severity, still had a very high reconviction rate, so in 1895, the Gladstone Committee abolished non-productive work and total solitary confinement, instead emphasizing that prison should turn people out "better, physically and morally, than when they came in" (Howard 1960, p.107); an act was passed in 1898 incorporating these changes.

"Since that date the general trend of penal legislation has been to rationalize and humanize the system further" (HMSO 1968b p.5); for instance, after the first World War, suffragettes' and conscientious objectors' experiences forced a knowledge of prison conditions on people who had a sense of public responsibility, were educated, and who were vocal (as Elkin, 1957 stresses). Numerous acts have facilitated the development of the current prison system, such as the Criminal Justice Acts of 1948, 1961 and 1967, and all those sentenced to custodial treatment in prisons in England and Wales now have their lives there regulated by the Prison Rules, made by the Home Secretary.

From the above brief description of the way that the use of prisons have developed in this country, it can be concluded that "most existing methods of dealing with offenders have evolved under the influence of growing social consciousness, of religious movements and philanthropic stimulus, from some temporary measure, or just from straight-forward commonsense, supported by experience. As a result, they reflect conflicting assumptions about the nature of criminality" (BPS 1965); the effects of this complex development are most noticeable in reviewing the conflicting purposes of imprisonment. Thus, even though such a review will undoubtedly help in

the understanding of what effects prison might be expected to have on psychological functioning, it must be kept in mind that, for historical reasons, such conclusions will inevitably be rather piecemeal.

The Purposes of Imprisonment

Traditionally, imprisonment has four main functions (not necessarily in order of importance); namely, punishment, deterrence, social defence, and reformation. As Maher (1966) says (p.231), "the treatment of crime is beset with several different problems arising from (these) contradictory goals", and further analysis of these functions may help. Firstly, imprisonment can be viewed as punishment for wrong doing; it has been postulated that this is basically "revenge" based on the simple fear that the social and legal controls may break down if it was not applied. This view is held by some members of the judiciary; for instance, Lord Goddard (cited in Jones, 1965 p.85), a former Lord Chief Justice, has even stressed that "the duty of the criminal law is to punish - reformation of the prisoner is not your business", but not all judges have such extreme views. This approach also assumes a non-deterministic approach to crime; i.e. that man has free will, and thus deliberately chooses to behave criminally (as opposed to behaving honestly) - otherwise, there would be no real justification for the punitive aspects of imprisonment. As there has never been any large-scale attempt to find out what happens when one does not punish criminals, it is not really possible to evaluate the use and importance of this function of imprisonment.

Secondly, imprisonment can be viewed as deterrence both for the convicted offender and also, in theory, for the potential law-breaker. Considerable work has been done of prison's efficaciousness as a deterrent and has concentrated mainly on reconviction rates. In this country, 85% of first offenders do not return to prison, but it has been suggested (e.g. by Playfair and Sington, 1965) that this may well be due not to the

effects of the experience of prison itself, as the success rate (i.e. no further reconvictions) is similar to the above figure whatever treatment is given - irrespective of whether that treatment is prison, a conditional discharge, probation, or fines. Wilkins (1958) for instance, found no significant difference in the reconviction rates on a three year follow-up of a group of 31 offenders on probation and a group of 31 imprisoned. It has been postulated (e.g. Mays, 1970) that it is probably the social disgrace of a court appearance and the sense of having done wrong which provides the deterrent, rather than the effects of the experience of imprisonment per se. For the 15 to 20% of prison failures, the picture is bleak, as the figures show that they are very likely to return to prison several times. Coupled to this fact is the observation that the prison population (HMSO 1971) has grown year by year recently, from an average of 26,198 people in prison per day in 1960 to an average of 40,000 in 1970 (or rise of 54% in ten years). This increase is undoubtedly partly due to the increase in the population at risk; in the last twenty years, however, the prison population has doubled, whilst the male "at risk" population has risen by only 9.7%, and thus this increase accounts only for a small proportion of the rise, which must thus be additionally put down to an increase in the crime rate itself. The figures available for the number of males aged 17 and over in England and Wales convicted of indictable offences per 100,000 of the population do show an increase from 394 in 1950 to 1155 in 1970, and thus it does seem that more crimes seem to be committed now than was previously the case. There are problems with the reliability of these figures, however; for instance, as Jones (1965) points out, there is probably a "dark number" of four times as many crimes than are actually known about by the police, and only one in twelve crimes actually gets to court. A change in the number of crimes reported to the police, or even a change in the police's efficiency in discovering and solving crimes may thus in part account for the apparent rise in crime that these figures show.

Another reason for the growth of the prison population is that of changes in courts' sentencing practices; recently, increasing lengths of sentences for serious offences have been noted, and over-enthusiastic use of the suspended sentence has increased the population in custody. Despite the possible influence of all these factors, it still seems that the crime rate has risen over and above what one might have expected, and thus it seems that prison is not particularly working as a deterrent, either for criminals, or for those contemplating committing crime.

Evidence for deterrence in general in the field of criminology seems to confirm this; even though no controlled experimentation has been done on this topic; work has been done on the changes in the crime rate following alterations in the punishments assigned to a given class of crime, and on the differences in crime rates in various societies where different punishments are given for the same crime. Historically (as Maher, 1966, stresses), the progressive lessening of penalties for a crime (e.g. capital punishment in England and Wales in the 19th century) has not been followed by an increase in the crime rate. Researchers have also noted that crime rates are, for instance, lower in England and Wales than in the USA, despite the latter's more severe punishments; whether of course this is due to the punishments per se or to other differences between the societies concerned is however debatable. Another problem with deterrence is that it may, on occasions, be too great, and encourage law breaking, rather than prevent it; it has been pointed out by writers such as Mays (1970) that this has now occurred in this country, where the abolition of the death penalty has meant that the penalty for, say, robbery with violence, could be the same as that for shooting a policeman, and a criminal might possibly stand a better chance of remaining undetected for the latter rather than the former crime.

The third goal of imprisonment is its social defence function; custodial prevention of further crime. The prison system in this country

views this as its primary purpose - "first, it is the task of the service, under the law, to hold those committed to custody" (HMSO 1969 p.7), and some people in the system emphasize that the service should "concentrate on providing secure conditions in which normal humanitarian considerations would be the sole criteria for the provision of facilities" (Sherwood 1972 p.9). The custodial aspect has improved markedly since the publication of the Mountbatten report (HMSO 1966) which followed the much-publicized escapes of George Blake and Ronald Biggs. Since that date, the number of escapes from closed prisons has been reduced to about a third of its previous level, despite the recent rise in the number of people in custody. Thus, providing a prisoner does not escape, imprisonment does prevent him from committing crimes personally in outside society, and thus this function does seem to be reasonably satisfactorily carried out. It should be noted, however, that this statement is strictly qualified, and the custodial prevention of further crime is not totally effective; a prisoner can still influence others to commit crimes (e.g. to prevent prosecution witnesses from giving evidence), and can plan future offences whilst in prison. Imprisonment also does not prevent crimes being committed inside prison, as riot, murder, blackmail, theft, and sex offences have all occurred recently inside prisons in this country, and thus the custodial prevention function is only partially effective (indeed, it is hard to see how it could ever be made completely effective; complete solitary confinement would undoubtedly cut down the frequency of offences inside prison, but 19th century experience does suggest that such treatment renders the fourth (the reformatory) aspect of imprisonment ineffective.

On to the final function of prison, which is the reformatory one. The prison service in this country also lays great stress on this; "second, in dealing with convicted offenders, there is an obligation on the service to do all that may be possible within the currency of the sentence 'to encourage and assist them to lead a good and useful life' "

(Rule 1 of the Prison Rules, HMSO 1964)) and such has been the stated aims of the service ever since the previously mentioned 1895 Gladstone Report. From the standpoint of society, this is a laudable aim, and one which does not need justification of whether "free will" exists or not, as a deterministic position would acknowledge that treatment in prison could theoretically help ex-prisoners on release, thus solving many of the problems of crime. Results, however, show that this aim is not being carried out very efficaciously; as has previously been mentioned, if a man has been to prison more than once, he is likely to return again and again. In fact (HMSO 1969 pp.53-55), more than two thirds of persistent offenders released after serving 4 years or more are reconvicted within two years of release. As "People in Prisons" (HMSO 1969 p.55) stresses, persistent recidivism "represents the most intractable problem confronting the prison system of this and other countries". Some part of this behaviour is undoubtedly due to what the person was like before going to prison, and to the lack of aftercare facilities, especially when release often places the ex-prisoner into the same social situation that he was in before he was sent to prison. Investigations in fact have shown that past criminal history is the most reasonable predictor of future criminality, and suggests that imprisonment thus does not produce the psychological changes that may be conducive to altering such behaviour, or if it does, is only of very limited reformatory effect. There is indeed some suspicion (noted in HMSO, 1965) that a considerable number of long-term prisoners reach a recognizable peak in their training, after which they may decline. This section may best be concluded in the words of two reviewers of this field; Levin (1971) says that: "one fact is undeniable; it is that imprisonment, as a means of reducing crime, has demonstrably failed"; and Mays (1970 p.108) concludes that: "as far as the 15 to 20% of prison failures go the picture is ... bleak. It seems that once an individual has embarked on a life of crime or has got into antisocial

habits, prison is not very successful in changing his attitudes and behaviour."

Thus from this brief resume, it will be seen that prison at this moment in this country has several functions, all of which have gradually developed for various historical reasons. These functions are all carried out, albeit to a limited extent, and thus one would expect, a priori, prison to have some form of (perhaps limited) reformatory function, so that prisoners would be less likely to commit crime after experiencing prison; one might thus expect prisoners to show slight cognitive improvements through being in prison, with the emphasis laid on work and the learning of skills there, or at the very least, no cognitive change, as changes are more likely to be evident in the field of attitudes. Several people have however suggested that prison may have other effects from these stated aims, and it is this question which this paper will attempt to throw some light on, firstly reviewing what previous research has discovered about the effects of imprisonment.

Theorizing on the Effects of Imprisonment.

As has been previously mentioned, there is some suspicion that "decline" may occur in prison. A lot has been written on these lines, suggesting that imprisonment may have detrimental effects. One of the most consistent trends in all the literature about men in captivity is the theme of "deterioration"; in 1816 (Buxton - see Howard 1960), it was stated that prison turned out people worse than when they came in; in the 1930s Sir Alexander Patterson said that "nobody could stand more than 10 years in prison without complete mental and physical deterioration", and in 1934 Fox (quoted in Taylor, 1960 p.67) said that: "it is the fight against the physical and mental deterioration almost inseparable from a long prison sentence that is the hardest part of the duty laid on the prison authorities". Other writers since then have also made similar observations, although

generally in not such sweeping generalizations as the above. Jones (1965), for instance, cautiously says that "there is reason to believe that a prison sentence does do a good deal of harm to certain kinds of offender" (p.97), whilst the Adult Offender White Paper says that "each additional year of prison progressively unfits" most prisoners (p.3). Sparks (1968) admirably summarizes this field in his review of the literature on long-term prisoners, concluding that "it seems to be treated as almost axiomatic by those who have written about imprisonment, that prisoners increasingly tend to "deteriorate" in some sense over long periods of time".

What is exactly meant by this term "deterioration" is not very clear, as even though this is a subject on which many writers have commented, their reports have by and large been subjective and vague, lacking in empirical evidence. Even when these findings are apparently clear, closer analysis reveals that they are often vague and unsubstantiated; typical of such are the observations of Grunhilt (stated in Taylor, 1960), who said that most prisoners suffer from a mental vacuity, this being reflected in a dwindling memory, inability to concentrate, a strange obliviousness, and a tendency to illusions and self deception, of Pickering (1966) who said that "long confinement ... results in damage to the personality", and of West (1963), who reported on an impression that an undue proportion of preventive detainees were "prematurely ageing". These mainly subjective reports do not help one in explaining how often (if at all), when and to what degree these changes occur, and whether their effects can be changed or modified. A similar criticism may be made of literature written by prisoners themselves, which are in a similar general vein; for instance, prisoners (e.g. in Taylor 1960) have said that they become dull automatons with their emotional sensitivity blunted and their cognitive efficiency impaired, and several have referred (e.g. Chapman, 1968 and Taylor, 1960) to such things as "prison rot ... mental inertia and inability to concentrate ... being no longer capable of fending for themselves", just "living in the organic

sense". Once again, these comments on the effects of imprisonment are not precisely defined, and no distinction is made as to whom they could be applied. On a more objective note, foreign papers by Vernet (1966) and La Plante (1969) have observed that mental breakdown, suicides, and psychoses occur more often in prisoners than in the general population but once again the processes whereby this occurs, and to whom it may occur have not been researched on.

This generally vague position was stressed by the Royal Commission on Capital Punishment (1953) who looked into the evidence relating to deterioration, but who found no experimental backing for it, and also more recently by the Radzinowitz Report (HMSO 1968a) which concluded that "this is a subject on which a multiplicity of opinions have been expressed, but on which there are virtually no hard facts, and on which very little research has been carried out" (p.57). A similar view has been stressed by Hood and Sparks (1970), who say that "there have been few studies of imprisonment which have attempted to assess the impact of institutional treatment in any detail" (p.216). From this section, then, it would be reasonable to expect that prison may have some form of detrimental effects, though what the precise nature of these effects are likely to be has not been clearly stated or discovered; nevertheless, it does seem that research into the cognitive effects of imprisonment may help to clarify this position.

Sociological Findings

Before going on to look at specific research work which might indicate what cognitive effects one would expect imprisonment to have on psychological functioning, there is a whole field of studies which attempts to explain prison's previously mentioned failure to alter criminal behaviour, and a brief review of work done in this field might help the understanding of the problems of imprisonment; several writers have, instead of laying stress on the possibility that prison may deteriorate inmates, have

suggested that desocialization processes in prison may cause the failure of prison to prevent people committing further crimes. This view is, for instance, clearly expressed in a Prison Officers' Association Memorandum (in Playfair and Sington 1965), which states that "after serving a sentence ... a man's senses are dulled and he leaves prison knowing only one thing - how to live in prison, so that when he gets out he is less well equipped to face life than when he was sentenced". This aspect of the effects of prison has been written about at some length by sociologists, especially in America, and closer analysis of it may help in the understanding of the effects of imprisonment. The most famous work is Clemmer's "The Prison Community" (1940), where the concept of "prisonization" is described at length. Briefly, Clemmer envisages this process as follows (as summarized by Mays); from the very first minute that he enters prison, a prisoner is stripped of his former identity and is obliged to become an anonymous member of a servile and subordinate group. He learns a new language, he is forced to wear strange clothes, his communications with the outside world and with his family, if he has one, are curtailed and subject to bureaucratic control, he is subjected to a regime of arbitrary regimentation against which has very little effective appeal, and, above all, he is exposed to a cultural milieu which is largely regulated by the other inmates and to which he is obliged to conform to some degree or to suffer further pains of isolation inside the prison. This inmate-controlled culture, Clemmer stresses, is based on the simple formula of "us against them", as it is organized around the inverted values of the most persistent offenders and long-term inmates of the system, and is reinforced by a code of sanctions which the prison staff are often powerless to inhibit. The end result is meant to be the adoption of new attitudes and ways of behaving which are not only unsuited to life in the outside world, but may frequently make it impossible for the individual to act successfully in any normal social role. Other writers (e.g. Schrag 1961, Sykes

1958, Goffman 1961) have written in the same vein, often distinguishing different "types" of prisoners, who they differentiate by their varying roles within the prison, and sociological studies in Britain (e.g. Morris and Morris 1963, Clayton 1970) have come to similar conclusions.

Despite the interesting nature of this work, it can however be criticized on many grounds; by and large, it is purely descriptive, often lacking in objectivity, and thus is of little use in predicting what prison will do to a man. There is, for instance, no real agreement about what is meant by "types", how they develop, why people should differ in this way in their reaction to imprisonment, and why different studies have identified different "types". Where analytical work has been carried out, the results show that things are not as clear-cut as these sociologists make out; Garrity (in Council of Europe 1967), for instance, only found that prisonization increased with length of time in prison for property offenders, and not for other offence categories, whilst Wheeler (1961) found that conformity to inmate culture increased initially, then decreased as the prisoner's release date approached, thus suggesting again that the inmate culture is not as influential as had previously been thought. Morris and Morris (1963) in their study on Pentonville, did not however confirm Wheeler's findings, again suggesting that generalization from one inmate culture to another may not be helpful, as the effects of these cultures may well vary from prison to prison, and from time to time. On the psychological side, work by Silverman et al (1966) found that long-term inmates are less susceptible to Titchener's Circles Illusion than inmates who have served shorter lengths of time; this result was interpreted by them as being "in accord with the conception that scanning responsiveness decreases during prolonged immersion in aversive, inescapable surroundings". From this it might be inferred that the longer a man is in prison, the less attention he pays to his environment, and thus is less likely to be influenced by the inmate culture.

Detailed research into the effects of the "inmate culture" thus show that results are not as clear-cut as was previously thought. It has also been pointed out by Glaser (in Council of Europe, 1967) that many inmates seem to live apart from the influences of the outspoken value system, whilst aggressive and articulate inmates try to impose on their peers an exaggerated view of a general acceptance of anti-social attitudes in the inmate group, and he concludes that the effects of the prison culture on post-release behaviour may thus not be as serious as had previously been feared. This conclusion is echoed by the Council of Europe (1967), who note that recent research using empirical and quantitative methods has modified the picture of an inmate culture which is a referee group for nearly all, and that "all in all, statements about the pervasively negative influences of the inmate system seem to be somewhat exaggerated". This approach is nevertheless a very interesting one; as has been stressed before, recidivism rates show that prison is ineffectual in preventing people from returning to prison, and it seems reasonable to assume that part of the blame for this must be laid at the door of the prisoners' penal experiences. The sociological approach which has just been discussed may well, with further investigation, prove very useful, but it does need clarification and quantification before it can be of real use in this field. This point will be developed at length in the section below entitled 'The Status of Testing' where recent work in this field by Cohen and Taylor (1972) will be discussed.

Psychological Findings

This approach also suffers from the drawback that it fails to account for the possibility that prison may have other effects besides the influences of the inmate culture, and it may be that research into fields such as the possible cognitive effects of imprisonment may indicate such effects, and may help, in part, to explain the problem of persistent

recidivism; as has been previously suggested, the experience of imprisonment may cause some form of cognitive decline, which would perhaps leave ex-prisoners less able to adapt to the outside world on their release. Research also needs to be done which indicates what general effects imprisonment may have, rather than the institution-specific effects which sociologists have tended to concentrate on.

There is, however, relatively little written about any other possible effects of imprisonment; it may be that the stress on sociological findings is a reflection of the lack of other work done in this field; as Hood and Sparks (1970) stress "most of those who have carried out important research in prison in recent years have been sociologists" (p.216). The study reported in this paper concentrates on cognitive aspects for precisely this reason; very little research has been done on this problem, and, as has been previously mentioned in the above review of criminological work, it would seem reasonable to expect that such work would indicate some effects. The only published study of note that has already been carried out on this problem is that of Taylor (1961), a prison psychologist in a New Zealand medium-security institution for men, in 1959. During the 5 years that he worked in the prison, Taylor (quotations from p.374) "identified six cases of deterioration", whom he described as "withdrawn, displaying a minimal response to their environment. They lacked spontaneity, had fixed expressions, and spoke without feeling. While they operated physically as persons, they seemed to have ceased to function as individuals. In some ways their symptoms resembled those of reactive depression, but they showed no suicidal tendencies and maintained a moderate level of physical activity ... the symptoms arose at a different time in each case, varying from six months to nine years after the beginning of the sentence. In all of the six cases, ... psychotherapy ... led to a restoration of buoyancy to the previous level of functioning".

The above description does, to a limited extent, indicate what the phrase "deterioration" might refer to, but in view of the small number of subjects noticed, and the observational nature of the description, it is only really of importance that these observations led Taylor to attempt to research into the problem of deterioration; whether it is an effect of imprisonment, and if it is characterized by a loss of cognitive efficiency and a lowering of motivational tone. He argued that if psychological deterioration is a result of imprisonment, its symptoms should be reflected in a group of prison inmates (group A), and not in a matched group who were free on probation (group B). From a pool of 170 prisoners and 265 probationers, he selected a sample of six pairs, matched on the basis of sex, nationality, age, marital status, educational background, and occupation. A third group (group C) was also selected, without controls, from among longer-term (3 years or more) prisoners who had served previous sentences, to see if they showed greater psychological deterioration than did those who were first admissions to prison. All of the subjects were tested as soon as they became available on Scott's (see Taylor) test battery, which includes tests to measure objectively changes in performance in word fluency, problem-solving, speed and efficiency, and perception of social incongruity. They were subsequently retested after six months with a comparable set of tests.

Taylor found no significant differences between the scores of group A and group B on any of the tests, with the exception of the Koh's Block Design Test, where the results supported his hypothesis at the 0.5 level, using chi-squared tests, but were not significant when t-tests were used. He put this lack of agreement down to the fact that the t-test he used is more adversely affected by the actual quantitative differences between scores and the small number of subjects used than the chi-squared test is.

He combined groups A and C, and compared their results from the first testing session with their results in the second testing session, and found

(using the t-test) significant deterioration on the Koh's Block Design Test and the McGill Delta Block Test, and significant improvement on the Digit Symbol sub-test of the Wechsler-Bellevue Scale, all at or above the .05 level. From these results, he concluded that the experimental results did not support the hypothesis that deterioration is an effect of imprisonment, but nevertheless suggested that (p.376) "it may be that deterioration of the mind for which I was looking begins with a cognitive deterioration" which the results on the two Block Tests reflected, "and then spreads to a change of attitude, outlook, motivation, and emotional orientation".

Taylor's work has been described at length, as it is probably the only study that has specifically set out to objectively find out what the effects of imprisonment are on cognitive skills. Interesting though his work is, it can be criticized on several grounds, all of which may be factors contributing to his failure to find very clear results. Firstly, the sample used was so small that it is doubtful whether results obtained from it can be generalized to prisoners as a whole; secondly, the inter-test interval used was probably too short for any major changes to occur in; thirdly, the subjects involved had only served relatively short lengths of imprisonment, over which there may well be only minor changes, and fourthly, there is a criticism that can be made of a lot of work in this field - namely, failure to adequately match the groups of subjects used in the experiment. It could be said that the reason for the differences which Taylor found was not the effect of imprisonment, but what would have occurred to the subjects independently; the significant difference between groups A and B, for instance, demonstrates that it may be that different sorts of people are committed to prison rather than being put on probation. This problem is very difficult to control for, and is one which many studies have completely ignored.

From this review of relevant literature about prison and its effects,

one can conclude that prison might be expected to have an effect on people; historically, it may be expected that prison should punish people, deter them from committing further crimes, and send them out reformed, to "lead a good and useful life". As has already been pointed out, recidivism rates demonstrate that prison does not succeed in its purpose to any great extent, and many writers have laid the blame for this state of affairs on prisoners' penal experiences. Research in this field has been mainly observational and descriptive, lacking the usual objectivity and quantification required in scientific research, and has tried to account for recidivism rates by pointing to "desocialization" processes in prison. Work on these processes has found some results but the effects have not been as marked as was originally thought; on the other hand, very little work has been carried out on the possible effects of imprisonment on cognition, even though Taylor's study demonstrates that prison could possibly have adverse effects on cognitive functioning. It seems that further research into these aspects of imprisonment may help the understanding of problems in this field; this paper thus concentrates on possible cognitive effects of imprisonment, in an attempt to carry out the Radzinowicz Report (HMSO 1968a) recommendations to empirically establish what effects imprisonment has, to try to settle the controversies and conjectures over this subject, and to see whether the numerous subjective reports mentioned above could be confirmed or disproved.

Other Relevant Fields. (a) Institutionalization

Before going on to describe the actual research, a brief review of experimental data from fields other than that of imprisonment itself may be of some relevance to the problem of what cognitive effects imprisonment might be expected to have; as the Radzinowicz Report (HMSO 1968a p.58) acknowledges, " 'deterioration' or 'prisonization'... exists, and exists in mental hospitals and other long-term institutions as well as prison",

and looking at work in these areas may be of some help. Incidentally, there is controversy surrounding terminology in this field, the terms 'deterioration', 'prisonization', and 'institutionalization' all being used by various authors; some (e.g. Taylor, 1961) attempt to differentiate between them, but in the absence of precise generally agreed upon definitions, it is probably best to use these words interchangeably as different labels of the same basic syndrome, and thus not cause confusion.

Goffman (1961) includes prisons, leprosariums, cloistered religious orders, naval vessels at sea, boarding schools, mental hospitals, orphanages, homes for the blind, and sanatoriums under his definition of "total institutions"; which he describes as "a place of residence and work where a large number of like-situated individuals, cut off from the wider society for an appreciable period of time, together lead an enclosed, formally administered round of life" (p.13). He goes on to say that central characteristics include the facts that work, sleep, and play are not separated in location as they are in normal society, that there are at least two classes of persons associated with the institution (the inmate proper and the staff, officers, or guards), and that contact with the wider society by the inmate is prohibited or regulated by the staff. Long stay in a total institution, by and large, produces change in the behaviour of the inmate, and, as Prock (1969 p.1837) says, "empirical evidence is available to show that institutionalized populations exhibit many differences from non-institutionalized populations. The major thrust of the evidence is that living in an institution has harmful physical and psychological effects and, as the Radzinowicz (HMSO 1968a) Report states, "common sense tells us that a long period of confinement in an institution is not likely to improve a man's ability to function effectively in the free community" (p.58). Unlike work on prisons, psychological research has been done on other total institutions, and a summary of results may help to clarify what effects prison may be expected

to have, and to point to those fields which research may best be concentrated.

Studies of the effects of institutionalization on children e.g. Spitz, Goldfarb, Dennis (in Zubec, 1969) and Bowlby (1965) have shown that individuals whose infancy was spent in an institutional environment show signs of low intelligence, abnormal passivity and dependence, and impairment in motor and language development, when compared with a normal population. Such results can in part be explained by other factors such as motivation, previous test experiences, and differential selection for committal to institutions, which have by and large been inadequately controlled for. There is, however, a study by Butterfield and Zigler (1970) which controlled for motivation (the theory being that heightened motivation of the institutionalized subjects may interfere with responding in the testing situation), and still found a difference in Stanford-Binet IQs. The adverse effects of prolonged institutionalization have been recognised by some administrators, and attempts have been made to counteract ill effects; Hiler and Nesvig (1961), for instance, describe a "progressive" regime for children in a psychiatric hospital, and found that their subjects improved in perceptual organization, in common sense and judgement, and in ability to perceive relationships and to distinguish between essential and non-essential aspects of a situation, over a two-year period. Their study can however be criticized for its small sample size ($N = 20$), its failure to control for natural improvements over time, and its failure to control for improvements due to repeated retesting on the same battery of tests (the Wechsler-Bellevue II). Nevertheless, this study does suggest that there is a possibility that, for children at least, it may be possible to ameliorate the effects of institutionalization to some extent; Clarke and Clarke (1976) in a review of this field, support the notion that adverse early experience in an institution can be overcome, given appropriate treatment.

Although the effects of institutionalisation at an early age may not be strictly comparable with its effects on adults, work with the latter has produced similar results. Studies (e.g. Bernstein et al (1965), Lieberman (1969), Lieberman et al (1968), and Prock (1969), mainly (though not exclusively) with the institutionalized elderly, have found such things as poor adjustment, depression, intellectual ineffectiveness, negative self-image, reduced capacity for independent thought and action, poor time orientation, and impairment in social judgement when comparing them with non-institutionalized subjects. Also they have found that as length of hospitalization increases, the proportion of patients with a definite wish to stay in hospital (as opposed to leaving it) increases; this finding is very similar to observations made of prisoners which have already been mentioned above. They go on to suggest that the severing of interest in return to society is paralleled by the decline in the extent to which society is interested in the patient.

Criticism can be levelled against this work however, for its failure to control for variables such as natural deterioration over time and differential selection, in terms of whether a person is committed to an institution or not. Some research has, however, controlled for these variables; Prock (1969), for instance, compared community, waiting list, and institutionalized aged subjects, and found no difference in personality type between the three groups which nevertheless varied on memory, orientation to everyday reality, and other variables. Similarly, Bernstein et al (1965) compared patients who were discharged from hospital with those who were not, and found no significant difference between the groups in terms of social judgement (as measured by the WAIS Comprehension sub-test, statistically equated for Vocabulary Scores), concluding that differential selection for hospitalization was not a factor confounding his main result of a negative relationship between length of institutionalization and comprehension score.

Thus, in conclusion, it seems that empirical work in the field which Goffman (1961) calls "total institutions" shows that it would be reasonable to expect that prolonged institutionalization in some kinds of institutions might have detrimental effects on inmates, and that one might expect prison to have similar effects to those found in the studies mentioned above. On the cognitive side, it would appear that general research in the areas of intellectual, psychomotor and memory skills might perhaps prove the most rewarding.

(b) Prisoner of War and Concentration Camp Studies

Another group of studies which also may provide useful clues to the psychological effects of long term imprisonment is that concerned with men who have been in prisoner of war or concentration camps during the last World War; it is in this field that perhaps the best empirical work in the whole area of non-experimentally restricted environments has been carried out. As Clayton (1970) points out, however: "there is a reluctance among sociologists and some senior prison administrators to compare the reactions and feelings of religious, political and military prisoners to imprisonment with those of criminal prisoners because 'their circumstances, uncertainties and expectations are so different' " (p.56). On the other hand, he goes on to stress that this view is not held by everybody connected with prisons, quoting a Governor as saying that: "the reactions of all men, good and bad (e.g. Bonhoeffer), to incarceration are very much the same" (p.57). In the absence of other information about the effects of imprisonment, one must utilize as many possibly useful sources as one can, and bear in mind that even though the comparisons may be only of limited applicability, they may help to suggest where one might expect changes to occur as a result of imprisonment, and where research might best be concentrated.

The general effects that the literature on concentration and prisoner of war camps notes seem very similar to Taylor's (1961) previously mentioned "six cases of deterioration". Chodoff (1970), for instance, in reviewing the effects of German concentration camps, concludes that evidence points to long-term unfavourable personality alterations in survivors, which mainly occur in two widely overlapping directions. "Some individuals develop tendencies toward seclusiveness, social isolation, helplessness, and apathy, becoming passive, fatalistic, and dependent, wanting only to be taken care of, and to be let alone by a world whose requirements they are no longer interested in trying to fulfil. Other survivors regard their environment with suspicion, hostility and mistrust." (p. 86). He names the most distinctive long-term consequence as the "concentration camp syndrome", which he describes as a combination of anxiety, restlessness, apprehensiveness, irritability, weakness, and fatigue. Similar reactions have been commented on by other writers (e.g. Taylor, 1960), with a common syndrome of apathy, emotional flatness, and loss of initiative; names such as "zombie", "rice-brain", "K.Z. syndrome", "barbed wire fever", or "boobhappy", have been used to describe it, whilst Newman (1944) has compared the syndrome to Caisson's disease, and Klein et al (1963) to "premature ageing". Chodoff (1963) stresses that such effects are likely to be long lasting, as clinical analysis of concentration camp survivors living in the United States 20 years after the experience demonstrated very similar effects to the above.

These reports are, however, largely subjective accounts of observations, but empirical work has been done which continues these rather general descriptions, so they have been mentioned briefly. The best study is probably that of Kral et al (1967) who compared 20 years after liberation 20 Canadian servicemen who had been Japanese prisoners of war in Hong Kong for about $3\frac{1}{2}$ years with their brothers who had also seen World War II in active service in the same area, but who had not been captured. Even

though there were no significant differences between the groups in terms of age, education, or marriage, the differences in favour of the non-captives were quite considerable; as well as confirming the usual clinical picture (mentioned above), results on the Wechsler Adult Intelligence Scale (WAIS) showed significantly different scores (Verbal IQ $p < .05$, Performance IQ $p < .02$, and Full Scale IQ $p < .01$), and other general psychomotor effects (e.g. Lower Tapping Rate $p < .05$) were found. Luchterhand (1970) also found evidence of CNS damage in 90 out of a 100 cases in concentration camp survivors, and patterns based on organic damage in 92 out of 96 examined by psychological tests.

Thus these results indicate that imprisonment in a concentration camp may have lasting effects of impairment in various areas of nervous and psychological functioning. They can in part be criticized though for often failing to account for alternative stresses beside that of imprisonment and the concomitant social isolation and privations; such things as malnutrition, crowding, sleeplessness, exposure, inadequate clothing, forced labour, beatings, injury, torture, exhaustion, and diseases (Abram 1970). Researchers such as Hocking (1965) have found prolonged starvation to be associated with such effects as apathy, depression, and irritability, and Archibald (in Hocking 1965) reports that Hiroshima survivors show life span and disease patterns consistent with a biological age twenty years greater than their chronological age. It would therefore appear that at least part of the effects of concentration camp incarceration may be due to other stresses beside imprisonment alone, and thus one must make comparisons with prison with caution; the results do, however, indicate that research in areas of intellectual and psychomotor functioning may be fruitful in a study on the effects of imprisonment.

(c) Isolation Studies

Results similar to those found in concentration camp studies have however been found to a limited extent in other situations where such stresses as starvation, humiliation and hard labour have been absent; such situations as controlled laboratory isolated group experiments, Antarctic and Arctic isolated duty stations, submarines, fall-out shelters, space and aerospace flights, man in sea experiments, expeditions and explorations, and sea voyages and disasters. These studies have again often been of a questionnaire type, and have reported such effects as tiredness, difficulty in sleeping, depression, feelings of loneliness, headaches, muscular soreness, irritability, interpersonal conflicts etc. (summarized in Zubek, 1969). Several investigators have written about impairments in intellectual efficiency, in memory and concentration, and in performance during prolonged confinement; Taylor (1969), for instance, reported that he observed apathy, slowing-up and sluggishness, and Mullin (1960 in Schultz 1965) found a widespread lack of intellectual energy, both studies being on Antarctic stations. As has been observed in previous studies, most such reports are however based on observations and retrospective appraisals by group members themselves, and little empirical work has been carried out. When work has been carried out, it has generally been concerned with only short periods of isolation, and has found (Zubek 1969 p.389) "very little evidence for serious shifts over time in intellectual functioning. ... So far, no test evidence has been presented to confirm the decrements that so many people feel really exist". In studies of effects on perceptual and motor skills, similarly (p.392) "persons undergoing group confinement generally seem to be able to maintain their abilities, although there are some reported instances of skill decrements". Lowered arousal has been found, though, using physiological measures, and thus it does seem that these studies, despite their lack of empirical evidence, do indicate that prolonged isolation may have detrimental

effects. Other factors may explain why the effects in these studies are not as marked as has been found in previous cases; many are of relatively short confinement durations, and nearly all are voluntary, often hand-picked samples, (McLaughlin (in Abram 1970) for instance stresses astronauts are a highly selected and trained group) all of which facts will seriously limit useful generalizations.

As Taylor (1969) stresses, these situations are psychologically similar to penal institutions, and even though the results of empirical research have not been very clear, there is some confirmation for the results of concentration camp studies, again suggesting that research into imprisonment may also indicate some effects on cognition. Incidentally, it is of interest to note that some people are of the opinion that prolonged imprisonment and environmental control does have an effect, and have used the so-called "brainwashing" techniques to try to change people. This controversial subject has been covered in several books (e.g. Burns et al, 1963), Zubek (1969), and evidence is very varied on the efficaciousness of such treatment. Marked changes, mainly in attitudes, have been reported in some cases in the literature, but, as Biderman (1963) stresses, such changes have occurred very rarely, and succeeded even more rarely. Nevertheless, the fact that considerable time and effort has been spent in trying to develop "brainwashing" does demonstrate that, once again, it is possible that changes occur in prison.

(d) "Sensory Deprivation" Studies.

Closely related to the above-mentioned group of reports from studies of isolated groups is the research done on what may loosely be termed "sensory deprivation"; a great deal of experimental work has been carried out on this subject which, as with previously reviewed associated research, has been compared by some writers with "the clinical impressions given by some long-term prison inmates before and after release", and has been found

to be "remarkably similar" (e.g. Taylor 1961 p.373) in its results. Once again, then, these studies may be of some use in hypothesizing what the effects of imprisonment might be, and where further studies might possibly be of some use.

Sensory deprivation studies by and large involve isolating a subject and making an attempt to totally cut off all sensory input, to try to discover what effects such treatment has on behaviour. Very similar to these studies are those which are generally labelled "perceptual deprivation" work (Kubzansky, in Zubek 1969 p.18), in which the experimental environment is designed to provide solely homogeneous and unpatterned input. These studies arose in an attempt to look into the problem of bizarre sensory distortions that have been known to occur to radio operators and radar observers during very monotonous and routine jobs; for instance, such workers are likely to report non-existent radar "pips", a decision which could have extremely serious consequences. The Canadian Defence Research Board decided to research into this problem, and asked D.O. Hebb, a psychologist at McGill University, to investigate it, which he did with the help of Heron, Scott, Bexton, and Doane. They found (e.g. Heron et al, 1953) that subjects who had been deprived of patterned sensory input had complicated hallucinations, showed intellectual and perceptual deterioration, became more susceptible to propaganda, and found the situation to be very unpleasant, frequently quitting the experimental situation long before the experiment was completed. Since this original work, considerable interest has been shown in this subject, and there are now over twenty research centres throughout the world working on it. Several books and reviews (e.g. Zubek, 1969, Vernon 1966, Solomon et al 1961) have been written on this topic, and a large number of research papers have been published. Recent work has also been done on the effects of social isolation; this group of studies obviously is of some similarity to the prison situation, and once again effects have been found, but not as marked as those of

sensory deprivation studies.

The relevance of sensory deprivation experimental results to prison conditions, or even to other actual deprivation and isolation situations is however rather limited, as subjects in these experiments by and large know that there is someone on hand constantly to "rescue" them, are volunteers, and will usually have some form of preconception as to what will happen in the experimental situation, which may influence results to produce similar effects to those of previous studies, or may even demonstrate what Masling (1966) calls the "Screw You" effect (the determination not to give the experimenter what the subject thinks he wants). Nevertheless, the results from these experiments are of sufficient similarity to conclusions drawn from other studies, and are thus of some confirmatory use.

The field is very large, and so only a few of the cognitive results will be dealt with in this review. Firstly, Zubek (1969) found that some subjects released after 14 days of perceptual deprivation were unable "to study or to engage in a variety of activities" (p.127) up to 8 days after the end of their deprivation experience (mean time 3.5 days). This concentration impairment seems to be a frequent result, and bears some similarity to the reports of apathy, lethargy, and inability to concentrate which less empirical studies have also noted. Secondly, in the field of sensory and perceptual-motor studies the most consistent results have been found; Nagatsuka and Suzuki (1964), for instance, found significant decreases in visual reaction times after deprivation, whilst other workers have found impairment in scores on tests of dexterity and other measures of eye-hand co-ordination, including situations of social isolation (e.g. Agadzhanian et al, 1963). Thirdly, intellectual decrements have been noted on several tests, including Koh's Block Design (Bexton et al, 1954 Scott et al 1959), WAIS Digit Symbol (Davies et al 1961) and tests of cancellation, dexterity, number facility, numerical reasoning, abstract reasoning, and space relations (Zubek 1962); in passing, it has been noted

that the variable of simple eye-hand co-ordination enters into many of these tests of intellectual performance, and it is possible that at least some of the observed intellectual decrements observed during isolation may be attributable to perceptual-motor dysfunction. Fourthly, retention and rate learning do not seem to be very much affected by sensory deprivation, whilst more complicated memory (e.g. Zubek et al, 1960) does seem to be affected. Fifthly, such things as verbal fluency, visual and auditory vigilance, reversible figures, pain sensitivity, colour discrimination, and recognition have been found in a study by Zubek et al (1962) to be affected by perceptual deprivation.

As with other previously reviewed research, not all the results have been as clear cut as those which have been mentioned above; for instance, Zubek et al (1960) found no effects on verbal fluency, numerical ability, and space relations tests under conditions of sensory deprivation, whilst perceptual deprivation work has shown effects. Similarly, social isolation results have not generally shown so large a decrement as sensory deprivation studies. The results taken as a whole do, however, indicate once again that one might expect prison to have some effects, particularly suggesting research into the area of psycho-motor skills. There is also some indication from these studies that individual differences may account for differences found in results; for instance, Walters et al (1960) found that subjects' anxiety level may affect tolerance for sensory deprivation. This possible influence of other factors beside the deprivation condition itself is an aspect which other studies previously mentioned have not adequately controlled for.

Also, it is only in the field of sensory deprivation results that any real theorizing has been carried out as to the possible causes of the observed changes found in the research. Suedfeld (in Zubek 1969, chap.13) points out that expectation (the effects of tacit and overt suggestion, of prior knowledge or experience, and of role playing) may account for some of

the experimental sensory deprivation results, but does concede that there are nevertheless many experiments which conceal the hypotheses and the treatment rationales and still reveal effects, and also that some of the most interesting sensory deprivation data were surprises both to the subject and to the experimenter. Thus it would seem that some other theory beyond expectation is necessary to account for the results. Several theories have been put forward about sensory deprivation effects; basically, they are all some modification of the U-shaped arousal curve (see Fiske and Maddi(1961), for instance), which postulates an inverted U-shaped function between cue function and arousal. These theories suggest that there is an optimal level of stimulation which the organism strives to attain, and in the sensory deprivation condition, low arousal interferes with cognitive activity. Also, in the absence of other stimuli, the subject becomes attuned to his own thoughts, emotions, and daydreams, and to faint residual stimuli in the environment - all of which will interfere with other activities, and might produce the observed decrements. This theory may help in part to explain the disparity found between various studies (for instance the differing effects various lengths of sensory deprivation has, individual differences in tolerance of the condition, etc.), and has been related (e.g. Lindsley 1961) to the brain-stem reticular formation, suggesting a physiological basis to the observed effects. Through this system all sensory excitations are meant to reach the cortex to create the levels of activation necessary for effective cognition and learning; it is also meant to be affected by cognition (i.e. from the brain), and in the absence of neural activity passing through the reticular formation, the "importance" of any given set of neural events may be greatly enhanced, to produce the observed decrements. It is interesting to note here that a study of concentration camp survivors by Ström (1962) found evidence of CNS damage in nearly every case; this result obviously could be connected with the above theoretical explanation of sensory deprivation

study results, but may be due to other factors than the concentration camp experience itself.

Arousal theories can however be criticized for their lack of specificity; the arousal level itself is hard to measure precisely, and the "optimum level of stimulation" which the organism is reputedly striving to maintain is not adequately defined by the theory. Thus specific predictions are hard to make using this theory, but nevertheless it does provide a theoretical basis for the observed cognitive decrements found in sensory deprivation work, and with further refinement may prove very useful in the general field this introduction has attempted to cover.

Conclusions of Introduction

This review of past work on prison's history, functions, and success in carrying out its functions, and on related research indicators as to the possible effects of imprisonment can now be summarized, in order to narrow the field of possible research to those aspects which past work has shown to be of some value, and to perhaps indicate what effects might be expected to be found. In making such a summary, however, it would be wise to bear in mind the comments of Smith (in Zubek 1969 p.375) who, in reviewing work of a similar nature to the above, stresses that "the ultimate goal of a research summary is to glean useful facts and hypotheses and to avoid unsubstantiated overgeneralizations and careless conclusions. The writers of the diverse literature ... represent similarly diverse fields and interests. Although, in a sense, such diversities may represent a strength, through breadth of outlook, it would not be overstating the case to indicate that many of these references lack some of the scientific refinements and controls that lead to more clear-cut interpretation of results". He does nevertheless conclude that, in his opinion, "the task of assembling useful research information is not best served by totally ignoring such limited studies".

What conclusions, bearing in mind the above comments, can be drawn from this research summary on the possible effects on cognitive skills of imprisonment? The summary covers a large number of situations each bearing, to a greater or lesser degree, some form of resemblance to prison conditions, and the overall conclusion from the research seems to be that it would be reasonable to postulate that the experience of imprisonment may produce cognitive decline. Intellectual and psycho-motor effectiveness seem particularly affected, whilst retention and note learning seem to be the least affected; the results for non-oppressive isolation conditions have not, however, been so clear cut, only small psycho-motor effects being found in researches. The differences between the results found in the different conditions also suggest that there could be a number of intervening variables which could ameliorate the effects of such treatment.

The studies cited above generally confirm various comments which have been made about sensory deprivation work which could perhaps be equally well applied to prison work; they provide "empirical support for the proposition that man needs constantly varying forms of stimulation to function adaptively in his environment" (Schultz, 1965 p.1), and show that "the adult is still a function of his sensory environment in a very general sense" (Hebb 1958, p.110). As Zubek (1969 p.432) concludes, it seems that "sensory variety is not just the spice of life; it is the bread of life". Bearing in mind these comments, it would seem that work in the largely unexplored field of the cognitive effects of imprisonment is likely to be rewarding; one would expect from surveying related literature, in particular from sensory deprivation, perceptual deprivation, and social isolation studies, that some form of psychomotor decline would be the most likely effect (especially with measures involving eye-hand co-ordination), and also perhaps some form of intellectual decline, both of a relatively permanent nature. This thesis reports on just such a study, endeavouring to investigate the cognitive effects of imprisonment, with particular

reference to possible psychomotor and intellectual effects, and bearing in mind that there may well be a large number of variables in the imprisonment situation which could affect results.

PROCEDURE

Experimental Design

The main aim of the research reported in this paper is to investigate the cognitive effects of imprisonment, with particular reference to possible psychomotor and intellectual effects. It was considered that the best way to assess such changes was by using a large battery of psychological tests, and assessing the prisoners by means of both a cross-sectional and a longitudinal analysis.

Firstly, the scores on a battery of cognitive tests of age-matched groups of men who had been in prison for differing lengths of time would be compared on the cross-sectional analysis (called "the first cross-sectional analysis"). Secondly, the same prisoners would be assessed at a later date, thus allowing a longitudinal analysis ("the longitudinal analysis") and a second cross-sectional analysis ("the second cross-sectional analysis"). In addition, changes due to a differential release policy by the Parole Board would be controlled for by an analysis of men paroled and those considered for parole but not granted it ("the groups of prisoners released and detained analysis"). Changes due to natural causes (such as increasing age, or increasing test sophistication) were also controlled for by the testing and retesting of a control group of people from varied backgrounds outside prison, over a similar length of time ("the control group").

Selection of the Sample

In selecting the sample for this investigation, an attempt was made to overcome two of the major criticisms that have been made above about other work in this area. Firstly, it has been suggested that one of the

reasons for the lack of clear-cut findings in previous research could be the small test-retest interval employed; Taylor (1961), for instance, used an interval of only six months, whilst social isolation studies (Zubek, 1969) have tended to be of even shorter duration. In an attempt to surmount this problem, this research used an intertrial interval of 18 months, which is a longer time than that employed in previous research. In order to have a follow-up study after 18 months, this study required as subjects prisoners whom one could reasonably expect to be still imprisoned at the end of such a period. This meant that the more long-term inmates had to be used, as they best meet this need, and have the additional advantage that if changes do occur as a result of being imprisoned, it would be reasonable to expect that these changes would be more marked in those who had been in prison the longest time. Secondly, another problem with previous research in this area (e.g. Morris and Morris, 1963) has been that it has tended to be by and large institution-specific; to try to overcome these effects, this research included a large number of prisons in an attempt to find results of general applicability.

(i) The First Cross-Sectional Sample.

Having thus decided that the sample should consist of long-term inmates from several different prisons, the precise population from which this sample was drawn was defined for the purposes of this research to be males sentenced in England and Wales to a minimum determinate sentence of 10 years, or to an indeterminate sentence of life imprisonment or detention at Her Majesty's Pleasure. Only males were used, for two main reasons; firstly, very few females have been sentenced to long terms of imprisonment, and secondly, most previous research has concentrated on males. Also, the population consisted only of people aged 21 or over on the 31st of December 1968, as prisoners below this age are dealt with separately by the Prison Department. About 1,100 men were serving such sentences at the end of

1968, and before the sample was chosen, two further groups of people were excluded: firstly, those of foreign nationality, to avoid any cross-cultural difficulties which may have affected test results, and secondly those who (assuming full remission) would be released within 24 months to try to avoid sample attrition as much as possible (as Kassebaum, Ward and Wilner (1971) stress in a study in this field, "attrition is a major issue in any longitudinal design" (p.83). It was not possible for this last point to be always fulfilled, as the number of long-term men who have served 6 years and still have 4 years left to serve is rather small; thus a few men were included who would have passed their remission date before being retested.

From this population, a sample of 215 prisoners were selected, on the basis of the limited number of variables initially available; namely, age, type of offence, type of sentence, and reception date on the present sentence. Controlling for these variables, five groups were selected, differing in the length of imprisonment served on the current sentence, and matched as far as possible on the above variables; as Table 1 shows, precise matching was possible for the first three groups, but not for group IV or group V, which are thus included mainly for comparison purposes. The sample having been chosen, the men were then seen in whatever prison they were held in. Initially, they were approached by members of the prison staff, who told them that they had been chosen to take part in an investigation into the effects of long-term imprisonment, and gave them the option of refusing to take part. This method produced a refusal rate of about 30%, so the prisoners concerned were subsequently seen individually by members of the research team, with the result that the refusal rate became virtually negligible. In addition, it was impossible to see several of the sample, for a variety of reasons; for instance, hospitalization, early release, etc. Overall, just over 20% of the main sample could not or would not be seen; these subjects were replaced randomly

TABLE ONE

COMPOSITION OF GROUPS (INITIAL DESIGN)

GROUP	I	II	III	IV	V
Reception Date on Present Sentence	1967 or 1968	1965 or 1966	1963 or 1964	1961 or 1962	Prior to 1961
Mean Age (in years)	34.64	35.96	37.04	37.68	42.87
s.d.	12.22	10.07	10.93	10.53	9.47
Type of Sentence:					
Indeterminate	25	25	25	25	10
Determinate	25	25	25	25	5
Type of Offence (determinates)					
Offences against persons	10	10	10	14	2
Sexual offences	5	5	5	5	0
Other offences	10	10	10	6	3
Number	50	50	50	50	15

with others who fulfilled approximately the aforementioned criteria of age, type of offence, type of sentence, and reception date on the present sentence. It was assumed that previous imprisonment would be randomly distributed throughout the groups, and would not be a confounding variable.

After the subjects had been tested, data on their previous imprisonment became available from various sources; as analysis of the results in terms of the original design (see Appendix I) did not yield consistent patterning, it was decided to investigate this variable further. Table 2

TABLE TWO

Total Mean Imprisonment X Groups (Initial Design)

GROUP	I	II	III	IV	V
Total imprisonment (in years)					
Mean	5.56	5.87	8.12	10.14	18.57
s.d.	6.70	4.21	5.57	5.03	8.15

presents a comparison between the groups in terms of total mean imprisonment; for the four main groups, there is no significant difference between the 1961-1962 and 1963-1964 groups, nor is there any significant difference between the 1965-1966 and 1967-1968 groups (t-test N.S.) in terms of mean total imprisonment length served. Thus one of the reasons for the inconclusive results from the first design could be this lack of significant differences between the groups in terms of total imprisonment.

This conclusion was confirmed by an analysis of the correlations for the main sample of $N = 215$ with total imprisonment and present imprisonment. This analysis is presented in Table 3, which gives all correlations significant at the .05 level or above* with either of these variables.

TABLE THREE

Significant correlations of test variables with Total and Present Imprisonment

<u>Variable</u>	<u>Total Imprisonment</u>	<u>Present Imprisonment</u>
Reversed Choice Reaction Time	.171*	-.028
Gibson Spiral Maze Time	.44*	-.103
Breaks	.277***	.104
Wechsler Memory Scale Visual Reproduction	-.184**	.023
Purdue Pegboard Assembly Trial I	-.171*	-.021
Assembly Trial II	-.231**	.023
Total Assembly	-.208**	.001
Wechsler Adult Intelligence Scale Information	.071	.148*
Comprehension	-.013	.154*
Arithmetic	.012	.139*
Digit Span	-.024	.139*
Digit Symbol	-.231***	.040
Block Design	-.140*	.077
Picture Arrangement	-.181**	.088
Object Assembly	-.193**	.126

As can be seen by this table, there are far more significant correlations between the test variables and total imprisonment than there are between them and present imprisonment, and it thus appeared that further

investigation of the former variable might prove fruitful. It was thus decided to reorganize the groups in terms of total imprisonment (Table 4)

TABLE FOUR

Composition of re-arranged groups

GROUP	1	2	3	4
N	50	50	50	25
Range of total imprisonment:	0 to 3yrs.11mos.	4 to 5yrs.11mos.	6 to 8yrs.8mos.	8yrs.9mos to 40 yrs.
Total imprisonment mean (in years)	2.47	4.94	6.99	11.29
Total imprisonment s.d.	0.83	0.62	0.77	2.41
Age mean (in years)	32.6	34.8	35.2	35.2
Age s.d.	7.9	10.4	9.9	3.7
N (determinate sentences)	20	21	17	17
N (indeterminate sentences)	30	29	33	8
Mean current sentence served (in years)	2.03	4.15	6.06	6.67

The subjects were divided into four new groups on this basis, the groups being formed by quartile division of the original sample; group 4 contains fewer subjects to retain age-matching, as the group would otherwise be biased by the fact that one generally has to be older to have served a longer time in prison. The other three groups are also matched within statistical limits for type of sentence, but it was not possible to do this for group 4, without altering the age-matching. It was felt, however, that despite this limitation, the group would yield useful information, and it has therefore been included, but with the note that results gained from its inclusion would need careful interpretation; in one of the later sections of this thesis, offence categories will be considered in relation to cognitive test performance. The rest of this thesis is initially based on the results of the rearranged groups.

(ii) The Longitudinal Sample

(a) The Prison Sample (including the second cross-sectional sample).

All available subjects were retested after a mean interval of 19.08 months, an attempt being made to test them in the same order as before, but as several had been moved around from one prison to another in the interim period, this was not altogether possible, and thus the testing took longer the second time, due to the necessity of following-up these men. 154 men ("the longitudinal sample"), out of the original sample of 215, were retested; the remaining 61 who were not seen can be broadly divided into four categories - 40 who had been released, 18 who had taken part in the initial training session but who declined to co-operate a second time, 2 who were hospitalized, and finally 1 who had died. These 154 men were used in the longitudinal analysis, and also in a further (the "second") cross-sectional analysis. Table 5 presents relevant variables, for these subjects who were seen twice, divided into the four total imprisonment groups. As will be noted, the mean age of the subjects left

TABLE FIVE

Composition of Groups Tested Twice
"The Second Cross-Sectional Sample"

GROUP	1	1b	2	3	4
N	43	35	38	32	14
Range of Total Imprisonment *	0 to 3yrs.11mos.	0 to 3yr.11mos.	4 to 5yr.11ms	6 to 8yr.8mos.	8yrs.9mos. to 40 yrs.
Total imprisonment* (in years) Mean	2.44	2.49	4.92	6.82	11.64
Total imprisonment* s.d.	0.90	0.94	0.63	0.68	2.87
Age Mean* (in years)	31.98	33.71	34.13	34.19	35.29
Age* s.d.	7.31	7.02	10.01	8.60	4.27
N (determinate sentences)	27	22	25	23	5
N (indeterminate sentences)	16	13	13	9	9
Mean current sentence served* (in years)	1.98	2.01	4.07	5.45	6.05

* (up to the time of first testing)

in Group 1 (those who had been in prison for the least amount of time in all) is lower than that of the other three groups; to retain this group's usefulness for comparison purposes, a modified group 1b (also on Table 5) was drawn up for the analysis of the retest results. This modified group was drawn up by excluding all those subjects left in Group 1 who were aged 25 or under, thereby making a group of 35, matched in terms of age with those subjects remaining in the other groups. It was hoped that this second cross-sectional analysis could also be done, utilizing the group who had been seen twice, to shed further light on the process of imprisonment.

(b) The Groups of Subjects Paroled and Detained

As has already been noted above; it was found on the second visit that 40 of the original sample had been released; 4 of these subjects had been released as they had reached the end of their sentence, whilst the remaining 36 had been released on parole. The term "parole" is used by the prison system to describe the release of an offender on licence before the normal end of his sentence, subject to the condition that misbehaviour during the period of the licence may lead to recall to the institution. In addition, some form of supervision is usually included in the licence in this country. The parole system in Britain is a recent innovation, only really beginning to come into use during the period covered by the research described in this thesis. Prior to 1968, its forerunner, the system of release on licence, was by and large used only with prisoners sentenced to life imprisonment, corrective training, or borstal training, or with young prisoners.

Under the parole scheme, "every person serving (in effect) a fixed sentence of imprisonment of over 18 months is eligible for consideration for parole when he has served one third of his sentence, or 12 months, whichever is the longer" (HMSO, 1969b p.48). For prisoners with

indeterminate sentences, the system is slightly different; "each case is carefully considered at an early stage, and a date is fixed for review, normally after four years, though in rare cases a review may be held earlier. This review at four years is carried out by the Home Office, its main purpose being to decide whether, exceptionally, the local review committee should be asked to review the case within the following two years. Such a review is unusual. The usual practice is to seek the views of the local review committee after an offender has served seven years whether or not it appears likely that a provisional release date can reasonably be fixed" (HMSO, 1969b p.51).

It was decided to use the 36 people who had been released under the above procedure as a further control on the cross-sectional sample; one problem with using such a sample is that any correlations of the psychological variables with length of imprisonment may be due not to imprisonment per se, but to the fact that those men who are likely to be kept in prison for the full duration of their sentence are likely to be initially different to those who are released before the normal end of their sentence, and it is the differential release-selection procedure which affects the results found. If, on the other hand, it could be shown that the variables which differentiate released men from detained men are not the same as those which relate to length of imprisonment, then there would be reasonable grounds for supporting the hypothesis that changes in performance with regard to these variables are a function of imprisonment rather than of differential selection of subjects for continued detention or release.

To attempt to overcome this problem, the 154 subjects who were seen the second time were examined, and it was found that 134 of this number were eligible for parole, and had been considered before the second testing session, but had not been released. From this group of 134, a sample of 84 men was chosen, to match the group of men paroled for age and type of current sentence (as can be seen in Table 6); it was felt desirable to

TABLE SIXComposition of the Samples of Men Detained and Men Paroled

		Detainees	Parolees
N		84	36
Age:	Mean	39.40	38.81
	s.d.	8.55	10.61
%	Indeterminates	35.70	36.10
%	Determinates	64.30	63.90
Mean total imprisonment served (in years)		10.21	9.15
	s.d.	6.58	6.01
Mean imprisonment served on present sentence (in years)		5.89	6.19
	s.d.	3.27	1.76

control for the latter as (as has been detailed above) the parole-section procedures are markedly different for determinate and indeterminate sentence men, and it was felt desirable to avoid possible confounding of the use of this variable for delection for parole. Subsequent analysis also demonstrated that there were no significant differences in total imprisonment served by the two groups, thereby avoiding any possibility of this variable confounding the results for the comparison between the groups of men paroled and detained.

(iii) The Control Group

The experimental design in this research called for the use of a comparison group of non-institutionalized controls when analysing the results from the longitudinal section of the analysis, to control for changes in test scores over time due to such causes as ageing, or increasing test sophistication (and also to control for the possibility that "criminals" behave differently on cognitive tests). It was initially planned to use a group of men employed by the Forestry Commission as such a control group, mainly for reasons of convenience; they stood a good chance of remaining in the same employment after the required inter-trial interval of about 18 months, and thus would be available for retesting. In addition, they represented a wide variety of different occupations (including motor mechanics, truck driving, power-saw operating, tree cultivation, and general labouring), easily reached through one central authority. The men used were all aged 21 or over, and were selected on the sole criteria of age-matching with the prison sample; again, they were given a chance to refuse to co-operate, but very few did so, those who did being replaced with subjects of the same age. As many subjects as possible (within the limits of age-matching) were seen, in an attempt to cut down on sample attrition; in all, 50 men were seen in various locations in Northumberland and North Yorkshire in 1969.

Examination of these subjects' test scores, however, demonstrated that on some of the test results, their scores were significantly inferior to those of the prison sample; as Table 7 shows, these differences were most notable on the Purdue Pegboard (Tiffin, 1968), a test of manipulative dexterity. Subsequent more detailed analysis of this group of forestry workers in terms of their precise occupation revealed that the inferior results were by and large shown by those subjects who had used petrol-driven power saws over any length of time. A review of research in this field (see, for instance, McCallum, 1971) indicated that a high proportion

TABLE SEVEN

Significant differences between the first control group
and the group of prisoners on the test variables.

Variable		Forestry Controls	Prisoner Group	P
Purdue Pegboard				
Dominant Hand	\bar{x}	15.080	15.799	.05
	s.d.	2.329	1.962	
Both Hands	\bar{x}	11.060	11.851	.02
	s.d.	2.034	1.678	
Total Simple	\bar{x}	40.200	42.136	.05
	s.d.	6.084	4.735	
Assembly Trial I	\bar{x}	32.000	34.416	.05
	s.d.	7.231	6.666	
Assembly Trial II	\bar{x}	34.960	37.831	.05
	s.d.	7.798	6.884	
Total Assembly	\bar{x}	66.960	72.247	.05
	s.d.	14.769	13.178	
Wechsler Adult Intelligence Scale				
Information	\bar{x}	10.720	11.623	.05
	s.d.	2.588	2.569	
Vocabulary	\bar{x}	10.500	11.357	.02
	s.d.	1.909	2.545	
N		33	154	

(all others N.S.)

of consistent users of vibrating tools (especially under cold conditions) suffer from what has become defined by the Industrial Injuries Advisory Council (1970) as "vibration induced white fingers"; this term refers to intermittent attacks of cold-induced pallor or cyanosis of the fingers. It seems likely that such a condition results from prolonged power-saw use, and that the detrimental effects on manipulative dexterity observed in this research is one of the possible sequelae of vibration induced white fingers (for a fuller account of these results see Banister and Smith, 1972).

In view of the above findings, which could affect the control group's use for comparison purposes, it was decided to omit all power-saw users from the control group, and to test a further group of people to replace them. It was also decided to use people from urban occupations to produce a more balanced control group in terms of environmental background. The Territorial Army was approached, and 23 of their volunteers were selected as being of the required age, aged 21 or over, and from varied urban occupational backgrounds (e.g. factory workers, motor mechanics, civil servants); again they were given a chance to refuse, and the few who did so were replaced with others of the same age.

All available controls were retested after an average interval of 17.73 months, this test-retest interval being slightly shorter than that of the prisoners for technical reasons concerned with the availability of men for testing. From this pool of 43 subjects, 30 were chosen to form a final comparison group which, as Table 8 shows, did not significantly differ from the groups of prisoners in terms of mean age, and did not contain any power-saw users.

TABLE EIGHT

Mean ages for the Groups

GROUP	N	\bar{x} age	s.d.
I (First time)	50	32.6	7.9
II (First time)	50	34.8	10.4
III (First time)	50	35.2	9.9
IV (First time)	25	35.2	3.7
I (Second time)	35	33.7	7.0
II (Second time)	38	34.1	10.0
III (Second time)	32	34.2	8.6
IV (Second time)	14	35.3	4.3
Total number of Prisoners seen twice:	154	35.7	9.7
Comparison Group	30	34.7	9.8

(All differences between \bar{x} ages N.S.)

Selection of the Tests

The study reported in this paper attempted to give as wide and as large a battery of tests as possible, concentrating on those areas of cognition where the studies discussed in the introduction above had

previously indicated effects; i.e. "some form of psychomotor decline would be the most likely effect (especially with measures involving eye-hand co-ordination), and also perhaps some form of intellectual decline, both changes being of a relatively permanent nature, ... whilst retention and note learning seem to be the least affected". The size of the battery was limited primarily by the amount of time which each subject was available for testing (about $1\frac{1}{2}$ hours on average), during which time personal data was also obtained from the subject during the session, and thus the battery concentrates on psychomotor and intellectual items, with very few items covering such things as retention and note learning. In addition, the selection of the tests to be used was limited by the stipulation that they should be reasonably portable, as the subjects were seen in a large number of different prisons and locations, which necessitated the carrying of all equipment around by the experimenters. Also, it was attempted as far as possible to avoid using any tests which prisoners would have previously done, to reduce the likelihood of test sophistication confounding the results. The tests in the descriptions below are presented in the order that they were taken by the subjects, solely for the sake of convenience. It was decided to use the same tests throughout the study; thus the longitudinal results outlined below are based on comparisons between the scores of subjects on the same tests at different times of testing. Although it is recognized that this could possibly introduce further confounding variables into the results, it was decided that such effects would be controlled for in that all subjects utilized would go through the same test-retest procedure, and thus any confounding effects would be constant over all groups, and thus would be controlled for in making inter-group comparisons.

(i) The Reaction Time Tests

(a) Introduction

A quick measure of visual reaction times was included in the battery used in this study as the previously discussed studies indicate that one of the effects that one might expect from spending a long time in prison would be some form of psychomotor decline. None of the other tests utilized in this battery specifically measure reaction time, and as previous related research had specifically noted effects on reaction time, these tests were included to widen the testing of cognitive abilities of the battery; as has been mentioned in the Introduction, Nagatsuka and Suzuki (1964) found significant decreases in speed of reaction time to a visual stimulus, after both prolonged and short perceptual deprivation periods, whilst Ross (1964) found hospitalized subjects did worse on a simple reaction time test at certain presentation intervals than did non-hospitalized controls.

(b) Administration

The apparatus used to measure visual reaction times in this study consists of a RACAL SA 535B 1.2 Mc/s Universal Counter-Timer (set to read to the nearest one hundred-thousandth of a second), a power supply pack, an experimenter's control box, and a subject's box. The latter presents the subject with a maximum of three lights, to which he has to respond with a three-way switch (see Appendix 2 part (i) for a sketch of the apparatus). The apparatus was constructed to be reasonably portable, self powered and, at the same time, to be extremely accurate. It measures visual reaction times by means of three separate tests of varying complexity.

(1) Simple Reaction-Time:

A white light is switched on on the subject's control box and the subject has to extinguish the light as quickly as possible by depressing the control lever immediately below the white light.

(2) Choice Reaction-Time:

A red or a green light (situated respectively to the left and to the right of the white light) is switched on, and the subject has to extinguish the light by moving the control lever in the direction of the light.

(3) Reversed-Choice Reaction-Time:

A similar task to (ii) above except that the subject has to move the control lever in the opposite direction to the light in order to extinguish it.

Each task was repeated ten times in the testing session; before subjects were tested on each test, the apparatus and the actions that subjects had to make were explained, and two practice trials were allowed to familiarize the subjects with the apparatus.

(c) Scoring

The subject's score consists of the average time taken to complete each task (over the ten trials), and is expressed in seconds.

(ii) The Gibson Spiral Maze

(a) Introduction

The Gibson Spiral Maze (Gibson, 1965, 1977) is a psychomotor test with similarities to the more complex Porteus Mazes (Porteus, 1959); the latter are similarly tests of psychomotor performance which are also reputed to

be sensitive to personality maladjustment. Schalling and Rosen (1968, 1970), for instance, have demonstrated that scores on the Porteus Mazes differentiate psychopathic from nonpsychopathic criminals, but not all work (e.g. Rankin and Thompson, 1968) on non-delinquent populations has demonstrated that Porteus' Scores are tapping a single ability; it seems that the scores often depend on cognitive errors, as well as psychomotor errors. In addition, the Porteus Mazes are very lengthy to administer. The Gibson Spiral Maze, on the other hand, "owes its direct ancestorship to the Porteus Mazes, and has arisen out of research covering some aspects of the latter test" (Gibson 1965, p.4), but offers the advantages of not requiring elaborate apparatus, of easy transportation, of "the merit of simplicity" (Raven, 1966 p. 471) and, as it is not a true "maze", having no blind alleyways or alternative pathways, it offers the additional advantage that tracing the way through it should not be dependent on intellectual ability. The Spiral Maze has been found by researchers such as Whiting, Johnson and Page (1969) to be significantly correlated with several other tests of motor impairment and impersistence, and seems to fulfil reasonably Gibson's claim that it is of use in the measurement of "the speed, accuracy and general style of peoples' muscular responses in response to carefully controlled stimuli" (1965, p.3), and is "a sensitive test of psychomotor competence" (p.11). It was thus included in this battery as a quick measure of the latter.

(b) Administration

The Maze (see Appendix 2, part (ii)) consists of a spiral design printed on a large card, and presents a pathway 135 cm in length bordered by heavy black lines, with obstacles in the form of the letter O scattered along the whole length of the pathway. The subject has to trace his way out of the maze as quickly as possible with a pencil, starting from the centre and working outwards, attempting to avoid all obstacles and the

sides of the maze en route. Whilst the maze is being completed, the administrator introduces time-stress by sharply urging every 15 seconds that the subject should go as quickly as he can. As such an authoritarian tone might be impossible when rapport had been established later on in the testing session, this test was thus administered first in the battery.

(c) Scoring

(1) Time Score (T):

This is simply the time taken, to the nearest tenth of a second, for the subject to complete the Maze.

(2) Error Score (E):

Obtained by summing the total number of times that the subject's pencil line touches an obstacle or the side of the maze without penetrating into them with twice the total number of times that the pencil line penetrates into an obstacle or the lines at the side. If the pencil line remains in continuous contact with the printed line for some distance, an error is scored for every inch of contact, whilst if it penetrates over the same distance, two errors are counted for every inch of length.

(3) "Adjusted" Error Score (E (T))

This score is obtained by partialling out the Errors with respect to Time. Gibson (1965, p.6) recommends this as being "the most useful single measure of psychomotor competency", and it is obtained in the following way:

The scores are converted to percentiles (see Appendix 2, part (iii) for the tables which were calculated for, and used in, this study) from the raw scores, and the regression formulae is applied to the

Time percentile to work out the average Error percentile for subjects who take that time. If the actual Error Score (converted into percentiles) is less than the average for the time taken, then the difference between the actual and the average Error Score is taken away from 50 to produce the adjusted Error Score. If the actual Error Score is greater than the average, then the difference is added onto 50 to produce the adjusted Error Score.

(4) $(\text{Time})^2 + (\text{Error})^2$ Score $(T^2 + E^2)$

This score has been suggested by Gibson (1969, p. 525) as a useful indicator of "the degree of psychomotor incompetence", and is obtained by summing the raw Time score squared with the raw Error Score squared. Gibson claims that it produces results that are easier to interpret.

(5) Breaks Score.

This score is the sum of the total number of times that the subject lifted his pencil off the maze in the course of completing it; this form of error is scored by Porteus (1959), but is not covered by Gibson's Error Category. Research has indicated that such errors are of importance; Rankin and Thompson (1966), for instance, identified pencil-lifting as a separate factor in a factor analysis of the Porteus Qualitative score. It was thus included in this study as another possible measure of psychomotor competence.

(iii) The Form Matching Test

(a) Introduction

The Form Matching subtest of the General Aptitude Test Battery (USES (1970) was included in this battery as a test of spatial ability; Anastasi (1968) defines such tests as measuring "the ability to visualize and

manipulate objects in space" (p.361). As has been previously mentioned, this was one of the tests which Zubek et al (1962) found performance on to be impaired by conditions of perceptual deprivation. Such an aptitude is not adequately covered by the rest of the battery used in this study, not even in Factor Analyses of the Wechsler Adult Intelligence Scale (Wechsler, 1955); Cohen (1957), for instance, identifies a perceptual organization factor from such studies, but stresses that such a factor is a combination of both perceptual speed and spatial visualization, not merely being dependent on the latter. The Form Matching test was chosen as a measure of spatial ability for several reasons; firstly, it is not used in prisons in this country (as the Birkbeck Spatial Relationships test, for instance, is); secondly, its comparative shortness of six minutes made it possible to include such a test within the limited time available to complete the battery used in this study (as opposed, for instance, to the Revised Minnesota Paper Form Board test (Likert and Quasha, 1941), probably the most well-known paper and pencil test measuring spatial perception, but which takes 20 minutes to complete), and thirdly, as is demonstrated by the Test Agency Catalogue of the National Foundation for Educational Research (1976), most spatial relations tests are part of aptitude batteries, it was chosen as the General Aptitude Test Battery, has the merit of being "the best validated multiple aptitude test battery in existence for use in vocational guidance" (USES, 1970 p.iii), with the additional advantage of high reliability, as, "despite the brevity of individual tests, ... both equivalent - form and retest correlations cluster in the .80's and low .90's" (Anastasi, 1968 p.345). It was thus decided to use this test alone as a quick reliable relatively pure measure of spatial ability.

(b) Administration

This test (see Appendix 2, part (iv)) consists of two separate sheets of paper with outline shapes on them in two boxes on each page. The top box is filled with shapes numbered in order from 1 to 60 (1 to 25 on page one, and 26 to 60 on page two), whilst the bottom box contains the same shapes jumbled up with letters on them. The subject is given one sheet at a time, and has to find the letter on the shape in the bottom box which is identical to the numbered shape in the top box, marking it on the scoring sheet (see Appendix 2, part (v)) next to the number. When the first sheet is completed, the subject is given the second sheet.

(c) Scoring

The score on this test consists of the total number of items correctly completed in six minutes, thus giving a maximum possible score of 60; it was decided to use the raw scores, as aptitude scores for job success prediction were not required in this study.

(iv) Visual Reproduction and Associate Learning

(a) Introduction

These tests were included in the battery used in this study as tests of short-term memory. As has already been pointed out in the introduction, previous related studies have found that retention and note-learning tests seem to be the least affected by conditions similar to long-term imprisonment, and so these brief tests of memory were included, to see if the same results would be found in this study. These items are two of the seven subtests of the Wechsler Memory Scale (Wechsler and Stone, 1945), and were selected from this scale as it is "the most widely used of the composite memory tests" (Talland, 1968 p. 157). The whole test was not given for several reasons; firstly, it takes over fifteen minutes, and thus was

unsuitable for inclusion in this study; secondly, as Buros (1949) points out, the Scale is inadequately standardized, even for its stipulated purpose of appraising "the patient's memory particularly as it is related to the rest of his functioning" (Wechsler, 1945 p.87); thirdly, it includes the Digit Span subtest which is also part of the Wechsler Adult Intelligence Scale (Wechsler, 1955), another section of this battery which it would not be valid to repeat twice in the same study, as test sophistication could then well influence the results; fourthly, part of the Scale is very Americanized, and is thus unsuitable for use in this country (e.g. Part I, question 6 is "Who is Mayor of this city?"), and finally, as Gilbert and Levee (1971) point out, it is not adequate to combine diverse tests into one score as this Scale does, for a serious loss on a particular type of memory may well be obscured by good functioning in other areas (in fact, most psychologists in this field "find it more expedient to devise their own batteries" - Talland (1968 p.157).

These two particular items were included in the battery used in this study as they purport to measure two different aspects of memory; as work by McGhie, Chapman and Lawson (1965) and Taub and Walker (1970) have indicated sensory modality used in studies of memory is of importance, as generally larger age-related effects on memory have been found with visual than with auditory inputs. It has been postulated that the information received via the two modalities is stored differently, and this study thus includes items from them both in an attempt to see whether the differences found in previous studies would be replicated in this research. The only other item in the rest of the battery used in this study specifically connected with memory studies is, as has previously been mentioned, the Wechsler Adult Intelligence Scale Digit Span subtest; work by Davis and Swenson (1970) on the Wechsler Memory Scale has, however, found that the Scale can be factor analytically described by two major factors, one they identified as "memory", and the other as "freedom from distractability".

They found the Associate Learning and Visual Reproduction subtests were highly weighted on only the first, whilst the Digit Span subtest was highly weighted on only the second; this would indicate that the two tests described in this section measure a different aspect to that measured by the Digit Span test, and thus might be of use in this study.

Thus these two tests were included as short tests of visual and verbal memory, areas in which work has been done by previous research, and which are not adequately covered elsewhere in the battery used in this research.

(b) Administration

Standard test material and administration of the Visual Reproduction and Associate Learning subtests of the Wechsler Memory Scale Form I was used in this study (Wechsler and Stone, 1945)

Visual Reproduction: this subtest consists of three cards with designs adopted from Army Performance tests and Binet printed on them (see Appendix 2, part vi). The subject is shown each card for ten seconds, and then has to reproduce the design on it from memory.

Associate Learning: this subtest consists of a list of ten pairs of words (see Appendix 2, part vii), which are read three times to the subject. After each presentation, single words are read out from the list, and the subject has to complete the paired associate.

(c) Scoring

Visual Reproduction: Scored according to Wechsler and Stone (1945), with a maximum of three points for the first card, five for the second, and six for the third, making the total maximum score 14.

Associate Learning: the test consists of 10 paired associates, 6 easy (e.g. Rose - Flower) and 4 hard (e.g. Obey - Inch), and the score is the sum of the correct hard associates plus half the sum of the correct easy associates, making a total maximum score of 21. In addition, note was made of the total number of easy associates correctly made, and of the total number of hard associates correctly made. This differentiation is only made subsequently when Associate Learning results reach significance.

(iv) Purdue Pegboard

(a) Introduction

The Purdue Pegboard (Tiffin, 1968) is a test of manipulative dexterity; such a test was included in the battery used in this study as previous related studies have indicated that "both simple and complex measures of visual motor coordination are adversely affected by conditions of reduced sensory stimulation" (Zubek, 1969 p. 236), and this test is one which purports to measure certain aspects of visual motor co-ordination. It was decided to use a test which involved apparatus rather than paper-and-pencil tests (e.g. subtests of the General Aptitude Test Battery) for the reason that "available evidence indicates that there is little or no correlation between printed tests and apparatus tests designed to measure the same motor functions" (Anastasi, 1968 p. 356). From those apparatus tests of manipulative dexterity which are readily available in this country (see National Foundation for Educational Research, 1976), the Purdue Pegboard was chosen as it provides measures (according to the manual) of "two types of activity: one involving gross movements of hands, fingers, and arms, and the other involving primarily what might be called "fingertip" dexterity" (Tiffin, 1968 p. 2). Fleishman and Ellison (1962) provide some evidence that the test does measure more than one aspect of manipulative

dexterity; in a factor analytic analysis of such tests, they found that all Purdue Pegboard subtests correlate with a factor which they identified as "finger dexterity", which they described as "the ability to make rapid, skilful, controlled manipulative movements of small objects, where the fingers are primarily involved" (p.101). They also found that Tiffin's "fingertip" subtests can be included in the factor they called "manual dexterity", described as "the ability to make skilful, controlled arm-hand manipulations of larger objects" (p.103). In addition, the Purdue Pegboard does not use tools, is easily portable, short to administer, and has been found (Costa et al, 1963) to be independent of educational level in normals. It was thus selected in preference to the other available tests which tend either to involve tool-use, or to take longer to administer, or to measure only one aspect of psycho-motor skills.

(b) Administration

This test consists of a wooden board in which are drilled two rows of twenty-five holes into which pins can be inserted. At the top of the board, there are four cups containing the pins, washers, and collars used in the test.

(a) Simple: The first part of this test consists of three simple tasks, involving the placing of metal pins as quickly as possible into the holes, using first the dominant hand only, then the nondominant hand only, and finally both hands together. There is a time limit of 30 seconds for each trial. A preliminary study (see Appendix 2, part viii) found no significant improvement on the simple task over three trials, so it was decided to follow the standard one-trial procedure in the interests of time-saving on the battery. In addition, a single initial scored practice trial using the dominant hand alone was given to familiarize subjects with the test.

(b) Assembly: The second part of this test requires the subject to assemble items involving the pins, the washers, and the collars, using both hands. There is a time limit of 60 seconds on this part of the test. The preliminary study found a significant improvement (t-test, $p < .05$) only between first and second trials, and thus this test was only administered twice.

(c) Scoring

(a) Simple: Scores consist of the number of pins correctly placed in the holes in 30 seconds and are recorded as follows:

- | | | |
|----------------------|---|---------------------------------------|
| (1) Simple Practice | = | initial dominant-hand practice trial. |
| (2) Dominant Hand | = | dominant-hand trial. |
| (3) Nondominant Hand | = | nondominant-hand trial. |
| (4) Both hands | = | both hands together trial. |
| (5) Total Simple | = | sum of parts 2, 3 and 4. |

(b) Assembly: Scores consist of the number of items correctly placed on the board in 60 seconds, and are recorded as follows:

- | | | |
|-----------------------|---|--------------------------------|
| (1) Assembly Trial I | = | first administration of test. |
| (2) Assembly Trial II | = | second administration of test. |
| (3) Total Assembly | = | sum of parts 1 and 2. |

(vi) Wechsler Adult Intelligence Scale

(a) Introduction

The Wechsler Adult Intelligence Scale ("WAIS", Wechsler, 1955) was one of the tests included in the battery used in this study as the previously mentioned related studies have indicated that it might be reasonable to postulate that the experience of imprisonment may produce intellectual decline. The WAIS was chosen as the measure of intelligence for this

study for several reasons:

(i) As Guertin et al (1971) stress in the most recent of their quinquennial reviews of the Wechsler scales, these "scales remain the unchallenged leaders for evaluating intelligence in individual testing" (p.290). This view is held by many other writers; Cronbach (1970) for instance, says that "for ... adults, the Wechsler is the dominant individual test" (p.252); and Buros (1972) says "the WAIS can be regarded as the psychological test apotheosized ... it is certainly the best of the adult individual tests of intelligence. It was carefully constructed and standardized. The norms were intelligently conceived and meticulously developed. This test has become the standard against which other adult tests can be compared". (p.786-8). Thus this test was selected to measure intelligence in this study, as it seems to be generally acknowledged as the best individual measure available. The reasons that the WAIS is so frequently used are many, but probably the most important one is that it is a restandardization of the Wechsler-Bellevue Intelligence Scale, which was originally standardized in 1939 as an intelligence scale suitable for adults (see Wechsler, 1944). The battery of tests used in the original scale was chosen after a comparative analysis of existing tests had been made, and thus the test has a long historical pedigree. The WAIS "represents a technical improvement, being more satisfactorily standardized and tending to produce rather more reliable scores on some of the sub-scales, particularly the verbal ones, and consequently more reliable total IQs " (Butcher, 1968 p.226). It used for purposes of standardization an American nationwide sample of 1700 adults aged 16 to 64, selected to be representative in terms of age, sex, part of the country, urban-rural residence, race, occupational level and education of the population as a whole; in addition it used 475 older subjects, aged from 60 to over 75. It has been shown to be of high

reliability (Anastasi, 1968), and, as Guertin et al (1971) say, its "validity ... is by now rather generally assumed" as a measure of intelligence in general, though, as Anastasi (1968) stresses, "more systematic investigation of validity would strengthen the interpretation of test scores" (p.282).

(ii) The WAIS and its subtests has been used in a large number of the studies involving intelligence tests mentioned in this introduction; for instance, Taylor's (1961) study on prisoners, Bernstein et al's (1965) study on institutionalization, or Kral et al's (1967) concentration camp study. The WAIS was thus included in this research so that more direct comparisons could be made with previous research in the same field.

(iii) The WAIS, in Cronbach's (1970) words, "spreads over a variety of significant tasks" (p.252); in all, it has 11 subtests, and is virtually a test-battery in its own right. As well as providing what Wechsler (1958) describes as "Verbal" and "Performance" scores, a great deal of work has been done using the scale subtests diagnostically, although a lot of the research in this field has proved to be inconclusive. Nevertheless, factor analyses of the WAIS by Cohen (1957) has identified three major factors, which he describes as "verbal comprehension", "perceptual organization" and "memory"; this result has also been found by other (though not all) experimenters in this field. It thus seems that the scale's subtests and derived scores, with their "breadth-of-sampling" (Guertin et al, 1971 p.294) could well be of use in this study, and this was another reason for the choice of the WAIS.

(iv) The final reason for the choice of the WAIS in this study was its practicality; it is easy to administer, relatively short (especially in terms of the amount of data it provides), is not used often in prison with

non-psychiatric prisoners, is easily portable, and is pleasant to use, usually being interesting to the subject.

(b) Administration

Standard WAIS administration (Wechsler, 1955) was used in this study. The scale consists of eleven subtests, which are briefly described below, listed in the order of their administration:

(a) Verbal Scale:

- (1) Information: 29 questions covering a wide variety of general knowledge which adults presumably would have had an opportunity to acquire.
- (2) Comprehension: 14 questions designed to test the subject's practical judgement and common sense, including ones on which the subject has to say what he would do in a certain situation, why certain things are done as they are, etc.
- (3) Arithmetic: 14 questions orally presented involving fairly elementary arithmetic, which the subject has to answer without using paper and pencil.
- (4) Similarities: 13 pairs of words are presented to the subject, and he has to say in what way the two things they represent are alike.
- (5) Digit Span: This subject consists of two parts; firstly, the subject is orally presented lists of three to nine digits, and has to repeat them; secondly, the subject must repeat different lists of two to eight digits backwards.
- (6) Vocabulary: 40 words of increasing difficulty are presented both orally and visually; the subject is asked the meaning of each word.

(b) Performance Scale:

- (7) Digit Symbol: The subject has to fill in as many symbols as he can in the blank spaces underneath digits, according to the key above the test, in 90 seconds.
- (8) Picture Completion: The subject is presented with 21 cards, each containing a picture from which some part is missing, and has to say what is missing from each picture.
- (9) Block Design: The subject has to copy 10 designs of increasing complexity on cards using from four to nine blocks, coloured red, white, and red-and-white.
- (10) Picture Arrangement: The subject has to sort 8 sets of cards of increasing complexity, varying from 3 to 6 cards a set, to tell a story in their correct sequence.
- (11) Object Assembly: The subject has to complete 4 jig-saw puzzles.

In addition to accuracy of performance, the speed the subject takes to complete items is taken into account in scoring the Arithmetic, the Digit Symbol, the Block Design, the Picture Arrangement and the Object Assembly subtests.

(c) Scoring

Standard scoring was used on the WAIS, with one judge scoring all the tests, to avoid problems of inter-judge reliability; as Schwartz (1966) has noted, this is a problem which causes large discrepancies of scores on some WAIS items. Each test was scored, and the raw scores were transferred into their scaled score Equivalents (see Appendix 2, part ix for a blank WAIS form, which includes these Equivalents), which were recorded.

(d) I.Qs:

(d) (i) The Verbal Score (the sum of the scaled scores of the six Verbal subtests); (ii) the Performance Score (the sum of the scaled scores of the five Performance subtests); and (iii) the Full Scale Score (the sum of all eleven subtests) were converted into Intelligence Quotients, using Wechsler's (1955) tables, and these Quotients also were recorded.

(e) Derived Scores:

As well as using the above scores, it was decided to utilize some of the derived scores from the WAIS; as Anastasi (1968) stresses, "in addition to yielding an IQ, the Wechsler Scales have been extensively investigated as possible diagnostic instruments for a wide variety of pathological conditions" (p.296). There are a large number of such scores, for all of which "the evidence is generally negative" (p.300); nevertheless, it was decided to use some of them in this study, as previous work has occasionally found them of use, and, in addition, they could be readily obtained by using data already available. The following four derived scores were thus noted as well:

(i) The Verbal-Performance Discrepancy:

This score is derived by subtracting the subject's Performance Intelligence Quotient from his Verbal Intelligence Quotient. Wechsler (1958) states that "a significant (negative) Verbal minus Performance constellation (is) frequently met with in subjects roughly labelled as "acting-out" individuals" (p.160), and this assertion has stimulated many studies of criminals (e.g. Manne, Kandel and Rosenthal (1962) (cited in Guertin et al, 1966) or Kahn (1968), although, as Guertin et al (1971) stress, its use as a general index of "acting-out" potential is debatable. It was included in this study so that comparisons could be made with previous studies, and to see if this variable varied with length of imprisonment.

(ii) Wechsler's Deterioration Index:

This index was developed by Wechsler (1958) to be used in the diagnosis of what he terms "mental deterioration", which he defines as "a falling off from a previous functioning level" (p.199). The assumption is that some of the subtests of the WAIS "hold" with brain damage, and thus represent a subject's cognitive level prior to injury or disease, whilst other subtests "don't hold", and thus provide a measure of the subject's cognitive level at the time of testing. The score is derived as follows: firstly, the Raw Scores on the subtests are converted into Wechsler's (1955) age-scaled scores, "to avoid the need for any extrapolation or bonus for age" (Wechsler, 1958 p.211); in other words, so that the experiment can compare an individual's performance on each test with that of his age peers. Second, the age-scaled scores for the following tests are

into two groups, as follows:

(a) "Hold" subtests

Vocabulary

Information

Object Assembly

Picture Completion

(b) "Don't Hold" subtests

Digit Span

Similarities

Digit Symbol

Block Design

Finally, the quotient is calculated by the following formula:

$$\frac{(\text{Hold} - \text{Don't Hold})}{\text{Hold}} \times 100$$

There has been a great deal of research attempting to validate this index, but as Anastasi (1968) points out, "results with the Wechsler Deterioration Index have been particularly disappointing" (p.300); some researchers have suggested their own indices (e.g. Allen, 1947, and Hewson, 1949), which have not been very much more successful than Wechsler's original index. It was thus decided to utilize the latter in this study, as most of the research which has been done in this field has concentrated on Wechsler's Index. The Index was included, despite its obvious disadvantages, in the hope that it might bring out some facet of the effects of imprisonment not covered by the other tests in this battery.

(iii) The Masculine/Feminine Score:

Wechsler's (1958) standardization sample for the WAIS suggested "that women seemingly call upon different resources or different degrees of like abilities in exercising whatever it is we call intelligence". From this finding, Wechsler developed a "masculine"/"feminine" score (MF), which he hoped would be "comparable to MF scores on standard masculinity-femininity tests like the Miles-Terman or the MMP I" (p.149). This score is obtained comparing those subtests which Wechsler expected males to do the best on (Information, Arithmetic and Picture Completion) with those on which he expected females to do the best on (Vocabulary, Similarities and Digit Symbol); the actual score is derived by subtracting the sum of the age-scaled scores (again used to control for effects of age) for the "feminine" subtests from the age-scaled scores of the "masculine" subtests.

Again, research on this derived score has proved inconclusive, some workers (e.g. Shaw, 1965) confirming Wechsler's results, whilst others (e.g. Levinson, 1963, or McCarthy et al, 1970) have found it to be of no use. It was included in this study as research with conditions of sensory deprivation (e.g. Peters et al, 1963) have found that subjects who score high on femininity scales tend to adapt better to such conditions; thus it

might be postulated that those prisoners who have the more feminine scores on this test might possibly withstand the effects of imprisonment better - if, on the other hand, this test did not discriminate between the groups in terms of masculinity/femininity, then a possibly confounding variable would be controlled for.

(iv) The Analytic Index:

This index has been found by Morgan (1966) to be correlated significantly ($r = .66$) with a "perceptual index", derived from the mean of the scale scores of the Rod-and-Frame Test, the Body-Adjustment Test, and the Embedded-Figures test; each of these latter tests requires the subject to separate himself or some other object from the surrounding field or overcome the influence of the field or context. The score consists of the summed age-scaled scores of the Picture Completion, Object Assembly and Block Design subtests.

It was included in this battery as it is meant to be a measure of the ability of a subject to separate himself from his environment, and to overcome the influence of field and context. Research findings on field dependency and sensory deprivation conditions are generally inconsistent, but Zubek (1969) concludes that evidence perhaps favours the candidacy of the bodily oriented subject as potentially more tolerant of deprivation. Thus this test was included for reasons of control of a possibly confounding variable (as the Masculine/Feminine Score, outlined above, also was).

Administration of the Tests

(i) Time of Testing

The subjects were tested during the following periods of time:

- | | | |
|------|-------------------------------------------|---------------------------|
| (i) | Prisoners first visit | February to November 1969 |
| (ii) | Forestry Commission employees first visit | May to November 1969 |

(iii)	Territorial Army men first visit	October to December 1970
(iv)	Prisoners second visit	September 1970 to July 1971
(v)	Forestry Commission employees second visit	December 1970 to January 1971 (+ one add.one, February 1972)
(vi)	Territorial Army men second visit	March to April 1972

(ii) Place of Testing

All the subjects were tested individually on the cognitive tests, in one private session.

- (a) The prisoners were tested in convenient small rooms in whatever prison they happened to be located in; during the course of this research the following prisons were visited at one time or another: Albany, Birmingham Hostel, Blundeston, Bristol, Chelmsford Special Wing, Coldingley, Dartmoor, Durham, Durham Special Wing, Gartree, Grendon, Hull, Leyhill, Lincoln, Maidstone, Maidstone Hostel, Nottingham, Parkhurst, Parkhurst Psychiatric Wing, Portsmouth, Reading, Shepton Mallet, Shrewsbury, Wakefield, Wormwood Scrubs, and Wormwood Scrubs Hospital.
- (b) The Forestry Commission employees were tested in various locations in Northumberland and North Yorkshire, the bulk of testing being carried out in Kielder Castle, Stonehaugh Village Hall, and Byrness Forestry Office.
- (c) The Territorial Army men were tested either in the Territorial Army headquarters, Durham, or in the University of Durham Department of Psychology.

(iii) Administration of Tests

The subjects were seen individually, and the tests were administered in the following order: the Reaction Time tests, the Gibson Spiral Maze,

the G.A.T.B. Form Matching, the Purdue Pegboard, the items from the Wechsler Memory Scale, and finally, the W.A.I.S. In addition, during the testing session, details were elicited from the subject about his home background, interests, etc., to help rapport and to fill in any details about the subject which were not obtainable from available written sources; such details will be discussed below in the section on "Social and Criminological Variables".

RESULTS

General Introduction

The results below are presented in the three main subsections of the experimental design, as follows:

- (i) The First Cross-Sectional Results
- (ii) The Longitudinal Results
 - (a) The Longitudinal Analysis
 - (b) The Second Cross-Sectional Analysis
- (iii) The Results of the Groups of Prisoners Paroled and Detained

Within each subsection, the various test results are described in the same order as they are described in the procedure section above. The results are also presented as a whole in Appendix 3, for easy reference. In addition a summary of the significant results is presented at the end of the "results" section.

Significant results (at the .05 level or above) are also presented graphically, when this will make them clearer. A detailed discussion of these results follows in the next section.

Along with each set of test results, control data is presented; the section entitled "problems of control" immediately below explains the rationale for using this control data. Also there is a brief note about the methods of statistical analysis used in this section before the results themselves.

The Problems of Control

As has already been mentioned above in the Method and Procedure Section, there are a number of assumptions underlying the experimental design used in this paper and a number of controls have been built into the research to try to check whether these assumptions are justifiable.

This subsection briefly describes these controls, and the reasons underlying their use, under the main headings as outlined above:

(i) The First Cross-Sectional Results.

It is assumed that any differences found between the four prison groups are due to the effect of being imprisoned for different lengths of time, rather than being due to any special process depending on the fact that all the people imprisoned are convicted criminals. To control for the possibility that any results found are only criminal-specific (rather than due to the effects of imprisonment), after each set of results those of the comparison (or control) group of 30 non-criminal subjects are presented. These results are compared with those of group one of the prisoners (i.e. the prisoners who had been in prison for the shortest length of time, and who thus would presumably be least affected by imprisonment), and if such comparisons indicate significant differences, the results of the prison groups are discussed in the light of these differences. Where no such differences occur, it is assumed that significant differences between the four prison groups are more likely to be due to their differing lengths of total imprisonment, rather than to their criminal nature. The cross-sectional results are in addition controlled by the comparison of the scores of prisoners released on parole and detained (see below for an expansion of this point).

(ii) The Longitudinal Results.

(a) The Longitudinal Analysis

In the longitudinal part of the study, it is assumed that changes indicated are due to the experience of imprisonment, rather than to other variables, such as the natural ageing process which could be assumed to have occurred in the test - retest interval, or changes due to the test-retest situation occurring within about 18 months, thus bringing in the possibility that increasing test sophistication could be affecting the test results. To control for this, the prison longitudinal results are compared below with the control group's longitudinal results; if the mean changes in test scores between first and second testing are significantly different for the two groups, then this difference is subsequently discussed - as both groups have done the same tests over the same time interval. Then it is assumed that differences in the prisoners' test scores are more likely to be due to imprisonment than to other causes. When there is no significant difference between the groups, it is assumed that changes are due to increasing test sophistication, the natural ageing process, etc.

(b) The Second Cross-Sectional Analysis

No specific controls are built into this part of the results, but the tables below do include the comparison groups retest results, so that in any subsequent discussion comparing the results for the four groups of prisoners on the second time of testing some attempt can be made to control for differences due to the effects of increased test sophistication; it is recognized, however, that this will provide a complete control, as the prison groups will have had the additional experience of imprisonment.

(iii) The Prisoners Paroled and Detained

It is assumed that any differences found between the four prison groups are due to the effects of being in prison for a greater length of time, rather than to any policy of differential release practised by the Parole Board. If it could be demonstrated that the Parole Board release prisoners selectively with regard to the cognitive variables used in this research, then this would cause the results found, rather than the experience of imprisonment. For instance, if it could be shown that the Parole Board systematically release more intelligent prisoners, then this would mean that the groups of people who had been in prison for the greatest length of time would appear to be becoming less intelligent as a result of being in prison, whereas this effect was occurring due to the differential release of more intelligent prisoners when they became eligible for parole.

To control for this possibility, the results section below includes a part looking at differences between a group of prisoners released on parole and a group of the same mean age who were considered for parole, but who were not released; where this subsidiary study indicates significant differences, these are discussed in the light of the overall results.

Statistical Analysis: a Note

The results presented below are analyzed using two-tailed t-tests. Analysis of Variance was also considered as a method of analysis, but the former method of statistical analysis was considered to be more appropriate for a variety of reasons:

(a) As Edwards (1970) points out, simple analysis of variance does not indicate where significant differences occur, which are of considerable interest in this study, and which are readily produced by t-tests. Complex analysis of variance would produce the results, but the end product would be of no difference, as, mathematically, $F = t^2$ (Edwards 1954). Analysis of variance is frequently used as a 'screening' device, to indicate which results are worthy of further more detailed analysis - as Fisher (1942, p.52) says "its claim to attention rests essentially on its convenience", but in studies involving multiple comparisons, as Edwards (1960) notes (p.136), one "should be guided by ones experimental interest", and it is quite usual in such cases to use analysis of variance multiple comparisons even when the overall analysis of variance is non-significant; in this study, it would not be of use as a screening device, as the study is specifically concerned with multiple comparisons, and thus t-tests were chosen as producing the same results in a much more efficient way. One possible disadvantage of using t-tests in this way is that, in some circumstances, they are more likely to yield significant results than analysis of variance is; as this is only a problem when the n involved is very small, this statistical consideration would not affect the analysis of the data presented in this thesis, where reasonably large n's are used.

(b) In view of the large number of subjects and variables utilized in this study, one consideration in deciding which method of statistical analysis to use was which methods of data processing were available. Computer-analysis was chosen as being the only viable way to analyze the data produced by this study. The Newcastle/Durham Universities IBM 360/67 computer had a t-test statistical package readily available, and trained personnel who could assist in the use of this package; complex analysis of variance could have been used, but, as has been outlined in (a) above, t-tests were chosen as being equally suitable, and far more convenient to use. Consult-

ation with statistical advisers on both the computer and Psychology departmental staff confirmed this choice.

(c) Two-tailed tests were used in preference to one-tailed tests as the purpose of this study was to attempt to investigate the cognitive effects of long-term imprisonment without hypothesising that these effects would necessarily be any one direction on any specific test used in the study.

Results

(i) The First Cross-Sectional Results.

The results presented below are for the four groups of prisoners as outlined in Table Four above. Namely:

Group	1	2	3	4
N	50	50	50	25
Total Imprisonment mean in years	2.47	4.94	6.99	11.29

The results presented below are for those obtained at the first time of testing only.

The controls used in this part of the study are to check the assumption that group one of the prisoners are comparable with normal populations. This is done by comparing the scores obtained by group one with those obtained by the control group.

(i) The Reaction Time tests:

TABLE NINE

Four Prison Groups x Reaction Times Results

Group	1	2	3	4
1) Simple Reaction (mean) Time	0.26	0.25	0.27	0.26
(s.d.)	0.06	0.04	0.05	0.07
2) Choice Reaction Time	0.36	0.37	0.37	0.37
	0.06	0.06	0.06	0.10
3) Reversed-Choice Reaction Time	0.46	0.49	0.50	0.54
	0.10	0.10	0.17	0.15

Significant Results

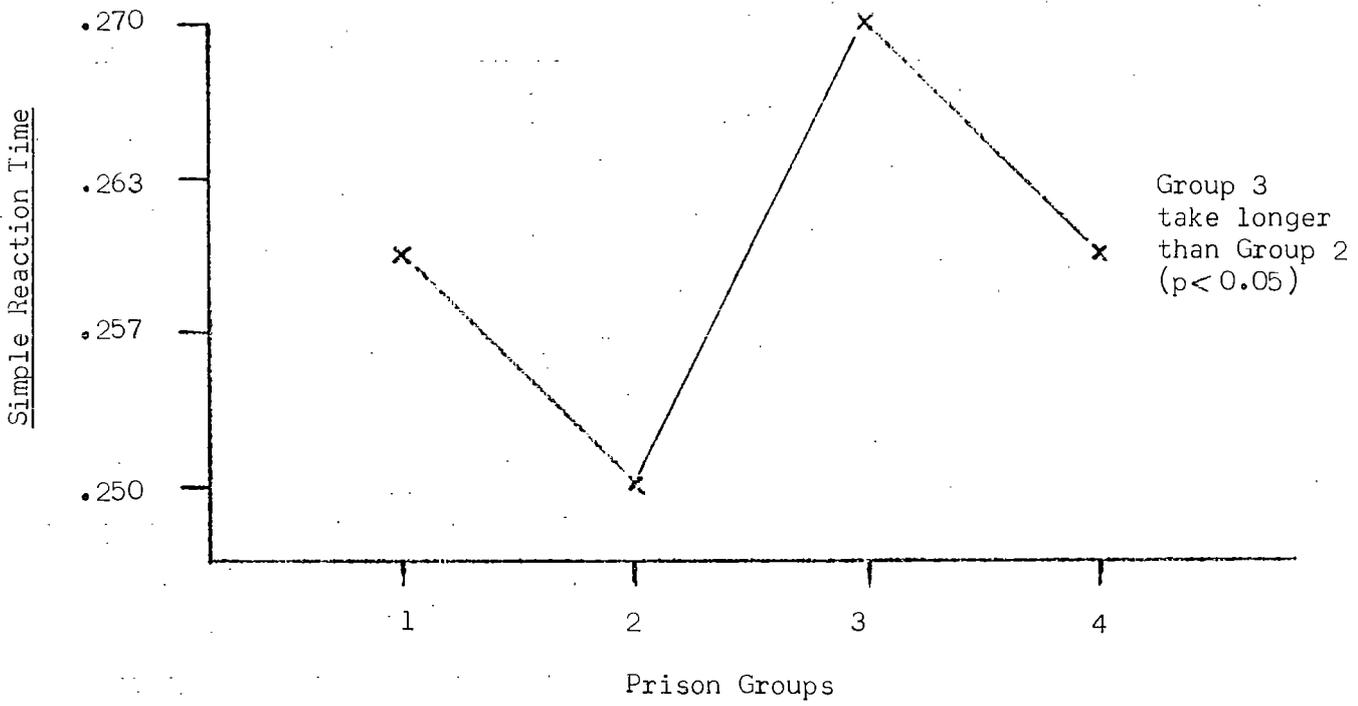
- 1) Simple Reaction Time: Group 3's simple reaction time was significantly longer than group 2 (t-test: $p < 0.05$).
- 2) Choice Reaction Time: No significant differences at the .05 level.
- 3) Reversed-choice Reaction time: Group 4's reversed-choice reaction time was significantly longer than group 1. (t-test: $p < 0.05$).

TABLE TEN

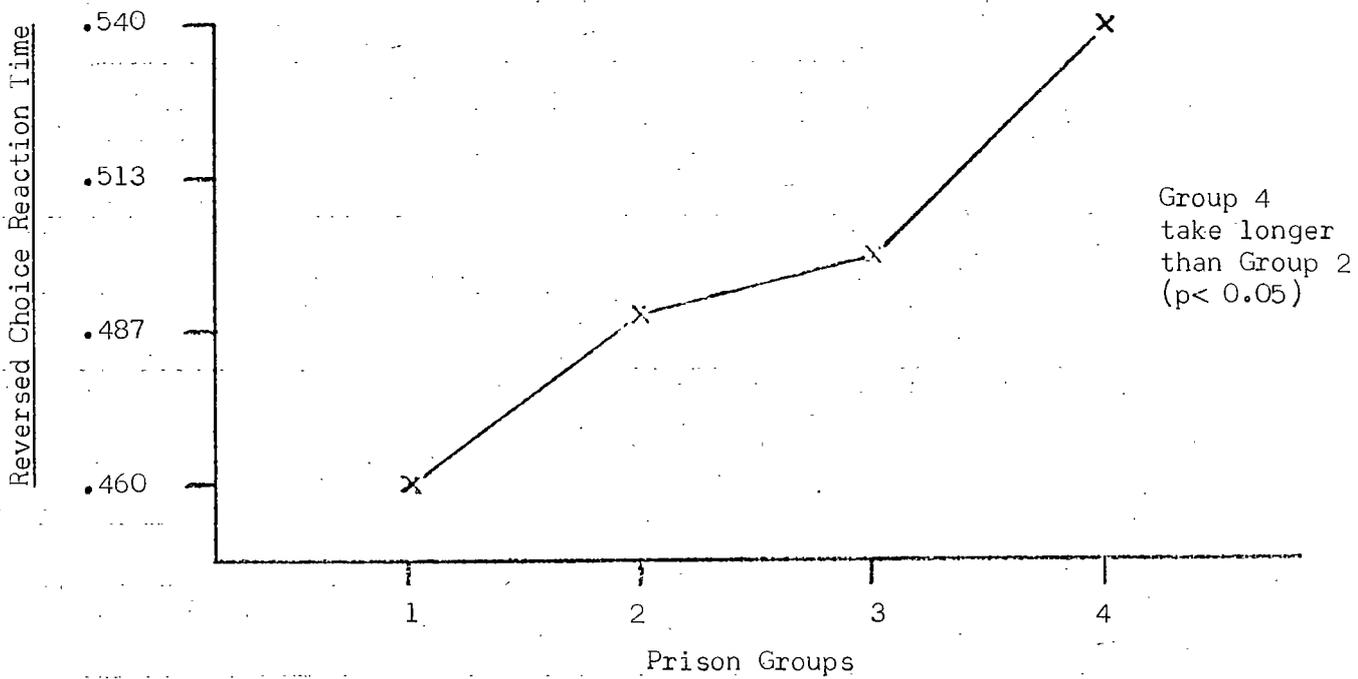
Control Group x Reaction Times Results

	<u>Mean</u>	<u>s.d.</u>
1) Simple Reaction Time	0.26	0.04
2) Choice Reaction Time	0.37	0.05
3) Reversed-Choice Reaction Time	0.51	0.16

First Cross Sectional Analysis: Simple Reaction Time



Reversed Choice Reaction Time



There are no significant differences between these reaction-times and those of group 1; thus the reaction-times of group 1 are not significantly different from those of a non-imprisoned group.

(ii) The Gibson Spiral Maze.

TABLE ELEVEN

Prison Groups x Gibson Spiral Maze Results

Group		1	2	3	4
1) Time Score	(mean)	43.03	45.44	44.27	44.66
	(s.d.)	11.36	14.85	13.32	15.51
2) Error Score		10.72	11.46	10.00	9.32
		9.15	12.94	8.38	6.66
3) "Adjusted" Error Score		49.06	48.16	47.72	46.76
		22.47	25.51	25.01	20.55
4) $(\text{Time Score})^2 + (\text{Error Score})^2$		2173.24	2570.28	2313.52	2437.72
		976.91	1601.89	1432.70	2049.89
5) Breaks Score		0.46	0.30	0.22	0.48
		0.81	0.65	0.58	1.29

Significant Results

There are no significant differences between any of the groups on the Gibson Spiral Maze scores.

The control group results were as follows:

TABLE TWELVEControl Group x Gibson Spiral Maze Results

	<u>Mean</u>	<u>s.d.</u>
1) Time Score	44.58	20.62
2) Error Score	9.30	8.04
3) "Adjusted" Error Score	42.37	26.26
4) (Time Score) ² + (Error Score) ²	2547.51	2879.65
5) Breaks Score	0.40	0.97

There are no significant differences between these scores and those of Group 1.

(iii) The Form-Matching Test (G.A.T.B)

TABLE THIRTEENPrison Groups x Form-Matching Results

Group	1	2	3	4
mean	30.04	31.26	28.44	29.03
s.d.	6.72	9.23	6.83	7.18

Significant Results

There are no significant differences between any of the groups on this test.

The control group results were as follows:

TABLE FOURTEENControl Group x Form-Matching Result

mean	31.67
s.d.	8.45

There is no significant difference between this result and that of Group 1.

(iv) Visual Reproduction and Associate Learning:

TABLE FIFTEENPrison Groups x Visual Reproduction and Associate Learning Results

Group	1	2	3	4
Associate Learning (mean)	13.84	14.68	15.28	14.46
(s.d.)	3.53	3.91	3.21	3.54
Visual Reproduction	10.18	9.70	9.34	9.24
	2.27	3.27	2.77	2.73

As the Associate Learning test produced significant differences, a further analysis was done to separate out the Easy and Hard Associates on this test; the results were as follows:

TABLE FIFTEEN (A)

Prison Groups x Easy and Hard Associates on the
Associate Learning Test

Group		1	2	3	4
Easy Associates	(mean)	16.32	16.56	16.64	16.60
	(s.d.)	1.92	1.43	1.21	1.30
Hard Associates		5.68	6.40	6.96	6.16
		2.94	3.46	2.81	3.12

Significant Results

Significant differences on these tests are as follows:

- (i) Hard Associates: Group 3 remembered significantly more hard paired associates than group 1. (t-test $p < 0.05$)
- (ii) Total Score: Group 3 remembered significantly more paired associates overall than group 1. (t-test $p < 0.05$).

The control group results are as follows:

TABLE SIXTEEN

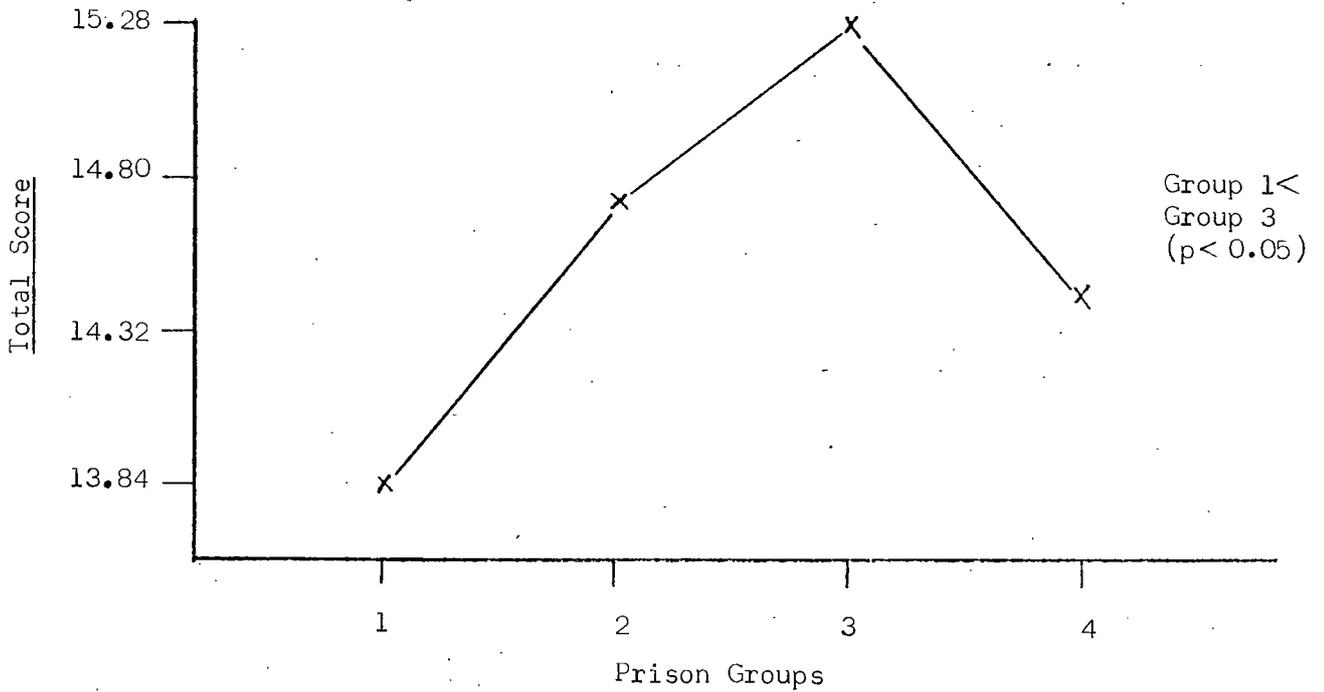
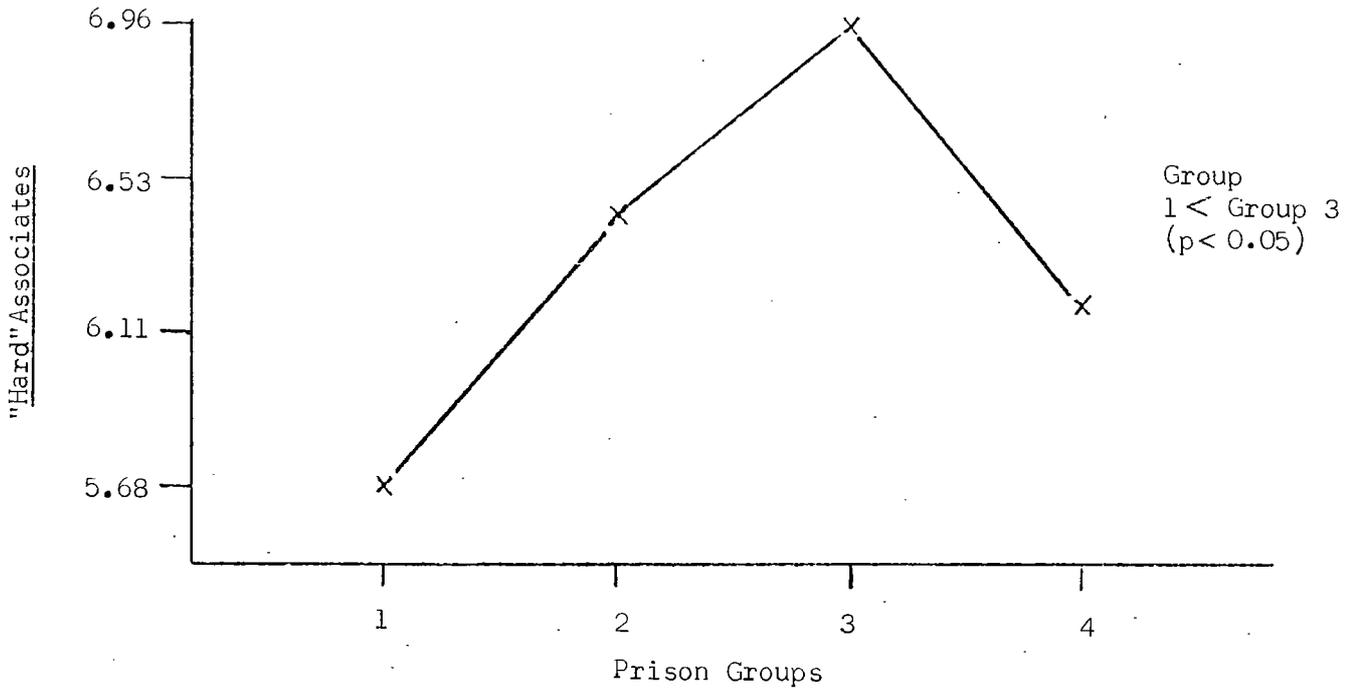
Control Group x Visual Reproduction and Associate
Learning Results

		<u>Mean</u>	<u>s.d.</u>
Associate Learning:			
Easy Associates	(E)	16.60	1.32
Hard Associates	(H)	5.77	3.03
Total Score	(E/2 + H)	14.07	3.48
Visual Reproduction		10.20	2.80

First Cross Sectional Analysis:

Wechsler Memory Scale:

Associate Learning



There are no significant differences between any of these results and those of group 1.

(v) Purdue Pegboard

TABLE SEVENTEEN

Prison Groups x Purdue Pegboard Results

Group	1	2	3	4
1) Simple Practice (mean)	14.74	15.04	14.86	14.92
(s.d.)	2.18	1.65	2.11	2.29
2) Dominant Hand	15.86	15.94	15.94	16.04
	1.75	1.95	2.05	1.90
3) Non-Dominant Hand	14.74	14.68	14.48	14.48
	1.74	2.13	1.79	1.66
4) Both Hands	11.94	12.06	11.80	12.12
	1.57	1.49	1.53	1.96
5) Total Simple	42.54	42.68	42.22	42.64
(D + N-D + B)	4.36	5.00	4.49	4.77
6) Assembly Trial I	35.26	36.46	33.40	35.16
	5.48	6.65	6.72	6.56
7) Assembly Trial II	38.42	40.24	36.92	39.68
	5.02	6.24	5.85	8.06
8) Total Assembly	73.68	76.70	70.32	74.84
(I + II)	10.01	12.40	12.06	13.85

Significant Results

Although there is a clear trend towards decreasing speed on the non-

dominant hand subtest, this failed to reach significance.

All the assembly subtests reached significance, but only due to the poorer performance of group 3, which was significantly slower than group 2, as follows:

6)	Assembly Trial I	Group 3 < Group 2	($p < 0.05$)
7)	Assembly Trial II	Group 3 < Group 2	($p < 0.01$)
8)	Total Assembly	Group 3 < Group 2	($p < 0.02$)

The control group results are as follows:

TABLE EIGHTEEN

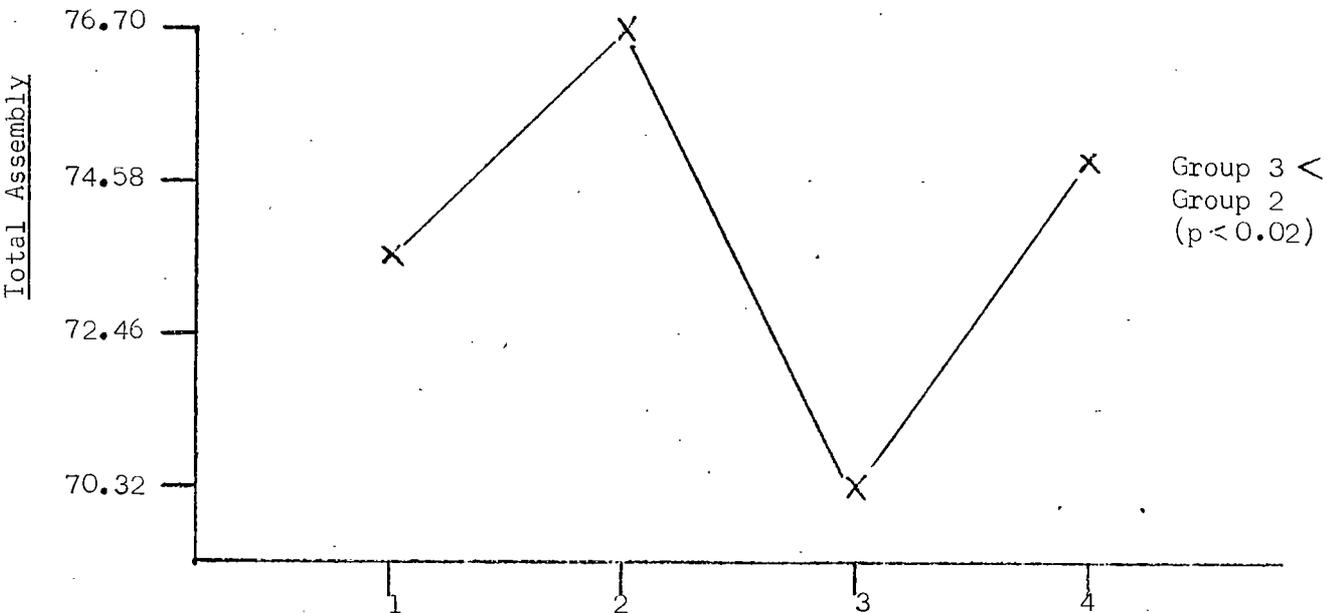
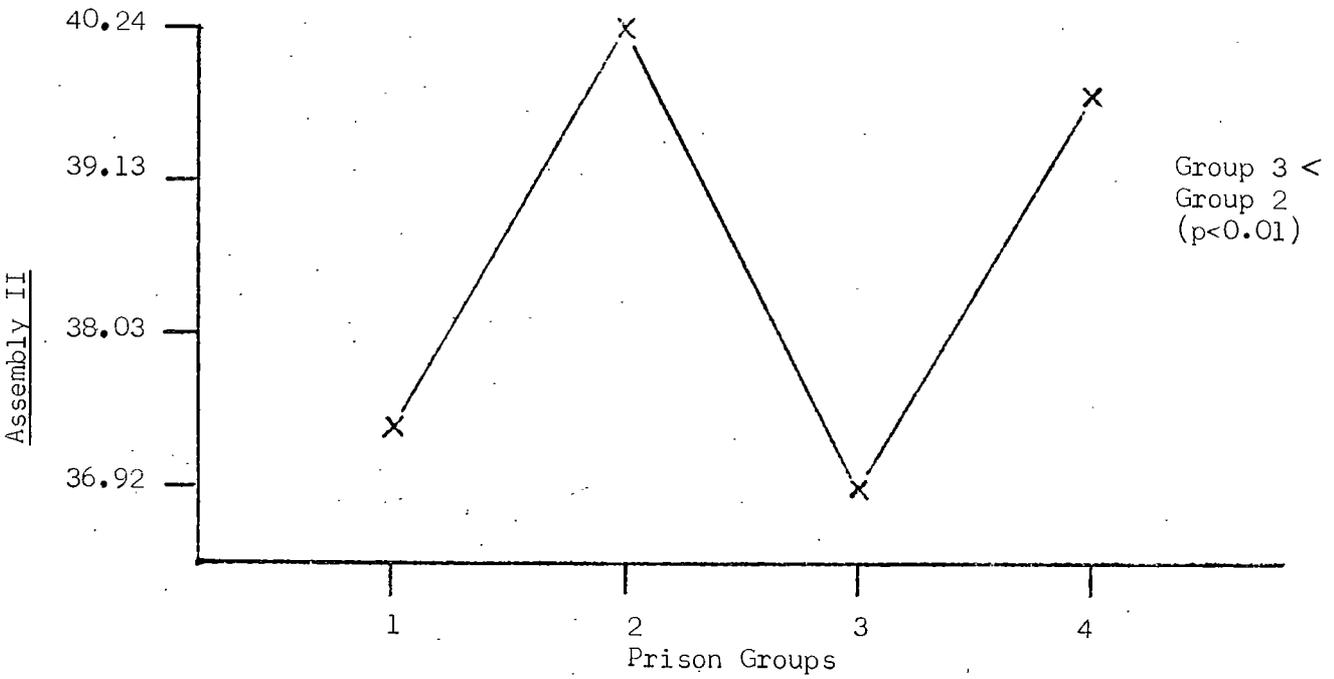
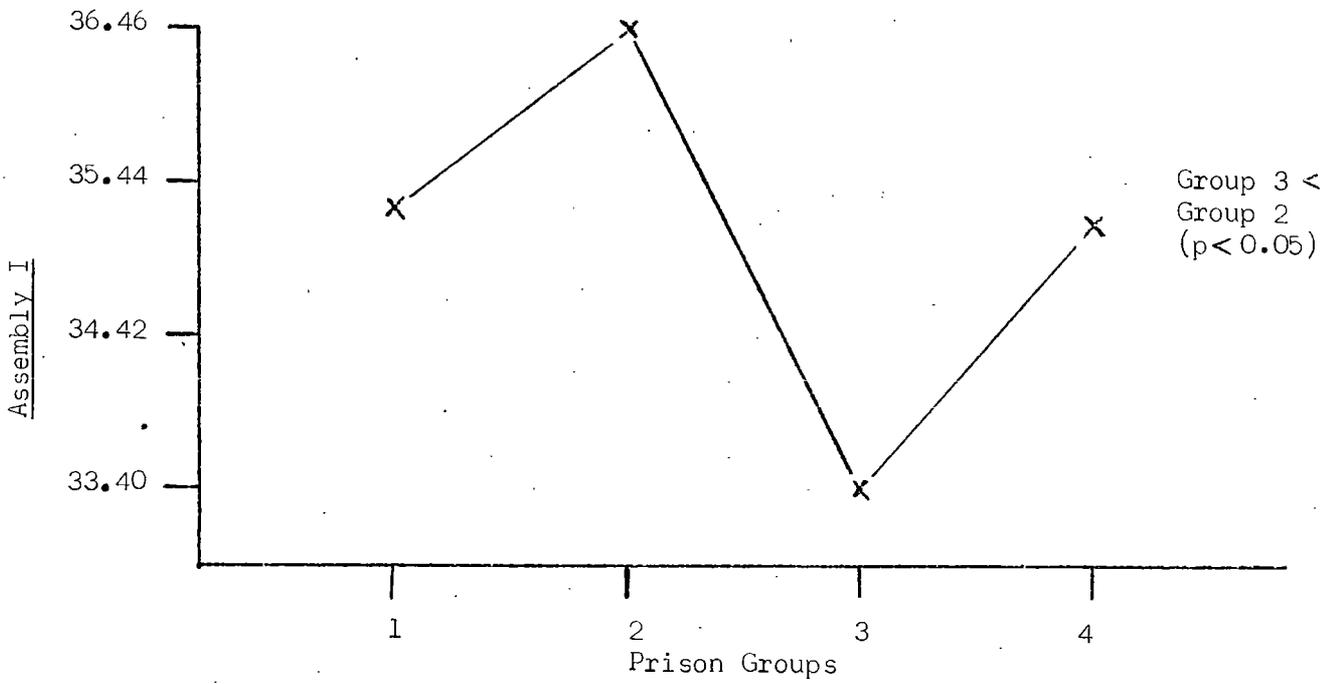
Control Group x Purdue Pegboard Results

	<u>Mean</u>	<u>s.d.</u>
1) Simple Practice	14.70	2.47
2) Dominant Hand	15.93	1.98
3) Non-Dominant Hand	14.50	2.26
4) Both Hands	11.90	1.99
5) Total Simple	42.33	5.58
6) Assembly Trial I	34.33	7.68
7) Assembly Trial II	37.77	7.66
8) Total Assembly	72.10	15.10

There are no significant differences between any of these results and those of group 1.

First Cross Sectional Analysis:

Purdue Pegboard



(vi) Wechsler Adult Intelligence Scale

TABLE NINETEENPrison Groups x WAIS Results

Group	1	2	3	4
(a) Verbal Scale:				
1) Information (mean)	11.16	11.30	11.76	12.00
(s.d.)	2.67	2.80	2.63	2.04
2) Comprehension	12.38	12.78	12.62	13.48
	3.28	3.18	2.98	2.74
3) Arithmetic	11.46	11.38	11.00	11.52
	3.00	3.62	2.66	2.42
4) Similarities	11.30	11.64	11.42	11.72
	2.15	2.28	2.32	2.01
5) Digit Span	10.60	10.98	10.08	10.60
	3.02	2.98	3.31	3.08
6) Vocabulary	10.74	11.16	11.60	11.44
	2.72	2.34	2.62	2.02
(b) Performance Scale:				
7) Digit Symbol	9.48	9.42	9.12	9.16
	2.38	2.81	2.50	2.12
8) Picture Completion	12.44	12.30	12.54	12.60
	2.60	2.70	3.27	2.16
9) Block Design	11.82	11.48	11.50	11.80
	2.66	3.16	3.02	2.72
10) Picture Arrangement	10.44	10.40	10.88	10.64
	2.43	2.73	3.01	1.91
11) Object Assembly	10.38	10.70	10.54	10.00
	2.12	2.94	3.04	2.45
(c) I.Qs:				
1) Verbal	107.28	109.02	108.34	110.16
	13.16	14.03	12.85	9.89
2) Performance	108.36	108.80	109.56	108.64
	12.27	14.36	13.99	9.69
3) Full Scale	108.32	109.48	109.34	110.20
	11.89	13.51	12.43	8.59

(d) Derived Scores	1	2	3	4
1) Verbal-Performance Discrepancy	-1.08	0.22	-1.22	1.52
	12.20	12.43	12.73	10.79
2) Wechsler Deterioration Index	0.57	1.86	5.90	3.27
	11.78	11.22	10.71	13.94
3) Masculinity/Femininity	2.92	2.28	2.10	2.72
	2.75	4.34	4.33	3.96
4) Analytic Index	35.44	35.34	35.48	35.52
	5.65	7.15	7.62	5.62

Significant Results

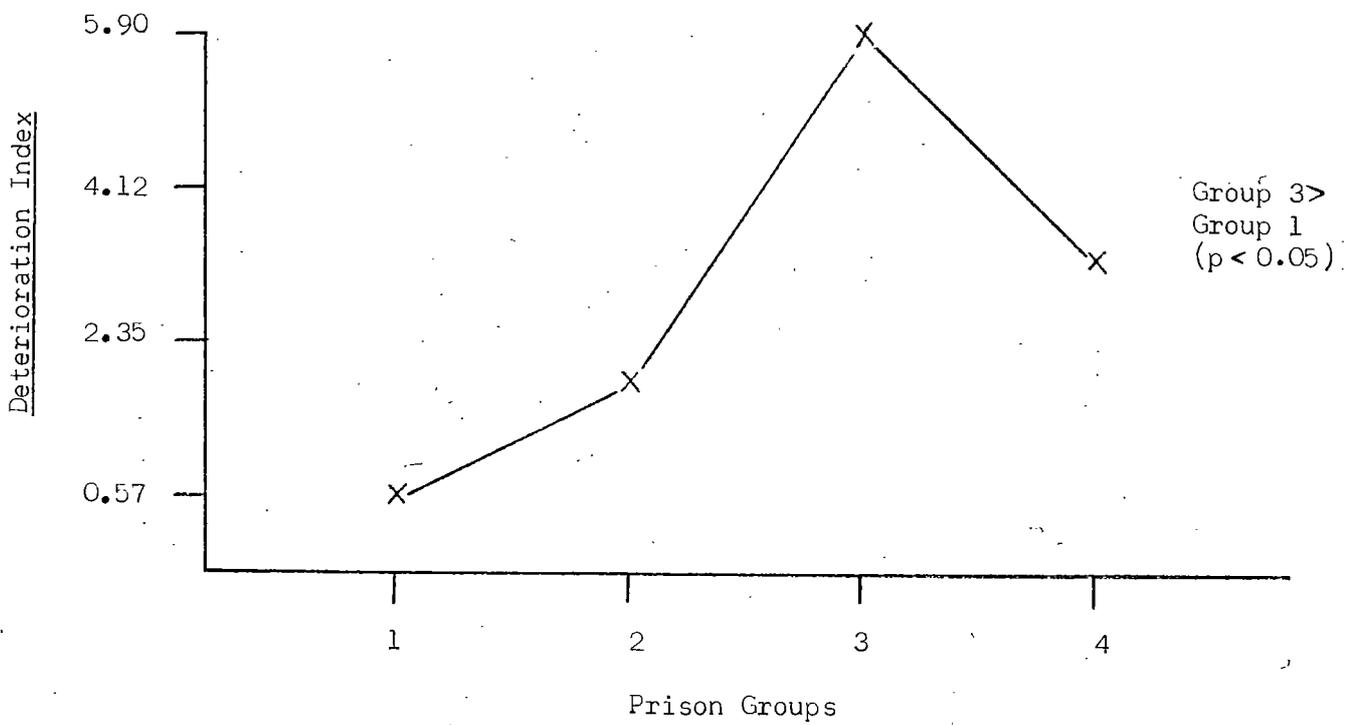
There is no significant decline in general intellectual ability as measured by this test; the only score on which significant differences occurred is the Wechsler Deterioration Index, where group 3 scored significantly higher (i.e. were more "deteriorated", to use Wechsler's terminology) than group 1 (t-test $p < 0.05$).

The control group results are as follows:

TABLE TWENTY

Control Group x WAIS results

	<u>Mean</u>	<u>s.d.</u>
(a) Verbal Scale		
1) Information	11.37	1.90
2) Comprehension	13.40	2.40
3) Arithmetic	12.30	2.60
4) Similarities	11.73	1.96
5) Digit Span	11.50	2.86
6) Vocabulary	11.33	2.06

First Cross Sectional Results: Wechsler Deterioration Index

(Table 20 continued)

	<u>Mean</u>	<u>s.d.</u>
(b) Performance Scale		
7) Digit Symbol	9.07	2.43
8) Picture Completion	13.37	2.61
9) Block Design	11.90	3.38
10) Picture Arrangement	10.07	2.94
11) Object Assembly	10.67	2.82
(c) <u>I.Qs</u>		
1) Verbal	111.50	9.35
2) Performance	110.03	11.76
3) Full Scale	111.40	9.41
(d) Derived Scores		
1) Verbal-Performance Discrepancy	1.47	10.77
2) Wechsler Deterioration Index	0.89	11.44
3) Masculinity/Femininity	4.20	3.83
4) Analytic Index	36.93	6.43

There are no significant differences between any of these results and those of group 1.

(ii) The Longitudinal Results

(a) The Longitudinal Analysis

The results presented below are for the 154 prisoners who were seen twice; the difference between their scores on the first and second testing have been calculated, and are summarized below when a mean score is positive. This indicates an increase in test scores between first and second testing;

when negative, this indicates a decline.

The controls used in this part of the study are to control for changes occurring due to the effects of the natural ageing process during the test-retest interval, and for changes due to increasing test sophistication. Again, the difference between the scores of the control group on the first and second testing have been calculated, and are summarized below. T-tests between the difference scores for the prisoner and control groups have been done, and significant results are indicated below; where a significant difference has been found, this is interpreted as indicating that one of the two groups' test results have significantly altered on the second testing, and such significant differences are commented on at length in the discussion section below. In order that this may be more easily done, the raw scores for the first and second tests are presented below for the tests where significant differences occur (a summary table of all raw scores is presented in Appendix 3).

(i) The Reaction Time Tests

TABLE TWENTYONE

Total Prison Sample Differences v Control Group
Differences on the Reaction Time Tests

	<u>Total Prison Sample</u>		<u>Control Group</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
1) Simple Reaction Time	0.01	0.08	0.03	0.08
2) Choice Reaction Time	0.00	0.10	-0.01	0.10
3) Reversed Choice Reaction Time	-0.02	0.14	0.00	0.11

There are no significant differences between the total prison sample difference scores and the control group difference scores.

(ii) The Gibson Spiral Maze

TABLE TWENTYTWO

Total Prison Sample Differences v Control Group
Differences on the Gibson Spiral Maze

	<u>Total Prison Sample</u>		<u>Control Group</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
1) Time Score	1.70	10.53	0.61	13.63
2) Error Score	-4.71	9.71	-1.73	8.41
3) "Adjusted" Error Score	-11.43	24.98	-5.53	29.87
4) $(\text{Time Score})^2 + (\text{Error Score})^2 - 102.35$		1191.11	-17.20	2599.62
5) Breaks Score	-0.20	1.04	-0.20	0.75

There are no significant differences between the total prison sample difference scores and the control group difference scores.

(iii) The Form-Matching test (GATB)

TABLE TWENTYTHREE

Total Prison Sample Differences v Control Group
Differences on the Form-Matching Test

<u>Total Prison Sample</u>		<u>Control Group</u>	
<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
2.58	5.65	2.63	6.17

There are no significant differences between the total prison sample difference scores and the control group difference scores.

(iv) Visual Reproduction and Associate Learning

TABLE TWENTYFOUR

Total Prison Sample Differences v Control Group
Differences on the Visual Reproduction and
Associate Learning Tests

	<u>Total Prison Sample</u>		<u>Control Group</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
Associate Learning	0.19	3.18	1.20	2.44
Visual Reproduction	0.47	2.30	0.60	1.87

There are no significant differences between the total prison sample difference scores and the control group difference scores.

(v) Purdue Pegboard

TABLE TWENTYFIVE

Total Prison Sample Differences v Control Group
Differences on the Purdue Pegboard

	<u>Total Prison Sample</u>		<u>Control Group</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
1) Simple Practice	0.73	1.81	0.83	2.19
2) Dominant Hand	0.73	1.91	0.80	1.64
3) Non-Dominant Hand	0.32	1.66	0.63	2.07
4) Both Hands	0.24	1.47	0.37	1.28
5) Total Simple	1.30	3.78	1.80	3.29
6) Assembly Trial I	1.10	5.78	2.17	4.80

Table 25 (continued)

	<u>Total Prison Sample</u>		<u>Control Group</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
7) Assembly Trial II	0.53	5.57	0.97	5.00
8) Total Assembly	1.63	10.60	2.50	9.51

There are no significant differences between the total prison sample difference scores and the control group difference scores.

(vi) Wechsler Adult Intelligence Scale

TABLE TWENTYSIX

Total Prison Sample Differences v Control Group
Differences on the Wechsler Adult Intelligence Scale

	<u>Total Prison Sample</u>		<u>Control Group</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
(a) Verbal Scale				
1) Information	0.57	1.12	0.27	1.03
2) Comprehension	1.14	2.33	0.50	2.39
3) Arithmetic	0.66	2.01	0.03	2.11
4) Similarities	0.70	1.64	-0.03	2.04
5) Digit Span	0.23	2.56	0.17	2.13
6) Vocabulary	0.80	1.40	-0.30	1.55

(Table 26 continued)

	<u>Total Prison Sample</u>		<u>Control Group</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
(b) Performance Scale				
7) Digit Symbol	0.49	1.17	0.53	1.06
8) Picture Completion	0.73	2.07	0.27	1.69
9) Block Design	0.51	1.97	0.20	2.12
10) Picture Arrangement	0.72	2.34	0.97	2.48
11) Object Assembly	1.04	2.50	1.07	2.02
(c) I.Qs				
1) Verbal	4.23	5.65	0.83	4.85
2) Performance	5.27	7.05	4.93	5.74
3) Full Scale	4.80	4.95	2.73	4.57
(d) Derived Scores				
1) Verbal-Performance Discrepancy	-1.04	8.51	-4.10	6.67
2) Wechsler Deterioration Index	1.63	11.46	0.36	11.72
3) Masculinity/Femininity	-0.07	4.10	0.53	3.72
4) Analytic Index	2.69	4.04	2.43	3.24

Significant Results

Only the following differences between the total prison sample difference scores and the control group difference scores reach significance:

- (a) Vocabulary: the sample of prisoners shows significantly greater improvement on the Vocabulary subtest of the WAIS (t-test: $p < 0.01$).

(b) Verbal IQ: the sample of prisoners shows significantly greater improvement on their Verbal IQ Scores (t-test: $p < 0.01$).

(c) Full Scale IQ: the sample of prisoners shows significantly greater improvement on their Full Scale IQ scores (t-test: $p < 0.05$).

There is no significant difference in the amount of improvement showed by prisoners and non-prisoners in Performance IQ or on any of the other WAIS subtests or derived scores.

(b) The Second Cross-Sectional Results

The results presented below are those obtained by the prisoners on the second time of testing, split into the four groups controlled for age (as has been detailed above on p.44). The scores obtained by the control group on the second time of testing are also presented, to endeavour to control for increasing test sophistication affecting the results.

(i) The Reaction Time Tests

TABLE TWENTYSEVEN

Second Visit Reaction Time Results

Group	1	2	3	4	Control Group
1) Simple Reaction Time					
(mean)	0.28	0.28	0.27	0.29	0.28
(s.d.)	0.07	0.05	0.06	0.04	0.07
2) Choice Reaction Time	0.36	0.37	0.35	0.36	0.37
	0.06	0.10	0.06	0.04	0.07
3) Reversed Choice	0.48	0.47	0.46	0.47	0.50
Reaction Time	0.09	0.13	0.12	0.11	0.10

There are no significant differences between any of the groups' Reaction Time Scores.

(ii) The Gibson Spiral Maze

TABLE TWENTYEIGHT

Second Visit Gibson Spiral Maze Results

Group	1	2	3	4	Control Group
1) Time Score (mean)	43.88	45.35	46.14	44.56	45.19
(s.d.)	11.48	11.21	12.38	15.42	20.22
2) Error Score	6.68	7.73	5.96	8.21	7.57
	4.38	9.00	4.64	5.49	5.45
3) "Adjusted" Error Score	36.94	40.78	36.15	43.28	36.84
	14.86	21.24	17.35	18.47	17.88
4) (Time Score) ² + (Error Score) ²	2121.98	2323.46	2340.13	2321.42	2530.64
	1129.31	1117.88	1258.61	1613.90	1654.42
5) Breaks Score	0.11	0.28	0.21	0.21	0.20
	0.39	0.79	0.59	0.41	0.90

There are no significant differences between any of the groups' scores on the Gibson Spiral Maze.

(iii) The Form-Matching Test (G.A.T.B.)

TABLE TWENTYNINE

Second Visit Form Matching Results.

Group	1	2	3	4	Control Group
Mean	33.65	33.21	31.46	29.85	34.30
s.d.	8.31	9.08	7.76	8.18	7.95

There are no significant differences between any of the groups' scores on the Form Matching test.

(iv) Visual Reproduction and Associate Learning

TABLE THIRTY

Second Visit Visual Reproduction
and Associate Learning Results

Group	1	2	3	4	Control Group
Associate Learning (mean)	14.48	14.63	15.43	14.46	15.26
(s.d.)	3.30	3.91	3.44	2.85	3.37
Visual Reproduction	11.05	10.10	10.25	9.85	10.80
	2.30	3.01	2.44	2.79	2.52

There are no significant differences between any of the groups' scores on these tests.

(v) Purdue Pegboard

TABLE THIRTYONE

		<u>Second Visit Purdue Pegboard Results</u>				Control
Group		1	2	3	4	Group
1)	Simple Practice (mean)	15.42	15.78	15.46	15.14	15.53
	(s.d.)	2.00	1.57	2.01	1.45	2.14
2)	Dominant Hand	16.65	16.89	16.37	16.64	16.73
		1.86	1.61	1.74	1.58	1.69
3)	Non-Dominant Hand	15.17	15.07	14.59	14.42	15.13
		1.87	1.59	1.67	1.17	2.09
4)	Both Hands	12.11	12.42	12.00	12.14	12.26
		1.58	1.29	1.58	1.40	1.93
5)	Total Simple	43.94	44.39	42.96	43.21	44.13
	(D + N-D + B)	4.75	3.89	4.41	3.44	4.98
6)	Assembly Trial I	37.20	37.86	34.00	35.64	36.50
		7.08	5.83	7.01	7.94	7.57
7)	Assembly Trial II	39.46	41.42	37.28	38.35	38.73
		6.19	5.57	7.27	8.52	7.91
8)	Total Assembly (I + II)	76.82	79.28	71.28	74.00	74.60
		13.00	10.97	14.04	16.39	15.37

Significant Results

As has already been noted above, in the first cross-sectional results (p. 86), there was a clear trend towards decreasing speed on the non-dominant hand subtest, but again this failed to reach significance.

All the assembly subtests reach significance; again, this appeared to be due to the poorer performance of group 3, which is significantly

slower from group 2 as follows:

- | | | |
|----------------------|-------------------|----------------|
| 6) Assembly Trial I | Group 3 < Group 2 | ($p < 0.05$) |
| 7) Assembly Trial II | Group 3 < Group 2 | ($p < 0.05$) |
| 8) Total Assembly | Group 3 < Group 2 | ($p < 0.05$) |

There are no significant differences between the control group's scores and the scores of any of the Prison Groups on any of the Purdue Pegboard subtests.

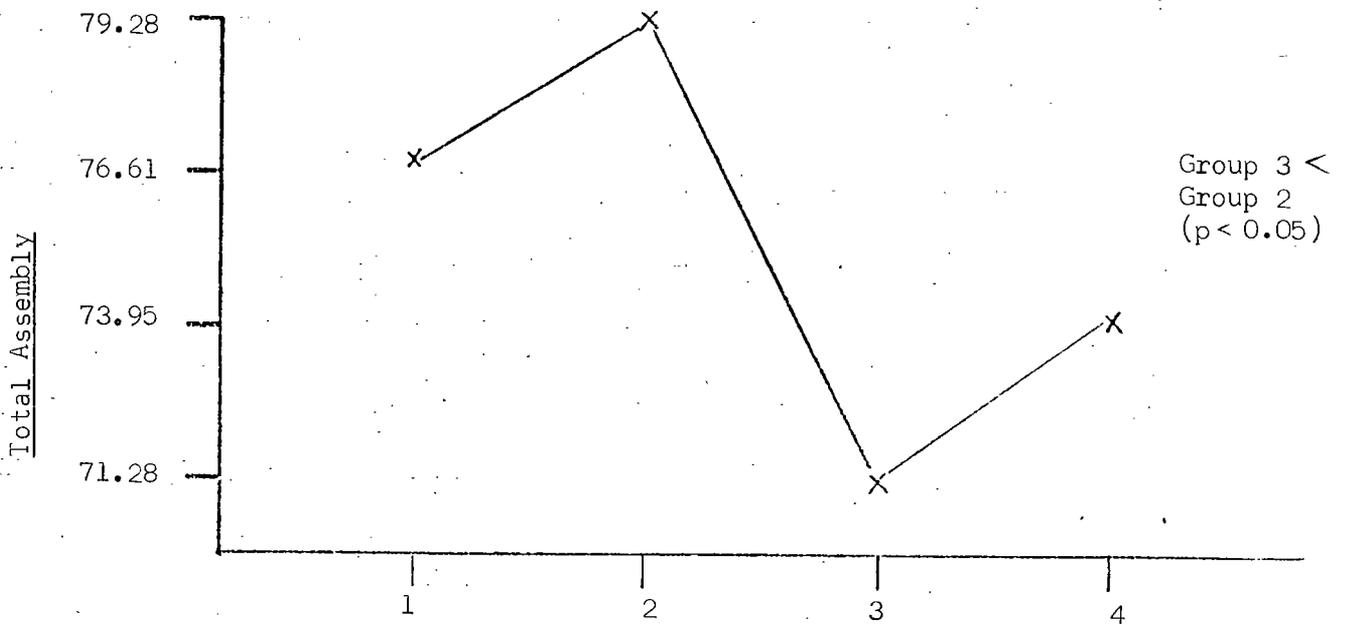
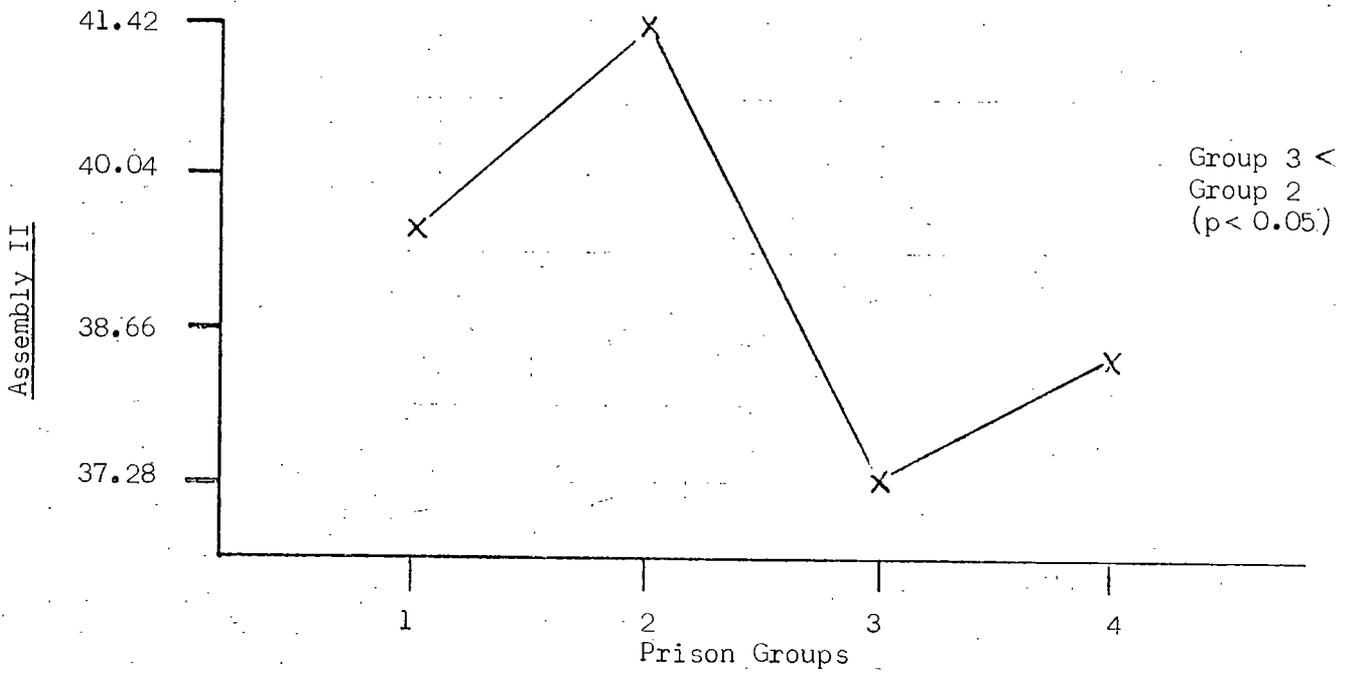
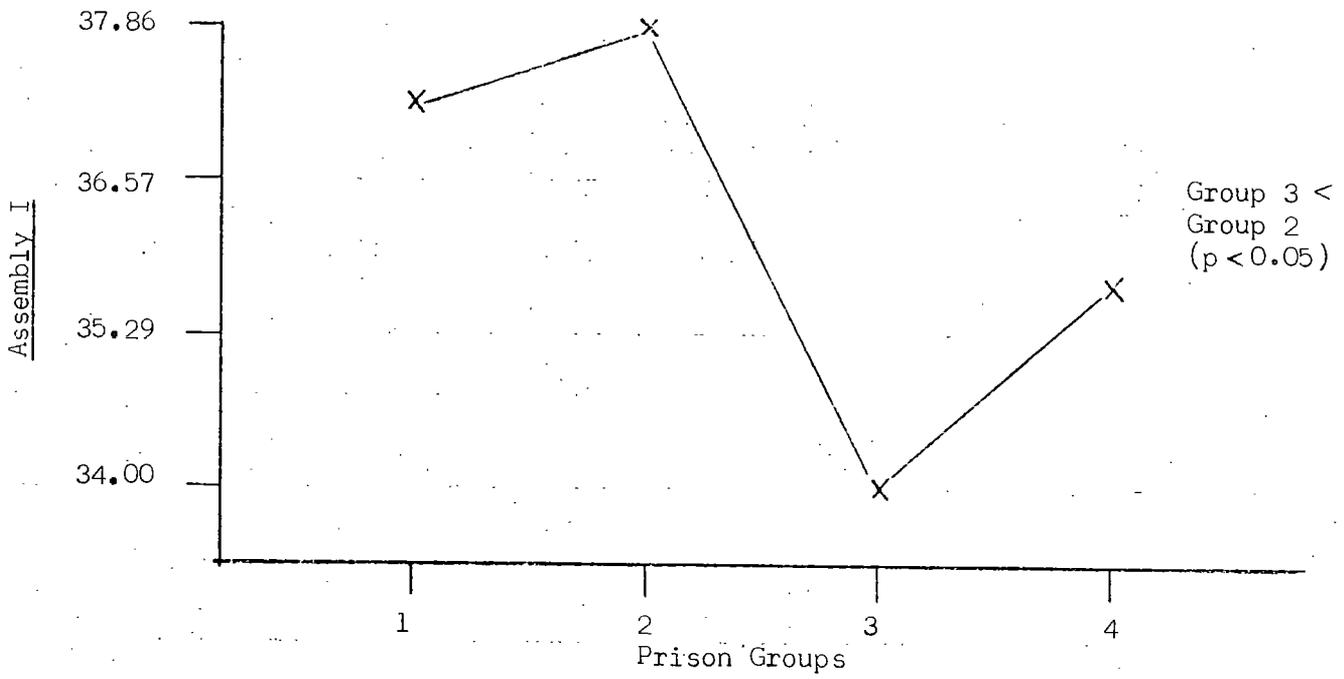
(vi) Wechsler Adult Intelligence Scale

TABLE THIRTYTWO

Second Visit Wechsler Adult Intelligence Scale Results

Group	1	2	3	4	Control Group
(a) Verbal Scale					
1) Information (mean)	11.94	12.50	12.15	11.57	11.63
(s.d.)	2.55	2.74	2.80	1.49	2.00
2) Comprehension	13.77	14.65	13.09	12.92	13.90
	3.07	3.47	3.24	2.49	2.83
3) Arithmetic	12.14	12.52	11.56	11.57	12.33
	2.75	2.97	2.46	2.19	3.06
4) Similarities	11.77	12.34	12.21	11.92	11.70
	2.34	2.16	2.61	1.33	1.94
5) Digit Span	11.22	11.23	10.84	10.57	11.67
	2.82	3.47	3.11	3.39	2.99
6) Vocabulary	11.71	12.23	12.09	11.35	11.03
	3.06	2.89	2.68	2.05	2.05

Second Cross Sectional Analysis: Purdue Pegboard



(Table 32 continued)

Group	1	2	3	4	Control Group
(b) Performance Scale					
7) Digit Symbol	10.00	10.07	9.53	9.50	9.60
	2.50	2.99	2.24	2.32	2.67
8) Picture Completion	13.22	13.44	13.09	12.35	13.64
	2.60	2.89	2.50	1.54	3.00
9) Block Design	12.40	12.18	11.81	12.35	12.10
	2.62	2.71	2.59	2.66	2.80
10) Picture Arrangement	11.17	11.44	11.62	11.00	11.04
	2.56	2.88	3.11	2.82	3.21
11) Object Assembly	11.80	11.52	11.00	10.28	11.73
	2.29	2.98	2.95	2.63	3.02
(c) I.Qs					
1) Verbal	112.05	115.31	111.78	109.71	112.33
2	13.22	14.49	12.85	9.23	9.43
2) Performance	114.37	115.55	112.78	111.21	114.96
	11.78	14.24	11.90	12.26	13.21
3) Full Scale	113.65	116.26	112.84	110.78	114.13
	12.36	13.81	11.86	10.16	10.53
(d) Derived Scores					
1) Verbal-Performance Discrepancy	- 2.31	- 0.23	- 1.00	- 1.50	- 2.63
	9.66	11.97	10.79	8.91	10.65
2) Wechsler Deterioration Index	2.91	3.29	5.13	1.49	1.25
	17.26	12.26	11.01	10.91	14.13
3) Masculinity/Femininity	3.02	2.78	2.18	2.57	4.73
	3.85	3.57	3.44	3.79	3.99
4) Analytic Index	38.37	38.60	37.25	36.57	39.36
	4.93	7.02	5.65	6.63	6.60

There are no significant differences between any of the groups' scores on the Wechsler Adult Intelligence Scale.

(iii) Prisoners Paroled and Detained

The results presented below are for the two groups of prisoners as outlined in Table Six above. Viz:

84 "Detainees", who were considered for parole but who were not released on the recommendation of the Parole Board during the inter-test interval, and 36 "Parolees", who were released on the recommendation of the Parole Board between the first and second times of testing.

(i) The Reaction Time Tests

TABLE THIRTYTHREE

Detainees v Parolees Reaction Time Results

	<u>Detainees</u>		<u>Parolees</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
1) Simple Reaction Time	0.28	0.10	0.27	0.07
2) Choice Reaction Time	0.38	0.12	0.37	0.08
3) Reversed-Choice Reaction Time	0.50	0.15	0.51	0.11

There are no significant differences between the detained and the paroled prisoners on the Reaction Time Tests.

(ii) The Gibson Spiral Maze

TABLE THIRTYFOURDetainees v Parolees Gibson Spiral Maze Results

	<u>Detainees</u>		<u>Parolees</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
1) Time Score	45.10	13.89	47.17	14.39
2) Error Score	10.39	8.66	8.14	6.52
3) "Adjusted" Error Score	48.86	22.79	45.94	20.62
4) (Time Score) ² + (Error Score) ²	2406.95	1480.00	2533.47	1617.00
5) Breaks Score	0.32	0.88	0.17	0.56

There are no significant differences between the detained and the released prisoners on the Gibson Spiral Maze.

(iii) The Form-Matching Test (G.A.T.B.)

TABLE THIRTYFIVEDetainees v Parolees Form-Matching Test Results

	<u>Detainees</u>		<u>Parolees</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
	28.67	8.00	30.22	8.69

There is no significant difference between the detained and the released prisoners on the Form-Matching Test.

(iv) Visual Reproduction and Associate Learning

TABLE THIRTYSIXDetainees v Parolees Visual Reproduction
and Associate Learning Results

	<u>Detainees</u>		<u>Parolees</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
Associate Learning	14.73	3.48	14.25	3.25
Visual Reproduction	9.31	2.75	9.39	2.68

There are no significant differences between the detained and the paroled prisoners on the Visual Reproduction and Associate Learning tests.

(v) Purdue Pegboard

TABLE THIRTYSEVENDetainees v Parolees Purdue Pegboard Results

	<u>Detainees</u>		<u>Parolees</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
1) Simple Practice	14.88	2.03	15.00	2.08
2) Dominant Hand	15.94	2.15	16.08	1.90
3) Non-Dominant Hand	14.43	1.77	14.25	1.81
4) Both Hands	12.00	1.68	11.83	1.56
5) Total Simple (D + N-D + B)	42.37	4.73	42.17	4.35
6) Assembly Trial I	33.77	6.11	34.33	7.43
7) Assembly Trial II	37.80	6.56	37.78	7.39
8) Total Assembly (I + II)	71.57	12.20	72.11	14.22

There are no significant differences between the detained and the paroled prisoners on the Purdue Pegboard.

(vi) Wechsler Adult Intelligence Scale

TABLE THIRTYEIGHT

Detainees v Parolees Wechsler Adult
Intelligence Scale Results

	<u>Detainees</u>		<u>Parolees</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
(a) Verbal Scale				
1) Information	11.49	2.30	12.28	2.63
2) Comprehension	12.94	2.69	13.42	3.47
3) Arithmetic	11.14	3.03	11.69	3.13
4) Similarities	11.25	2.13	12.33	2.08
5) Digit Span	10.73	3.26	10.53	3.32
6) Vocabulary	11.58	2.43	12.17	2.56
(b) Performance Scale				
7) Digit Symbol	8.63	1.97	9.50	2.65
8) Picture Completion	11.96	2.65	12.86	3.04
9) Block Design	11.36	2.70	11.75	2.84
10) Picture Arrangement	9.98	2.15	10.33	2.47
11) Object Assembly	9.91	1.97	10.67	3.17

(Table 38 continued)

	<u>Detainees</u>		<u>Parolees</u>	
	<u>Mean</u>	<u>s.d.</u>	<u>Mean</u>	<u>s.d.</u>
(c) I.Qs				
1) Verbal	109.25	11.83	112.50	14.54
2) Performance	107.75	10.73	111.92	13.44
3) Full Scale	107.96	16.03	112.97	12.99
(d) Derived Scores				
1) Verbal-Performance Discrepancy	1.50	10.30	0.58	14.16
2) Wechsler Deterioration Index	35.19	6.34	37.06	6.92
3) Masculinity/Femininity	1.27	14.49	4.22	14.17
4) Analytic Index	1.98	4.14	1.97	4.21

There are no significant differences between the detained and paroled prisoners on the Wechsler Adult Intelligence Scale, with the sole exception of the similarities subtest, where the paroled prisoners did significantly better ($p < 0.02$) than the detained prisoners. In general, the paroled prisoners did better than the released prisoners, their full scale I.Q. being higher at the .10 level.

Summary of Statistically Significant ResultsTABLE THIRTYNINESummary of Statistically Significant Results

(i) The First Cross-Sectional Results:

Simple Reaction Time	Group 3 took significantly longer than Group 2 ($p < 0.05$).
Reversed Choice Reaction Time	Group 4 took significantly longer than Group 1 ($p < 0.05$).
Associate Learning	Group 3 remembered significantly more paired associates than Group 1 ($p < 0.05$). Further analysis indicated that this difference was due to their superiority on the "hard" associates ($p < 0.05$).
Purdue Pegboard	
Assembly Trial I	Group 3 were significantly slower than Group 2 ($p < 0.05$).
Assembly Trial II	Group 3 were significantly slower than Group 2 ($p < 0.01$).
Total Assembly (I + II)	Group 3 were significantly slower than Group 2 ($p < 0.02$).
W.A.I.S.	
Deterioration Index	Group 3 were more "deteriorated" (i.e. scored significantly higher) than Group 1 ($p < 0.05$).

(ii) The Longitudinal Results

(a) The Longitudinal Analysis

W.A.I.S.

Vocabulary

The prison group's scores rose significantly more than the control group's scores over the two times of testing ($p < 0.01$).

Verbal IQ

The prison group's scores rose significantly more than the control group's scores. ($p < 0.01$).

Full Scale IQ

The prison group's scores rose significantly more than the control group's scores. ($p < 0.05$).

(b) The Second Cross-Sectional Analysis

Purdue Pegboard

Assembly Trial I

Group 3 were significantly slower than Group 2 ($p < 0.05$).

Assembly Trial II

Group 3 were significantly slower than Group 2 ($p < 0.05$).

Total Assembly (I + II)

Group 3 were significantly slower than Group 2 ($p < 0.05$).

(iii) The Prisoners Paroled and Detained

W.A.I.S.

Similarities

Paroled prisoners scored significantly higher than detained prisoners.

($p < 0.02$).

There were no statistically significant differences between the scores of the prison and the control groups (where such an analysis was appropriate, as has been outlined above at the start of this section), on any of the above results, thus indicating that the differences found are more likely to be due to the experience of imprisonment rather than to differential release on parole; however, as mentioned below, the two groups were identifiably (though not statistically) different.

DISCUSSION

Introduction

The discussion below will initially be in terms of the main subsections of the experimental design (as outlined above in the "procedure section"). The significant results will be described in detail, will be related to the original hypothesis about the effects of long-term imprisonment, and will be discussed at length.

A concluding section will then be presented in an attempt to correct the various subsections to produce a consistent picture of the possible cognitive effects of long-term imprisonment.

(i) The First Cross-Sectional Results

(a) Summary of Results

(a) There is no significant decline in general intellectual ability, as measured by the W.A.I.S.; there are no statistically significant differences between either the mean IQ scores or the mean W.A.I.S. subtest scores for any of the four groups.

(b) A trend towards decreasing speed in performance was noticed on some measures; this was most clear on the Reversed-Choice Reaction-Time test and on the Non-Dominant Hand and Assembly subtests of the Purdue Pegboard. Not all of these differences reach statistical significance, however; only two of the reaction time comparisons are significant, Group 3 taking longer than Group 2 on Simple Reaction Time (t-test

$p < 0.05$) and Group 4 taking longer than Group 1 on Reversed-Choice Reaction Time ($p < 0.05$). Similarly, with the Purdue Pegboard, the significant differences between groups arise from the poorer performance of Group 3; for Assembly Trial I, Group 3 Group 2 ($p < 0.05$), for Assembly Trial II, Group 3 Group 2 ($p < 0.01$), and for Total Assembly, Group 3 again Group 2 ($p < 0.02$).

- (c) The Wechsler Deterioration Index produced significant differences, Group 3 scoring significantly higher than Group 1 ($p < 0.05$), thus being more "deteriorated" in Wechsler's (1958) terms. It should be noted, however, that none of the scores attained by the prison groups in this study on the Wechsler Deterioration Index are of a level which Wechsler (1958, p.211) suggests is indicative of intellectual deterioration.
- (d) The only significant improvement is that of the Associate Learning subtest abstracted from the Wechsler Memory Scale. Group 3 remembered significantly more paired associates than Group 1 ($p < 0.05$). A subsequent analysis of the data differentiating between "easy" and "hard" associations indicates that this improvement is entirely due to differences on "hard" associations, where again 1 3 ($p < 0.05$).
- (e) There were no other significant results, but a number of test results showed trends; for instance, the W.A.I.S. Vocabulary, Information and Comprehension test scores all tended to increase with length of imprisonment.
- (b) Control Results indicate that these differences found are likely to be due to the experience of imprisonment.

- (a) A comparison between the scores of Group 1 and those of a control group indicated no significant differences; thus the differences found in this study are more likely to be due to the differing lengths of total imprisonment of each of the groups, rather than being due to any special properties of a "criminal population".
- (b) The comparison between men released on parole and those considered for parole but not released shows no significant differences on any of the variables which this subsection of the study found to be statistically significant; thus the effects found above are likely to be due to the varying amounts of total imprisonment each of the groups had been through, rather than any policy of differential release by the prison authorities. It would appear that the cognitive criteria used in this research are not crucial in differentiating between those selected for parole and those considered but detained; the only variable on which a significant difference was found was the W.A.I.S. Similarities subtest, where the released prisoners scored significantly higher than the prisoners considered for parole but not released ($p < 0.02$). The results of this comparison will be discussed in detail below. In addition, at the time of first testing the prisoners, the Parole Board had only just started considering prisoners for release under this scheme.

(c) Discussion

The present results, obtained on a representative sample of long-term prisoners, offer no support for the view put forward in the "Introduction" that imprisonment is associated with general intellectual decline (as measured by the Wechsler Adult Intelligence Scale). There is, however, some evidence that confirms previous findings in this area, that a decline in psycho-motor speed is associated with increasing lengths of

imprisonment, there being trends and significant differences observed with the Reaction Time and Purdue Pegboard tests, which support such an observation. These results accord to at least some extent with those outlined in the introduction, and may perhaps best be initially discussed in relation to studies of normal ageing, as there appear to be a number of parallels between these results and those found in ageing studies.

Intellectual decline has been found in many ageing studies (e.g. Wechsler, 1958), but a number of more recent studies have acknowledged (e.g. Wesman, 1968; Schaie, 1974; Anastasi, 1976) that age-decrements on cross-sectional W.A.I.S. results may in fact be partly confounded by cultural changes and the different learning experiences of the older subjects: i.e. the apparent age-decrement may often be due, in part at least, to the existence of systematic differences between the groups in terms of variables such as education, rather than to actual changes in the level of intellectual functioning. In this prison study, where the four groups of subjects are of the same mean age and the subjects have presumably had broadly similar learning and cultural experiences, the fact that no general intellectual decrement was found can be seen to fit in partly with previously cited ageing studies.

In addition, closer analysis of the W.A.I.S. subtest results show some similarities between the findings of this study and those of ageing work. With ageing, verbal factors are found to "Hold" (using Wechsler's terminology), scores on these subtests tending to decline far less than scores on subtests requiring different abilities (e.g. Digit Span); Wechsler in fact bases his notion of a Deterioration Index on these differential decline rates (1958, ch.12). Some writers (e.g. Birren, 1970) have even noted some scores, such as vocabulary, to rise with age. In this study, scores on the Information, Comprehension and Vocabulary subtests all tend to rise with increasing lengths of total imprisonment (although not sufficiently to attain statistical significance); in this

context, this is an interesting observation for a number of reasons:

- (i) it shows similarities between the data generated from this study and the previously mentioned ageing studies.
- (ii) it may, in part at least, account for why no general intellectual decrement was found in this study.
- (iii) it helps in the explanation of the results of other subsections of this study, and consequently it will be further developed below.
- (iv) finally, this observation may be of help in the understanding of the significant difference found in the Wechsler Deterioration Index; as two of the "hold" tests on this Index are those which tend to improve with the length of time spent in prison, it is probable that it is the combination of improvements on these subtests which contributes most significantly to this result. This result is probably thus more a reflection of the improved verbal skills of people who have spent a long time in prison, rather than being due to any "intellectual deterioration" (as has already been pointed out, the Deterioration Index never rises to a level which Wechsler suggests is indicative of intellectual deterioration).

It is interesting to note that the only significant improvement to be found in this section of the results can be seen to confirm this suggestion that there is an association between total length of imprisonment served and increasing dependence on verbal skills; a significant

improvement was noted on the Wechsler Memory Scale associate learning test, and subsequent analysis indicated that this improvement was the most marked on the "hard" associates of this test (see Table 15A). Although Wechsler and Stone (1945) intended this test to measure short-term memory, an analysis of the correlations between the associate learning test and the other tests indicates that it is only correlated at the 0.05 level with the visual reproduction test (another supposedly short-term memory test from the same battery) for two out of the four groups, whilst it is significantly correlated at the 0.001 and 0.01 level with the W.A.I.S. Information and Vocabulary subtests. Table 40 lists all tests which have a significant correlation with associate learning in more than one group.

TABLE FORTY

Significant Correlations with
Associate Learning (total score)

	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
Wechsler Memory Scale Visual Reproduction	0.32 [*]	0.33 [*]	0.24	0.29
G.A.T.B. Form Matching	0.06	0.37 ⁺	0.37	0.07
W.A.I.S. Information	0.47 ^x	0.44 ⁺	0.43 ⁺	0.29
Digit Span	0.48 ^x	0.31 [*]	0.45 ⁺	0.27
Vocabulary	0.42 ⁺	0.37 ⁺	0.27	0.08
Digit Symbol	0.17	0.41 ⁺	0.49 ^x	0.25
Reversed-Choice Reaction Time	-0.34 [*]	-0.18	-0.29 [*]	-0.32

(* = $p < 0.05$ + = $p < 0.01$ x = $p < 0.001$)

It thus seems likely that, for the sample used in this study, it depends more on verbal facility rather than being merely a measure of short-term memory. This conclusion is supported by a number of studies; for instance, Davis and Swenson (1970) who factor analyzed the Wechsler Memory Scale subtests, and found that associate learning is likely to depend more on memory in general (viz both long-term and short-term abilities), rather than on short-term memory alone. Eysenck (1967) cites studies where a correlation has been found between paired associate learning tasks and intelligence, again supporting the view that the associate learning test is tapping more abilities than short-term memory.

Studies (e.g. Taub and Walker, 1970) looking at changes in memory with age have generally found that subjects find it harder to handle visual information than verbally presented information. One such study by Boyle et al (1975) actually used the Wechsler Memory Scale, finding Visual Reproduction to decline with age, whilst Associate Learning scores did not alter. As McGhie et al (1965) point out, it is probably more important for the individual to have an efficient and less vulnerable auditory storage system as auditory information is always transient, whilst visual information may usually be scanned for some time. Eysenck (1967) suggests that associate learning depends on verbal mediation, rather than rote learning. These studies thus tend to support the contention that a significant improvement on the Wechsler Memory Scale Associate Learning subtest is probably likely to be due more to improved verbal skills than to improvements in short-term memory, and that one would expect such improvements if one is drawing a parallel between the effects of imprisonment and ageing.

It is with the psychomotor tests that the most obvious comparisons with previous ageing studies can be made; these tests do provide some evidence that a decline in perceptual-motor speed is associated with

increased lengths of imprisonment. The results on the reaction-time tests appear to be the most clear-cut; in these tests, it was found that subjects are generally the slower the longer they have spent in prison. This is particularly apparent with the choice reaction-time results, which is the test which requires the most complex processing out of the three reaction-time tests. Similarly, it appears to be the most complex skills that are affected on the Purdue Pegboard, where it was found that there were a number of significant differences on the Assembly subtests, which require complex manipulative dexterity; those prisoners who had been in prison longer tended to do worse than those who had been in prison for shorter total length of time. These results bear a close resemblance to those found in ageing studies (e.g. Teichner 1954, Birren 1970, Elias et al 1977), where lowered psychomotor functioning has frequently been found, especially in studies where complex skills are required. In addition, they are also similar to studies mentioned in the introduction.

It should, however, be noted that with the exception of the Reversed-Choice reaction-time results, there is no straightforward relationship between results and length of imprisonment; for instance, the most marked decline in psycho-motor speed appears to occur for group 3, the subjects of which have served a mean total of seven years imprisonment, and not for subjects in group 4, who have served an average of nearly eleven years in all. The somewhat ambiguous nature of the results, especially in terms of the lack of simple monotonic relationship between imprisonment and the psychological variables measured by means of the tests used in this study, must mean that any conclusions from this part of the study must be regarded as being tentative only; as pointers to further work in this area, rather than as definite conclusions. Possible reasons for the pattern of results found will be considered further below.

Taking the cross-sectional results as a whole, they do seem to indicate that imprisonment does have an effect on a representative sample of long-

term prisoners, as measured by their performance on a series of psychological tests. These results partly confirm previous findings in the area, in that they do show some evidence of psychomotor decline with increasing lengths of imprisonment; however, they do not support any notions of intellectual decline - in fact, there seems to be evidence of an increase in verbal skills with increasing lengths of imprisonment. These results may, in part at least, be explicable in terms of the findings of a number of studies looking at the effects of age on psychological variables.

Whilst it is admitted that it is somewhat of an oversimplification to say that verbal skills hold up well with age, whereas nonverbal skills (especially ones involving the necessity for speedy movement) decline, and it is realized that there are a number of problems involved in conducting research into ageing (some of which have been mentioned above), there does seem to be a lot of evidence that changes in cognitive abilities do occur with age (e.g. Horn 1975). In addition, it is interesting to note that ageing studies tend to stress the very skills that this study highlights; Maxwell (1961), for instance, in a study on W.A.I.S. performance in the older age ranges concluded that "it seems fair to say that good performance on the W.A.I.S. battery of tests as old age sets in depends to an ever increasing extent on verbal comprehension, the command of the language which a person attains and enjoys during youth and middle life. The contribution to performance made by inductive and deductive reasoning, perceptual speed, fluency, and perhaps to a lesser extent, visualization, gradually declines" (p.451). Blum et al (1970) in a Longitudinal study of ageing (which are comparatively rare in this area) found that the vocabulary test (from the Stanford-Binet battery) did not significantly change over the twenty year period, actually slightly increasing, whilst on the other hand, a number of the Wechsler-Bellevue Performance Intelligence items showed significant decline. Elias et al (1977) conclude their review on intelligence similarly, as follows: "if intelligence is defined in

terms of those abilities which require long-term memory and the use of acquired skills, there appears to be relatively little decline. ... In fact, acquired skills in certain areas can increase with age and experience and compensate for losses in other areas. ... It is clear that if one defines intelligence in terms of a set of behaviours that reflect rapid responding and competency with visual-spatial problem-solving ability, persons in elderly adult cohorts do not do as well as persons in younger cohorts." (p.71).

Thus the cross-sectional results may perhaps be interpreted as showing similar patterns to those that might be expected with increasing age; as these groups are matched for age, a possible conclusion that could be drawn from this part of this study is that one of the effects of imprisonment is to slightly accelerate the ageing process. It is interesting to note in this context that the paroled prisoners were significantly higher than the detained prisoners on the W.A.I.S. Similarities subtest, and were also higher on all other W.A.I.S. subtests (with the exception of Digit Span); one cannot therefore suggest that differential release results have produced the observed differences in the cross-sectional study (they would, in fact, tend to depress improvements in Verbal skills items with increasing lengths of imprisonment).

If this hypothesis is correct, one might possibly speculate as to why this process should occur; referring back to the literature on institutionalization cited in the introduction (e.g. Goffman, 1961), one of the possible effects of imprisonment might be, by putting somebody into a situation where all the usual decisions about work, rest, play, sleep, food etc. are taken away from them to make them disinterested in their surroundings. A prisoner in such a position is in many ways in a similar position to many retired people, who tend to be less involved in the normal routines of life. One of the theories of ageing, the "disengagement theory" (Cumming, 1959) stresses that as people get older and retire, they often curtail their

activities, disengaging from others in the social system. The theory suggests that such cutting off from friends, surroundings, the routine of life, etc. may well have harmful psychological consequences, and it could be that imprisonment possibly has similar effects. It must be stressed that this approach to ageing is only one of a number of theories in this field, and that it is unlikely to be the most important factor in the ageing process; as Bromley (1966) stresses "the primary cause of human ageing is to be found in the degenerative physical changes that takes place in the body over time" (p.284). Many writers (e.g. Savage et al, 1977) suggest that there are probably a number of different patterns of ageing, depending on the individual, and that to search for a single overall theory is probably futile. Despite the recognition that this is only one of a number of theories, it is nevertheless felt that the parallel between disengagement in old age and imprisonment is an interesting one to note in this context.

An alternative hypothesis could be rooted again in the comparison between life inside and outside an institution; prison life tends to be radically different to "outside" life, in that in most prisons the work done by prisoners is of far shorter duration than similar work outside, and it tends to be fairly simple, unskilled, and monotonous (see, e.g. Morris and Morris, 1963). In addition, the whole pace of life is less hectic; prisoners do not have urgent appointments to keep, they have a lot of free time (though there is often little to do during it), and, according to the American sociologists such as Clemmer (1940), cited in the introduction, there is pressure put on them by other prisoners to ensure that the prison is kept relatively calm. In these circumstances, this continuous stress on maintaining a relatively relaxed quiet environment could possibly mean that the prisoners learn to take things much quieter, and tend to develop behavioural patterns of older people.

As has already been stressed, the findings from this part of the study were not clear-cut, and the above two hypotheses should be regarded as being purely speculative; one question that arises from this discussion is as to how permanent the changes found on the psychological tests are likely to be. If prison does have harmful effects, are these unalterable; research is yet to be done on the long-term psychological effects of imprisonment after release, but it does seem reasonable to suggest that if psychomotor decline does occur in prison, this will not help ex-prisoners subsequent job prospects, even if the effects can be later overcome.

There are alternative hypotheses that can be put forward in the attempt to explain the findings of this part of this study; these will be considered further below. Among such hypotheses include the effects of prison education on test scores, and the stress in prison on the importance of verbal skills, rather than physical skills. Other considerations such as the status of the tests and the samples used in this study will also be dealt with below.

(ii) The Longitudinal Results

(iia) The Longitudinal Analysis

(a) Summary of Results

(A) Overall, the test-retest differences indicate that both the prison sample and the control group improved their performance on the psychological tests on retesting. The only test on which the scores declined for both samples was the Simple Reaction Time test; in addition, both groups took longer to complete the Gibson Spiral Maze, but made less errors and less breaks in completing it. The control group's performance, however, declined on the W.A.I.S. Similarities and Vocabulary tests. It is probably likely that at least part of this improvement is only due to increasing

test sophistication.

(B) The psycho-motor type tests produced varied results; the prison sample improved their performance at retesting more than the control group on Simple and Reversed Choice Reaction Time, and the W.A.I.S. Picture Completion and Block Design subtests. On the other hand, the control group did better on Choice Reaction Time, the W.A.I.S. Digit Symbol, Object Assembly and Picture Arrangement subtests, Performance IQ, the G.A.T.B. Form Matching, and all the Purdue Pegboard tests. In addition, the prison sample took longer in completing the Gibson Spiral Maze than the control group on retesting, but made less errors. None of these differences, however, reached statistical significance.

(C) The results on the verbal tests were more straightforward; the control group improved less on retesting than the prison group on all the W.A.I.S. Vocabulary items, Verbal IQ and Full Scale IQ. In addition, their W.A.I.S. Deterioration Index score was lower. The only test on which they improved more than the prison group was the W.M.S. Associate Learning test. The only differences which reached statistical significance, however, were those on the W.A.I.S. Vocabulary subtest, Verbal IQ and Full Scale IQ. As the control group improved more on the Performance IQ than the prison sample, it is apparent that the significant improvement in Full Scale IQ is largely attributable to improvements in verbal ability, rather than overall general improvements.

(b) Control Results

As this part of this study relies extensively on comparing the scores of prisoners and controls, this will be discussed in the next section below. The effects of differential release have been dealt with above, and thus will not be repeated here.

(c) Discussion

(A) Test-Retest Correlations:

This part of the study was specifically designed to cut down on differences due to increasing test sophistication with the taking of some tests twice over a period of time.

It is interesting to note at this point (as Table 41 shows) that the test-retest correlations for the entire sample were in all cases, highly significant, and in good accord with published figures of reliability, where such figures are available. It thus seems that the tests used were very reliable over the period of this study, and that the changes noted are likely to be of psychological significance, rather than due to random effects operating in the testing situation itself.

TABLE FORTYONE

Test-retest correlations for the psychological tests for the whole sample (N = 184) as compared to published reliability figures for the same tests (where available).

<u>Test</u>	<u>Test-retest Correlation</u>	<u>Published Reliability Figure</u>
Reaction Time		
Simple	.373	-
Choice	.382	-
Reversed Choice	.488	-
Gibson Spiral Maze ^x		
Time	.684	.73
Error	.484	.77
"Adjusted" Error	.300	-
(Time) ² + (Error) ²	.584	-
Breaks	.362	

(Table 41 continued)

<u>Test</u>	<u>Test-retest Correlation</u>	<u>Published Reliability Figures</u>
G.A.I.B. Form Matching *	.770	.80
W.M.S.		
Visual Reproduction	.575	-
Associate Learning	.666	-
Purdue Pegboard		
Simple Practice	.576	.63
Dominant Hand	.508	.63
Non-Dominant Hand	.576	.60
Both Hands	.598	.68
Total Simple	.675	.71
Assembly Trial I	.675	.68
Assembly Trial II	.706	.68
Total Assembly	.720	.86 (3trials)
Wechsler Adult Intelligence Scale **		
Information	.906	.91
Comprehension	.732	.77
Arithmetic	.756	.81
Similarities	.723	.85
Digit Span	.688	.66
Vocabulary	.873	.95
Digit Symbol	.893	.92
Picture Completion	.706	.85
Block Design	.748	.83
Picture Arrangement	.631	.60
Object Assembly	.590	.68

(Table 41 continued)

<u>Test</u>	<u>Test-retest Correlation</u>	<u>Published Reliability Figures</u>
Verbal IQ	.906	.96
Performance IQ	.840	.93
Full Scale IQ	.918	.97
Verbal-Performance Discrepancy	.704	-
Wechsler Deterioration Index	.799	-
Masculinity/Femininity	.569	-
Analytic Index	.427	-

Notes:

(1) All test-retest correlations are significant at the .001 level.

(2) Published reliability figure sources:

x Gibson, 1977

* USES, 1970

+ Tiffin, 1968

** Wechsler, 1955.

(B) Discussion of the Longitudinal Results:

Once again, the results for this section produce a slightly confused picture; again, tentative consideration of these results within the framework of the previously developed ageing hypothesis may prove useful. Taking the statistically significant results first, this section of the study shows that the prison sample significantly improves on the W.A.I.S. Vocabulary subtest, and on the Verbal IQ and Full Scale IQ scores over the test-retest interval, when compared with a group of non-imprisoned controls. Although the test-retest correlations for these scores are very similar to those published by Wechsler (1955), they do not accord with the general

pattern of test-retest changes that have been found with this psychological test. Wechsler (1958) stresses that there is a tendency for I.Q. scores, as measured by the W.A.I.S., to remain stable over time; he cites "an average IQ difference of approximately 5 points between successive retests, after intervals from several weeks to several years", without specifying the direction of such a change. Both the samples used in this study, on average, fall within 5 IQ points of their previous Full Scale score (the Prison Sample improved by an average of 4.80 IQ points, whilst the Control Group improved by an average of 2.73 IQ points), thus supporting Wechsler on this point. Wechsler, however, then goes on to stress that the change will "depend in a measure on the degree to which the test items of the scales used lend themselves to practice ... the Performance section of the W.A.I.S. is much more subject to practice than the Verbal section" (p.157). In discussing the Wechsler-Bellevue I test (a precursor of the W.A.I.S.), he suggests that on retesting "the change in Verbal IQ (is) approximately half that of the Performance" (p.101). Whilst the test-retest differences for the Control group fit in well with these previous findings, in that their improvement seems almost entirely due to improvement in Performance IQ, the differences for the prison sample differs radically, in that their Verbal IQ score increases almost as much as their Performance IQ score.

This finding confirms the suggestion arising from the first cross-sectional results, discussed above, that prisoners become more dependent on verbal skills as a result of having been imprisoned for a greater length of time; the results from the longitudinal analysis clearly show a marked increase in verbal skills of the prison sample, as compared to the scores of the control group. This finding is in line with the previous discussion on ageing studies, where an increased reliance on verbal skills and an actual improvement has been found on a number of studies (e.g. Elias et al, 1977). As has been mentioned above in the summary of results,

the prison sample improved more than the control group on all vocabulary subtests, which fits in well with this argument; in addition, their "Deterioration Index" increased, showing again an increasing reliance on verbal skills. The only results in this section not in accord with the previous findings were the results on the W.M.S. Associate Learning test, where the control group did markedly better on second testing than did the prison sample (though the difference did not reach statistical significance, p was less than 0.10). It has been argued above that performance on this test is affected by verbal mediation, and thus one would expect the prison sample, with their increasing reliance on verbal skills, to do better rather than worse on this test. This result is hard to fit in with the other results; one possible explanation could be that this test is less reliable. Wechsler (1945) does intend the test to be sensitive to transitory changes in memory, and thus does not cite test-retest scores. The Digit Span subtest on the W.A.I.S., however, is identical to part of the Wechsler Memory Scale, and it is interesting to note at this point (as is listed in Table 41) that this test is the least reliable of the W.A.I.S. Verbal subtests. Against such an explanation, it must be pointed out that this study did find a good test-retest correlation for this test, although it was not as high as the test-retest correlations for the W.A.I.S. Verbal items. Another possible explanation is that the Associate Learning test is less amenable to practice effects; the prison sample could have discussed some of the tests in the inter-trial interval, and such a discussion could have increased their scores on items such as W.A.I.S. Comprehension, Similarities, Vocabulary and Information. It is extremely unlikely that they would discuss a test involving paired associate learning, as it would be difficult to recollect the stimulus material utilized; in fact most prisoners seemed to remember the W.A.I.S. Performance subtests and the Reaction Time tests, which provides some support for this. On the other hand, the control group

who would not be in continual contact with each other, would be much less likely to discuss the tests. At best, this is probably only a part explanation, but it is important to reiterate that the difference on this test did not reach statistical significance.

The results on the psychomotor tests do not fit in so well with the first cross-sectional results, but it should be stressed at the outset that none of the differences between the improvements shown by the two groups on these tests reached statistical significance. The overall picture is far less clear than those on the verbal tests, but they do point to some support for the previous developed hypothesis that the results of this study showed some similarities to those of ageing studies. This is particularly noticeable on the Purdue Pegboard, where all the scores of the prison sample improved less than those of the control group's; again, the more complex skills seemed to be affected, the discrepancy being greatest on the Assembly subtests, which require more fine manipulative skills. The prison sample's W.A.I.S. Performance IQ improved less, and they improved less on three out of the five subtests; it is interesting to note that one of the tests on which they did better ($p .20$) was the Picture Completion subtest, which Wechsler (1958) includes in his "Hold" category in constructing his Deterioration Index, as it is one of the test items, the scores of which are supposed to stand up well to ageing. They also, however, did better on the Block Design test, one of the "Don't Hold" tests; as this difference is only significant at the $.50$ level, then it is probably not worth discussing further. Another result which is contrary to prediction is that for the Simple and Reversed Choice Reaction Time tests, where the prison sample's differences indicated quicker reaction times than those of the control group; again, the differences involved were very slight, and nowhere near statistical significance. It may be relevant to note here that the reaction time results were generally the least reliable of all the tests used, results could be affected by practice,

results could have been affected by differential release policy (this point is developed below) and they also may be affected by the differing circumstances in which they are taken; the Simple Reaction Time test was the only one on which scores declined between testing sessions. On all the remaining tests (with the exception of the Gibson Spiral Maze, which is mentioned below), the control group's scores improved more in the re-test session than those of the prison sample; this improvement would again support the general contention that increasing lengths of imprisonment are associated with some form of psychomotor decline.

The only major test which has not been mentioned in the discussion above is the Gibson Spiral Maze; both groups took longer to complete this test, but made less errors and less breaks. In addition, the prison sample took longer than the control group, but made less errors (this latter difference only falls slightly short of statistical significance, p being less than 0.10). A similar effect is also noticeable, in very general terms, in the first cross-sectional results on this test (see Table 11 above). Gibson (1977) makes little mention of the effect of adult age differences in his Spiral Maze performance, beyond some data from a very small number of elderly people in several Old People's Homes, but it seems reasonable to suggest that a test of psychomotor competence such as this is claimed to be may exhibit changes with ageing. As Bromley (1966) suggests, "the decline in speed of performance is one of the most outstanding characteristics of ageing" (p.183), and he goes on to cite a number of studies (e.g. Welford, 1958) which indicate that older subjects tend to require more time, and make less errors on tasks requiring skilled performance. In this study, the intertrial interval was under two years, but the increase in time taken by both groups and the decrease in errors and breaks, on the Gibson Spiral Maze could again be indicative that the ageing process had affected the scores of both groups; both groups, having got older during the intertrial interval, altered their behaviour on the

test accordingly (it is assumed, for the purpose of this analysis, that "breaks" can be subsumed under the general heading of "errors"). If this hypothesis is correct, it is interesting to note that the prison sample exhibits these "ageing" characteristics to a greater extent than the control group; again, this observation fits into the general hypothesis that there are similarities between the results of imprisonment and the ageing process.

Whilst not being so clear cut, the results of the Longitudinal analysis do provide a limited amount of further support for the thesis that increasing lengths of imprisonment are associated with an increasing reliance on verbal skills, and a decline in some psycho-motor skills. Once again, parallels can be drawn between the results of long term imprisonment, as measured by the psychological tests used in this study, and the results of ageing studies. It is interesting to note again in this context that the paroled prisoners were significantly higher than the detained prisoners on the W.A.I.S. Similarities subtest, and were also higher on all other W.A.I.S. subtests (except for Digit Span); differential release policies thus would be likely to work against the results found in this Longitudinal analysis, where an increase in verbal skills has been found.

Increasing test sophistication may have partly produced these results, but the design used controlled for this to some extent. Unless one is going to assert that prisoners discussed some of the test battery questions with fellow prisoners, as has been suggested above, and that this produced the significant differences found in this study, it seems likely that the effects found are in some way related to the experience of imprisonment. Again, it is realized that the results could, in part at least, be explained by such hypotheses as prisoners increasing use of education facilities affection their scores, or the possible stress in prison on

verbal skills; these will be dealt with below.

(iib) The Second Cross-Sectional Analysis:

(a) Summary of Results

The results from this analysis, as they include far less prisoners per group (only 119 prisoners in toto, as opposed to 175 in the first cross-sectional analysis), and as they are more highly selected (possibly due to differential release under parole), must be regarded as being of less importance than those from the first cross-sectional analysis; nevertheless, it is hoped that this part of this study will help to throw light on the effects of long-term imprisonment. Another problem with this group is that the scores are all retest scores, and thus practice effects etc. may be a confounding factor in the analysis of the results.

(A) Again, there is no significant decline in general intellectual ability, as measured by the W.A.I.S.; there are no significant differences between the groups on either the mean IQ scores or any of the subtest scores.

(B) The only significant differences found in this part of the study was in the Purdue Pegboard assembly subtests; group 3 took longer than group 2 ($p < 0.05$) on Assembly Trial I, Assembly Trial II and Total Assembly. This result was similar to that found in the first cross-sectional analysis, and the pattern of test scores for the groups (despite the drop in subject numbers) were remarkably similar over the two testing occasions. The other Purdue Pegboard subtests also showed declining trends, but did not achieve statistical significance.

(C) There were no other results to remark on; as the first part of the Longitudinal analysis has shown, most test scores improved on retesting. The trends in W.A.I.S. Verbal IQ, Vocabulary, Information and Comprehension subtests which were noticed in the analysis of the first set of cross-sectional results were only replicated for groups 1 and 2 in the second cross-sectional results. The trends for the Reaction Time results also appeared to be markedly different between the two times of testing.

(b) Control Results

(A) There were no significant differences between the control group's second results and those of the four prison groups; to some extent, the small number of subjects in the groups would be likely to cut down on the number of significant results. As the previous analysis of the Longitudinal results have shown above, there are significant differences between the overall prison sample and the control group, but these differences are not evident when the prison sample is analyzed in terms of the four groups differing in length of imprisonment. In addition, there do seem to be marked changes in test performance for both the prisoners and the controls over the two testing sessions; again, these have already been dealt with.

(B) The comparison between prisoners paroled and detained does indicate that paroled prisoners tend to score higher on all W.A.I.S. subtests (with the exception of Digit Span); this difference reaches statistical significance on the Similarities subtest. In addition, there seem to be no clear release patterns in terms of Purdue Pegboard or Reaction Time Tests; on some of the subtests, paroled prisoners do better, and on others, the detained prisoners do better. Prisoners who have been paroled tend to have served around 6.19 years on their current sentence,

and thus it is likely that groups 3 and groups 4 would be the ones most affected by differential drop out (this is confirmed by the attrition in these two groups, which was higher than for either group 1 or group 2).

(c) Discussion

As has already been stressed, these results must be viewed with caution, as a number of prisoners who were seen at first testing were not seen a second time. Once again, the results are not very clear-cut, there being few consistent trends across the four groups; results could well be affected by the differential selection of prisoners for parole.

There is some evidence to support the previous finding that complex psychomotor skills, as measured by the Assembly subtests of the Purdue Pegboard, are affected by imprisonment; although the overall pattern of test scores shows an improvement over the first time of testing, this improvement was far less than the improvement shown by the control group over the same period of time. It thus seems that this analysis provides some confirmation for the possibility that complex psychomotor skills are adversely affected by imprisonment.

The results for the Reaction Time tests are not, however, so clear-cut; the possible problems over the reliability of these tests has already been discussed and parole release could well also affect the results on these tests. For instance, the second cross-sectional analysis shows a slight trend towards Reversed Choice Reaction Time improving with imprisonment; however, the analysis of subjects paroled indicates that there is a tendency to release prisoners who have served a relatively long period of time on their current sentence, and who also have slower Reversed Choice Reaction Times. None of these differences reach statistical significance, but they do indicate how differential release policy can affect the trends shown on a number of test variables, particularly

when the numbers left in the various groups have been reduced.

The difference between this analysis and the previous one as regards verbal skills can also be explained, in part at least, by using the same line of reasoning. Although none of the W.A.I.S. Verbal subtests showed general improvement trends with increasing lengths of imprisonment (as had been previously noted), the results of this analysis showed a marked (though statistically non-significant) improvement for all groups, with the exception of group 4. Again, this increased reliance on verbal skills also probably accounted for the increase in the Wechsler Deterioration Index noted for groups 1 to 3 inclusive. Once again, there appears to be a tendency for the Parole Board to release the more verbally adept prisoners (as measured by the W.A.I.S.), and thus those left in group 4 would be those who did not fulfil this criterion; it seems likely thus that the previously argued increasing reliance on verbal skills in prison is not damaged by the finding in this part of the study that the prisoners who have been in prison for the greatest length of time in all are not particularly verbally skilled. The reason for their lack of skill would seem to be because they are a highly selected sample, rather than because their test performance is a result of imprisonment. It is interesting to note that the W.M.S. Associate Learning subtest results for this analysis closely follow those of the first cross-sectional analysis, with a slight increase in remembered associates for group 1; the parole analysis indicates that there is a tendency (again nonsignificant) for subjects who do worse on this test to be released.

Once again, it must be stressed that these results must be treated with extreme caution, but it does seem from the second cross-sectional analysis that there is support for the previously-mentioned association between imprisonment and a decline in complex psycho-motor skills. The other results are not very clear-cut, but it does seem that if differential release patterns are taken into account, they do provide general support

for the previous thesis that there seems to be an increasing reliance on verbal skills with increasing lengths of time being spent in prison.

(iii) The Prisoners Paroled and Detained

(a) Summary of Results

(A) The only statistically significant difference between the group of men who were given parole and the matched group of those who were considered for parole but who were not released was found on the W.A.I.S. Similarities subtest, where those released performed better than those detained ($p < 0.02$).

(B) No other results reached statistical significance but it is interesting to note that the released prisoners scored higher on all the W.A.I.S. subtests (with the exception of Digit Span), Verbal IQ, Performance IQ, and Full Scale IQ.

(C) As has been mentioned above, there were no consistent patterns on any of the other tests to distinguish those released from those retained; for instance, those released did better on three out of the eight Purdue Pegboard tests, and better on two out of the three Reaction Time Tests. It seems likely that psychomotor skill level is not taken into account when prisoners are considered for parole.

(b) Control Results

This part of the study is based on the comparison between a group of men released on parole and a matched group of prisoners who were considered for parole, but who were not released; the results will thus be discussed below.

(c) Discussion

As has been stressed on a number of occasions above, it does not seem that any differential release policy by the Home Office Parole Board is entirely responsible for the cognitive changes noted in the first cross-sectional analysis; firstly, the Parole early release scheme had only just started when this study initially commenced, but secondly it does not seem that cognitive criteria (or at least those utilized in this study) are significantly used by the Parole Board in their consideration of whether to give a man early release or not. There does appear to be a slight tendency for the more intelligent people (as measured by the W.A.I.S.) to be released early, but this was only found to reach statistical significance on one variable.

Given this slight tendency to release the more intelligent prisoners, it seems that such a policy would work against the significant increases in W.A.I.S. Vocabulary scores, Verbal IQ and Full Scale IQ found in the Longitudinal analysis; it would make significant results in this area in this direction less likely, and thus it appears that the Parole Board's release policy has, if anything, cut down on significance in this part of this study.

The area where it might have affected the results is in the second cross-sectional analysis, where the differential release policy would tend to affect the numbers of subjects left in groups 3 and 4, but not alter the numbers in the other two groups.

As prisoners tend to be interviewed in connection with considering them for early release under the Parole scheme, it seems likely that the more intelligent ones will be better able to impress their interviewers; for instance, one of the things considered by the Parole Board is the prisoner's "plans for his future" (HMSO, 1969b, p.20), and a prisoner who is better able to verbalize will be at a possible advantage in this situation. The W.A.I.S. Similarities subtest result could perhaps be

interpreted in this context. Developing from this view, one can attempt an explanation for this result in terms of Wechsler's (1958) discussion on the skills that are possibly tapped by this subtest; Wechsler suggests that this subtest sheds light "upon the logical character of the subject's thinking processes" (p.73), and that somebody with logical thinking processes would tend to do better on this test. Such a person would perhaps be more likely to impress both the Prison Authorities and the Parole Board that they were capable of leading a non-criminal life if granted early release. In fact, the Parole Board, with its emphasis on the importance of verbal skills, could well be one of the motivating forces behind the increase in verbal skills apparent in the longitudinal part of this study, rather than the increase in verbal skills being purely a function of imprisonment.

Psychomotor skills tend to be ignored when a prisoner is considered for early release under the Parole Scheme; no consistent pattern of results were noted on such tests as the Purdue Pegboard and the Reaction Time Tests. This finding would lend support to the view that the Parole Board is more interested in improvements in verbal behaviour than in alterations in other forms of skilled behaviour.

CONCLUSIONS OF PART ONE

By and large, the results produced by this study do not indicate a straightforward relationship between test performance on a variety of cognitive tests and the total length of time spent in prison; this lack of a simple monotonic relationship thus makes the results rather difficult to interpret, as they present a rather diverse overall pattern. Any conclusions that can be drawn from this study must thus be regarded as being of rather a tentative nature.

The introduction to this thesis reviewed previous literature in this area; one of the outstanding features of much of the literature produced about the effects of long term imprisonment is that the most likely response to such treatment is going to be "deterioration". The bulk of the studies that have been previously carried out, however, tend to be based on impressions, rather than on firm data; as the Radzinowicz Report (HMSO, 1968a) stresses "this is a subject ... on which there are virtually no hard facts, and on which very little research has been carried out" (p.57). Again the HMSO (1969a) publication "People in Prison" emphasizes that "not enough is known about the effects of long term imprisonment" (p.108). The results of this study clearly do not indicate any devastating psychological change in cognitive abilities with increasing lengths of imprisonment on any of the measures used; this is not to say, of course, that damaging cognitive changes have not occurred, as the large battery of tests may not necessarily have been in the appropriate areas. It does, however, seem unlikely that cognitive abilities of prisoners have radically changed in areas not assessed in this study, as such changes should have been evident in at least some of the wide range of tests used in this study. A further possibility could

be that the psychological tests utilized in this study were not sufficiently sensitive to detect the changes caused by the effect of imprisonment. This point will be looked at further in the "Status of Testing" section in part three, but again it seems unlikely that the radical change predicted by some authors did not show up on any of the tests used. One comment of possible relevance here is that in discussions with prisoners on the effects of imprisonment, the topic of "deterioration" is frequently brought up, but always in the context of telling one about the effects that imprisonment is having on somebody else; when asked whether they felt that this process was occurring to them, the usual reply was that they felt it was not - as they were aware of this "danger", they took active steps to keep themselves occupied. Cohen and Taylor (1972), in their qualitative study on prisoners in the E wing of Durham Prison (which is discussed in detail below in Part Three), also support this; in general, they conclude, such prisoners appear to be affected rather little by their environment, and take active steps to try to avoid being damaged by the experience of imprisonment.

Previous studies on situations such as those involving sensory deprivation, perceptual deprivation and social isolation were also discussed in the introduction, in the hope that such studies might help one in predicting the likely outcome of a long period of imprisonment. From the review of such studies, it was concluded that some form of psychomotor decline (especially with measures involving eye-hand co-ordination, such as the Purdue Pegboard Assembly tests) and also perhaps some form of intellectual decline were the most likely outcomes of long term imprisonment.

As has already been stressed above, the results were not very clear-cut, although a number of changes were indicated. To some extent, the predictions from the literature review have been supported by this study; there does seem to be some evidence that there is an association between

length of imprisonment and psychomotor decline. This is particularly noticeable on the results for the two cross-sectional analyses, and to some extent (though not statistically significantly) on the Longitudinal analysis. It seems that the Purdue Pegboard Assembly tests, which involve complex eye-hand co-ordination, is particularly consistent in showing decline in performance with increasing imprisonment over all parts of this study. There is also some supportive evidence for this conclusion from the Reaction Time results on the first cross-sectional analysis.

The other major prediction made from the literature review (viz that there was likely to be an association between length of imprisonment and intellectual decline) does not, however, seem to have been found in this study. Indeed, some of the most statistically significant results of the whole study suggest that there is an association between length of imprisonment and improved verbal skills; the Longitudinal analysis clearly shows this, despite the Parole Board's differential release policy, which tends to release the more verbally adept prisoners (as measured by the W.A.I.S.) on Parole, and thus would be likely to decrease the possibility of achieving significance on verbally-related results. The first cross-sectional analysis results can also be interpreted in this light; also there is limited support for such an assertion from at least groups 1 and 2 on the second cross-sectional analysis (who would only be marginally affected by the Parole Board's differential release policy). This result is rather difficult to explain in relation to previous findings in this area, but it must be emphasized that the conditions where intellectual decline was noted usually tended to involve far more severe conditions (in terms of sensory deprivation, social isolation, etc.) than are generally encountered in prisons. No previous large-scale studies have been done looking specifically at the cognitive effects of long-term imprisonment, and thus the predictions made in the literature review may not hold for

long-term imprisonment itself.

This slightly confusing general finding of an association between psychomotor decline, verbal skills improvement and long-term imprisonment has been mainly discussed in terms of being somewhat parallel to the results that have been found in ageing studies. Although the results of this study were not totally supportive of such a comparison, the overall picture that is shown by the prisoners' cognitive test performance fits in to a large extent with the results of ageing studies. This proposition that there are some similarities between long term imprisonment and the ageing process has been remarked upon in general terms by previous writers; West (1963), for instance notes that an undue proportion of preventive detainees seem to be "prematurely aged", whilst Clayton (1970) quotes a young "lifer" (an indeterminate sentence prisoner) in Pentonville as saying that he had heard that the first five years for lifers is alright, and then one ages three years for every year one does. Although it is simplifying results in this field to some extent, there does seem (e.g. Birren, 1970) to be evidence that, in general, there is a tendency to find lowered psychomotor functioning and an increasing reliance on verbal skills with ageing. It is just such a change that is noticeable in the overall results of this study, and thus the results have been discussed above in relationship to the proposition that there are similarities between the ageing process and the effects of long-term imprisonment. Indeed, a number of ageing studies indicate that an improvement in verbal skills is often likely with increased age; Horn (1975), for instance, says that most evidence seems to indicate that scales measuring Cattell's "crystallized intelligence" (such as the W.A.I.S. Vocabulary subtest) often exhibit a pattern of no change with age, or even a slight improvement between the ages of 20 and 50 years. Again, this result is in good accord with the results of this study. The significant increase on the Wechsler Deterioration Index noted on the

first cross-sectional analysis was also discussed in terms of supporting this result, as was the increasing trend noted in this Index in the second cross-sectional analysis; the increase was probably due more to the increase in verbal skills, rather than to "intellectual deterioration" (using Wechsler's (1958) terminology). In addition, the significant improvement on the Wechsler Memory Scale Associate Learning subtest was also discussed in terms of possibly being a reflection of increased verbal skills.

Further evidence to support this possibility of a parallel between ageing studies and the effects of long term imprisonment came to a limited extent from the Gibson Spiral Maze, especially in the Longitudinal results, where it was found that subjects tended to take more time on the retest of the Maze, and to make less errors (including less "break" errors as well). Although the differences noted did not reach statistical significance, they can be interpreted as being similar to the findings of many classical studies of the effect of ageing (e.g. Welford, 1958) on skilled performance, where speed decrements and accuracy increases have been noted.

The results of the remaining tests have not been discussed, as they generally present a rather confused picture; some tests fit into the general pattern of psychomotor decline noted above (e.g. the G.A.T.B. Form Matching test and the Wechsler Memory Scale Visual Reproduction test) in all three parts of the analysis, but as the differences between the various groups never attain statistical significance, they have not been discussed. None of these tests produce consistent evidence which is at variance with the general overall pattern of results, as discussed above.

The results of the control group have demonstrated that the effects found in this study are more likely to be due to the effects of imprisonment itself, rather than being due to natural ageing, increasing test sophistication with a test-retest design, or to the specific "criminal nature" of the prison sample. It is interesting to note at this point that the retest performance of the control group was far more in accord

with the performance that has previously been found using samples drawn from the general population than the prisoners' behaviour was; the contrasts on the W.A.I.S. test-retest data is of particular interest in this context, where the prisoners' increased reliance on verbal skills seems particularly noticeable.

The analysis comparing the samples of prisoners paroled and those considered for parole but not released, in part at least, controlled for the possibility that differential release policy accounted for the results of this study, rather than the experience of imprisonment itself. This analysis showed that the Parole Board tended to release the more verbally adept prisoners; if this is so, this would tend to reduce the significance of verbal skills improvements in the Longitudinal analysis. A statistically significant increase in verbal skills was nevertheless found in this part of the study, despite the differential release policy. Thus it seems that this finding is again more likely to be a product of length of time in prison, rather than being the result of differential release. The parole analysis does, however, suggest that one should be careful when looking at the groups who have been in prison for the greatest length of time, as these groups will be more highly selected than the other groups; one should have the greatest confidence in the results of the groups who have been in prison for the shortest length of time.

Whilst it is admitted that any conclusions based on this study must be purely tentative, and to be regarded as pointers for future research, rather than definitive conclusions, it does seem that these results only partially confirm the results from related studies, and are perhaps explicable in terms of drawing a parallel between the effects of long-term imprisonment and the ageing process. The results in general may perhaps be possibly interpreted as showing similar patterns to those that might be expected with increasing age; as the groups used in this study were matched for age, a preliminary overall conclusion that can be drawn from

this study is that one of the effects of long-term imprisonment is to slightly accelerate the ageing process. This preliminary conclusion has been discussed above, in the first cross-sectional analysis, where two speculative hypotheses are put forward to attempt to account for this link; the findings were related to "disengagement theory", and the effects of the pace of life inside prison.

The results are also possibly explained without necessarily suggesting a similarity between the process of long term imprisonment and ageing; it could be, for instance, that the increase in verbal skills noted with increasing imprisonment could be a result of increased use of prison educational facilities, or a general emphasis in prison on the importance of verbal, rather than physical skills. It could be that the psychomotor decline is associated with doing different prison jobs, rather than a function of imprisonment itself.

Other explanations for the results exist; rather than reflecting any change that is related to the experience of long-term imprisonment, they could be merely a function of the inadequacies of the tests used. A further consideration is the representativeness of this sample vis a vis prisoners in general; indeed, are prisoners such a heterogeneous group that it is unjustifiable to treat them as being likely to exhibit the same responses to long term imprisonment?

The majority of the rest of this thesis will make a tentative attempt to look, so far as possible, at these alternative hypotheses; part two will look at detail at possible moderating variables which could account for the results found in this part, whilst part three will critically examine both the tests and the methodology used in this study.

PART II

INTRODUCTION

This part develops from part one, and looks in detail at alternative explanations to account for the results of that part. It is divided into three main sections, as follows:

(i) Wechsler Adult Intelligence Scale Factor Analysis:

In this section, the possibility that prisoners differ in the factorial structure underlying their test performance is investigated; if their factorial structure is found to be markedly different, then the results found in part one may be due more to the samples used in this study rather than being due to the effects of long term imprisonment. This section also compares the factorial composition of performance on the Wechsler Adult Intelligence Scale at the two times of testing, to see if findings from such a comparison are in accord with the ageing parallel hypothesis already developed above.

(ii) Social and Criminological Variables:

In this section, the possibility that the increase in verbal skills found in part one could be due to prisoners making increased use of the prison educational and other facilities with increasing lengths of total imprisonment, rather than being an effect of imprisonment itself is investigated. Similarly, the possibility that the decrements noted in complex psychomotor skills found in part one are due to prisoners getting less interesting jobs with increased lengths of total imprisonment, rather than being a result of

imprisonment itself, will also be considered. A large number of social and criminological variables will be looked at in detail to investigate such possible moderating variables.

(iii) Offence Category of Prisoners:

This section investigates in detail the variable of "criminality", another possible moderating variable. The cognitive test results, and the social and criminological data will be examined with the prisoners grouped into categories based on their current offence (at the time of testing).

(i) WECHSLER ADULT INTELLIGENCE SCALE FACTOR ANALYSIS

Introduction

Wechsler (1958) denotes Chapter eight in his book on "The Measurement and Appraisal of Adult Intelligence" to the consideration of the factorial composition of the W.A.I.S. He considers this to be an important exercise, as such an analysis may help to define the underlying abilities that one is measuring. He reviews the major studies in this area, and comes to the conclusion that factor analyses of the W.A.I.S. generally identify three main factors:

- (a) "g" (eductive, general reasoning factor)
- (b) verbal comprehension
- (c) non-verbal (or visual-motor) organization

Some studies (e.g. Cohen, 1957) have identified further factors; a lot of the variance between results is probably accounted for by the differences in factor extraction used, but one additional factor that does seem to come out systematically is:

- (d) memory

Further factors that research has produced have proved difficult to interpret, and may well be a function (to some extent, at least) of the samples or method used; Silverstein (1969), for instance, has produced an alternative factor analytic solution for Cohen's work, and does not find the same factors.

In the context of this study, a factor analysis of the W.A.I.S. results helps to potentially deal with part of one of the major problems of this study; namely, that the results may be due to the unique characteristics of criminals, rather than to the effects of long term imprisonment. To some extent, this possibility was controlled for in the first cross-sectional analysis, where no significant differences were found on the test variables between the control group and prison group 1, but it could be that although no differences were noticeable on the test variables themselves, these variables could reflect different underlying factors. Secondly, a factor analysis of the W.A.I.S. results comparing the factors from the first and the second set of testing might support the previous suggestion that there is a similarity between long term imprisonment and the ageing process; one of the results, for instance, that has been found in previous work is that the memory factor plays an increasing role in older age groups (though it should be noted that the effect only becomes marked from the age of 60, as Cohen (1957) points out). Thirdly, it would be interesting to discover whether there is a noticeable change in the factorial composition of the W.A.I.S. with retesting.

Method

The W.A.I.S. subtest scores of:

- (a) the sample of 175 men seen in the first cross-sectional analysis;
- (b) the second scores of the sample of 154 men who were seen twice;

were analysed separately using the program FTAN (Youngman, 1971). FTAN performs a principal components analysis and then Kaiser's varimax rotation on the data.

Results

The results below are presented in tabular form, so that comparisons can be easily made between the factors derived for the two prison groups and those found in the normative data presented in Wechsler (1958). The first row presents the principal component from the principal components analysis, whilst the next three rows presents the results of the rotated analysis. It was found, after some pilot analyses, that three rotated factors could meaningfully account for most of the variance. A factor loading of 0.5 was arbitrarily selected as the level below which variables were not considered in defining factors; on the other hand, Wechsler places his cut-off point at 0.2, but this difference is explicable in terms of the different methods of rotation used in these two studies. These factors are presented in Table 42 in terms of their defining variables.

TABLE FORTYTWO

Wechsler Adult Intelligence Scale Factor Analysis Results

	Wechsler (1958) (after Cohen 1959)	Prison Group	
		<u>First time of testing</u>	<u>Second time of testing</u>
N	300	175	154
Principal component from principal components analysis	Information .84	Information .79	Information .79
	Vocabulary .79	Vocabulary .77	Similarities .78
	Similarities .75	Comprehension .76	Vocabulary .77
	Picture Completion .72	Similarities .75	Comprehension .77

	(	Comprehension	.71	Picture Completion	.72	Arithmetic	.72
	(	Arithmetic	.71	Arithmetic	.69	Picture Completion	.70
	(	Block Design	.71	Block Design	.67	Block Design	.69
		Picture Arrangement	.69	Digit Symbol	.65	Picture Arrangement	.68
		Digit Symbol	.64	Picture Arrangement	.61	Digit Symbol	.67
	(	Object Assembly	.59	Digit Span	.60	Object Assembly	.62
	(	Digit Span	.59	Object Assembly	.60	Digit Span	.60
Percentage of Variance accounted for by factor			50%		48%		50%

Rotated Factors

Factor I	Vocabulary	.48	Vocabulary	.88	Vocabulary	.89
			Information	.83	Comprehension	.84
	Comprehension	.45	Comprehension	.79	Information	.78
	Information	.21	Similarities	.78	Similarities	.73
	Similarities	.20				
Percentage of Variance accounted for by factor		not cited		29%		30%

Factor II	Object Assembly	.45	Picture Arrangement	.84	Object Assembly	.86
	Block Design	.30	Picture Completion	.73	Picture Completion	.63
	Picture Arrangement	.22	Digit Symbol	.64		
			Block Design	.60		

(Table 42 continued)

Percentage of Variance accounted for by factor	not cited	21%	16%
Factor III	Arithmetic .32	Arithmetic .73	Digit Span .83
	Digit Span .24	Digit Span .73	Arithmetic .63
Percentage of Variance accounted for by factor	not cited	15.5%	15%

Discussion

Although it is admitted that the process of defining and naming factors is idiosyncratic to some extent, it does appear that there are marked similarities between the factors found to underline performance on the W.A.I.S. in this study and the results of previous factor analyses; as has been outlined in the introduction, Wechsler (1958) suggests that factor analyses of W.A.I.S. results are likely to produce three or four main factors, and this study has produced similar factors to these.

- (a) the principal component from the principal components analysis for both prison groups seems to follow the pattern of Wechsler's data, and is thus interpretable in terms of showing an underlying factor of "g". It is interesting to note that the percentage of variance accounted for by this factor is almost identical for all three samples.

- (b) the main factor produced in the rotated factor analysis again follows the pattern of Wechsler's data, and is thus probably "verbal comprehension".

- (c) the second factor produced in the rotated factor analysis also seems (though to a lesser extent) to follow Wechsler's data. Although this factor is harder to interpret, all the defining variables are from the "performance" half of the W.A.I.S, and thus could be called "non-verbal organization".

- (d) the third factor produced in the rotated factor analysis is almost identical to Wechsler's third factor, and thus is probably (following Wechsler) some form of "memory" factor.

Although it is admitted that there are some slight differences noticeable on the second factor of the rotated factor analysis, the results of this study of a group of prisoners does appear to show marked similarities between the factors underlying their performance on the W.A.I.S. and that of Wechsler's normative group. It thus seems that the factors underlying W.A.I.S. performance of the prison sample are remarkably similar to those found in non-institutionalized samples; the differences in individual test performance which have been found in other parts of this study are therefore more likely to be due to the effects of imprisonment than to the group of prisoners being on a typical sample in terms of their underlying abilities.

It is interesting to note that little change seems to occur in the factors underlying W.A.I.S. performance between the testing and retesting results; there is no marked increased reliance on verbal skills and decreased reliance on non-verbal skills, but the percentage of variance accounted for by the various factors does change slightly in line with

the previous analysis. The factor analysis reported in Table 42 above does show that the "non-verbal organization" factor (factor II) accounts for less variance (viz 16% as opposed to 21%) on the second time of testing, whilst the "verbal comprehension" factor (factor I) does account for slightly more variance (viz 30% as opposed to 29%). These slight changes can be interpreted as again providing some support for the previous argument that there are possible parallels between the effects of long term imprisonment and the ageing process, but it must be stressed that the differences involved are very slight.

This study indicates that there seems to be little change in the underlying factorial composition of performance on the W.A.I.S. with re-testing; although changes in individual subtest performance are often noted with retesting, this study indicates that the W.A.I.S. is still assessing the same basic skills. It must be pointed out, however, that research has yet to be done as to whether this finding can be generalized to normal populations.

(ii) SOCIAL AND CRIMINOLOGICAL VARIABLES

Introduction

The purpose of this section is to look at detail at a number of the possible moderating variables that could have affected the results of this study; it has been suggested above that the results found may, in part at least, be attributable to factors other than the effects of imprisonment alone. For instance, it could be that the improvements noted in verbal skills with increasing lengths of imprisonment are due to prisoners making increased use of the prison educational and other facilities, rather than a result of imprisonment itself. It could be that the decrements noted in complex psychomotor skills with increasing lengths of imprisonment are due to prisoners getting less interesting prison jobs, rather than being a result of imprisonment itself. Also, there could be differences between the groups in terms of how "criminal" the prisoners are, and again this could affect the results of this study.

In order to examine such variables, a large amount of information about the sample's past criminal history and present prison career was abstracted mainly from the prisoners files. As is generally acknowledged, such information is often rather scanty; for instance, the Radzinowicz Report (HMSO, 1968a) remarks, in talking of an analysis of the records of some serious offenders, that "for various reasons, notably the unevenness of the amount of information contained in the records themselves, this study did not provide a fully comprehensive picture" (p.2). Again, Morris and Morris (1963) make a similar comment in their study on Pentonville. In a number of prison riots, for example, the files have been destroyed by the prisoners themselves, and subsequent records have been, of necessity, rather curtailed. Bearing this in mind, these variables

have thus been divided into broad categories, precise figures only being used when records are relatively accurate.

One possible check of the reliability and validity of these figures is to look in detail at the samples of men paroled and released; if these figures are of any use, then it would be reasonable to expect that they would help in differentiating between those granted early release under the parole scheme, and those considered for parole but not released. This section will thus include a comparison of the social and criminological variables of these two groups, in the hope that such a comparison will demonstrate the reliability and validity or otherwise of the figures discussed in this section.

Having done this, this section will then go on to discuss the social and criminological variables in detail, in relation to the findings of the main part of this study.

Social and Criminological Variables

The following variables were abstracted from the prisoners' files:

(a) Social Variables

(1) Marital status at beginning of current sentence.

Either single or married (the latter includes living with a common law wife).

(2) Marital status at time of testing.

- Classification as (1) above.

(3) Marital separations between commencement of present sentence and time of testing.

(4) Outside job level, before present conviction.

- 1 = labouring
- 2 = semi-skilled
- 3 = skilled
- 4 = vocational and professional

i.e. the higher the score, the better the level of the outside job.

(5) Regularity of outside employment.

- 1 = hardly ever worked
- 2 = worked semi-regularly
- 3 = regularly worked

i.e. the higher the score, the more regular the outside employment.

(b) Criminological Variables

(i) Past Criminal History

(1) Age at first conviction (in whole years).

(2) Total number of previous convictions (excluding minor driving offences).

(3) Seriousness of previous convictions.

- 1 = petty thieving, etc.
- 2 = burglary, etc.
- 3 = serious housebreaking, minor violence, etc.
- 4 = sex offences, major violence, etc.

i.e. the higher the score, the more serious the previous convictions.

(4) Total time spent in prison up to the beginning of the current sentence (to the nearest month; months expressed in decimal terms as a fraction of a year).

(5) Total time spent in prison, including the current sentence, up to the time of testing (to the nearest month; months expressed in decimal terms as a fraction of a year).

(6) Sentenced to approved school or borstal.

- 0 = never
- 1 = once
- 2 = more than once

(ii) Present Prison History

(1) Rating of interest value of prison employment at time of testing

- 1 = uninteresting (e.g. cleaners)
- 2 = routine (e.g. tailors).
- 3 = interesting (including blue and red bands, and participation in "full time" training and educational courses).

i.e. the higher the score, the more interesting the prison employment.

(2) Use made of prison educational facilities during current sentence.

The information on this variable was usually more extensive than other information, and thus it was felt possible to code it on a 4-point scale.

- 1 = none
- 2 = very occasional
- 3 = occasional
- 4 = extensive

i.e. the higher the score, the more use is made of prison educational facilities.

- (3) Extent of contact with "outside world" whilst in prison during current sentence (measured by the numbers of visits and letters received from friends and/or relatives).

1 = none
2 = limited
3 = good

i.e. the higher the score, the more contact with the "outside world".

- (4) Use made of prison facilities in general (e.g. sports or library facilities, T.V., etc.) during the current sentence.

1 = none
2 = limited
3 = extensive

i.e. the higher the score, the more use is made of prison facilities.

- (5) Total number of petitions made to the Governor in the twelve months prior to testing, during the current sentence.

- (6) Total number of recorded offences committed in prison during the twelve months prior to testing, during the current sentence.

- (7) "Preferability" of prison where tested, at time of testing (this judgement was entirely subjective, gained from the prisoners' own comments about prisons, and the author's own impressions).
Scored on a 4-point scale, higher scores indicating less preferable prisons.

Paroled and Detained Prisoners' Social and Criminological Variables.

(a) Introduction

As has been suggested in the introduction to this section, one way to examine the reliability of the social and criminological variables would be to analyze the differences between the prisoners paroled after the first cross-sectional analysis and a group of prisoners who were considered for parole, but who were not released. As the Parole Board does not seem to significantly use cognitive variables in assessing the suitability of a prisoner for early release (as has been outlined above) it seems likely that they will take social and/or criminological variables into account when considering a prisoner; as will be outlined below, previous research in this area suggests that just such a consideration is likely to be made, and the Parole Board itself (HMSO, 1969b) suggests it looks at these variables, amongst others. If significant differences are found between the paroled and detained prisoners, and these significant differences are in accord with previous published research, then this will be taken to indicate that the social and criminological variables utilized in this study are of some use. In addition, if a differential release policy is detected, then this policy should be possibly taken into account when examining the results of this study (particularly the longitudinal results).

(b) The Parole System

The term "parole" is used by the prison system to describe the release of an offender on licence (and usually under some form of supervision in this country) before the normal end of his sentence, subject to the condition that misbehaviour during the period of the licence may lead to recall to the institution. Such a course of action is intended to be useful in several ways; first, it is hoped that parole may be

viewed as part of the correctional process, reducing the likelihood of recidivism; secondly, it provides an opportunity to assess a person's likelihood of recidivism on the basis of his current behaviour, rather than solely on the behaviour shown prior to incarceration; thirdly, it is hoped that the chance of getting parole may cause prisoners to modify their behaviour in prison for the better (it has been suggested above, in this context, that a possible reason for the increase in verbal skills noted in prison could be due to the prisoner attempting to favourably influence the Parole Board's decision); fourthly, it allows closer supervision of newly released offenders in society than is usually possible; finally, it offers a considerable saving in cost, as care in the community in large is generally cheaper than institutional care.

Parole is extensively used in the United States (especially since the 1930s), but it has only been introduced to this country relatively recently. The 1967 Criminal Justice Act set up the current system, under section 60 of that act; "every person serving a fixed sentence of imprisonment of over eighteen months is eligible for consideration for parole when he has served one third of his sentence, or twelve months, whichever is the longer. Unless he specifically declines the opportunity, each prisoner who is eligible for parole has his case considered by a local review committee at the prison in which he is detained. The committee reports to the Home Office, and all cases in which a committee thinks a prisoner suitable for parole are now referred by the Home Office to the Parole Board. Additionally, some cases are now referred which the local committee has not deemed suitable" (HMSO, 1969a, p.48). The system for prisoners who are on indeterminate sentences is slightly different; "each case is carefully considered at an early stage, and a date is fixed for review, normally after four years, though in rare cases a review may be held earlier. This review at four years is carried out by the Home

Office, its main purpose being to decide whether, exceptionally, the local review committee should be asked to review the case within the following two years. Such a review is unusual. The usual practice is to seek the views of the local review committee after an offender has served seven years whether or not it appears likely that a provisional release date can reasonably be fixed (such a date is usually fixed a year in advance). The Home Office considers the case and forwards it to the Parole Board whether or not the committee's recommendation is favourable. The Lord Chief Justice, and the trial judge if available, must by law be consulted before any prisoner in this category is released" (HMSO, 1969a, p.51).

(c) Criteria for Release on Parole

As can be seen above, the Parole Board does not decide to release a prisoner on licence lightly. A prisoner usually will be released only after the local review committee, the Home Office, and the Parole Board have duly considered the "prisoner's social and criminal history, his probable circumstances if released, and his likely response to supervision" (HMSO, 1969b, p.20).

The precise criteria used by these authorities has not been set out, except in such general terms as "the selection of a prisoner as one suitable for parole depends upon his history prior to the start of his current sentence, his behaviour during his current sentence, his plans for his future and the circumstances into which he will go if and when he is released" (HMSO, 1969b, p.20). In subsequent reports, the Parole Board has made it clear that "while adhering to general principles, the Board has avoided the formulation of inflexible rules" (HMSO, 1970, p.19), and thus does not state what criteria it uses when considering a prisoner for parole.

There has, however, been a number of studies that have been done, mainly in the United States, that are of relevance in the discussion of possible criteria that the Parole Board may use. For instance, Martin and Barry (1969) found that low socio-economic status, low educational status, marital instability, and poor home environment all seem highly prognostic of recidivism, confirming the earlier work of Morris (1965) that offenders without close family relationships are more likely to be at risk of failure after imprisonment. Carney (1967), in a four-year follow-up investigation, found that recidivists were significantly younger, had more previous convictions, were younger at their first arrest, had been imprisoned previously, behaved worse in the institution, tended to show more behavioural disorders, and tended to be imprisoned for property offences (rather than offences against the person), when compared with non-recidivists. Several studies make use of statistical prediction tables, which can be drawn up on the basis of studies such as those mentioned above and can be used to assess the likelihood of reconviction on parole; Gough et al (1965), for instance, used the California Youth Authority Base Expectancy tables in their research, and found that variables such as the above were all prognostic of recidivism.

Thus, from this brief review, one can form some impression of what Parole Board's criteria are likely to be; one would expect that offenders of higher socio-economic and educational status, with better marital and family relationships, less serious previous convictions, who were older at first admission, have a smaller number of previous convictions, and who have been well-behaved in prison would be the best risks on parole, and therefore the sort of prisoner most likely to be chosen for early release by the Parole Board; the results below indicate to what extent these variables, measured as has been previously indicated, are associated with release on parole in this country.

(as the sample selection and the way in which the variables were assessed have been dealt with at length above, they will not be repeated here).

(d) Results

TABLE FORTYTHREE

A comparison of the results of the paroled and detained prisoners on the social and criminological variables.

<u>Variable</u>	<u>Detainees</u>	<u>Parolees</u>	<u>Probability</u>
(a) <u>Social Variables</u>			
1) Marital status at beginning of sentence: Single	57%	50%	NS*
2) Marital status at time of testing: Single	73%	58%	.05*
3) Marital separations	15%	8%	NS*
4) Outside job level (mean)	1.49	1.72	NS
(s.d.)	0.75	0.88	
5) Regularity of outside employment	1.81	1.94	NS
	0.83	0.83	
(b) <u>Criminological Variables</u>			
(i) Past Criminal History			
1) Age at first conviction	17.50	22.06	0.05
	7.30	10.96	
2) Number of previous convictions	8.17	4.22	0.001
	5.98	4.50	
3) Seriousness of previous convictions	2.26	1.67	0.02
	1.05	1.22	
4) Total Previous imprisonment	4.32	2.96	NS
	5.47	6.11	

(Table 43 continued)	<u>Detainees</u>	<u>Parolees</u>	<u>Probability</u>
5) Total imprisonment to testing	10.21	9.15	NS
	6.58	6.01	
6) Sentenced to approved school or borstal	0.77	0.53	NS
	0.92	0.77	
(ii) Present Prison History			
1) Prison employment interest value	2.06	2.72	0.001
	0.83	0.57	
2) Use made of prison education facilities	1.82	1.69	NS
	1.05	1.12	
3) Contact with "outside world"	2.55	2.75	NS
	0.67	0.60	
4) Use made of prison facilities	2.07	2.19	NS
	0.50	0.51	
5) Number of petitions	3.94	3.25	NS
	6.47	4.62	
6) Number of offences	1.23	0.31	0.001
	2.27	0.52	
7) "Preferability" of prison tested in	2.63	1.69	0.001
	1.10	0.82	

* All ps are based on two-tailed t-tests, with the exception of these variables; here the significance level refers to the results of a χ^2 test.

(e) Summary of Results

- (A) A significantly ($p < 0.05$) greater proportion of parolees were married at the time of testing; this result is due to the fact that the slight difference between the groups at the commencement of the current sentence had been accentuated by the greater number of separations occurring in the group of detainees. No other statistically significant differences were found on the social variables, though parolees tended to have had better outside jobs ($p < 0.20$), and more regular outside employment than the detainees.
- (B) On the criminological variables, parolees tended to be less "criminal" than detainees, in the sense that they started their criminal career later ($p < 0.05$), had fewer previous convictions ($p < 0.001$) and less serious previous convictions ($p < 0.02$). Also (though not statistically significantly) they were less likely to have been sent to borstal or approved school ($p < 0.20$), and they had served less time in prison, both totally and previously.
- (C) In prison, parolees tended to have more interesting employment ($p < 0.001$), to be in a "preferred" type of prison ($p < 0.001$), and committed fewer offences whilst in prison during the year prior to testing ($p < 0.001$) than detainees. They also (though not statistically significantly) tended to have better external contact with the "outside world" ($p < 0.20$), made more use of the prison facilities ($p < 0.20$), petitioned less, but made less use of the prison educational facilities.

(f) Discussion

This analysis of the comparison between the characteristics of men considered for parole but not released and men released on parole confirms the Parole Board's assertion that "the criteria used ... in considering the merits of each case for parole ... are based on the guide lines which have been identified by criminological research as the factors significant for success or failure after release from custodial sentence" (HMSO, 1972, p.16).

It is evident that the criteria used are similar to those used in other countries (as has been reviewed above); prisoners paroled have significantly better marital relationships, less serious previous convictions, a smaller number of previous convictions, are older at their first conviction, commit fewer offences whilst in prison, are incarcerated in more "preferable" prisons and have more interesting jobs in these prisons. These latter two differences are probably due to a combination of their good prison behaviour and their more stable and favourable outside situation; prisoners who are scheduled for release, for instance, are often moved to "preferable" prisons as a stage towards their eventual release - many are given a final spell in "open" conditions during their last few months of imprisonment. Other variables supported this general finding (though not statistically significantly); fitting in with previous work, there was a tendency for those released to have had better outside jobs, more regular outside employment, and to have maintained better contact with the "outside world" whilst they were imprisoned.

In conclusion from this part of the study, it seems evident both that the Parole Board uses very similar criteria to those indicated by American studies to be the most predictive of non-recidivism, and that the social and criminological variables, despite being based on the prisoners' files, seem to be sufficiently reliable and valid to warrant their being used in this thesis in an attempt to investigate possible moderating variables.

This study also indicates that the Parole Board tends to operate a differential release policy that keeps the more "criminal" prisoners (in terms of their number of previous convictions, age at first conviction and seriousness of previous convictions) in prison, released the less "criminal"; whether this selective factor has affected the results found in this study will be considered later.

The First Cross-Sectional Analysis and the Social and Criminological Variables:

(a) Introduction

Having established that the social and criminological variables are likely to be useful in this context, this part of this section will look at these variables in detail in relation to the main part of the study, in an endeavour to look at alternative explanations for the results of this study. Specifically, these variables can be used to ascertain whether the decrease in psychomotor skills is related to a decrease in the interest value of prison employment, whether the increase in verbal skills noted is associated with an increase in the use of prison education and other facilities, or whether the prison population becomes more "criminal", as a result of parole selection procedures. The results can also be used, in part at least, to see if prisoners attempt to "impress" the Parole Board by their behaviour inside prison.

In this section, the social and criminological variables are presented in terms of the four groups of prisoners utilized in the first cross-sectional analysis, and then will be discussed in relation to the above points.

(b) ResultsTABLE FORTYFOUR

The social and criminological variable results for
the first cross-sectional analysis groups.

<u>Variable</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
<u>(a) Social Variables</u>				
1) Marital status at beginning of sentence: Single	50%	58%	66%	68%
2) Marital status at time of testing: Single	66%	72%	78%	72%
3) Marital separations	16%	14%	12%	4%
4) Outside job level (mean)	1.62	1.64	1.56	1.28
(s.d.)	.89	.83	.84	.46
5) Regularity of outside employ- ment	1.92	1.86	1.90	1.56
	.85	.86	.84	.77
<u>(b) Criminological Variables</u>				
<u>(i) Past Criminal History</u>				
1) Age at first conviction	21.36	19.68	19.42	14.96
	8.73	9.59	9.40	4.65
2) Number of previous convictions	4.34	4.68	4.70	8.52
	3.92	3.75	4.96	4.89
3) Seriousness of previous convictions	1.78	2.02	1.66	2.76
	1.17	1.19	1.14	.83
4) Total previous imprisonment	.42	.80	.94	4.29
	.81	1.08	1.66	3.32

(Table 44 continued)

<u>Variables</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
5) Total imprisonment to testing	2.47	4.94	6.99	11.29
	.83	.62	.77	2.41
6) Sentenced to approved school or borstal	.38	.46	.36	1.04
	.73	.73	.72	.93
(ii) Present Prison History				
1) Prison employment interest value	1.96	2.24	2.40	2.04
	.83	.85	.76	.84
2) Use made of prison education facilities	2.04	2.26	1.84	2.04
	1.16	1.19	1.11	.98
3) Contact with "outside world"	2.32	2.66	2.58	2.52
	.74	.66	.67	.59
4) Use made of prison facilities	2.16	2.22	2.14	2.00
	.55	.41	.51	.49
5) Number of petitions	3.02	3.04	2.12	4.72
	7.20	5.28	3.51	6.44
6) Number of offences	1.16	1.20	.64	.56
	2.34	2.23	1.98	.96
7) "Preferability" of prison tested in	2.36	2.18	2.06	2.72
	.85	.92	.93	1.06

- (c) Summary of Results (all t-tests, except for the marital social variables, where χ^2 was used)
- (A) A significantly greater number of the prisoners in group 1 were married at the beginning of their sentence than either group 3 ($p < 0.05$) or group 4 ($p < 0.02$); it is interesting to note, however, that by the time of testing, there were no significant differences between any of the four groups in terms of marital status, as group 1 had had more separations than any of the other three groups.
- (B) There were no significant differences between groups 1 to 3 in terms of outside job level or regularity of outside employment, but there were a number of significant differences between these three groups and group 4. On outside job level, group 4 was significantly lower than group 1 ($p < 0.05$) and group 2 ($p < .02$), and it was also lower than group 1 ($p < 0.05$) on regularity of outside employment.
- (C) On all the criminological variables, with the obvious exception of total imprisonment to testing (the very basis that the groups had been separated on), groups 1 to 3 did not significantly differ from each other, but in every single case, group 4 was significantly more "criminal"; i.e. group 4 had more serious previous convictions, a greater number of them, were younger at first conviction, had a greater length of previous imprisonment, and were more likely to have gone to borstal or approved school. The differences were all at the 0.001 level, with the exception of three variables, where they were still highly significant, being all at the .01 level. On total imprisonment served to testing, each group differed from each other at the .001 level.

(D) The only statistically significant differences between the groups on the present prison history variables were on the current prison employment, where group 3 had a more interesting job than group 1 ($p < .02$), and on the type of prison tested in, where group 4 was in a significantly more "preferred" prison than group 2 ($p < .05$) or group 3 ($p < .01$). There were no significant differences between the groups in terms of use made of prison education or other facilities.

(d) Discussion

Overall there appears to be very little difference between the four prison groups in terms of their use made of educational and other facilities whilst in prison; it thus seems unlikely that the slight increase in verbal skills found on the first cross-sectional analysis is attributable to increased use of the prison educational facilities with longer periods of imprisonment. The significant improvement noted in prison employment interest value would similarly not explain the slight psychomotor decline found in the initial analysis; if prisoners systematically did less interesting jobs as their sentence progressed, then one might expect some psychomotor decline as a result of this experience (rather than being due to imprisonment in general). This analysis, however, demonstrates the precise opposite; group 3 are in significantly more interesting jobs than group 1 are.

The major result that this analysis demonstrates is that group 4 is in many ways significantly different from the other three groups; on all the criminological variables (with the obvious exception of total imprisonment, the very basis on which these four groups had been found), differences were found. It seems that group 4 is very much more "criminal" than the other three groups (as has been outlined above). Although the control group has been, in part, used in an attempt to ensure that the

differences found in this study are not due to the prisoners being on a typical sample, and hence that the results found are related to the effects of long term imprisonment, comparisons have only been made between group 1 and the controls, and between the overall prison sample differences between test and retest scores and those of the control group. A direct comparison of the scores of the control group and group 4 would be inappropriate within the terms of this thesis, as the latter group's scores would be likely to be affected by the experience of imprisonment; it has been assumed that the four prison groups are reasonably well matched, so that differences between them are not due solely to variances in sampling. This analysis demonstrates that this assumption holds reasonably well for groups 1 to 3, but that group 4 are not matched in terms of "criminality"; whether this difference is of crucial importance will be considered at length below, but it does suggest that, in the first cross-sectional analysis, the results of group 4 must be treated with caution. It seems possible that this group is more selected as a result of either the Parole Board policy of releasing the less "criminal" prisoners on parole (as has been discussed above), or as a result of the tendency of judges to take previous criminal history into account when passing sentence, and thus giving more "criminal" people longer sentences than less "criminal" people. The finding that group 4 tend to have poorer and more irregular outside employment would fit in with the suggestion that they are more "criminal".

The remaining significant finding that more of group 1 were married at the beginning of their current sentence, is rather difficult to explain; it could be that groups 3 and 4 (the latter especially) are, as has been suggested above, more selected than group 1, in that prisoners with more stable marital relationships tend to be given parole.

The lack of significant trends in the present prison history variables does not support the notion that prisoners, with increased time spent in prison, attempt to try to impress on the parole board that they are suitable for release; the slight (though statistically not significant) decline in offences noted in this analysis can be interpreted, in part at least, in this light, but other variables do not show a deliberate attempt by prisoners in this direction. Again, a lack of such attempt would, to some extent, help to discount explanations that increased verbal facility in prison is related to deliberate attempts by the prisoners themselves to impress on the authorities that they are ready for release.

The Longitudinal Results

(i) The Longitudinal Analysis and the Criminological Variables

(a) Introduction

Once again, there are a number of alternative explanations for the results found in the longitudinal analysis; the most marked finding was the increase in verbal skills, and again this could be due to an increased use of educational facilities with the passage of imprisonment, rather than being a result of the experience of imprisonment per se. Also the slight (though non-significant) psychomotor decline (relative to the control group) noted on some tests (especially the Purdue Pegboard) could be related to the prison employment held by the prisoners, rather than being due to the effect of imprisonment itself. As the social and past criminal history variables would not change over the intertrial interval, the results presented below in Table 45 are for the current prison history variables only (the only social variable that might have changed is that of current marital status, on which no significant differences were noted).

(b) ResultsTABLE FORTYFIVE

The present prison history criminological
variables for the longitudinal group

<u>Variable</u>	<u>First time of testing scores</u>	<u>Second time of testing scores</u>
1) Prison employment interest value (mean)	2.117	2.364
(s.d.)	1.035	0.757
2) Use made of prison education facilities	2.071	2.123
	1.144	1.134
3) Contact with "outside world"	2.474	2.409
	0.951	0.720
4) Use made of prison facilities	2.110	2.143
	0.421	0.463
5) Number of petitions	3.260	5.578
	6.160	9.24
6) Number of offences	1.097	0.513
	2.274	1.276
7) "Preferability" of prison tested in	2.494	2.143
	0.985	0.973

(c) Summary of Results (all t-tests)

(A) This analysis of the present prison history variables shows that a number of statistically significant changes take place with spending an increasing length of time in prison; there is a trend towards

prisoners getting more interesting jobs in prison ($p < .02$), and there is a trend towards them moving to more "preferable" prisons ($p < .01$). In addition, there is a drop in the number of offences ($p < .01$) and an increase in the number of petitions to the Governor ($p < .01$).

(B) There are no significant differences between the two times of testing in terms of the use made of prison educational facilities, or in the use made of prison facilities in general.

(d) Discussion

As has already been noted, these results show that there is a tendency for prisoners, as they progress through their prison career, to obtain more interesting prison jobs, and to be moved to more "preferable" prisons. Long term inmates often tend to "advance" through the prison system, from the more custodial to the more "open" institutions, and this reflected in the significant differences found; Hall Williams (1975), for instance, talks of 'career planning' for long term prisoners in just such terms. Again, there is a tendency for prisoners to become better behaved, as measured by the drop in the number of offences committed in prison; whether this is due to deliberate policy by the prisoner, who realizes that committing offences within prison will affect his parole chances, or whether it is due to prison having a general "quietening" effect (perhaps related to the psychomotor decline already discussed) is a matter for debate. Why there should be an increase in the number of petitions is also a matter for conjecture; it could be that, with increasing lengths of imprisonment, prisoners get more confident in the use of such machinery, or get more verbally adept. On the other hand, it could be a reflection of improved prison file keeping over the time, or an effect of such factors as the growing political awareness of prisoners; in 1971, for instance,

when this part of the study was taking place, there were the beginnings of the movement to establish a prisoners' trade union ("PROP"), and the increased petition rate could be related to this (see Fitzgerald, 1977).

These results again provide no evidence for alternative hypotheses explaining the rise in verbal skills on increased use of prison educational facilities, as there are no significant differences on this variable. In addition, the significant increase in prison employment interest value also shows that psychomotor decline is unlikely to be associated with this variable. Again, there is no obvious pattern of increased attempts by the prisoners to impress the parole board that they are ready for release (a history of increased petitions, in fact, may go against being given parole; this was noted on the parole study, but did not reach statistical significance).

(ii) The Second Cross-Sectional Analysis and the Criminological Variables:

(a) Introduction

These results are briefly presented below in table 46, again to examine the effects of moderating variables.

(b) Results

TABLE FORTYSIX

The present prison history criminological variables
for the second cross-sectional analysis.

<u>Variable</u>	<u>Group 1</u>	<u>Group 2</u>	<u>Group 3</u>	<u>Group 4</u>
1) Prison employment interest value (mean)	2.286	2.447	2.344	2.357
(s.d.)	0.795	0.795	0.787	0.745
2) Use made of prison education facilities	2.371	2.447	2.000	2.000
	1.268	1.032	1.191	0.961
3) Contact with "outside world"	2.429	2.684	2.375	2.429
	0.784	0.620	0.707	0.514
4) Use made of prison facilities	2.229	2.211	2.156	1.929
	0.418	0.413	0.448	0.616
5) Number of petitions	5.114	4.868	2.812	9.214
	8.724	8.338	3.963	14.045
6) Number of offences	0.600	0.421	0.438	0.357
	1.047	0.747	1.134	0.842
7) "Preferability" of prison tested in	2.200	2.000	2.031	2.286
	0.838	0.986	1.092	0.914

(c) Summary of Results (all t-tests)

None of the differences between the four second cross-sectional analysis groups attained statistical significance.

(d) Discussion

Although none of the results in this analysis reached significance, they nevertheless provide further support for the results of the previous

analyses in this section; again, use made of prison educational facilities and prison employment interest value do not seem to be variables which can account for the cognitive changes found in this study.

Summary of Social and Criminological Variables Section

This section looked in detail at a number of possible moderating variables that could have affected the cognitive test results found in this study; an analysis of prisoner's files did not indicate any increasing use made of prison educational or other facilities with increasing lengths of imprisonment, and thus an explanation of the slight improvement in verbal skills found in parts of the major study in terms of making more use of such facilities does not seem tenable. Secondly, it was not found that there was a decline in the interest value of prison employment with increasing lengths of imprisonment; if this had been found, this might have, in part at least, accounted for the slight decline in psychomotor skills noted on parts of the major study. In fact, there seemed to be a tendency for prison jobs to get significantly more interesting with increasing lengths of imprisonment. Thirdly, an explanation of the increase in verbal skills being related to prisoner's attempts to convince the parole board that they are ready for release is not generally supported; with the exception of the decline in the number of offences committed whilst in prison (explicable by other processes, such as a desire for a "quieter life", the effects of imprisonment, etc.), it does not seem that prisoners act in ways to impress the Parole Board (the marked increase in the number of petitions to the Governor noted in part of this study, for example, would be hard to explain in these terms).

A comparison was made between the results of a group of prisoners released on parole and a group who were considered for parole, but who were not released; this fitted in well with American parole prediction work, thus confirming that the variables utilized in this part of this study were reasonably accurate. One of the findings of this comparison was that there was a tendency for the Parole Board to release the less "criminal" prisoner (in terms of having a small previous criminal record, etc.), and an analysis of the first cross-sectional groups indicated that group 4 were noticeably more "criminal" than groups 1 to 3, possibly as a result of differential release on parole, or as a result of differential sentencing policy. The next section will consider another moderator variable related to this finding, namely, a differentiation of the sample in terms of broad offence categories, in part to see whether the more "criminal" prisoners are differentially affected by the experience of imprisonment.

(iii) OFFENCE CATEGORY OF PRISONERS

Introduction

The previous section on social and criminological variables suggested that there is a tendency for those prisoners who have been in prison for the longest to be more "criminal" than those who have been in prison for shorter times. In this context, "criminal" was defined in terms of the prisoner having more previous convictions, and more serious previous convictions, starting his criminal career earlier, and tending to have been sentenced to approved school or borstal during their criminal history. The analysis which compared prisoners released on parole with a group of men who were considered for parole, but not granted it, indicated that less "criminal" people were more likely to be given parole; thus the increase in "criminality" with imprisonment could be due to the Parole Board's differential release criteria. Another explanation for this finding is in terms of the judiciary taking previous offences into account when awarding sentences, and thus tending to give more "criminal" people longer sentences.

Given that these differences between the prison groups exist, and that group 4 in particular is likely to be affected by such differences (as it has been in prison the longest), then it seems that this variable of criminality "ought to be looked at in detail. This section thus presents an analysis of the results of the main study in terms of the offences for which the prisoners were sent to prison (on the sentence current at testing); again, this could be a possible moderating variable. It could be that it is not meaningful to treat prisoners as a homogenous group; as they have been sent to prison for a variety of crimes, it is possible that they would be affected differently by the experience of

imprisonment, depending on their previous criminal careers.

This section will thus initially look at the prisoners in terms of their offence categories, in an attempt to discover whether there are significant differences between their performances on the cognitive variables utilized in this study. If it is established that there are significant differences between the offence category groups of prisoners, then such differences would possibly affect the main results of this study; it could be that this study, rather than attempting to assess the effects of long-term imprisonment, is a reflection of the characteristic behaviour of different offender groups. The main study was designed to take some account of the broad division between determinate and indeterminate sentences, but it was impossible to produce good matching in terms of this variable for group 4 (see Table 4 above, where the composition of the first cross-sectional groups are described in detail); it could thus be that the results of group 4 in particular may be affected by any significant differences found in this section.

It is difficult to make a priori predictions as to what differences one would expect between different offender categories of prisoners in terms of their performance on the cognitive tests utilized in this study, as there are very few studies that are directly relevant. Studies that have been done in this area have tended not to use long term prisoners, have tended to use different categories of offences to those committed by the prisoners in this sample, and have tended to look at differences in terms of social, attitudinal or personality variables, rather than in terms of cognitive abilities. Such studies are often attempting to classify offenders, either on the basis of their current offence, in terms of a typology based on their criminal career, or in terms of a typology based on personality types; the ultimate aim of these studies is usually to examine the aetiology of crime. Typical of such work is that of Gibbons (1965), or of Clinard and Quinney (1967); both of these studies

concentrate on social or attitudinal variables, and thus are not comparable to this study. Similarly, Cuthbert (1970), in a study of murderers, comes to the conclusion that they show "vulnerable personalities, who can only solve their problems by direct and violent action"; again, he cites no cognitive data.

The dangers of generalizing from different samples of criminals to long term inmates is well illustrated by comparing the results of studies carried out by Woodward (1963) and Deiker (1973). Woodward, in a study of convicted juvenile offenders, found that the delinquents had markedly lower IQs than the public at large; Deiker, on the other hand, found no significant differences in IQ between a group of murderers and a matched control sample. This disparity in result indicates how generalizing from studies which use widely differing samples is inadvisable.

One result which has been found in a number of studies that may be comparable to this one is the finding that sex offenders tend to have significantly lower W.A.I.S. Verbal IQs (see, e.g. Ruff et al, 1976); it thus might be predicted that sex offenders are likely to show significant differences on this variable. Deiker's (1973) finding that murderers tend to have W.A.I.S. IQs that do not significantly differ from those of normal samples is also a finding that one would expect to find replicated in this study.

Thus this section looks at the possible moderating variable of "criminality" in detail by re-examining the data produced in this study in terms of offence category groups; it also will attempt to control for the possibility that different offence category members may exhibit different cognitive test performance, thereby influencing the main results of this study. It is realized that homogeneous criminal careers are not common (as Hood and Sparks, 1970, point out), but it is felt justified to type offenders on this basis in this study, as their current offence was sufficient to attract an extremely long prison sentence.

Selection of the Samples:

As has been outlined above, the sample used in this study was deliberately chosen in order that there should be equal numbers of prisoners serving indeterminate sentences and prisoners serving determinate sentences in each of the four groups; this was successfully achieved for the first three groups, but in group 4, determinate sentences were over-represented. This difference has been noted above, and it was suggested that such an analysis as is presented in this section would be carried out.

In this section, one could simply compare the test performance of those who had been given indeterminate sentences as opposed to those who had been given determinate sentences; such a comparison, however, assumes that different sentencers give the same sentence for the same offence. There is ample evidence to suggest that this assumption is not justified; Walker (1971), for instance, points out that there are considerable variations in courts' sentencing policies. In this study, a number of offences (e.g. rape, arson) were given determinate sentences in some cases, and indeterminate sentences in other cases. It thus seems that a simple division on the basis of the type of sentence given will not lead to homogeneous offence categories.

An alternative approach would be to separate the prisoners in terms of their current offences, and it is this approach which is adopted here. There were a large variety of current offences, which could be broadly categorized under four main headings, as follows:

- (a) murder or manslaughter
- (b) offences against the person (but excluding any murders or manslaughters); e.g. greivous bodily harm, robbery with violence.

- (c) offences against property; e.g. robbery without violence, burglary, fraud, forgery.
- (d) sexual offences; e.g. rape, paederasty.

The subjects of the first cross-sectional sample were categorized on this basis, and from these broad categories four offence groups were selected for the purposes of the analysis of this section. These groups were selected so that, in so far as this was possible, they would be matched in terms of both age and the amount of time in total that they had spent in prison; the purpose of such matching was to ensure that the offence category comparison groups differed solely on the variable of current offence, rather than on other possibly confounding variables.

Results

Table 47 below outlines the composition of these four offence category groups, and looks at the differences between them in terms of the social and criminological variables; this section looks at these results initially, to see if the groups selected on the criteria of current offence category do significantly differ.

TABLE FORTYSEVEN

The social and criminological variables results for the offence category groups.

<u>Variable</u>	<u>Offence Category</u>			
	<u>Murder or Manslaughter</u>	<u>Offences against the person</u>	<u>Offences against property</u>	<u>Sexual Offences</u>
N	37	20	29	14
Age at testing (mean)	38.46	38.10	38.00	38.29

(a) Social Variables

(Table 47 continued)

<u>Variable</u>	<u>Offence Category</u>			
	<u>Murder or Manslaughter</u>	<u>Offences against the person</u>	<u>Offences against property</u>	<u>Sexual Offences</u>
1) Marital status at beginning of sentence: Single	65%	40%	55%	64%
2) Marital status at time of testing: Single	84%	50%	62%	79%
3) Marital separations	19%	10%	7%	15%
4) Outside job level (mean)	1.68	1.35	1.76	1.07
(s.d.)	.81	.49	1.06	.27
5) Regularity of outside employment	1.95	1.75	1.97	1.14
	.80	.79	.94	.54
(b) <u>Criminological Variables</u>				
(i) Past Criminal History				
1) Age at first conviction	19.38	17.65	19.24	19.43
	7.94	5.37	9.73	8.75
2) Number of previous convictions	4.49	8.95	6.93	8.21
	4.60	5.79	5.01	5.07
3) Seriousness of previous convictions	1.81	2.55	1.79	2.93
	1.18	1.10	.94	1.07
4) Total previous imprisonment	.89	4.51	4.40	4.61
	1.33	3.24	7.85	3.88
5) Total imprisonment to testing	8.51	8.91	8.66	8.27
	3.49	4.32	8.23	4.25
6) Sentenced to approved school or borstal	.22	.80	.79	1.00
	.53	.89	.94	.96

(Table 47 continued)

<u>Variable</u>	<u>Offence Category</u>			
	<u>Murder or Manslaughter</u>	<u>Offences against the person</u>	<u>Offences against property</u>	<u>Sexual offences</u>
(ii) Present Prison History				
1) Prison employment interest value	2.46	1.85	1.97	2.14
	.68	.88	.91	.77
2) Use made of prison education facilities	2.03	1.60	1.83	1.64
	1.13	.92	1.04	1.01
3) Contact with "outside world"	2.51	2.75	2.48	1.79
	.68	.55	.74	.70
4) Use made of prison facilities	2.16	2.05	2.21	1.93
	.37	.51	.45	.27
5) Number of petitions	2.84	3.45	2.72	7.00
	5.32	4.79	3.61	8.77
6) Number of offences	.30	1.30	1.10	2.93
	.65	1.75	2.06	4.31
7) "Preferability" of prison tested in	1.95	3.10	2.41	2.79
	.73	1.07	1.21	1.19

Summary of Results (all t-tests, except for the marital social variables, where χ^2 was used).

- (a) A number of significant differences were noted on the marital variables; prisoners convicted of murder or manslaughter were more likely to be single than those convicted of offences against the person, both at the beginning of the sentence ($p < .001$) and at the

time of testing ($p < .001$). They were similarly more likely to be single than those convicted of property offences, at the time of testing ($p < .001$); to some extent, this is likely to be due to the fact that more of them become separated during their current sentence ($p < .05$). Also, prisoners convicted of sexual offences were more likely to be single than those convicted of offences against the person, both at the beginning of the sentence ($p < .01$) and at the time of testing ($p < .001$). Again, they were more likely to be single than those convicted of property offences, at the time of testing ($p < .02$).

- (b) A number of significant differences were noted on the outside employment variables; sexual offenders were more likely to have worse jobs than any of the other three groups ($p < .05$ to $< .001$), and also had less regular outside jobs than any of the other three groups ($p < .02$ to $< .001$).
- (c) On the past criminal history variables, the prisoners convicted of murder or manslaughter appeared to have a less "criminal" background; their scores were significantly lower than those of the other three groups in every single comparison on the number of previous convictions, seriousness of previous convictions, previous imprisonment, and borstal or approved school sentence variables ($p < .05$ to $< .001$). In addition on these variables, the group of property offenders had significantly less serious previous convictions than either the group convicted of offences against the person ($p < .02$), or the group of sexual offenders ($p < .01$).

(d) On the present criminal history variables, again the prisoners convicted of murder or manslaughter were significantly different on a number of variables from the other groups; as compared to the offences against the person group, they tended to commit less offences whilst they were in prison ($p < .02$), they tended to be in a more "preferable" prison ($p < .001$), and they tended to have a better prison job ($p < .01$). As compared to the property offenders group, they again tended to commit less offences ($p < .05$), and to have a better prison job ($p < .02$). As compared to the sexual offenders, they had better external contact whilst they were in prison ($p < .01$), made better use of the prison facilities ($p < .02$), committed less offences ($p < .05$) and were in a "preferable" prison ($p < .02$). In addition, the sexual offenders had worse external contact than either of the other two groups ($p < .01$ and $p < .001$), and made worse use of the prison facilities than property offenders ($p < .02$). The only significant difference between the property and the offences against the person group was on the prison "preferability" variable; the property offenders tended to be in a more "preferable" prison ($p < .05$).

Discussion

This analysis has produced a large number of significant results, and again demonstrates that the social and criminological variables used in this study are of considerable use. The differences that this analysis highlights suggest that a further investigation of the variable of offender category might be of help in analysing the results of the main study; as these groups differ on the social and criminological variables, they may well also differ on the cognitive test variables. Although groups 1 to 3 of the main cross-sectional analysis are fairly well balanced in terms of offence categories (except for there being less sexual offenders and

more people convicted of murder and manslaughter in group 3), this is certainly not true of group 4, which consists of a preponderance of people convicted of offences against the person, and very few of the other three offence categories.

The most important finding in this analysis is that people convicted of murder or manslaughter tend to be less "criminal" than other offence category groups, and tend to be better behaved inside prison, committing fewer offences, doing more interesting jobs, and (possibly as a consequence of their good behaviour) tend to be sent to the more "preferable" type of prison. One finding that does not readily fit into this overall pattern is that they tend to either be single, or, if married, to become separated whilst they are in prison; in part, this is explicable in that firstly a number of them are in prison for killing their wives, and thus will be more likely to be single. Secondly, all the murder or manslaughter group were given indeterminate sentences, and it may well be that such a sentence is more stressful to the marital relationship, as the wife does not know how long they will be separated for, and thus will be more likely to dissolve the marriage.

The other major finding from this section seems to be that people convicted of sexual offences tend to have serious criminal past history, poor outside employment, poor marriages, poor contact with the "outside world" whilst they are in prison, and a prison history of making poor use of the prison facilities, and tending to commit offences (far more than the average for prisoners in general, which is around 1.9 in 1976 (HMSO 1971)). It appears that this offence category group is, like the group of men convicted of murder and manslaughter, an identifiable group that can be differentiated on the basis of the variables used in this analysis.

The other two groups do not significantly differ on many points, but it does seem apparent that the offence against persons group is marginally the more "criminal" of the two (although both groups have serious past

criminal histories). It is interesting to note here that the majority (56%) of group 4 are people convicted of offences against persons (as opposed to the other three groups, where only 18% are such people), and this is probably why group 4 appeared to be the most "criminal" on the social and criminological variables, as reported in the last section.

As this analysis has established significant differences between the offence category groups in terms of the social and criminological variables, this section now goes on to examine the cognitive test results of these four groups, to endeavour to ascertain whether they significantly differ in these measured abilities. If such differences were established, this would help in the analysis of the main results of this study.

Offence Category Groups and the Cognitive Test Results from the
First Time of Testing:

(a) Introduction

As has been outlined above, this analysis will examine the cognitive test results from the first time of testing in terms of the prisoners' offence category, to investigate whether this is a possible moderating variable.

(b) Results

TABLE FORTYEIGHT

The cognitive test results (first visit)
of the offence category groups.

<u>Test</u>		<u>Murder or Manslaughter</u>	<u>Offences against the person</u>	<u>Offences against property</u>	<u>Sexual offences</u>
Reaction Time					
Simple	(mean)	.26	.27	.26	.32
	(s.d.)	.04	.05	.05	.14
Choice		.37	.38	.37	.43
		.07	.07	.07	.22
Reversed Choice		.51	.51	.53	.60
		.17	.11	.11	.24
Gibson Spiral Maze					
Time		43.29	42.02	50.68	56.04
		13.71	9.29	17.49	15.01
Errors		9.97	9.75	9.03	9.93
		6.52	4.95	13.49	5.05
"Adjusted" Error		47.81	49.90	44.34	65.57
		21.05	19.99	27.35	19.59
(Time) ² + (Error) ²		2218.19	1964.75	3134.62	3468.93
		1707.20	859.60	2081.00	1712.00
Breaks		.27	.05	.41	.50
		1.00	.22	1.24	.94
G.A.T.B. Form Matching		28.68	29.70	29.24	25.57
		7.20	7.28	5.66	10.10
W.M.S.					
Visual Reproduction		9.35	9.75	9.45	7.57
		2.90	2.69	2.31	3.59
Associate Learning		14.78	13.13	13.97	13.75
		3.70	2.77	3.27	4.03
Purdue Pegboard					
Simple Practice		15.11	14.40	15.10	13.14
		1.94	2.14	1.50	2.41
Dominant Hand		15.92	16.65	15.97	14.43
		2.99	1.53	1.43	1.70

(Table 48 continued)

	<u>Murder or Manslaughter</u>	<u>Offences against the person</u>	<u>Offences against property</u>	<u>Sexual Offences</u>
Purdue Pegboard (cont)				
Non-Dominant Hand	14.30 1.61	14.90 1.29	14.62 1.61	12.71 1.82
Both Hands	11.76 1.92	11.95 1.61	12.21 1.74	10.86 1.99
Total Simple	41.97 4.55	43.50 3.89	42.79 3.93	38.00 4.84
Assembly Trial I	33.86 6.30	33.20 5.28	35.59 6.82	30.36 8.85
Assembly Trial II	36.86 6.61	37.45 6.89	38.59 6.65	35.29 8.37
Total Assembly	70.73 12.53	70.65 11.37	74.17 12.95	65.64 16.68
Wechsler Adult Intelligence Scale				
Information	12.57 2.56	10.50 2.01	11.72 2.25	10.64 3.10
Comprehension	13.46 3.02	11.80 3.14	12.93 3.03	10.86 3.61
Arithmetic	11.92 3.09	11.25 2.69	10.69 3.17	10.00 3.35
Similarities	12.16 2.33	10.40 1.90	11.83 2.22	10.36 2.84
Digit Span	11.16 3.50	9.55 3.76	10.34 3.03	8.86 3.25
Vocabulary	12.05 2.56	11.25 2.65	11.83 2.42	10.36 3.32
Digit Symbol	9.16 2.47	8.15 1.98	9.10 2.27	7.36 1.98
Picture Completion	11.97 2.82	12.15 2.46	12.72 2.51	9.50 2.03
Block Design	11.65 2.94	10.85 2.64	11.07 2.33	8.71 3.20
Picture Arrangement	10.24 2.52	10.20 1.99	10.45 2.35	8.36 2.84
Object Assembly	10.81 3.06	9.70 2.68	9.24 2.39	9.29 2.58

(Table 48 continued)

	<u>Murder or Manslaughter</u>	<u>Offences against the person</u>	<u>Offences against property</u>	<u>Sexual offences</u>
Wechsler Adult Intelligence Scale (continued)				
Verbal IQ	113.27 12.55	104.05 12.95	109.28 12.31	101.14 16.02
Performance IQ	109.78 12.85	106.00 12.81	107.97 10.22	96.50 14.79
Full Scale IQ	112.41 10.99	105.25 12.33	109.14 10.54	99.07 15.41
Verbal Performance Discrepancy	3.49 14.64	- 1.95 11.00	1.31 11.32	4.64 11.62
Wechsler Deterioration Index	2.06 12.55	8.27 8.95	3.10 11.52	4.46 10.44
Masculinity/Femininity	1.65 3.69	3.80 2.93	1.45 3.92	.86 2.66
Analytic Index	36.22 7.30	34.35 7.74	34.52 5.55	29.43 7.60

(c) Summary of Significant Results (all t-tests)

Altogether, there were 44 significant results ($p < .05$); they will be considered below in relation to the tests used in this study (there were no significant differences on unmentioned tests).

(A) Reaction Time Tests: no significant differences between the groups were found on these tests. The sexual offenders had slower reactions on all three tests.

(B) Gibson Spiral Maze: Property offenders took significantly longer to complete their maze than violence offenders ($p < .05$); sexual offenders took significantly longer than either violence offenders ($p < .02$) or the murder/manslaughter group ($p < .02$).

- (C) Purdue Pegboard: The sexual offenders were significantly worse on the Purdue Pegboard "simple" tests, as follows; on the Simple Practice subtest, they were worse than property offenders ($p < .02$) and the murder/manslaughter group ($p < .01$); on the Dominant Hand and the Non-Dominant Hand subtests, they were worse than all three of the other offence category groups ($p < .02$ to $< .001$); on the Both Hands subtest, they were worse than the property offenders ($p < .05$); finally, on the Total Simple subtest, they were worse than both the property offenders ($p < .01$) and the murder/manslaughter group ($p < .02$). There were no significant differences between any of the other three groups on any of the Purdue Pegboard results.
- (D) Wechsler Adult Intelligence Scale: Again, the sexual offenders were significantly worse on a number of the W.A.I.S. subtests; they were worse than the murder/manslaughter group on the Information, Comprehension, Similarities and Digit Span subtests (all $ps < .05$), and also had significantly lower Verbal IQ than this same group ($p < .02$); they were worse than both the murder/manslaughter group and the property offenders (the first "p" in the brackets following each subtest refers to the former, the second the latter) on the Digit Symbol ($p < .01$, $p < .02$), Block Design ($p < .01$, $p < .05$) Picture Arrangement ($p < .05$, $p < .05$), Performance IQ ($p < .01$, $p < .02$), Full Scale IQ ($p < .01$, $p < .05$) and Analytic Index ($p < .01$, $p < .05$) scores; finally, they were worse than all three groups on the Picture Completion subtest (for the violence and murder/manslaughter groups, $p < .01$, and for the property offenders, $p < .001$).

The murder/manslaughter group were significantly better on a number of the subtests than the group of offenders convicted of offences against the person; namely the Information ($p < .01$), Similarities ($p < .01$), Verbal IQ ($p < .02$), Full Scale IQ ($p < .05$)

and the Deterioration Index subtests ($p < .05$: i.e. the violence offenders were more "deteriorated", in Wechsler's terms). The murder/manslaughter group were also significantly better than the property offenders on the Object Assembly subtest ($p < .05$). The property offenders were better than the violence offenders on the similarities subtest ($p < .05$).

Finally, the group of offenders convicted of offences against the person scored significantly higher on the W.A.I.S. Masculinity/Femininity scale (i.e. were more "masculine" in terms of their performance pattern) than any of the other three groups ($p < .05$ to $< .01$).

(d) Discussion

The main purpose of this part of the study is to investigate the possible moderating variable of offence type; the first cross-sectional analysis produced significant differences in the Reaction Time tests, the Wechsler Memory Scale Associate Learning subtest, the Purdue Pegboard Assembly tests, and the Wechsler Deterioration Index. Although this analysis based on offence type indicated a number of significant differences, only one of the significant differences was in one of the tests in which significant results were found in the first cross-sectional analysis. It thus seems that, with one possible exception, the differences between the composition of the four cross-sectional groups in terms of offence category is not pertinent to the findings of the main part of this study.

The one exception to this is the Wechsler Deterioration Index, where it was found in this analysis that the prisoners convicted of offences against the person were more "deteriorated" (in Wechsler's terminology), than the prisoners who were convicted of murder or manslaughter. On the first cross-sectional analysis, it was found that group 3 were more

deteriorated than group 1, and thus one possible explanation for this result is that group 3 has more violence offenders, and less murder/manslaughter offenders. A close analysis of the composition of the groups in terms of offence categories, however, reveals the opposite; group 3 has more murder/manslaughter offenders (52% v 44%) and less violence offenders (18% v 22%) than group 1 (χ^2 is not significant). It thus seems that the significant difference found on the Wechsler Deterioration Index in the first cross-sectional results is not explicable in terms of the differences found between offender groups.

The results of the analysis presented in this section accord well with previous research findings in this area (as cited above). The control group is not an ideally matched sample for this part of the analysis, as it is younger (though not statistically significantly) and also it has not been imprisoned; it is felt, however, that it is of some limited use as a control group in these circumstances. There are no statistically significant differences between the W.A.I.S. IQ scores for the control group and the group of people convicted of murder or manslaughter, confirming Deiker's (1973) result. Secondly, there are statistically significant differences between the Verbal IQ scores for the control group and for the group of sexual offenders, confirming Ruff et al's (1976) result (t-test, $p < .02$); it is interesting, to note, however, that the cognitive test performance of the latter group is generally lower than that of the control group (for instance, the t-test for the Full Scale IQ shows a statistically significant difference, $p < .01$, and a similar comparison for the Performance IQ is also significant at $p < .01$). This study looked at detail at 14 sexual offenders, whilst Ruff et al only looked at 10, so the differences found between the two studies could be, in part at least, due to the rather small samples used in both studies.

Although the results presented in this section have suggested that the first cross-sectional statistically significant results are not explicable in terms of the groups varying in offender type, they do nevertheless suggest that there are highly significant differences between offender groups in terms of cognitive test performance.

The sexual offenders tend to have poorer simple psychomotor skills, as assessed by the Purdue Pegboard, and seem to do generally worse than most of the other offender groups on the W.A.I.S.; it may be that there is an association between this finding and the social and criminological variables, suggesting that efforts at constructing offender typologies ought to take some account of cognitive abilities. It could be, for instance, that there is a relationship between the sexual offender's history of poor outside employment and their lack of psychomotor skills, and there could be a relationship between these offenders' poor response to imprisonment (as evidenced by their high rate of offending) and their lack of cognitive abilities. In fact, their very current offence may be related to their lower W.A.I.S. intelligence (as Walker and McCabe, 1973, suggest in their study on sexual offenders).

The group of prisoners who were convicted of murder or manslaughter, on the other hand, tend to generally perform the best of the offence category groups on the W.A.I.S.; their better prison records, with more interesting jobs, etc. could again be related to their cognitive abilities. It should be noted, however, that there are only a few significant differences between the scores of this group and those of the violence and property offenders. One difference that does need some discussion is the finding that this group were significantly less "deteriorated" on the W.A.I.S. Deterioration Index than the group of men convicted of offences against the person. As with the first cross-sectional analysis, it must be emphasized that neither group reach anywhere near the level that Wechsler (1958, p.211) regards as being indicative of intellectual

deterioration. In the first cross-sectional analysis, it was argued that differences on the Deterioration Index seemed to be related to increased reliance on verbal skills, rather than being an indication of deterioration. In this case, it appears that the violence offenders seem to be superior on W.A.I.S. Picture Completion, one of the "Hold" tests; despite their Full Scale IQs being over 7 points lower, they still performed better on the Picture Completion subtest than the group of people convicted of murder and manslaughter (in fact, the Picture Completion average score was the highest score of the violence offenders on all their W.A.I.S. subtests). It is probable that their higher score on this subtest is the main reason for the Deterioration Index differences; again, this finding suggests that this Index tends to be over-affected by differences in one or two of the test results, and points to the need to closely look at the individual test results that go to make up the Index when trying to assess the meaning of its results.

The violence and property offenders show little overall differences, but differed on a few tests; firstly, the violence offenders took shorter on the Gibson Spiral Maze. The Gibson Spiral Maze will be discussed in detail later, but it is interesting to note that the three rather more "impulsive" offence groups tended to complete the Maze quicker, whilst the property offenders, whose offence probably requires more organization and planning than those committed by the other groups, took the longest. They also were the most accurate (though not significantly so), in terms of the numbers of errors they made, adjusted for time taken. Secondly, the property offenders did better on the W.A.I.S. Similarities subtest; Wechsler (1958) suggests, as has been previously mentioned, that this subtest is, in part at least, a measure of abstract or conceptual skills. Again, such skills would be expected of property offenders, but not of violence offenders. Finally, the violence offenders were significantly more "masculine" on the W.A.I.S. Masculinity/Femininity scale, a result

which accords well with their offence; in this culture, there is a tendency for aggression to be seen as related to Masculinity (see, for instance, Brown, 1965).

To conclude this section, the analysis of the cognitive test results of the different offence groups of prisoners does not indicate that the results of the first cross-sectional analysis are likely to be explicable in terms of differences between the groups in current offence. What this section does indicate, however, is that different offender groups are readily differentiated in terms of social, criminological and cognitive test variables; future research in this area should thus attempt to look at cognitive test performance when attempting to set up offender typologies. Studies that ignore such variables are possibly less likely to be able to discover the aetiology of crime.

Another possible line of research that is suggested by this section is the extent to which the present prison history criminological variables and the cognitive test data is a result, not of differences between offence groups, but of differing experiences of imprisonment. One possible reason for the differences noted above between, for instance, the sexual offenders and the other groups of prisoners could be that these people are treated differently in prisons, possibly by both fellow inmates and staff. Fitch (1964), for instance, points out that it "is generally known (that) sexual offenders feel themselves to be more harshly viewed and dealt with by society as a whole, and within the prison community in particular, than do other types of offender" (p.29). Other studies (e.g. Morris and Morris, 1963) have also confirmed this finding. Many sexual offenders feel that they are so victimized by fellow prisoners that they ask to be put under "Rule 43", or voluntary solitary confinement.

The Home Office itself recognizes this to be a problem, and during the course of this study established special prisons for containing such prisoners. If a prisoner feels that he is being victimized, then this

may well affect both his current prison history (many would be loath to do physical education, for instance, if they felt that they would be attacked in the gymnasium) and his cognitive test performance. Such an analysis is beyond the scope of this study (partly because the number of sexual offenders seen was relatively small), but research in this direction could well prove to be useful.

Offence Category Groups and the Cognitive Test Results from
the Longitudinal Analysis:

(a) Introduction

Although the analysis cited immediately above did not find any significant differences between the offence category groups which would account for the differences found in the first cross-sectional analysis, there is still the possibility that the offence category groups would perform differently on retesting in the longitudinal part of this analysis, and this section analyses the longitudinal data in terms of offence category group performance.

(b) Selection of the Sample

It was extremely difficult to find four matched groups for this analysis, as only 10 sexual offenders had been seen twice. The mean age and total imprisonment served by these 10 was calculated, and subjects were drawn from the pool of prisoners seen twice to match them. The end result was four groups differing in offence category, but not significantly different in terms of mean age or total imprisonment. Bearing in mind the extremely small size of these sample groups, the only cognitive data that is presented below in Table 49 are the results on those variables where a significant difference had been found in the longitudinal analysis.

(c) ResultsTABLE FORTYNINE

The significant longitudinal cognitive test
differences for the offence category groups

		<u>Murder or Manslaughter</u>	<u>Offences against the person</u>	<u>Offences against property</u>	<u>Sexual offences</u>
N		24	12	20	10
Age	(mean)	36.92	37.00	38.45	38.30
	(s.d.)	8.24	4.14	7.08	7.28
Total Imprisonment		8.29	8.75	10.17	7.06
		3.57	4.54	9.29	3.50
W.A.I.S. Vocabulary		0.67	0.92	0.90	0.20
		1.84	0.86	1.81	1.47
Verbal IQ		3.96	6.25	3.85	2.10
		6.32	4.07	5.00	4.78
Full Scale IQ		5.00	6.00	5.05	3.40
		5.19	5.39	4.09	5.00

There were no significant differences (using a t-test) between these four groups on any of the variables that had previously been found to be significant in the longitudinal analysis.

(d) Discussion

This brief study provides further support for the analysis of the first cross-sectional study in terms of offence categories; it does not seem that the offence categories significantly differ in terms of their performance on the cognitive tests at retesting. It thus does not seem

likely that offence categories are a significant moderating variable in this study. This is not, of course, to preclude the possibility that a study of offence types is not very valuable in its own right (as has been stressed above), but it must be stressed that such a study is outside the scope of this thesis. It must also be stressed that this longitudinal analysis is very tentative, as the sample size is so small.

Bearing in mind the extreme difficulty with which four groups were drawn up for this part of this analysis, a second cross-sectional analysis has not been presented, as sample attrition in terms of offence categories would make it impossible to draw up reasonable sized samples that would be comparable to each other in terms of variables such as age and total imprisonment.

CONCLUSIONS OF PART TWO

In part two, a number of alternative explanations accounting for the differences found in the cognitive test data results were examined, and it was found that firstly the results were not explicable in terms of prisoners making increased use of prison educational or other facilities as their total imprisonment increased, and thus the increase in verbal skills noted could not be put down as being due to this. Secondly, prisoners obtained more interesting prison employment as their imprisonment increased, and thus the decrease in psychomotor skills noted in the main study could not be put down to their prison work experience. Thirdly, the overall pattern of the prisoners' prison history did not support the notion that verbal skills are developed by the prisoners in an attempt to impress the parole board as to their readiness for release on parole; prisoners did not seem to systematically change their behaviour as their sentence progressed in such a way as to maximize their parole chances. Fourthly, the proposition that a group of criminals such as those used in this study perform in different ways on the cognitive tests to normal populations was not supported in the factor analysis of the Wechsler Adult Intelligence Scale. In addition, a detailed analysis of the prison sample in terms of offence category on current sentence indicated that there were no significant differences between offence category groups on any of the variables that were significant on the main study.

It thus seems that none of the possible moderating variables examined in part two can account for the differences found in the main part of this study. There may, of course, be other variables which could affect the response of a prisoner to prison; for instance, a prisoner's personality or his attitudes could alter the way in which prison has an effect.

The hypothesis that prison is a more verbally oriented community than the "outside world" is another possibility that could, in part at least, account for the increase in verbal skills noted in this study; prisoners did make significantly more petitions to the Governor in the longitudinal analysis of the criminological variables, and this could be related to such a hypothesis (or could be explained in terms of, for instance, growing political awareness). On the other hand, this finding could be a result of the process of change during imprisonment; in the absence of further information, this hypothesis is difficult to assess. Yet another moderating variable could be that different prisons affect prisoners differently; again, the effect of this variable is very hard to assess, as prisoners are not randomly allocated to prisons, and thus the effects of individual prisons would be confounded with the selected nature of the prisoners in them (this fits in with the notion of a "prison career", discussed above).

Although no firm conclusions can be drawn from this study, and it is realized that the cognitive test variables discussed above have produced a rather inconsistent pattern of results, it does seem tenable at this point to suggest that this data can be interpreted as providing some evidence for the hypothesis that the effects of long term imprisonment are similar to a slight premature ageing; none of the moderating variables discussed in detail in part two provide alternative reasons for the results found in the main part of the study. Part Three below will look in detail at the tests and methodology used in this study; these are further possible sources of error in the main results.

As well as looking at the effects of long term imprisonment, this thesis looked at the selection criteria used by the Parole Board in their consideration of whether or not to release a man on parole, and came to the conclusion that the criteria used were very similar to those shown by American studies to be indicative of non-recidivism. In addition,

different offence category groups' cognitive test performance was looked at in detail, and it was found that such data could differentiate between sexual offenders and other groups; and between prisoners convicted of murder and manslaughter and other offenders; it was suggested that efforts at constructing offender typologies ought to take cognitive test data into account, as it was felt that such data were likely to add to the value of such a typology.

PART III

INTRODUCTION

This part examines the possibility that the results found in part one of this study are a reflection of inadequacies of the tests used, or the result of using inappropriate methods to assess psychological change occurring as a result of long term imprisonment, rather than the results of long term imprisonment itself. Part three is subdivided into two sections, as follows:

(a) Cognitive Tests

In this section, the tests themselves used in this study are examined in detail. The results of a factor analysis is presented, to see the extent to which each test taps underlying factors of cognitive ability. In addition, each test's usefulness and consistency in this study is discussed. In this way, it is hoped to ascertain the extent to which it is likely that the cognitive test results indicate actual differences between the prison groups, rather than being merely due to their own inadequacies. The analysis presented in this section is also likely to highlight which of the tests used in this study merit further use and/or development.

(b) The Status of Testing

The lack of clear-cut results in part one of this study could be in addition due to the inadequacies of the methods used to assess changes in prisoners with long term imprisonment. In this section, the assumptions of the approach adopted will be critically considered, along with a discussion of the problems involved in such an approach.

An alternative approach that has been also used in the study of long term imprisonment will also be considered, and the relative merits of the two approaches will be discussed.

As these two sections are fairly different, no overall conclusions will be drawn to part three; instead, each section will end with its own conclusions in which a summary of the section and its implications for the main section will be drawn out.

(i) COGNITIVE TESTS

Introduction

This section will look in detail at the relative usefulness of the various tests used in this study, by initially presenting a factor analysis of the tests, to see the extent to which the individual tests utilized in this study do tap different cognitive abilities. Each test's results will then be considered in detail, and conclusions will be drawn as to whether the tests proved useful in this study, and whether they are likely to be actually tapping the cognitive ability that they are said to be assessing.

Method

All the first cross-sectional results (viz of $N = 175$) were analyzed using the program FTAN (Youngman, 1971), and the rotated results are presented below. None of the "derived" scores (i.e. ones formed by summing or otherwise combining other scores) were included in this analysis, as their inclusion would have tended to yield spurious correlations and factors; thus the Gibson Spiral Maze "Adjusted" Error Score, the $(\text{Time})^2 + (\text{Error})^2$ score, the Purdue Pegboard Total Simple and Total Assembly scores, and the W.A.I.S. IQs and derived scores were omitted.

Results

It was found, after some pilot analyses, that seven rotated factors could meaningfully account for most of the variance. A factor loading of 0.6 was arbitrarily selected as the level below which variables were not considered in defining factors. Table 50 below presents these seven factors in terms of their defining variables, the percentage of variance

for which each factor accounts being shown in parenthesis. The seven factors accounted for 70.70 per cent of the total variance within the data. The factors have been named, usually after the cognitive test that appears to be most closely related to it.

TABLE FIFTY

Factor Analysis of the First Cross-Sectional Cognitive Test Data

Factor I = Purdue Pegboard (15.92%)

Both Hands	- .83
Dominant Hand	- .82
Non-dominant Hand	- .82
Simple Practice	- .81
Assembly Trial	- .62
Assembly Practice	- .61

Factor II = Wechsler Performance Intelligence (14.61%)

Picture Arrangement	- .78
Visual Reproduction (W.M.S)	- .72
Block Design	- .22
Object Assembly	- .63
Picture Completion	- .61

Factor III = Wechsler Verbal Intelligence (14.50%)

Vocabulary	- .91
Comprehension	- .86
Information	- .82
Similarities	- .70

(Table 50 continued)

Factor IV	=	Reaction Time	(8.32%)
Choice Reaction Time			- .89
Simple Reaction Time			- .80
Reversed Choice Reaction Time			- .65
Factor V	=	"Verbal Memory"	(6.43%)
Associate Learning (W.M.S)			- .76
Digit Span		(W.A.I.S)	- .66
Factor VI	=	Gibson Spiral Maze	(5.98%)
Error			- .92
Time			- .73
Factor VII	=	Gibson Spiral Maze "Breaks"	(4.93%)
Breaks			- .89

Discussion

Detailed discussion of these results will follow below, but it is interesting to note that the factors coming out of this analysis seem to be in general related to one test alone; it does seem that each of the major tests assessed separate cognitive abilities. The Purdue Pegboard, the W.A.I.S., the Reaction Time tests, and the Gibson Spiral Maze test all come out as tapping different areas. The G.A.T.B. Form Matching test seems to depend on a multiple of factors, its highest weights being on Factor I (-.48) and factor II (-.47). The Wechsler Memory Scale subtests seem to involve different abilities, as has already been suggested

above; Visual Reproduction seems to be more related to spatial-type skills, whilst Associate Learning seems to assess verbal memory.

Review of the Tests used in this Study

(1) The Reaction Time Tests

These tests were included in this battery as previous work in the area of perceptual deprivation (e.g. Nagatsuka and Suzuki, 1964) had indicated that reaction times were significantly affected by such experiences. It was also felt that such psychomotor skills could be readily and quickly assessed during the testing session, and thus a reaction time test could be included with only a minimal amount of inconvenience. In the absence of a suitable commercially produced portable self-powered apparatus, this study utilized apparatus specifically built for the prison research.

The factor analysis reported above indicates that these tests were tapping a separate cognitive ability, and thus their inclusion in this battery was fully justified.

The tests came up with significant results in the first cross-sectional analysis; prisoners who had been in the longest tended to be the slowest. The test-retest correlations, although they were highly significant ($p < .001$), were the lowest of all the cognitive tests (with the exception of some of the Gibson Spiral Maze subtests), and the longitudinal data did not reveal any consistent patterning in the Reaction Time tests. The reason for this disappointing result is not clear; it could be that a test of this nature is liable to practice effects. Such effects, when they have been researched, have been found to be very complex; Murrell (1970), for instance, looked at reaction times over a long period of time, and found in multiple choice conditions an improvement in subject's times initially, and then a deterioration. In simple

conditions, he found older subjects tended to be initially slower, then quickened up, then slowed down again. He also found that age differences tended to be eliminated with practice, concluding that "experiments conducted without extensive practice give results which are inapplicable to experienced individuals" (p.273). Similarly, Smith (1967) found that practice could significantly alter choice reaction times.

Despite this disappointing result in the longitudinal part of this study, the Reaction Time tests did provide useful data in the first cross-sectional analysis, and their inclusion in the test battery made a valuable contribution to this study.

(2) The Gibson Spiral Maze

The Gibson Spiral Maze was included in this battery as a quick test of psychomotor competence. Gibson (1977) does also claim, however, that the test is of use in differentiating delinquents from non-delinquents. This study produced no significant differences between the scores of the control groups on any of the Spiral Maze variables and those of the prison groups, and thus it seems likely that the Maze is not of much use in differentiating between adult criminals and non-criminals.

The only results on the Spiral Maze to reach significance were the differences between the time taken to complete the Maze by the subjects divided into offence category groups. As has been noted above, it is interesting that the slowest group was the group of property offenders, which probably includes the least "impulsive" of the prisoners, as property offences generally involve considerable foresight and planning (as opposed to, say, violent offenders, who often tend to act on the "spur of the moment"). In addition, the prisoners' scores in the longitudinal analysis, although not reaching statistical significance, showed interesting changes; their scores showed a trade-off of time for accuracy, a result which was interpreted as fitting in with those found

in ageing studies.

It thus seems that the Spiral Maze is of some limited use; on the factor analysis, the Time and Error scores come out as a factor, thus showing that the Maze is probably assessing abilities not covered by the other tests in this study. The two derived scores (viz "Adjusted" Error Score and $(\text{Time})^2 + (\text{Error})^2$), on the other hand, seem to be of very little use; they provide no results of value to this study, they show comparatively low test-retest correlations (especially the "Adjusted" Error score), and they are extremely time consuming to score. Raven (1966) agrees with this, pointing out that Gibson's (1965) method of adjusting the Error score, as used in this study, is unsatisfactory. Gibson (1969) himself insists that "the Error score is meaningful only in respect to the score on Time" (p.523), but the "Adjusted" Error score does not appear (so far as this study demonstrates) to be the answer.

The Gibson Spiral Maze has come under a lot of critical fire; Buros (1972), for instance, points out that the test has poor norms, unknown reliability, and scanty evidence of validity. Gibson's (1977) revision of the Maze manual produces little further information that would satisfy Buros, and one must agree with the latter that the spiral is a highly appropriate task for experimental research, rather than being a well-established test of psychomotor competence.

It is interesting to note that the "Breaks" score comes out as a separate factor on the factor analysis presented above; as has been mentioned in the procedure section above, Porteus maze research has indicated that pencil-lifting is a separate factor. Gibson (1976) says that he has heard of no other research in which pencil lifting occurs on the Spiral Maze, but it does seem that this variable needs further research. On this study, this variable did not appear to be of importance.

The Gibson Spiral Maze thus appears to be of some use; being extremely quick to administer is a great advantage, and the factor analysis

of the cognitive data results does indicate that it is tapping an ability not covered by the other tests used in this study. It does appear, however, to be in need of standardization, and requires a large amount of work before it can be established as a psychological test; it may well prove of use in research looking at the effects of ageing on skilled performance.

(3) The G.A.I.B. Form Matching Test

This test was included in the battery as a test of spatial ability; although it proved to be highly reliable (.77 test-retest correlation), it did not appear to be of importance in any of the analyses carried out in this paper. On the factor analysis of the cognitive test data it comes out as being most highly loaded on the "manipulative dexterity" factor, with the "W.A.I.S. performance" factor coming second, which suggests that, in this analysis at least, it was not assessing spatial ability alone. It seems clear that this test may be of use in vocational guidance, but it does not seem to be of use in a study of this nature as a relatively "pure" measure of spatial ability.

(4) Wechsler Memory Scale Visual Reproduction and Associate Learning tests.

These tests were included in the battery as measures of short-term memory; previous studies had suggested that retention and note learning would be the least affected by long term imprisonment. These two tests in particular were chosen, as they purport to measure two different aspects of memory, via two different sensory modalities. Contrary to expectation, a significant difference was found on the Associate Learning test on the first cross-sectional analysis; subjects who had been imprisoned the longer tended to do better. This result was replicated on the second cross-sectional analysis, but inexplicably the longitudinal analysis revealed that the prisoner group improved less on this variable than the

control group (though not significantly less). The significant increase was interpreted in terms of showing an increased reliance on verbal skills, rather than purely in terms of short-term memory. There were no significant differences involving the Visual Reproduction test.

The factor analysis reported above demonstrates that, for the sample used in this study, the Visual Reproduction test seems more related to W.A.I.S. Performance items than it does to the Associate Learning subtest; it is probably more a measure of psychomotor abilities than a test of short-term memory. The Associate Learning test, on the other hand, does appear to be related to memory to some extent, as it appears on a factor with the W.A.I.S. Digit Span; both these tests require verbal skills, and it is possible that subjects who do well on these tests do so through using some form of coding process. It is interesting to note that these factors do not accord with the previously cited study of Davis and Swenson (1970), who found that Associate Learning and Visual Reproduction were identifiable as contributing to a "memory" factor, whilst Digit Span appeared to be measuring "freedom from distractability". A possible reason for the differences between these studies is that Davis and Swenson did not include any W.A.I.S. items in their factor analysis, and thus the possibility that items were tapping other cognitive skills would not come out of their analysis.

Once again, the findings of this study casts considerable doubt on the Wechsler Memory Scale; the results of the factor analysis cited in this section, the significant differences found in studies between visual and aural memory, the inadequate standardization of the Scale (Buros, 1949), the way in which it tends to cloud over specific memory function breakdowns (Williams, 1968), and the contribution of factors such as verbal mediation must all cast some doubt on this scale, which may well be assessing many things besides decrements in short-term memory.

(5) The Purdue Pegboard

The Purdue Pegboard was included in the battery as a test of manipulative dexterity, as previous studies had indicated that complex and simple visual motor co-ordination appears to be affected by conditions of reduced sensory stimulation.

Of all the tests used in this battery, it produced by far the most consistent set of results; there were significant declines on all three of the Assembly scores on both cross-sectional analyses, and the prisoner group did worse (though not statistically significantly worse) than the control group in the longitudinal analysis. In addition, it identified the sexual offenders as a significantly different group in the offence category analysis. On the factor analysis, all six of the non-derived scores came out as variables on the same factor; presumably, a measure of manipulative dexterity. None of the scores were related to any of the other factors, so it appears in this study that the Purdue Pegboard is a good reliable measure of manipulative dexterity, and does not depend on intellectual factors. Such a finding is supported by studies such as Costa et al (1963), who found that the Purdue Pegboard could be used as a reasonably accurate screening device in the detection of cerebral lesion, as it assessed sensorimotor performance relatively independently of educational level, verbal or intellectual ability. There are a number of studies (see, e.g. Tiffin, 1968) demonstrating that this test is of use in selecting between applicants to industrial jobs involving finger dexterity and manual dexterity.

It thus seems that this test is both valid and reliable; it is interesting to note that it was also sensitive to the differences in manipulative dexterity of prolonged power-saw users, as mentioned in the "procedure" section above (see Banister and Smith, 1972). Of all the findings of this study, the possible relationship between long term

imprisonment and a decline in manipulative dexterity seems the most well established.

- (6) The Wechsler Adult Intelligence Scale (the derived scores will be considered after this section).

The W.A.I.S. results found in this study, although disappointing in not showing monotonic relationships with imprisonment, do accord well factorially with those of previous studies (as the section on W.A.I.S. factor analyses demonstrates). Similarly, on the factor analysis reported above, the Performance tests and the Verbal tests come out as two separate factors, assessing skills not otherwise covered in this study. The only non-W.A.I.S. item to load on one of these factors is the W.M.S. Visual Reproduction item, and it has already been argued above that this test probably assesses similar skills to the W.A.I.S. Performance subtests, rather than measuring short term memory ability.

One result that seems consistent over all the analyses (though not necessarily statistically significantly so) is that there seems to be an association between imprisonment and an increase in verbal skills, as measured by the W.A.I.S., and that in general terms, there does not seem to be a noticeable intellectual decline in the prison sample. This result has been dwelt upon at length above, and, after the decline in Purdue Pegboard performance, is probably the second outstanding result from this study.

One interesting finding from this study that is not in accord with Wechsler (1958) is that the mean IQs of both the prisoner groups and the control group on the first cross-sectional analysis are well above "average" IQ. Many studies of criminals (e.g. Prentice and Kelly, 1963) have found that they tend to have lower measured IQs, and on a priori grounds one might have accepted a similar result in this study (it must be noted, however (as will be developed in the next section), that the

prisoners used in this sample might not be a typical sample of criminals). One would certainly not expect the control group of forestry workers and people in urban occupations to be well above average in intelligence. A possible reason for this disparity is that Wechsler's norms, which were drawn up in 1955, are no longer appropriate; Buros (1972) makes just this point, emphasizing that there is an urgent need for new norms to be developed for the W.A.I.S.

Despite this slight drawback, one must concur with other writers that the W.A.I.S. has proved a reliable measure in this study, where the factor analytic results fit in well with patterns previously found. In addition, the test seems to have been sensitive to changes occurring in the sample over time and with increasing imprisonment, producing consistent results.

Derived Scores

These scores were used in this study, despite the evidence to support them being generally negative, as they required no further testing of the subjects, and they had on occasion proved of interest in the past.

(a) The Verbal-Performance Discrepancy

This derived score was included in this study as Wechsler (1958) had claimed that negative Verbal minus Performance scores were associated with "acting-out" individuals, and one might thus expect the prison sample in general (or at least particular offence category groups) to score on this derived score in accordance with Wechsler's prediction. In this study, however, there were no significant differences between any of the groups on any of the analyses on this variable. To some extent, this is explicable in terms of the increased reliance on verbal skills noted with increasing lengths of imprisonment; such a process would obviously reduce the size of any discrepancy that was initially present on the subject's

entering prison. It is interesting to note that a comparison between the scores of group 1 (those prisoners who had been in prison for the least amount of time) and those of the control group indicates that group 1 did show a negative discrepancy, whilst the control group's score was positive, supporting Wechsler to a limited extent, but it must be emphasized that this difference was nowhere near statistical significance (t-test, $p < .40$).

In the offence category analysis no significant differences were noted between the groups, but it is again of interest to note slight support for Wechsler, in that the offenders convicted of violence were the only group to show a negative score on this variable; of the four offence groups, one would expect this one to be the one most likely to contain "acting out" individuals. Again it must be emphasized that the difference between the violence offender group and the other three groups was again nowhere near statistical significance (the most significant result being $p < .20$).

In conclusion, then, it seems that one must concur with Guertin et al (1971) that this "discrepancy must be questioned as a general index of "acting out potential" (p.318); this study provides very slight support for Wechsler, in that the discrepancies tend to be in the predicted direction. It must be stressed, however, that these discrepancies never attain statistical significance, even when comparing the scores of violence offenders and those of the control group ($p < .30$), and thus it seems that this discrepancy is not of very much use in the prediction of "acting out" potential, as it does not seem to be able to detect any significant difference between such radically different groups as these.

(b) Wechsler's Deterioration Index

This derived score was included in this study as Wechsler (1958) claims that it can be indicative of intellectual decline; again, it is realized that this Index has come in for a lot of adverse criticism (as has been mentioned in the procedure section above), but as the information was available, this Index was calculated in the hope that it would shed further light on the effects of long term imprisonment.

The Index produced one of the few significant results on the first cross-sectional analysis, group 3 attaining a significantly higher score than group 1 (high scores being indicative of "deterioration", in Wechsler's terminology; group 3 had been imprisoned longer than group 1). In addition, this pattern was replicated on the second cross-sectional analysis and on the longitudinal study, where the prison groups scored higher than the control group (though it must be noted that none of these differences attained statistical significance). On the offence category analysis, the group of men convicted of murder or manslaughter scored significantly lower than those convicted of offences against the person. It must be remarked, however, that the Deterioration Index Scores never reached a level which Wechsler (1958, p.211) would regard as being indicative of intellectual deterioration; the highest score reached by any group was 8.27 (offences against the person category), whilst Wechsler suggests that only scores greater than 15 or 20 "may be considered significant" (p.212).

The individual test results that contribute to the Deterioration Index were looked at in detail, and it was suggested that, in the main part of the study, the prime reason for the Index producing significant results was not that it was measuring intellectual deficit, but that it happened to include in its "hold" category the Vocabulary and Information subtests; the scores on both these subtests improved with length of imprisonment, the former significantly so in the longitudinal analysis.

It thus seemed to be more likely measuring an increased reliance on verbal skills, rather than "deterioration". In the offence categories analysis, the significant result was suggested as being due to one group being comparatively very much better on one test (the Picture Completion test, another "hold" test), and again the result seemed to be associated with this difference, rather than intellectual deficit differences. It thus seems that the Index is unduly influenced by differences in one or two test results that are used in its formulation, and suggests that one needs to look closely at the individual's test results before attempting to use the Index as a measure of intellectual deficit (to Wechsler's credit, it must be pointed out that he does suggest that the Index should only be used as one of the factors determining such a diagnosis).

The Index was useful in this study as it just happened to highlight some of the differences between the prison groups, but, as a measure of intellectual deficit, it appears to be severely lacking, especially as it seems unduly influenced by only a few subtest scores. One must concur with Butcher (1968) and others (e.g. Matarazzo, 1972) that the Index is of little practical value, particularly for the purpose for which it was initially developed.

(c) The Masculine/Feminine Score

This derived score was included in this study as studies have found that subjects who score high on femininity scales tend to adapt better to sensory deprivation conditions; thus a possible confounding variable could be looked at. Again, it is realized that this scale has met with considerable criticism, but it was included as it was merely a score derived from the W.A.I.S. main results.

This derived score produced no significant differences on any of the results of the main analysis; the only significant difference was on the

offence category analysis, where the violence offenders came out as being more "masculine" than any of the other three groups. This result was interpreted as showing some support for Wechsler, in that it could be contended that there is an association between aggression and masculinity in this culture; it is also interesting to note that the group of prisoners convicted of murder or manslaughter (again aggressive behaviour) obtained the second highest score on this derived score, the group of sexual offenders scored the lowest (but still were "masculine", in that their average score was positive).

This study thus demonstrates some limited support for Wechsler, but it must be emphasized that the reason for the sex differences noted on the W.A.I.S. may be a reflection of the different socialization experiences of men and women, rather than an indication of intrinsic sex differences. As Levinson (1963) points out, if this is so, then one would expect the differences to become less evident as the sexes obtain more equal education and employment.

As no significant differences were found on this derived score in the main study, it seems that even if there are differences between people showing masculine or feminine W.A.I.S. patterns, such differences would not affect the main findings of this study. This was confirmed by analysis of the correlations between subjects' Masculine/Feminine scores and their other cognitive test data, which found no significant correlations between Masculine/Feminine scores and any of the test variables which had proved to be important in this analysis. It thus seems unlikely that this variable has affected the main results of this study.

(d) The Analytic Index

This derived score was included in this study as a measure of subject's "perceptual index" (as has been discussed under "procedure" above). No significant differences were found on the main part of this study in

this variable; the only significant difference that was found was on the offence categories, where the sexual offenders scored significantly lower than two of the other groups. Guertin et al (1971) criticize the Analytic Index as being merely "a very close approximation to the performance factor score, since these (three subtests) are the heaviest loaded items on that factor. There is little reason to treat this three-subtest sum as if it were some new combination meriting another label" (p.299). Looking closely at the offence category analysis, Guertin's point is confirmed, as the sexual offence group are also significantly lower than the same other two groups on Performance IQ. It thus seems that this Index is of little use.

Conclusions of this Section

From this overall analysis of the cognitive tests used in this study, it seems that both the Purdue Pegboard and the Wechsler Adult Intelligence Scale proved to be most useful, producing consistent results. The Gibson Spiral Maze and the Reaction Time tests were of some use, but both required further research and standardization. The Wechsler Memory Scale produced a rather diverse set of results, and did not seem to be solely measuring short-term memory; it thus is possibly only of limited use. The G.A.T.B. Form Matching subtest seemed to be no use whatsoever in this study; the factor analysis of the test results indicated that it may be assessing a variety of skills, rather than purely spatial ability. As has been found in previous studies, the Wechsler derived indices proved of little use; on some of them (especially the Masculine-Feminine score) there was a limited amount of support for Wechsler, but they did not contribute much to the overall study itself, except to highlight

certain groups of W.A.I.S. subtest scores.

As the Purdue Pegboard and the Wechsler Adult Intelligence Scale produced the most consistent results throughout this study, and as the analysis presented in this section indicates that they do seem to be tapping relatively well defined areas of cognitive ability, it thus seems likely that the results of the main part of the study are a reflection of differences in prisoners' cognitive abilities, rather than an artifact of the tests used. Further research in this area could well build on this finding.

(ii) THE STATUS OF TESTING

The methodology utilized in this study is very much within a traditional "Psychological" framework; it is recognized, however, that a number of criticisms can be levelled at such an approach, and at the psychometric orientation to assessing human abilities. This section commences with a consideration of the problems and assumptions involved in the approach adopted in this study; each problem will be outlined, and then will be discussed in terms of the extent to which it could affect the results of the main part of this study. This section then goes on to consider in detail an alternative qualitative approach to the effects of long term imprisonment; this alternative approach is critically examined, to see to what extent it satisfactorily overcomes the problems of the quantitative approach. Finally, a conclusion will be drawn as to what extent each method is likely to come up with valid and reliable results.

Problems Involved in Testing

There has been recent increasingly critical commentary on experimentation in psychology in general, and on psychometric tests in particular. Partly this has developed through the use and misuse of psychological findings for political ends; the well known article by Jensen (1969) on the heritability of intelligence, and the resultant furor that followed its publication, is a good example in this context. Partly this has developed through a growing realization (e.g. Adair, 1974) that the psychological experimental situation itself can be viewed not as a way of isolating crucial variables but as a social psychological situation in its own right. Partly it has developed through increasing dissatisfaction with the way in which psychology has apparently stagnated,

and the search for alternative approaches (e.g. Armistead, 1974 or Shotter, 1975).

Some of the problems that this critical commentary has come up with will be outlined below, and will be discussed in relationship to this study; the experimental method and the experimental situation will be looked at initially, and then psychological testing will be examined.

(a) Sampling Assumptions

In a study of this nature, it is assumed that one can take a sample of long term prisoners as somehow representative of long term prisoners as a whole, carry out a series of tests on them, and then generalize from the sample seen to the unseen remainder; one problem with such a procedure is that the initial sample may be unrepresentative, so that it is unjustified to generalize to the larger group from them. One finding of relevance in this area is that volunteers often systematically differ from non-volunteers (e.g. Rosenthal and Rosnow, 1969), in that they tend to be more intelligent and have educational status; this study deliberately tried to avoid using volunteers, and the concomitant problems, by having a preselected group, but as a number of prisoners refused to take part in the study, they had to be replaced by more amenable prisoners (as has been outlined in the "procedure" section above). It is thus possible that this aspect of sampling could have, in part at least, affected the results of this study. The use of statistics helps one in assessing whether it is justifiable to generalize ones results to a larger population, but the lack of clear-cut results in this study could indicate the presence of moderator variables as yet undiscovered. A number of moderator variables have been examined in the latter part of this study, but this does not preclude that there could be many more; for instance, work summarized by Tong et al (1974) indicates that smoking

may well affect performance on tasks such as the Reaction Time tests. As no record was kept of which of the sample smoked, how many they smoked, and when, the effects of this variable cannot be assessed. Other criticisms that could be mentioned under this heading include the extent to which one can take a group of people, all of whom have been convicted of committing crimes, and then treat them as a relatively homogeneous group. Again, the extent to which it is possible to generalize the results found in this study over time and situation is debateable; this study might present an accurate picture of cognitive changes occurring in long term prisoners as a result of long term imprisonment in England and Wales in the late 1960s and early 1970s, but whether the same results would be found now or in another country is questionable to some extent.

(b) Subject Effects

A number of studies sees the experimental situation as having demand characteristics, and thus suggest that behaviour in such a situation may not be representative of how the subjects normally behave in the absence of a psychological investigator; for instance, if the study of this thesis had been introduced to the prisoners as related to their getting parole, a different set of responses may well have occurred. Orne (1962) suggests that one of the important effects in this area is the "good subject" effect, where the subject attempts to give the experimenter the results he thinks he wants; in this study, subjects were given no specific information as to the precise purpose of the tests, beyond that the researcher was looking at "imprisonment", and that the study would involve two testing sessions over (roughly) a two-year period. It is possible that prisoners could make a reasoned guess at the purpose of the experiment, and deliberately give answers in the retest session to demonstrate that prison had had an effect on

them, but such behaviour has not been shown in the test results. Rosenberg (1969) suggests that another effect in this area is the "socially desirable subject", who sees psychology as being of a mental-health and clinical orientation, and thus tries to present himself in the best possible light to the psychologist; it is probable that this latter effect is more likely than the former in this study. As has already been mentioned above, many prisoners spoke of the dangers of "rotting in prison", and how was it not affecting them, as they were taking active steps to prevent it from "harming" them; they thus may have been motivated to present themselves in the best possible light. If this effect was equally present in both testing sessions, then it would probably not affect the results to a great extent, but if it occurred more in the second session (i.e. the prisoners were trying to "prove" they had not altered), this could have affected the results of this study.

(c) Experimenter Effects

A number of studies (of which the most famous are the so-called "Rosenthal Effect" experiments, named after Rosenthal, 1966) have suggested that changes or distortions in the results of an experiment may be produced by the experimenter's behaviour in the testing situation. The experiment may be the result of a self-fulfilling prophecy on the part of the experimenter, who either only "sees" results that fits into his thesis, or (not usually deliberately) moulds and shapes the subject's behaviour in the experimental situation so as to get the subject to behave in the way that he has predicted the subject will behave. In this study, it could be suggested that one's a priori predictions about the possible effects of long term imprisonment could be the cause of the subject's behaviour in the testing situation, rather than the subject's behaviour being a reflection of their normal behaviour. Given the

extremely varied nature of the results of this study, and the way in which they do not fit in with the a priori predictions of the experimenter, it seems unlikely that an experimenter effect has occurred in this study. The limited range of tests used in this study, however, did depend on the experimenter's a priori decision, and to some extent at least would affect the outcome of this study, in that change in areas not tapped by the tests would not be evident.

(d) Ethical Considerations

There have been many criticisms of psychological tests and experiments in terms of them invading subject's privacy; one way around this is to tell the potential subjects the purpose of the experiment or test, in order that they can then give their informed consent as to whether they wish to participate in the study or not. A problem with doing this is that, as Rochford (1974) points out, one might then influence the results of the tests by giving the subjects expectations about the situation; for instance, telling somebody before they do the W.A.I.S. that it is a measure of IQ may well affect their test performance. Many psychological experiments "resolve" this problem by utilizing deception, and then relying on a debriefing situation afterwards to inform the subject of the experimental design and why deception was necessary; obviously, there are ethical problems in this situation, as the B.P.S. (1977) recognize. This study did not deceive the subjects; if they asked questions, they were told about the tests in general terms, so that their expectations would not affect their results. Similarly, they were told about the purpose of this study in general terms, and thus, to some extent at least, the principle of informed consent was violated in this study. Subjects were, however, given a chance to opt out of the study, and nearly all of those who took part in the first round of testing were happy to take part in the second round (if they had

not been released in the interim period!). This study also did not unduly invade the subject's privacy, in that all subjects were promised that individual results would remain anonymous, and that only results of groups of people would be published.

(e) Validity and Reliability of Tests Used

Although it is relatively easy to produce reliable tests, it is not so easy to produce valid tests; this is especially so when assessing a concept so nebulous as "intelligence". As Butcher (1968) points out, there is considerable lack of agreement as to what constitutes intelligent behaviour, and with a lack of an agreed criterion, it becomes difficult to validate ones tests. Anastasi (1976) points out that "the weakest feature (of the W.A.I.S.) is the dearth of empirical data on validity" (p.264). This issue has been somewhat sidestepped in this thesis, where it has been assumed that the W.A.I.S. is probably tapping a number of cognitive abilities, to which loose names can be given (e.g. "verbal skills"), without getting involved in the controversy as to what intelligence "is"; it is taken as axiomatic that very good (or conversely very poor) performance on the W.A.I.S. is associated with cognitive abilities (or the lack of them). "People that score highly on the W.A.I.S. would be expected to do well adademically" is probably a justifiable example of the sort of generalizations that can be made from this test without actually stipulating what it precisely measures. The Purdue Pegboard, on the other hand, does seem to be reasonably well validated as a test of finger and manual dexterity, and did serve as a valid predictor of power-saw use in the 1972 Banister and Smith study. Other problems that could be subsumed under this heading include questions as to how justified one is in using the same test to assess a number of people, who may well vary on a number of crucial variables. As has been

stated in the procedure section above, the prison sample was chosen to exclude prisoners of foreign nationality, to avoid cross-cultural difficulties on the tests, but there may well be other variables that were not controlled for that could affect the results. For instance, is it justified to use the W.A.I.S., a test developed and standardized in the United States, with British subjects? As the American factor analytic results of this test accord well with those found in this study, it seems that it is justifiable to use this test. This does not, however, necessarily mean that other tests (e.g. G.A.T.B. Form Matching) from America can be used indiscriminately on British populations. Another problem with tests is that of reliability - the sample of behaviour produced by the subject at a given point of time may not be characteristic of them; as this study produced good test-retest correlations, however, it seems that this criticism is not supported in this study.

(f) Limitations of Test Coverage

As has been pointed out above, the large battery of tests used in this study may not have come up with many significant results because they were not assessing the right areas of cognitive ability. It does, however, seem unlikely that large changes in cognitive areas not assessed by these tests could have occurred without showing to some extent on the battery of the tests; one can, however, think of a few areas such as "creativity" not assessed by this study where such an event could have occurred. One problem that could be considered under this heading is that psychological tests themselves only cover limited areas of intellectual functioning, as they only have a narrow conception of ability; the famous Terman study of gifted individuals (of which the last reported follow-up was by Oden, 1968), for instance, only found the intelligence test to be a limited predictor of success. Tests looking at wider

ranges of abilities, and perhaps including motivational and personality variables, might be useful in this context.

(g) Assumptions of Measurability

Psychological tests assume that psychological variables are amenable to measurement; that one can quantify performance, and then statistically compare groups' performances expressed in numerical terms. Although it is admitted that this assumption may not be entirely justified, the fact that some of the tests used (e.g. The Purdue Pegboard) are able to validly discriminate between groups provides some support for allowing the quantification of results. An additional advantage of quantification is that it allows the data to be re-analyzed, and to be expressed in terms which can readily be understood by other psychologists. Linked to this assumption of measurability is the problem of test sensitivity; it could be that the tests are valid in relatively crude terms, but are not particularly useful in the assessment of the rather more subtle changes that could occur with long term imprisonment. This is not necessarily, however, a reason for saying that testing is futile; it could be that tests with greater powers of discrimination could be developed for use in such situations.

(h) Question of Permanence of Abilities

A lot of the debate surrounding the race/IQ controversy (as has been mentioned above) has been over the extent to which cognitive abilities are permanent over time, or amenable to change; one of the fundamental questions involved in this research is the problem of whether, if long term imprisonment has an effect on cognitive abilities, this change is permanent or temporary. It would seem reasonable to agree with Anastasi (1976) that "research suggest(s) that whether intelligence test scores rise or decline with increasing age in adulthood depends on

what experiences the individual undergoes during those years and on the relationship between these experiences and the functions covered on the tests" (p.342). It is difficult to say what the long-term effects on cognitive ability of long term imprisonment are likely to be after release, but, theoretically at least, change in abilities depending on change in circumstances seems possible; the fact, however, that this study found more significant correlations between total imprisonment and the psychological test results than with present imprisonment would seem to indicate that the effects discussed in this study are likely to be relatively permanent.

An Alternative Approach to Studying the Effects of Long Term Imprisonment

It is possible to study the same area without using such a traditional approach; such a study has been carried out by Cohen and Taylor (1972). The methodology of this study will be described, and then it will be critically analysed, looking at it in terms of the same problem areas as have just been dealt with above.

The Cohen and Taylor (1972) Study

In their book "Psychological Survival: the Experience of Long-Term Imprisonment" Cohen and Taylor adopt a qualitative approach to studying the effects of long-term imprisonment. During the late 1960s, they gained access to Durham "E" wing, which at that time was being used to house prisoners who were serving long term sentences (up to 20 years or life) under conditions of maximum security. They were invited by Durham University Extra-Mural Department to give a series of weekly classes in social science to these prisoners; initially, they gave classes in formal sociology, but then they moved towards unprogrammed discussion. Arising

from these discussions came the material for their book. The authors thus "started without a problem, evolved a set of methods while they worked, and ended up with a collection of observations, anecdotes and descriptions rather than a table of results" (p.32). They rejected questionnaires, psychological tests and structured interviews, instead relying on four major research methods; unstructured group interviews, often as a way of summarizing attitudes to particular areas. Here, the authors would record their observations and interpretations and then (if possible) show them to the men. Secondly, they made extensive use of the men's writing, including letters, stories, essays and poems relating to their circumstances. Thirdly, they used "literary identification as a method of discovering the prisoners' opinions, where prisoners would identify passages from literature which they felt fitted in with their own feelings. Finally, they asked the prisoners to read and correct the research as it was written up. As has been noted above, the general view of Cohen and Taylor was that the prisoners appeared to be affected rather little by their environment, as they took active steps to resist any possible damaging effects of prison life; the bulk of their book covers the main techniques that they claim prisoners use. Although they modestly say in the text that the book "is an account of how one small group of men, long-term security risk prisoners in one type of English prison during the 1960s, dealt with their environment" (p.58), the title of the book suggests that it is intended to be generalized to other situations of long term imprisonment. This viewpoint is supported by their claim in the preface to the book, in which they say that they "hope that this book, which concentrates on how people survive in extreme and adverse situations, will become a manual - a handbook for psychological survival - for others who find themselves in similar circumstances" (p.10).

Having described the approach of this study which uses a completely different methodology to that adopted in this study, the question then arises as to how it deals with the problems of the more traditional approach?

(a) Sampling Assumptions

At the outset, it must be stressed that the samples used in this study were a small and highly selected group of men. In the first place, they only came into contact with those prisoners who were classified as needing conditions of maximum security, a highly selected number in itself. They only came into contact with them in the context of one institution; Durham "E" wing in the late 1960s was hardly a typical long term prison, as the men had far less freedom and were far more closely supervised than those in other long term institutions who were not in maximum security wings. Thirdly, all the prisoners they saw volunteered to come and take part in the research (bringing in problems of possibly ending up with a non-representative sample, as Rosenthal and Rosnow (1969) stress). Fourthly, the type of prisoner who would come to a University Extra Mural social science course would, presumably be different from the average prisoner in terms of intelligence. Fifthly, there is no mention in the book of the demographic characteristics of their sample; what is its composition in terms of age, total imprisonment, offence category etc., or do these variables make no difference to prisoners' responses to long term imprisonment? Sixthly, they used no control group to control for natural changes which might occur with time. Finally, the actual number of prisoners on which the research is based is rather small; their sociology classes "varied in size from two to twelve depending on transfers to other wings and the men's interest in the subject. At one time or another some fifty men passed through the class. Of these they got to know about 10 intimately and an equal number fairly well" (p.31).

Given that their sample was so small and so atypical of long term prisoners, it seems that to call their book "a handbook for psychological survival" is rather over ambitious. In terms of sampling, the more formal methods used in the main study of this thesis potentially should lead to findings that can be more easily generalizable to long term prisoners in general.

(b) Subject Effects

Cohen and Taylor's study made no attempt to control for demand characteristics; it is likely that their presence in the prison, and their discussions about the effects of long term imprisonment could well have sensitized the prisoners to this issue. If this is the case, then the responses of the prisoners reported in the book may, in part at least, be a function of the prisoners' awareness that they were subjects to a research project dealing with the effects of long term imprisonment, rather than responses that would occur in the absence of such research.

(c) Experimenter Effects

The extent to which Cohen and Taylor may have produced the results they found is questionable to some extent, but it is interesting to note that in talking about their fourth research method (where their research papers were read and corrected by the prisoners), they do admit that the prisoners were "far too polite to go on criticizing us beyond a certain point" (p.37), implying that they felt that the prisoners were occasionally acquiescing to what they had written.

Their general orientation also appears to be against the Prison Department establishment; they refer to prison officers as "screws", and Earl Mountbatten as "the Admiral", for instance. On page 182, they stress that "being on the men's sides was an essential part of the research endeavour"; this general approach may have affected the results of their

research. Feldman (1977) points out they see some of the prisoners as "close to romantic anarchists" (p.222), which he feels to be a very naive viewpoint; again, this could have biased the research results.

(d) Ethical Considerations

Their study involved no deception of the prisoners as to its purpose, but does suffer from the possibility that individual prisoner's privacy was invaded. The book is sprinkled with a number of case histories and anecdotes, and the individual prisoners involved can be identified by people who are involved in the Prison Service and who knew the rough composition of Durham "E" wing at the time. Such knowledge is not necessarily going to work in the prisoner's best interests.

(e) Validity and Reliability of Tests Used

This study did not use tests as such, but nevertheless used a variety of research methods. Feldman (1977) points out that "the research methods used are open to bias of all kinds" (p.222), and goes on to say that the reliability and validity of the methods used are suspect (e.g. the use of literary writings as some form of projective test), that the authors give no quantitative data to differentiate between the differing ways prisoners overcome the problem of "deterioration", and that they give no information on the effects these differing ways have on the prisoners. Other points that could be made here include the assumption made by Cohen and Taylor that the men's written work and verbalizations bore some relationship to their actual behaviour (an assumption that is hard to test), and that their methods are not properly replicable; one cannot, for instance, reanalyse their data in the way that one can with quantified information. Using methods of this nature also makes the detection of changes over time difficult, as it is difficult to compare, say, prisoner's "writings" at different points in time.

(f) Limitations of Test Coverage

Although Cohen and Taylor's work has produced a number of interesting points as to how prisoners cope with long term imprisonment, they only look at some of the variables of importance; the possible effects of imprisonment on the inmates' physical skills, for instance, was never considered.

(g) Assumptions of Measurability

Although this study did not use quantifiable information, one can nevertheless question some of the assumptions made by the researchers; for instance, to what extent is it possible for prisoners to be able to verbalize and/or write down their impressions of long term imprisonment? The question of the accuracy of such an exercise has been mentioned above, but here it is suggested that prisoners may not be aware of changes occurring with imprisonment, or that, even if they are aware of them, they may not be able or willing to express them. Another question that can be asked here is whether sufficient variations of characters in literature exist to allow prisoners to find one they can closely identify with.

(h) Question of Permanence of Abilities

This point was not looked at by Cohen and Taylor, who do not mention how long it takes a prisoner to adopt a method to counteract "deterioration", whether this changes with length of imprisonment, and what the long term effects of adopting such behaviour is likely to be.

Conclusions of this section

This section has looked in detail at the problems and assumptions involved in the approach adopted in this study to assessing the effects of long term imprisonment, and has also critically looked at another

approach to the same subject which uses a radically different methodology. In conclusion, it seems that the general approach adopted by this study appears to be the more likely of the two to come up with results that are valid and reliable, and can be generalized to the whole long term prison population; although it is admitted that there are many flaws in the quantitative approach, it appears on balance to have less flaws than the qualitative approach cited above.

Nevertheless, the overall impression of the Cohen and Taylor work is that there is some merit in the approach; the question of how the prisoners view "time" in prison, and how they attempt to cope with long spells of imprisonment are both of considerable interest.

The major advantage of the quantitative data appears to be that it provides a large amount of information that can be readily understood by other researchers, and which can be built upon in the future. It allows a large number of variables to be looked at, and hopefully will ultimately produce some more concrete results than those of this study. The qualitative approach is probably best seen as an adjunct to this process, and perhaps is best viewed as a source of hypotheses, rather than as an end in itself; the ideas generated by Cohen and Taylor could possibly be quantified, and would then add to our knowledge about the effects of long term imprisonment in general. This sort of approach was adopted for the social and criminological variables utilized in this study, and proved to be most useful.

PART IV

IMPLICATIONS OF THIS STUDY

Introduction

The main results of this study have already been summarized above, in the "Summary of Findings" section; although the results were not clear cut, they did indicate that some changes were associated with long term imprisonment, the most noticeable being a slight decline in psychomotor skills, and an increased reliance on verbal skills. These results were discussed in relationship to studies of ageing, and it was tentatively suggested that there could be a parallel drawn between the two processes. In addition, this study looked at a number of social and criminological variables, finding them useful in distinguishing between men released under the parole scheme and men considered, but not released. A third major finding was that the social and criminological variables, along with the cognitive test results, were useful in distinguishing between offenders in different offence category groups, and it was suggested that the consideration of such variables should help in the construction of typologies of offenders.

This study specifically looked at only long term prisoners, and in all saw about one in five of all long termers serving sentences in English and Welsh prisons at the end of 1968; the project additionally tried, so far as it was possible, to see a sample of prisoners pre-selected on grounds of age, type of sentence, etc. so as to see as representative a group of long-term prisoners as possible. It thus seems reasonable, given this comparatively large and fairly well selected sample, that the

results found in this study would be likely to be replicated if another equally sized sample had been drawn from the same population; in other words, the results found would be generalizable to other long term prisoners. Whether it would be justified to do this in 1978 is another question which will be considered below.

Generalizability of Findings

Whether one can generalize these results to the effects of imprisonment in general is another question; it may well be that long term inmates are a highly selected group of prisoners, and are not typical of inmates in general. In 1975, for instance (HMSO, 1976), there were on average 38,601 males in custody, of which only 1373 were serving long term sentences (as defined in this study), and it may well be that the small percentage (3.56%) of long term inmates varies considerably from prisoners in general. Looking at reconviction rates, for instance, 47.9% of those released from prison in general had been reconvicted by 1975, but only 7.7% of released "lifers" and 18.2% of released men sentenced to ten years or more had been reconvicted (a χ^2 test reveals this difference is highly significant, $p < .001$). It thus seems that long term inmates are an atypical group of prisoners, and that the question of whether one can generalize from findings with them to prisoners in general is a matter for further research. It may well be, for instance, that they are a more intelligent group of people; it is possible that the more serious crimes (especially property offences) need more intelligence. McClintock and Gibson (1961) point out that 50% of all robberies involving the loss of £10 or less are cleared up, whilst only 15% of those involving over £100 result in a conviction. As well as possibly differing demographically before going to prison, they could well react differently to the experience of imprisonment; as one prisoner who took part in this study remarked "long term inmates treat prison as

their home, so behave better in it, and try to make it a more pleasant place to be in, whilst short term inmates can look forward to life outside, and thus do not care about the prison and their fellow-prisoners".

Implications for Research in Criminology

The fact that this study has found that imprisonment may well have an effect on inmates has implications for a lot of work done in criminology; Eysenck (1977), for instance, carries out a lot of his research on imprisoned criminals, on the assumption that their behaviour will be similar to that of criminals in general. As Feldman (1977) points out, such studies may well be confounding the effects of imprisonment with differences between criminals and non-criminals, and should thus be treated with extreme caution.

Research in Prisons

The Radzinowicz report (HMSO, 1968a) states that "there is in this country still too little research in the field of criminology as a whole. Practically nothing is known about the vital subject of the lasting effects of ... long-term imprisonment, yet pronouncements continue to be made, and very long prison sentences continue to be imposed" (p.71). Other writers, (e.g. Sparks, 1968) have made similar comments, decrying the lack of empirical research in this area.

Partly the reason for this dearth of work is because, as Hood and Sparks (1970) stress, there are considerable "methodological and practical problems in this kind of research in prisons ...; there are numerous difficulties about data collection in prison, and many variables in the institutional setting which are hard to control" (p.216). Another problem, as Kassebaum et al (1971) stress in their book on the effectiveness of prison treatment, is that of "attrition, a major issue in any

longitudinal design" (p.83). The study reported in this thesis came up against just such problems as these, and made some efforts to deal with them; it still may be the case, however, that the reason for the inconclusive nature of the results is that there exists other confounding variables which have yet to be detected.

Despite the existence of variables of this nature, it is contended in this thesis that there is a great necessity to carry out work to assess the consequences of long term imprisonment, and that empirical work based on soundly designed research is still the most likely way in which results can be found that can be generalized to long term prisoners as a whole. As the B.P.S. (1965) stress, "the influence of criminological research upon the development of the penal system has been rather small", and it is argued that this is unfortunate, in that there is a great potential contribution that research can make to this field. Possible future research in this area will be considered below.

Future Research into the Effects of Long Term Imprisonment

Amongst many possibilities are the following:

(a) The evidence is mounting that the number of long term inmates is likely to increase in the next few years; Britain already has more imprisoned people serving life imprisonment than any other Western European Country (Watson, 1975), and thus the question of the effects of long term imprisonment is likely to become a more pressing one. There is also evidence that the nature of prisoners may have changed over the last few years, especially resulting from the recent influx of Irish terrorists (102 at the beginning of 1976 - Humphry and May, 1977); there have undoubtedly been an increase in troubles within prisons, of which the 1976 riot in Hull prison is a good example. In these

circumstances, a study such as the one described in this thesis could justifiably be carried out. Rather than aiming for a replication of this study, such work could rather build upon its findings; the research outlined in this thesis suggests that the areas of psychomotor and verbal skills in particular would be likely to prove significant in such a study. In addition, extreme care should be taken in the selection of the sample, to try to cut down on confounding variables. Social and criminological variables would also seem to merit further research, as would some form of attempt at quantifying prisoners' conceptions of time and the ways in which they see themselves attempting to withstand the possible effects of imprisonment (both areas which Cohen and Taylor, 1972, found to be of interest in their study).

(b) Further research into the differences between prisoners in terms of their current offence may also prove useful, particularly in the looking at the possible aetiology of criminal behaviour; it seems that cognitive test results may add to such a study.

(c) Research into the long term effectiveness of parole could also be done; it is possible that the social and criminological variables in particular may be of use here. There may, for instance, be detectable differences between recidivists and nonrecidivists, which would help in the proper determination of who would be likely to benefit from being granted parole.

(d) It would be possible to mount long-term follow up studies (with the permission of those involved), to look at the extent to which the differences noted on the cognitive test data change with the prisoner leaving prison; are the changes noted likely to be irreversible, or do they change with the passage of time?

(e) As well as using the variables to assess the success of parole, they could also be of possible use in predicting recidivism in general; recidivists may be identifiable on the variables used in this study. Such a finding would again be of use, as it could help in the identifying of those particularly likely to commit further crimes. Such people could be then given extensive after-care etc.

Implications for the Treatment of Long Term Prisoners

Again, there are many implications from this study, including:

(a) An obvious implication from this finding is that cognitive changes occur during long term prison sentences, and these changes may make it harder for a prisoner to work steadily at a job on release; if prison is associated with a decline in psychomotor skills, then such a decline would mean that an ex-prisoner would be less able to perform in a skilled manual occupation than before he was imprisoned. This would lead one to suggest that it would seem to be important that prisoners should be encouraged to work as if they were in outside employment; they should do a working week of normal hours at occupations that are suitable for their level of skills. Such a prison has been set up at Coldingley (Bisley, Surrey), where specific emphasis is laid on the improvement of industrial skills and the development of regular work patterns. The replication of this experiment elsewhere may well prove useful, especially if it includes features such as the ability of workers to change their jobs, be sacked, etc. (as Coldingley does), thereby duplicating outside employment so far as is possible within the confines of prison. It is realized that there is some opposition to such a proposition from trade unions, especially in a time of high unemployment, and thus a careful

choice would have to be made as to which industries to concentrate on.

(b) If prison does lead to an increased emphasis and dependence on verbal skills, then this finding could be built on by improving prison educational facilities, and by encouraging prisoners to make use of them. To some extent, this has occurred over the last few years, when there has been increased expenditure on such facilities, with more vocational and trade training; the growth of prison Open University facilities illustrates this point well. In 1976 (Forster, 1976), there were fourteen prisons designated as Open University centres, with 142 prisoners following courses, achieving a 71% pass rate (as opposed to 75% outside), whilst in 1971, there were only two prisons in which such courses could be attempted. Improving the educational qualifications of prisoners in this fashion might help them to avoid committing further crimes, but it also might make them more embittered if they did not gain employment on release; improved after-care might help with such a problem.

(c) If prisoners convicted of murder or manslaughter tend to be less "criminal" in terms of their past history (as has been indicated above), then segregation of such people might help them to avoid forming criminal associations with some of their fellow prisoners. The prison system has one prison operating experimentally on this basis at Portsmouth, and it would be interesting to extend this experiment.

(d) Realization by the Prison Department that long term imprisonment could have detrimental effects, and that it is important to have some form of "career plan" for prisoners is another implication from this study. As Cohen and Taylor (1972) stress, it appears that realization of the possible effects of long term imprisonment is one step on the

road to withstanding such effects, and discussing such effects may help to alleviate them. The Prison Department has recently attempted to develop "career plans", and to set up special units for long term prisoners, including the setting up of "Main Centres" in Wormwood Scrubs and Wakefield (Watson, 1975) to acclimatise life imprisonment men to the prison system, and to keep a close watch on their reactions to imprisonment. In Scotland, the Barlinnie Prison Special Unit has gained notoriety through the publication of a book about it by a prisoner presently incarcerated in it. Boyle's (1977) book "A Sense of Freedom" suggests that this unit is comparatively successful in changing prisoners for the better, but obviously it is rather early to assess the success of such experiments.

(e) One way to reduce the numbers of people in prison would be for the Parole Board to adopt a more adventurous release policy; as has been mentioned above, the variables used in this study might be of use in the prediction of recidivism. The Parole Board has released slightly more long term prisoners recently; in 1975, for instance (HMSO, 1976), 2807 prisoners were released on parole, of which 96 were "lifers", as opposed to 2288 (49 lifers) in 1974. It may well be that this policy can be beneficially further extended. Informing the prisoners of why they have been refused parole, and giving them suggestions as to how they can make better use of prison facilities is another possible useful alteration.

(f) Allowing prisoners more participation in the running of the prison may also help to overcome some of the effects noted in this study; if they were given more control over their own lives, then this might make the prison conditions more like the "outside world". One could, for instance, have Wing committees, involving staff and prisoners which would meet to discuss prison facilities, meals, hours of work etc.

(g) Helping prisoners to maintain outside contacts might also help prisoners to fit into the community on release; it would possibly help to avoid the likelihood of the prisoner feeling "disengaged" from the "outside world".

(h) Bearing in mind the possibility of detrimental effects of imprisonment must lead one to consider alternatives to such treatment, especially in terms of helping the individual within the community. It is realized, however, that such treatment would be unlikely to be politically acceptable to the community at large, and that also there is a case for incarcerating certain people in as humane conditions as possible, until they can be demonstrated to be of no danger to people in the "outside world".

BIBLIOGRAPHY

- ABRAM, H.S. (1970) "Psychological Aspects of Stress"
Springfield, Illinois: Charles C. Thomas
- ADAIR, J.G. (1973) "The Human Subject"
Boston: Little, Brown and Co.
- AGADZHANIAN, N.A. BIZIN, I.P., DORONTIN, G.P. & KUZNETSOV, A.G. (1963)
Changes in higher nervous activity and in some
negative reactions under prolonged conditions of
adynamia and isolation. In Zubec, J.P. (1969)
"Sensory Deprivation"
New York: Appleton - Century-Crofts.
- ALLEN, R.M. (1947) The test performance of the brain injured.
J. Clin. Psychol. 3, 225-230.
- ANASTASI, A. (1968) "Psychological Testing" 3rd ed.
New York: Macmillan
- ANASTASI, A. (1976) "Psychological Testing" 4th ed.
New York: Macmillan
- ARMISTEAD, N. (1974) "Reconstructing Social Psychology"
London: Penguin Press
- BANISTER, P.A. & SMITH, F.V. (1972)
Vibration - induced white fingers and manipulative
dexterity. Brit. J. Indust. Med. 29, 264-267.
- BERNSTEIN, A.S., KLEIN, E.B., BERGER, L. & COHEN, J. (1965)
Relationship between institutionalization, other
demographic variables, and the structure of in-
telligence in chronic schizophrenics.
J. Cons. Psychol. 29, 320-324.
- BEXTON, WH., HERON, W. & SCOTT, T.H. (1954)
Effects of decreased variation in the sensory
environment. Canad. J. Psychol. 8, 70-76

- BIDERMAN, A.D. (1963) "March to Calumny: The Story of American POWs in the Korean War" New York: Macmillan
- BIRREN, J.E. (1970) Towards an experimental psychology of ageing. Amer. Psychologist. 25, 124-135
- BLUM, J.E., JARVIK, L.F. & CLARK, E.T. (1970) Rate of change on selective tests of intelligence: a 20-year longitudinal study of ageing. J. of Geront. 25, 171-176.
- BOWLBY, J. (1965) "Child Care and the Growth of Love" 2nd ed. London: Penguin Press
- BOYLE, E., APARICIO, A.M., KAYE J & ACKER M. (1975) Auditory and visual memory losses in ageing populations. J. of the Amer. Geriatrics Soc. 23, 284-286.
- BOYLE, J. (1977) "A Sense of Freedom" Glasgow: Canongate Press
- B.P.S. (1965) "Penal Memorandum" London: British Psychological Society
- B.P.S. (1977) Ethical principles for research with human subjects. Bull. Brit. Psychol. Soc. 30, 25-26
- BROMLEY, D.B. (1966) "The Psychology of Human Ageing" London: Penguin Press
- BROWN, R. (1965) "Social Psychology" New York: Free Press
- BURNS, N.M., CHAMBERS R.M. & HENDLER, E. (1963) "Unusual Environments and Human Behaviour" New York: Free Press
- BUROS, O.K. (1949) "The Third Mental Measurements Year Book" New Brunswick: Rutgers University Press
- BUROS, O.K. (1972) "The Seventh Mental Measurements Year Book" Highland Park, N.J.: Gryphon Press
- BUTCHER, H.J. (1968) "Human Intelligence: its Nature and Assessment" London: Methuen

- BUTTERFIELD, E.C. & ZIGLER, E. (1970)
Preinstitutional social deprivation and IQ changes among institutionalized retarded children.
J. Abn. Psychol. 75, 83-89
- CARNEY, F.J. (1967) Predicting recidivism in a medium security correctional institution.
J. Crim. Law, Criminol., Police Sci. 58, 338-348
- CHAPMAN, D. (1968) "Sociology and the Stereotype of the Criminal"
London: Tavistock
- CHODOFF, P. (1970) The German concentration camp as a psychological stress. Arch. Gen. Psychiatry 22, 78-87
- CLARKE, A. & CLARKE, A.D.B. (1976)
"Early Experience - Myth and Evidence"
London: Open Books
- CLAYTON, T. (1970) "Men in Prison"
London: Hamish Hamilton
- CLEMMER, D. (1940) "The Prison Community"
Boston: Christopher Publishing Co.
- CLINARD, M.B. & QUINNEY, E.T. (1967)
"Criminal Behaviour Systems: a Typology"
New York: Holt, Rinehart and Winston
- COHEN, S. & TAYLOR, L. (1972)
"Psychological Survival: the Experience of Long-Term Imprisonment" London: Penguin Press
- COHEN, J. (1957) The factorial structure of the WAIS between early adulthood and old age.
J. of Consulting Psychol. 21, 283-290
- COSTA, L.D., VAUGHAN, H.G., LEVITA, E. & FARBER, N. (1963)
The Purdue Pegboard as a predictor of the presence and laterality of cerebral lesions.
J. Cons. Psychol. 27, 133-137
- COUNCIL OF EUROPE (1967) "The Effectiveness of Punishment and other Measures of Treatment"
London: Council of Europe

- CRONBACH, L.J. (1970) "Essentials of Psychological Testing" 3rd ed.
New York: Harper and Row
- CUMMING, E. (1959) "Disengagement - a Tentative Theory of Ageing"
A.P.A. Symposium.
- CUTHBERT, T.M. (1970) A portfolio of murders.
Brit. J. Psychiatry. 116, 1-10.
- DAVIS, J.M., MCCOURT W.F., COURTNEY J. & SOLOMON P. (1961)
Sensory deprivation, the role of social isolation.
Arch. Gen. Psychiat. 5, 84-90
- DAVIS, L.J. & SWENSON, W.M. (1970)
Factor analysis of the Wechsler Memory Scale.
J. Cons. Clin. Psychol. 35, 430.
- DEIKER, T.E. (1973) WAIS characteristics of indicted male murderers.
Psychol. Rep. 72, 1066.
- EDWARDS, A.L. (1954) "Statistical Methods for the Behavioural Sciences"
New York: Holt, Rinehart and Winston.
- EDWARDS, A.L. (1960) "Experimental Design in Psychological Research"
2nd ed. New York: Holt, Rinehart and Winston
- ELIAS, M.F., ELIAS P.K. & ELIAS J.W. (1977)
"Basic Processes in Adult Developmental Psychology"
Saint Louis: C.V. Mosby Co.
- ELKIN, W.A. (1957) "The English Penal System"
London: Penguin Press
- EYSENCK, H.J. (1967) Intelligence assessment: a theoretical and
experimental approach.
Brit. J. Educ. Psychol. 37, 81-98
- EYSENCK, H.J. (1977) "Crime and Personality" 3rd ed.
London, Paladin Press.
- FELDMAN, M.P. (1977) "Criminal Behaviour: A Psychological Analysis"
New York: Wiley

- FISHER, R.A. (1942) "The Design of Experiments" 3rd ed.
Edinburgh: Oliver and Boyd
- FISKE, D.W. & MADDI, S.R. (1961)
 "Functions of Varied Experience"
Homewood, Illinois: Dorsey Press
- FITCH, J. (1964) "Prison Department Report on Sexual Offenders"
London: Private Circulation
- FITZGERALD, M. (1977) "Prisoners in Revolt"
London: Penguin Press
- FLEISHMAN E.A. & ELLISON G.D. (1962)
 A factor analysis of five manipulative tests.
J. App. Psychol. 46, 96-105.
- FORSTER, W. (1976) Leicester University Report on higher education
in British prisons.
Times Higher Educ. Supp. 25th June 1977
- GIBBONS, D. (1965) "Changing the Lawbreaker"
Englewood Cliffs, New Jersey: Prentice-Hall
- GIBSON, H.B. (1965) "Manual of the Gibson Spiral Maze" 1st ed.
London: University of London Press
- GIBSON, H.B. (1969) The Gibson Spiral Maze Test: re-test data in
relation to behavioural disturbance, personality
and physical measures.
Br. J. of Psychol. 60, 523-528
- GIBSON, H.B. (1976) Personal communication
- GIBSON, H.B. (1977) "Manual of the Gibson Spiral Maze" 2nd ed.
London: University of London Press
- GILBERT, J.G. & LEEVEE, R.F. (1971)
 Patterns of declining memory.
J. of Gerontology 26, 70-75.
- GOFFMAN, E. (1961) "Asylums"
New York: Doubleday and Co.

- GOUGH H.G., WENK E.A. & ROZYNKO V.V. (1965)
Parole outcomes predicted from the CPI, the
MMPI and a Base Expectancy Table.
J. Abn. Psychol. 70, 432-441
- GUERTIN W.H., LADD C.E., FRANK G.H. RABIN A.I. & HIESTER, D.S. (1966)
Research with th Wechsler Intelligence Scales
for Adults, 1960-1965.
Psychol. Bull. 66, 385-409
- GUERTIN W.H., LADD C.E., FRANK G.H., RABIN A.I. & HEISTER, D.S. (1971)
Research with the Wechsler Intelligence Scales
for Adults, 1965-1970.
Psychological Record. 21, 89-339
- HALL WILLIAMS J.E. (1975) "Changing Prisons"
London: Peter Owen
- HEBB, D.O. (1958) The motivating effects of exteroceptive stim-
ulation. Amer. Psychologist 13. 109-113.
- HERON, W. BEXTON W.H. & HEBB D.O. (1953)
Cognitive effects of a decreased variation to
the sensory environment.
Amer. Psychologist 8. 366.
- HEWSON, L. (1949) The W-B scale and the Substitution Test as aids
in neuropsychiatric diagnosis.
J. Nerv. Ment. Dis. 109. 158-183
- HILER, E.W. & NESVIG, D. (1961)
Changes in intellectual functions of children
in a psychiatric hospital.
J. Consul. Psychol. 25, 288-292
- H.M.S.O. (1964) "Prison Rules"
London: H.M.S.O.
- H.M.S.O. (1965) "Adult Offender"
London: H.M.S.O.
- H.M.S.O. (1966) "Report of the Inquiry into Prison Escapes and
Security" London: H.M.S.O.
- H.M.S.O. (1968a) "The Regime for Long-Term Prisoners in Conditions
of Maximum Security" London: H.M.S.O.

- H.M.S.O. (1968b) "The Treatment of Offenders in Britain"
London: H.M.S.O.
- H.M.S.O. (1969a) "People in Prison (England and Wales)"
London: H.M.S.O.
- H.M.S.O. (1969b) "Report of the Parole Board for 1968"
London: H.M.S.O.
- H.M.S.O. (1970) "Report of the Parole Board for 1969"
London: H.M.S.O.
- H.M.S.O. (1971) "Report on the Work of the Prison Department 1970"
London: H.M.S.O.
- H.M.S.O. (1972) "Report of the Parole Board for 1971"
London: H.M.S.O.
- H.M.S.O. (1976) "Report of the Parole Board for 1975"
London: H.M.S.O.
- HOCKING, F. (1965) Human reactions to extreme environmental stress.
Medical J. of Australia 2, 477-483.
- HOOD R. & SPARKS R. (1970) "Key Issues in Criminology"
London: World University Library
- HORN, J.L. (1975) Psychometric studies of ageing and intelligence.
In Gershon, S. & Raskind A. "Aging Volume Two"
New York: Raven Press
- HOWARD, D.L. (1960) "The English Prisons"
London: Methuen
- HUMPHRY, D. & MAY, D. (1977)
Why the prisons could explode.
Sunday Times, 23rd January 1977. p. 12.
- INDUSTRIAL INJURIES ADVISORY COUNCIL (1970)
"Vibration Syndrome"
London: H.M.S.O.
- JENSEN, A.R. (1969) How much can we boost IQ and scholastic achievement?
Harvard Educ. Rev. 39, 1-123.

- JONES, H. (1965) "Crime in a Changing Society"
London: Penguin Press
- KAHN, M.W. (1968) Superior Performance IQ of murderers as a function of overt act or diagnosis.
J. Social Psychol. 76, 113-116
- KASSEBAUM, G., WARD D. & WILNER D. (1971)
"Prison Treatment and Parole Survival"
New York: Wiley
- KLEIN, H. ZELLERMAYER J. & SHANAN J. (1963)
Former concentration camp inmates on a psychiatric ward.
Arch. Gen. Psychiat. 8, 334-342
- KRAL V.A., PAZDER L.H. & WIGDOV B.T. (1967)
Long-term effects of a prolonged stress experience.
Canad. Psychiat. Ass. J. 12, 175-181
- LA PLANTE, J. (1969) Les effets psychologiques de la detention.
Laval Medical 40, 1057-1061
- LEVIN, B. (1971) The Times, 29th July 1971.
- LEVINSON, B.M. (1963) Wechsler M-F Index.
J. General Psychol. 69, 217-220.
- LIEBERMAN, MA. (1969) Institutionization of the aged: effects on behaviour.
J. of Geront. 24, 330-340.
- LIEBERMAN M.A., PROCK V.N. & TOBIN S.S. (1968)
Psychological effects of institutionalization.
J. of Geront. 23, 343-353.
- LIKERT, R. & QUASHA, W.H. (1941)
"Minnesota Paper Form Board Manual"
New York: The Psychological Corporation
- LINDSLEY, D.B. (1961) Common factors in sensory deprivation, sensory distortion, and sensory overload. In Solomon P. et al, "Sensory Deprivation".
Cambridge: Harvard University Press

- LUCHTERHAND, E. (1970) Early and late effects of imprisonment in a Nazi concentration camp.
Social Psychiat. 5, 102-110
- MAHER, B.A. (1966) "Principles of Psychopathology"
New York: McGraw Hill.
- MARTIN P.L. & BARRY J.R. (1969)
A prediction of recidivism.
Correct Psychol. 3. 6-13
- MASLING J. (1966) Role-related behaviour of the subject and psychologist and its effects upon psychological data. In Levine, D. (ed) "Nebraska Symposium on Motivation Vol.14"
Lincoln, Nebraska: Univ. of Nebraska Press
- MATARAZZO, J.D. (1972) "Wechsler's Measurement and Appraisal of Adult Intelligence". Baltimore: Williams and Wilkins.
- MAXWELL, A.E. (1961) Trends in cognitive ability in the older age ranges.
J. Abn. & Soc. Psychol. 63. 449-452
- MAYS, J.B. (1970) "Crime and its treatment"
London: Longman
- McCALLUM, R.I. (1971) Vibration Syndrome
Brit. J. Industr. Med. 28, 90-93
- McCARTHY D, ANTHONY R.J. & DOMINO G. (1970)
A comparison of the CPI, Franch, MMPI and WAIS M-F Indexes.
J. Cons. Clin. Psychol. 35, 414-416.
- McCLINTOCK, F.H. & GIBSON E. (1961)
"Robbery in London"
London: Methuen
- McGHIE, A. CHAPMAN J, & LAWSON J.S. (1965)
Changes in immediate memory with age.
Brit. J. of Psychol. 56, 69-75.
- MORGAN, D.W. (1966) WAIS 'Analytic Index' and rehospitalization of schizophrenic servicemen.
J. Cons. Psychol. 30, 267-269

- MORRIS, P. (1965) "Prisoners and their Families"
London: Allen and Unwin
- MORRIS, T. & MORRIS, P. (1963) "'Pentonville'; a Sociological Study of an English Prison"
London: Routledge & Kegan Paul
- MURRELL, F.H. (1970) The effect of extensive practice on age differences in reaction time.
J. of Geront. 25, 268-274
- NAGATSUKA, Y. & SUZUKI, Y. (1964) Studies on sensory deprivation.
Tohoku Psychologica Folia. 22, 64-68
- NEWMAN, P.H. (1944) The prisoner of war mentality.
Brit. Medical J. 8-10
- N.F.E.R. (1976) "Test Agency Catalogue"
Slough: National Foundation for Education Research
- ODEN, M.H. (1968) The fulfilment of promise: 40-year follow-up of the Terman gifted group. Genetic Psychol. Monographs. 77, 3-93
- ORNE, M.T. (1962) On the social psychology of the psychological experiment: with particular reference to demand characteristics and their implications.
Amer. Psychologist. 17, 776-783.
- OXFORD ENGLISH DICTIONARY (1976) "The Concise Oxford Dictionary", 6th ed.
Oxford: University Press
- PETERS, J., BENJAMIN F.B., HELVEY W.M. & ALBRIGHT, G.A. (1963). A study of sensory deprivation, pain and personality relationships for space travel.
Aerospace Med. 34, 830-837
- PICKERING, I.G.W. (1966) Problems of the long term prisoner.
Medico-Legal J. 159-167.

- PLAYFAIR, G. & SINGTON, D. (1965)
"Crime, Punishment and Cure"
 London: Secker and Warburg
- PORTEUS, S.D. (1959) "The Maze Test and Clinical Psychology"
 Palo Alto, California: Pacific Books
- PRENTICE, N.M. & KELLY, F.J. (1963)
 Intelligence and delinquency: a reconsideration.
J. Soc. Psychol. 60, 327.
- PROCK, V.N. (1969) Effects of institutionalization: a comparison of
 community, waiting list, and institutionalized
 aged persons.
Amer. J. of Public Health. 59, 1837-1844.
- RANKIN, R. & THOMPSON, K. (1966)
 A factorial investigation of scores on the
 Porteus Maze.
Perc. & Mot. Skills 23, 1255-1260
- RAVEN, J.C. (1966) Review of the Gibson Spiral Maze test.
Brit. J. Psychol. 57, 471.
- ROCHFORD, G. (1974) Violating the principle of informed consent.
Bull. Brit. Psychol. Soc. 27, 485-492.
- ROSENBERG, M.J. (1969) The conditions and consequences of evaluation
 apprehension. In Rosenthal, R. & Rosnow, R.L.
"Artifact in Behavioural Research"
 New York: Academic Press.
- ROSENTHAL, R. & ROSNOW, R.L. (1969)
"Artifact in Behavioural Research",
 New York: Academic Press.
- ROSENTHAL, R. (1966) "Experimenter Effects in Behavioural Research"
 New York: Appleton-Century-Crofts.
- ROSS, J.A. (1964) Influence of hospitalization on simple reaction
 time. Percept. & Mot. Skills. 18, 865-868
- ROYAL COMMISSION ON CAPITAL PUNISHMENT (1953)
 London: H.M.S.O.

- RUFF, C.F. TEMPLER, D.I. & AYERS, J.L. (1976)
WAIS IQs of sexual offenders.
Arch. of Sexual Beh. 5, 327-329.
- SAVAGE, R.D. GABER, L.B., BRITTON, P.G., BOLTON N. & COOPER, A. (1977)
"Personality and Adjustment in the Aged"
London: Academic Press.
- SCHAIE, K.W. (1974) Translations in gerontology - from lab to life;
intellectual functioning.
Amer. Psychologist, 29, 802-807.
- SCHALLING, D. & ROSEN, A.S. (1968)
Porteus Maze differences between psychopathic
and non-psychopathic criminals.
Brit. J. Soc. & Clin. Psychol. 7, 224-228.
- SCHALLING, D. & ROSEN, A.S. (1970)
A note on Porteus Q score and the construct of
psychopathy.
Univ. of Stockholm Psychol. Lab. Rep. 307
- SCHRAG, C. (1961) A preliminary criminal typology.
Pacific Social Rev. 4, 12.
- SCHULTZ, D.P. (1965) "Sensory Restriction: Effects on Behaviour"
New York: Academic Press.
- SCHWARTZ, M.I. (1966) The scoring of WAIS comprehension responses by
experienced and inexperienced judges.
J. Clin. Psychol. 22, 425-7.
- SCOTT, T.H., BEXTON, W.H., HERON, W. & DOANE B.K. (1959)
Cognitive effects of perceptual isolation.
Canad. J. Psychol. 13, 200-209.
- SHAW, D.J. (1965) Sexual bias in the W.A.I.S.
J. Cons. Psychol. 29, 590-1.
- SHERWOOD, D. (1972) Prison as a last resort.
Prison Service Journal 5, 8-9
- SHOTTER, J. (1975) "Images of Man in Psychological Research"
London: Methuen

- SILVERMAN, J. BERG P.S.D. & KANTOR, R. (1966)
Some perceptual correlates of institutionalization.
J. of Nerv. & Mental Diseases. 141, 651-657.
- SILVERSTEIN, A.B. (1969) An alternative factor analytic solution for Wechsler's Intelligence Scales.
Educ. & Psychological Measurement 29, 763-767.
- SMITH, E.E. (1967) "Choice Reaction Time"
Washington: Private Paper
- SOLOMON, P., LEIDERMAN P.H., MENDELSON J. & WEXLER, D. (1961)
Sensory deprivation: a review.
Amer. J. Psychiat. 114, 357-363.
- SPARKS, R.F. (1968) Problems concerning the confinement of long term prisoners; a survey of the literature.
Cambridge: Private paper.
- STRÖM, A. (1962) Examination of Norwegian ex-concentration camp prisoners.
J. of Neuropsychiat. 4, 43-62.
- SYKES, G.M. (1958) "The Society of Captives".
New Jersey: Princetown Univ. Press
- TALLAND, G.A. (1968) "Disorders of memory and learning"
London: Penguin Press.
- TAUB, H.A. & WALKER, J.B. (1970)
Short-term memory as a function of age and response interference.
J. of Gerontology. 25, 177-183.
- TAYLOR, A.J.W. (1960) The effects of imprisonment.
Br. J. Criminol. 1, 64-69.
- TAYLOR, A.J.W. (1961) Social Isolation and Imprisonment.
Psychiatry 24, 373-376
- TAYLOR, A.J.W. (1969) Ability, stability and social adjustment among Scott Base personnel, Antarctica.
Occup. Psychol. 43, 81-93.

- TEICHNER, W.H. (1954) Recent studies of simple reaction time.
Psychol. Bull. 51, 128-149.
- TIFFIN, J. (1968) "Purdue Pegboard examiner manual"
Chicago: Science Research Associates, Inc.
- TONG, J.E. KNOTT, V.J., McGRAW D.F., & LEIGH, G. (1974)
Smoking and human experimental psychology.
Bull. Brit. Psychol. Soc. 27, 533-538.
- U.S.E.S. (1970) "Manual for the USES General Aptitude Test Battery"
Washington, D.C.: U.S. Employment Service
- VERNET, R.P.J. (1966) Enquete sur la detention de longue duree dans
les pays d'Europe qui ont aboli la peine de mort.
Annee Medicale et Legale. 46, 356-360.
- VERNON, J. (1966) "Inside the Black Room; Studies of Sensory Deprivation"
London: Penguin Press
- WALKER, N. (1971) "Sentencing in a Rational Society"
London: Penguin Press
- WALKER, N. & McCABE, S. (1973) "Crime and Insanity in England Volume Two"
Edinburgh: Edinburgh Univ. Press
- WALTERS, R.H., MARSHALL, W.E. & SHOOTER, J.R. (1960)
Anxiety, isolation and susceptibility to social
influence.
J. Personality 28. 518-529.
- WATSON, P. (1975) Inside prison: a life sentence.
Sunday Times, 2nd November 1975, p. 15.
- WECHSLER, D. (1944) "Measurement of Adult Intelligence" 3rd ed.
Baltimore: Williams and Wilkins.
- WECHSLER, D. (1945) A standardized memory scale for clinical use.
J. of Psychol. 19, 87-95.

- WECHSLER, D. (1955) "Manual for the Wechsler Adult Intelligence Scale"
New York: The Psychological Corporation.
- WECHSLER, D. (1958) "The Measurement and Appraisal of Adult Intelligence. 4th ed.
Baltimore: Williams and Wilkins.
- WECHSLER, D. & STONE C.P. (1945) "Wechsler Memory Scale Manual"
New York: The Psychological Corporation
- WELFORD, AT (1958) "Ageing and Human Skill"
Oxford: Oxford University Press
- WESMAN, A.G. (1968) Intelligent testing.
Amer. Psychologist. 23, 267-274.
- WEST, D.J. (1963) "The Habitual Prisoner"
London: Macmillan
- WHEELER, S. (1961) Socialization in correctional communities.
Amer. Sociol. Rev. 26, 697.
- WHITTING, H.T.A., JOHNSON G.F. & PAGE, M. (1969)
The Gibson Spiral Maze as a possible screening device for minimal brain damage.
Br. J. Soc. & Clin. Psychol. 8. 164-168
- WILKINS, L.T. (1958) A small comparative study of the results of probation.
Br. J. Delinq. 8, 201-209.
- WILLIAMS, M. (1968) The measurement of memory in clinical practice.
Brit. J. Soc. Clin. Psychol. 7, 19-34.
- WOODWARD, M. (1963) "Low Intelligence and Delinquency" 2nd ed.
New York: Institute for the Study and Treatment of Delinquents.
- YOUNGMAN, M.B. (1971) "Programmed Methods for Multivariate Data"
Lancaster: Department of Educational Research, University of Lancaster.

- ZUBEC, J.P. (1969) "Sensory Deprivation: Fifteen Years of Research"
New York: Appleton - Century - Crofts.
- ZUBEC, J.P., AFTANAS, M., HASEK, J. SANSOM, W., SCHLUDERMAN, E., WILGOSH, L
& WINOCUR, G. (1962) Intellectual and perceptual changes during
prolonged perceptual deprivation; low illumination
and noise level.
Perc. and Motor Skills Monograph Supp. 15,171-198.
- ZUBEC, J.P., SANSOM, W. & PRYSIAZNUIK, A. (1960)
Intellectual changes during prolonged perceptual
isolation (darkness and silence).
Canad. J. Psychol. 14, 233-243.

APPENDICES

INDEX	PAGE
Appendix 1: Summary of results x present sentence	267
Appendix 2: Tests used	
(i) Reaction Time subject's apparatus sketches and order of stimuli presentation	270
(ii) Gibson Spiral Maze	272
(iii) Gibson Spiral Maze regression data used to calculate Errors partialled out with respect to Time	273
(iv) G.A.T.B. Form Matching test	274
(v) G.A.T.B. Form Matching answer sheet	276
(vi) Visual Reproduction test	277
(vii) Associate Learning test	278
(viii) Purdue Pegboard pilot study results	281
(ix) W.A.I.S. blank form	283
Appendix 3: Summary of results x total imprisonment	287
(i) First Cross Sectional Results	287
(ii) Longitudinal Results	290
(iii) Second Cross Sectional Results	292
(iv) Prisoners Released x Prisoners Detained	295
(v) Control Group Results	297

Appendix 1: Summary of results x present sentence

<u>Date of admission on present sentence</u>		<u>1967/68</u>	<u>1965/66</u>	<u>1963/64</u>	<u>1961/62</u>
N		50	50	50	50
Reaction Time:	Simple (mean)	0.26	0.26	0.27	0.28
	(s.d.)	0.05	0.05	0.06	0.09
	Choice	0.37	0.37	0.37	0.39
		0.06	0.07	0.07	0.13
	Reversed Choice	0.52	0.47	0.51	0.49
		0.12	0.15	0.12	0.16
Gibson Spiral Maze:					
	Time	45.51	43.74	46.40	43.31
		11.72	14.84	12.15	13.90
	Errors	10.02	12.02	9.24	9.70
		11.07	9.60	8.86	7.97
	Errors (time partialled out)	48.32	50.62	47.14	45.24
		22.62	30.45	19.20	21.27
	Time ² + Errors ²	2425.60	2365.04	2452.82	2228.44
		855.10	1628.00	1165.00	1437.00
	Breaks	0.64	0.36	0.40	0.24
		1.16	0.72	1.03	0.69
G.A.T.B. Form Matching		29.24	29.20	30.04	29.48
		6.90	9.94	7.45	7.43
Wechsler Memory Scale:					
	Associate Learning	13.82	14.82	14.78	15.23
		3.69	3.51	3.54	3.14
	Visual Reproduction	9.84	10.34	8.66	9.56
		2.85	2.60	3.20	2.53

Appendix 1 (continued)

	<u>1967/68</u>	<u>1965/66</u>	<u>1963/64</u>	<u>1961/62</u>
Purdue Pegboard:				
Simple Practice	14.34	15.08	14.84	15.12
	1.76	2.28	2.02	2.13
Dominant Hand	15.54	16.34	15.68	16.08
	1.55	2.21	1.96	2.07
Non-Dominant Hand	14.50	14.82	14.30	14.46
	1.76	1.93	1.74	1.91
Both Hands	11.70	12.28	11.58	11.92
	1.56	1.58	1.64	1.72
Total Simple (D + N-D + B)	41.74	43.44	41.56	42.46
	4.14	5.10	4.50	4.87
Assembly Trial I	34.08	36.08	33.92	34.22
	5.52	6.89	7.57	6.25
Assembly Trial II	37.08	39.16	38.58	37.52
	6.01	6.17	7.23	6.02
Total Assembly (I + II)	71.16	75.24	72.50	71.74
	11.28	12.45	14.32	11.75
W.A.I.S.				
Information	11.20	11.26	11.78	11.96
	2.81	2.69	2.67	2.34
Comprehension	12.00	12.12	13.54	12.74
	3.51	3.09	3.20	2.78
Arithmetic	11.04	11.70	11.50	11.34
	3.15	2.92	3.28	2.78
Similarities	11.22	11.10	11.78	11.60
	2.15	2.60	2.10	1.97
Digit Span	9.94	10.34	11.28	10.46
	3.20	3.11	3.36	2.84

Appendix 1 (continued)

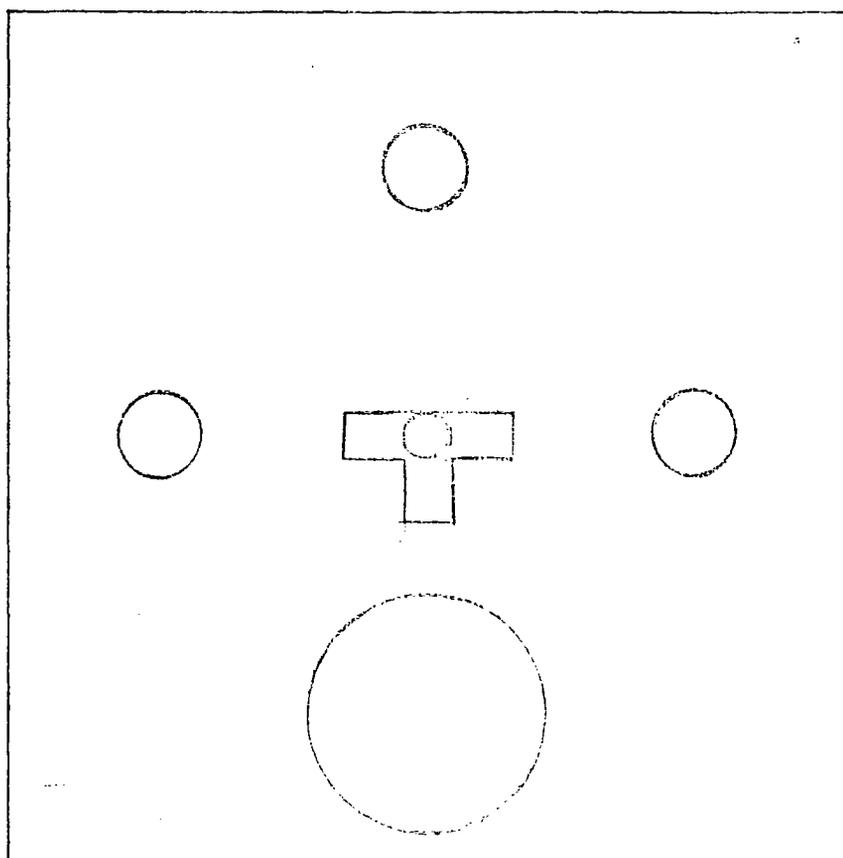
	<u>1967/68</u>	<u>1965/66</u>	<u>1963/64</u>	<u>1961/62</u>
Vocabulary	10.94	10.92	11.74	11.52
	2.94	2.51	2.37	2.36
Digit Symbol	8.92	9.18	9.18	8.94
	2.42	2.79	2.33	2.36
Picture Completion	12.22	12.20	12.60	12.52
	2.28	3.18	3.08	2.76
Block Design	11.02	11.48	11.56	11.64
	2.60	3.13	2.95	2.88
Picture Arrangement	10.10	10.56	10.14	10.80
	2.12	3.29	2.26	2.63
Object Assembly	9.60	10.60	10.42	10.78
	2.13	2.63	2.53	2.89
Verbal I.Q.	106.16	107.44	111.70	109.66
	14.41	13.12	13.38	11.66
Performance I.Q.	106.56	109.24	109.56	110.76
	11.15	14.86	12.44	11.67
Full Scale I.Q.	106.82	108.72	111.48	110.72
	12.69	13.41	12.46	10.27
Verbal-Performance Discrepancy	- 0.40	- 1.80	2.14	- 1.10
	10.84	11.59	11.07	13.10
Analytic Index	34.18	36.00	35.90	36.54
	5.53	7.01	6.47	6.54
Deterioration Index	3.03	2.41	2.20	4.80
	11.40	14.53	12.86	11.44
Masculinity/Femininity	2.58	3.36	2.00	2.74
	3.39	3.75	4.44	4.14

Appendix 2: Tests used

(i) Reaction Time subject's apparatus sketches

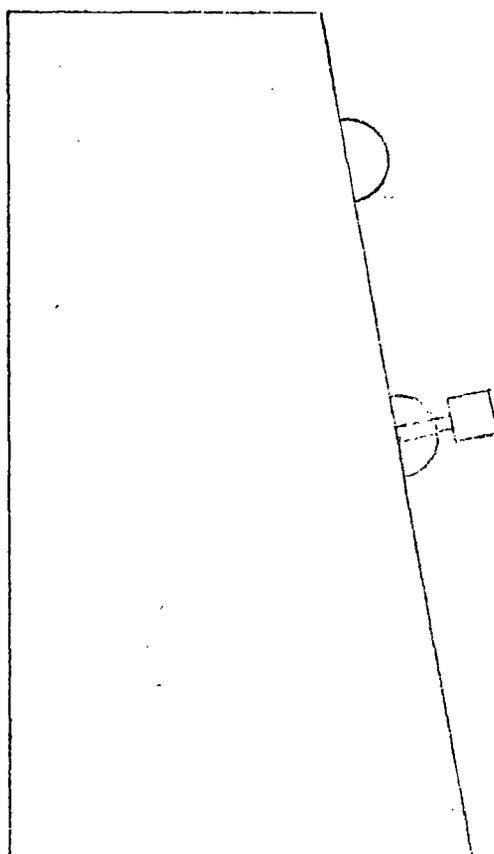
(a) Front view

White Light

Red Light
Subject's Lever
Green LightSpace for
Loudspeaker
(not utilized)

(b) Side View

Scale 1:2



Reaction Time: Order of stimuli presentation

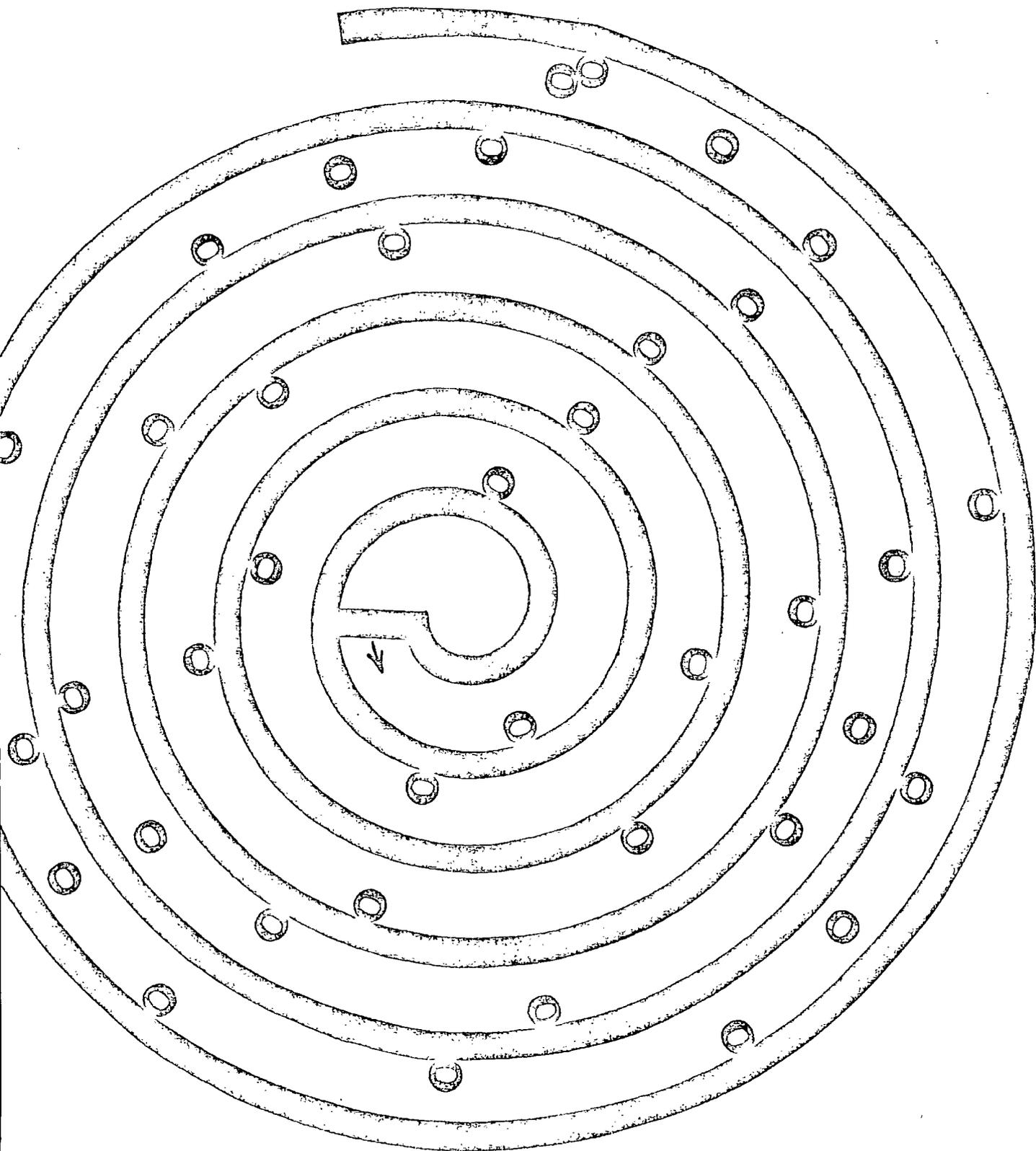
(a) Choice Reaction Time

Trial	1	Green
	2	Green
	3	Red
	4	Green
	5	Red
	6	Red
	7	Red
	8	Red
	9	Green
	10	Green

(b) Reversed Choice Reaction Time

Trial	1	Green
	2	Green
	3	Green
	4	Red
	5	Red
	6	Green
	7	Red
	8	Red
	9	Red
	10	Green

(ii) Gibson Spiral Maze.



Please note that the maze has been slightly truncated so as to permit it fitting in an A4 format; the complete maze is 135cm in length.

(iii) Gibson Spiral Maze regression data used to calculate Errors partialled out with respect to Time

Time		Errors	
Raw Score	Percentile	Predicted Score (in Percentiles)	Raw Score
		95	27.5
		90	22
		85	19
		80	17
25	5	76	15
30	10	73	13.5
32	15	70	13
33	20	67	12
35	25	64	12
37	30	61	11
38	35	58	10
40	40	56	10
41	45	53	9
43	50	50	9
44	55	47	8
46	60	44	7.5
47	65	41	7
49	70	38	6.5
51	75	35	6
54	80	32	5.5
57	85	29	5
60	90	27	4.5
72	95	24	4
		20	3.5
		15	2
		10	1.5
		5	.5

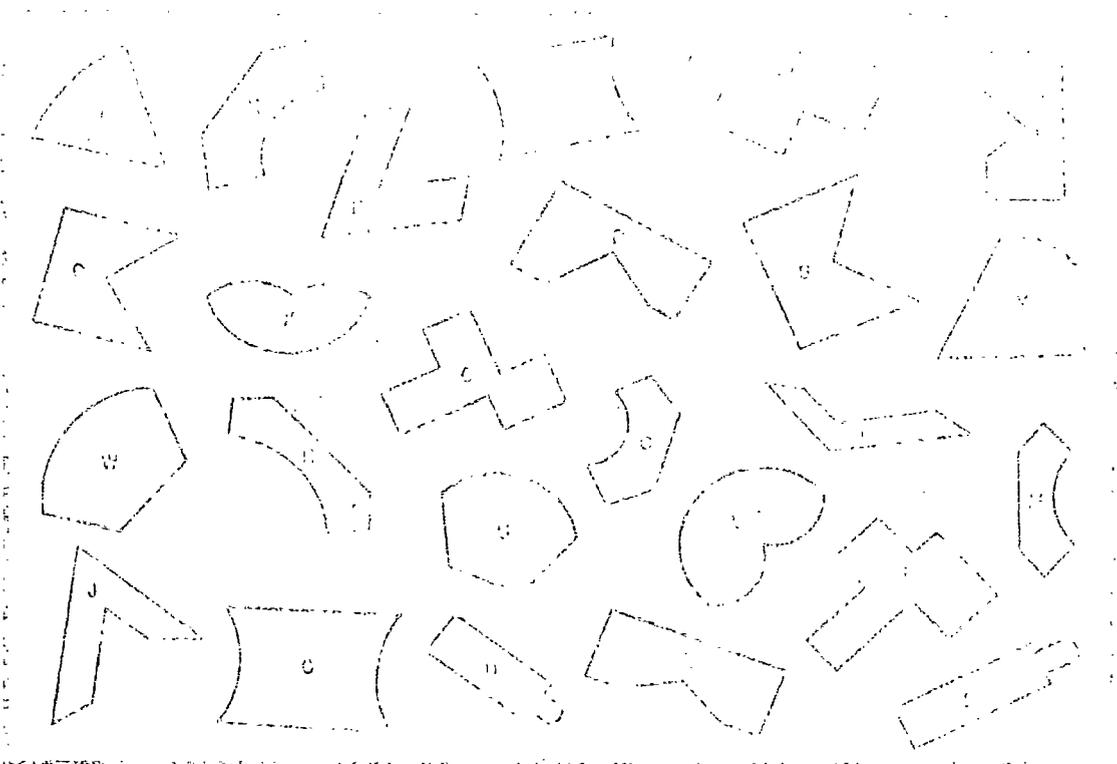
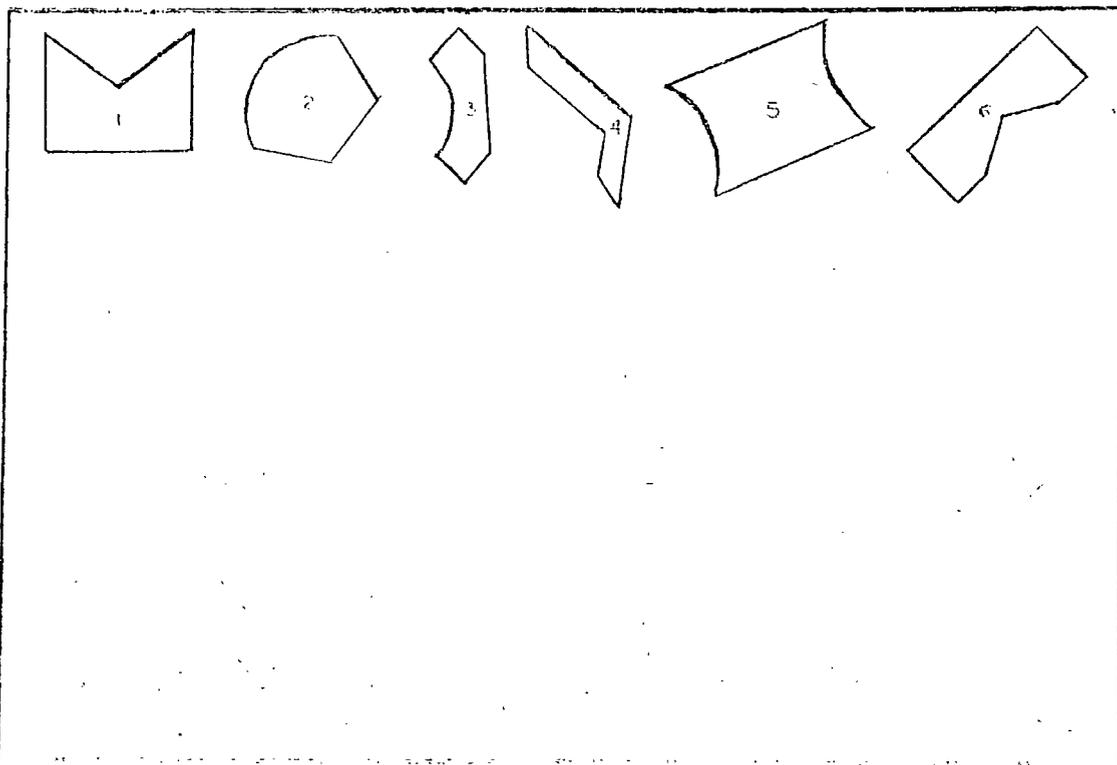
(regression formula $\bar{Y} = -.58X + 79$)

The adjusted Error score is calculated (see Gibson, 1977) in percentiles, as follows:

$$E(T) = 50 - (\text{expected error score} - \text{actual error score})$$

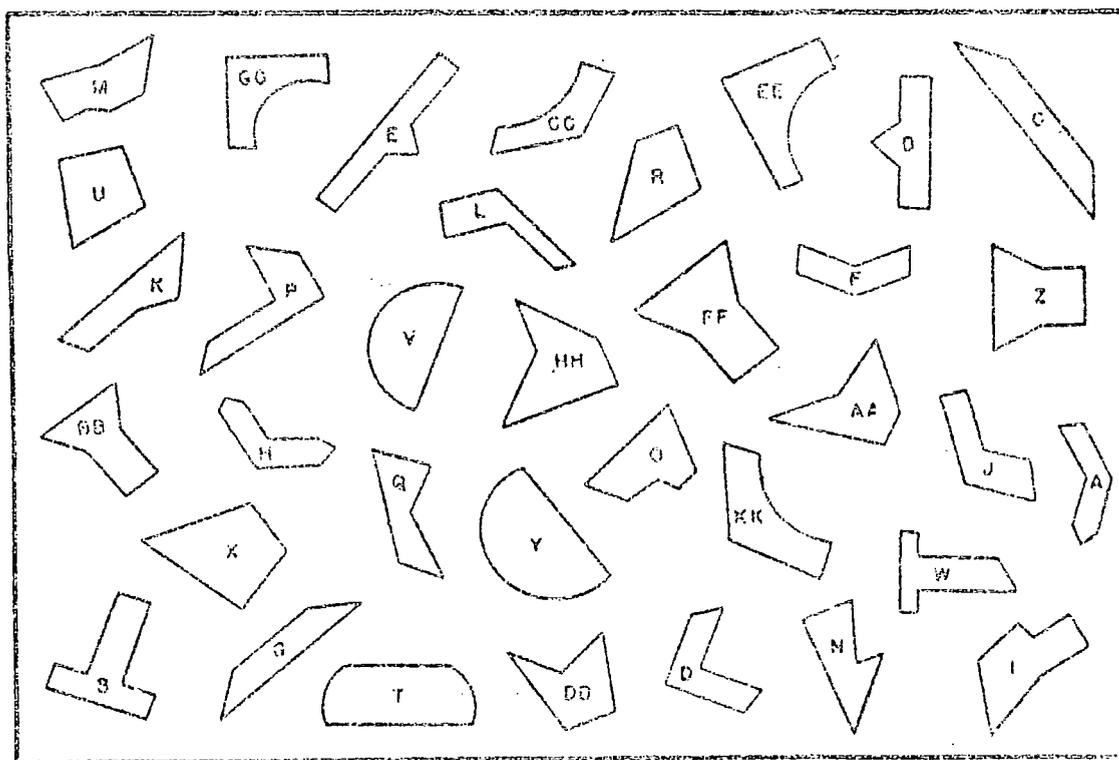
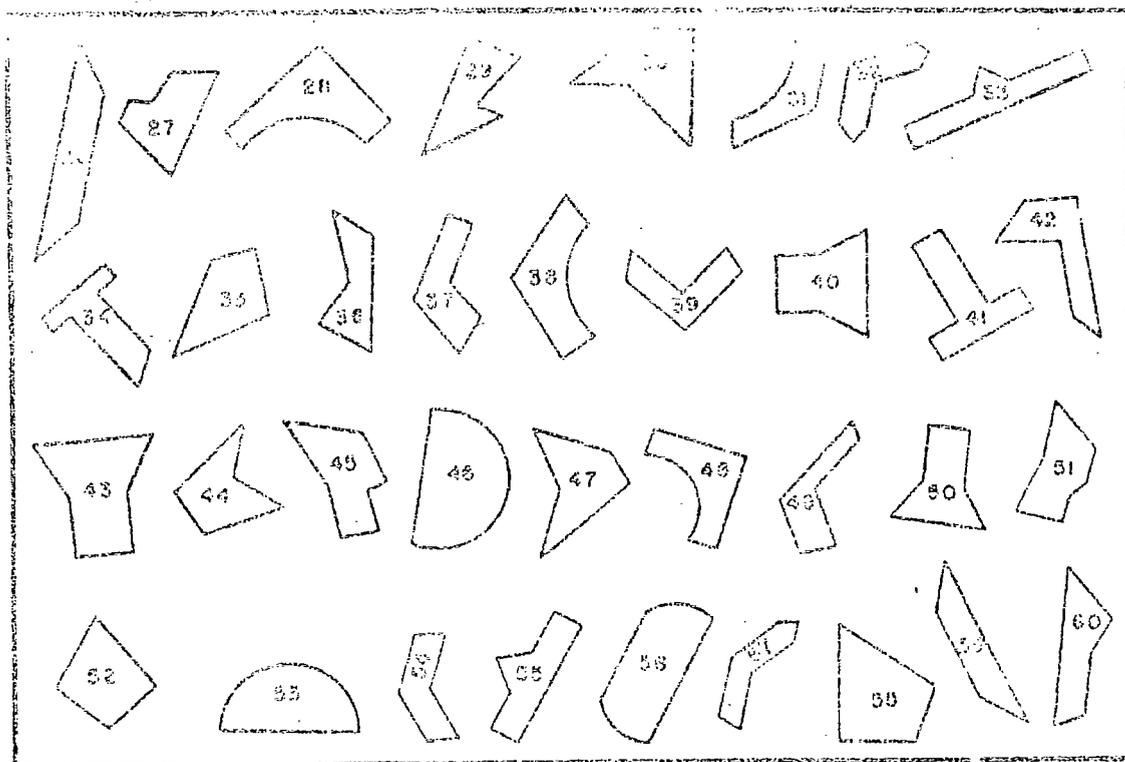
(iv) G.A.T.B. Form Matching test

Part one



(iv) G.A.T.B. Form Matching test

Part two

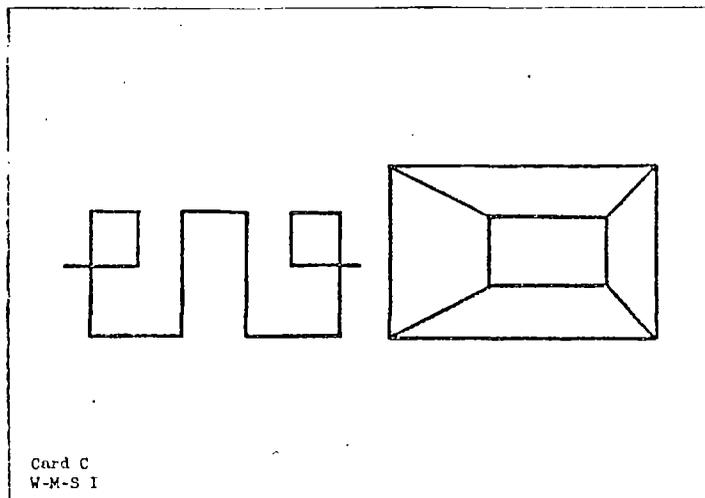
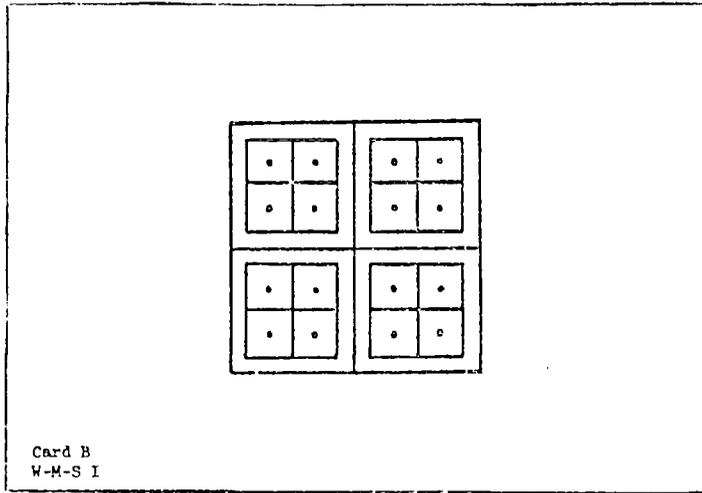
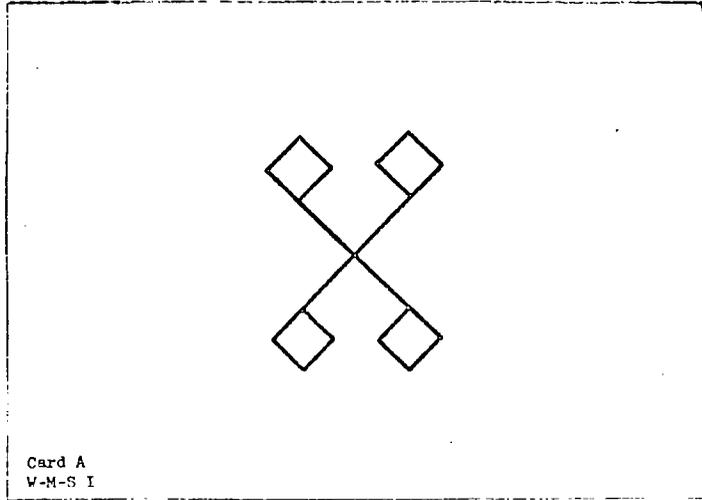


G.A.T.B. SPATIAL TEST

Answer Sheet

1	.....	31	.....
2	.....	32	.....
3	.....	33	.....
4	.....	34	.....
5	.....	35	.....
6	.....	36	.....
7	.....	37	.....
8	.....	38	.....
9	.....	39	.....
10	.....	40	.....
11	.....	41	.....
12	.....	42	.....
13	.....	43	.....
14	.....	44	.....
15	.....	45	.....
16	.....	46	.....
17	.....	47	.....
18	.....	48	.....
19	.....	49	.....
20	.....	50	.....
21	.....	51	.....
22	.....	52	.....
23	.....	53	.....
24	.....	54	.....
25	.....	55	.....
26	.....	56	.....
27	.....	57	.....
28	.....	58	.....
29	.....	59	.....
30	.....	60	.....

(vi) Visual Reproduction test



(vii) Associate Learning test

(a) The "Easy" Associates:

Metal - Iron
 Baby - Cries
 North - South
 Rose - Flower
 Up - Down
 Fruit - Apple

(b) The "Hard" Associates:

Crush - Dark
 School - Grocery
 Obey - Inch
 Cabbage - Pen

(c) Order of presentation and recall

(i) First trial: presentation

Metal - Iron
 Baby - Cries
 Crush - Dark
 North - South
 School - Grocery
 Rose - Flower
 Up - Down
 Obey - Inch
 Fruit - Apple
 Cabbage - Pen

(ii) First Trial: recall

North

Fruit

Obey

Rose

Baby

Up

Cabbage

Metal

School

Crush

(iii) Second Trial: presentation

Rose - Flower

Obey - Inch

North - South

Cabbage - Pen

Up - Down

Fruit - Apple

School - Grocery

Metal - Iron

Crush - Dark

Baby - Cries

(iv) Second Trial: recall

Cabbage

Baby

Metal

School

Up
 Rose
 Obey
 Fruit
 Crush
 North

(v) Third Trial: presentation

Baby - Cries
 Obey - Inch
 North - South
 School - Grocery
 Rose - Flower
 Cabbage - Pen
 Up - Down
 Fruit - Apple
 Crush - Dark
 Metal - Iron

(vi) Third Trial: recall

Obey
 Fruit
 Baby
 Metal
 Crush
 School
 Rose
 North
 Cabbage
 Up

(viii) Purdue Pegboard pilot study results

Three trials on each subtest were completed by 20 subjects; the results, using analysis of variance, were as follows:

(a) Dominant Hand

	SS	df	MS
Total	326.40	59	-
Conditions	9.10	2	4.55
Subjects	236.07	19	-
Subjects x Conditions	81.23	38	2.14

$$F_{2,38} = 2.1286^{NS}$$

(b) Non-Dominant Hand

	SS	df	MS
Total	234.98	59	-
Conditions	1.63	2	0.82
Subjects	215.65	19	-
Subjects x Conditions	17.70	38	0.47

$$F_{2,38} = 1.7397^{NS}$$

(c) Both Hands

	SS	df	MS
Total	136.18	59	-
Conditions	1.03	2	0.52
Subjects	83.52	19	-
Subjects x Conditions	51.63	38	1.36

$$F_{2,38} = 0.3802^{NS}$$

As there were no significant differences between the subjects' performance over three trials on the Purdue Pegboard "simple" subtests, it was decided to only give one trial on each of these subtests.

(d) Assembly

	SS	df	MS
Total	2560.56	59	-
Conditions	41.00	2	20.50
Subjects	2375.23	19	-
Subjects x Conditions	144.33	38	3.70

$$F_{2,38} = 5.5450^{xx}$$

(significant at the 0.01 level)

Closer analysis of this result indicated that the significant result was the result of an improvement over the first two trials, as follows:

	Average Score	I-test results
Trial I	32.92	x (significant at the .05 level)
Trial II	34.40	
Trial III	34.90	NS

It was thus decided to give two trials on the assembly subtest.

WAIS RECORD FORM

Wechsler Adult Intelligence Scale

Name _____

Birth Date _____ Age _____ Sex _____ Marital: S M D W
NO. DAY YR. CIRCLE ONE

Nat. _____ Color _____ Tested by _____

Place of Examination _____ Date _____

Occupation _____ Education _____

TABLE OF SCALED SCORE EQUIVALENTS*

RAW SCORE											Scaled Score
Information	Comprehension	Arithmetic	Similarities	Digit Span	Vocabulary	Digit Symbol	Picture Completion	Block Design	Picture Arrangement	Object Assembly	
29	27-28		26	17	78-80	87-90					19
28	26		25		76-77	83-86	21		36	44	18
27	25	18	24		74-75	79-82		48	35	43	17
26	24	17	23	16	71-73	76-78	20	47	34	42	16
25	23	16	22	15	67-70	72-75		46	33	41	15
23-24	22	15	21	14	63-66	69-71	19	44-45	32	40	14
21-22	21	14	19-20		59-62	66-68	18	42-43	30-31	38-39	13
19-20	20	13	17-18	13	54-58	62-65	17	39-41	28-29	36-37	12
17-18	19	12	15-16	12	47-53	58-61	15-16	35-38	26-27	34-35	11
15-16	17-18	11	13-14	11	40-46	52-57	14	31-34	23-25	31-33	10
13-14	15-16	10	11-12	10	32-39	47-51	12-13	28-30	20-22	28-30	9
11-12	14	9	9-10		26-31	41-46	10-11	25-27	18-19	25-27	8
9-10	12-13	7-8	7-8	9	22-25	35-40	8-9	21-24	15-17	22-24	7
7-8	10-11	6	5-6	8	18-21	29-34	6-7	17-20	12-14	19-21	6
5-6	8-9	5	4		14-17	23-28	5	13-16	9-11	15-18	5
4	6-7	4	3	7	11-13	18-22	4	10-12	8	11-14	4
3	5	3	2		10	15-17	3	6-9	7	8-10	3
2	4	2	1	6	9	13-14	2	3-5	6	5-7	2
1	3	1		4-5	8	12	1	2	5	3-4	1
0	0-2	0	0	0-3	0-7	0-11	0	0-1	0-4	0-2	0

SUMMARY		
TEST	Raw Score	Scaled Score
Information		
Comprehension		
Arithmetic		
Similarities		
Digit Span		
Vocabulary		
Verbal Score		
Digit Symbol		
Picture Completion		
Block Design		
Picture Arrangement		
Object Assembly		
Performance Score		
Total Score		
VERBAL SCORE _____ IQ _____		
PERFORMANCE SCORE _____ IQ _____		
FULL SCALE SCORE _____ IQ _____		

Persons who wish to draw a "psychograph" on the above table may do so by connecting the subject's raw scores. The interpretation of any such profiles, however, should take into account the reliabilities of the subtests and the lower reliabilities of differences between subtest scores.

I. INFORMATION	SCORE 1 or 0		SCORE 1 or 0		SCORE 1 or 0
1. Flag		11. Height		21. Members of Parliament	
2. Ball		12. Italy		22. Genesis	
3. Months		13. Clothes		23. Temperature	
4. Thermometer		14. Valentine's Day		24. Iliad	
5. Rubber		15. Hamlet		25. Blood vessels	
6. Prime Ministers		16. Vatican		26. Koran	
7. Longfellow		17. New York		27. Faust	
8. Woods		18. Egypt		28. Ethnology	
9. Gibraltar		19. Yeast		29. Apocrypha	
10. Brazil		20. Population			

OBSERVATIONS:

2. COMPREHENSION		SCORE 2, 1 or 0
1. Clothes		
2. Engine		
3. Envelope		
4. Bad company		
5. Cinema		
6. Taxes		
7. Iron		
8. Child employment		
9. Forest		
10. Deaf		
11. Town land		
12. Marriage		
13. Still waters		
14. Swallow		

4. SIMILARITIES		SCORE 2, 1 or 0
1. Orange—Banana		
2. Coat—Dress		
3. Axe—Saw		
4. Dog—Lion		
5. North—West		
6. Eye—Ear		
7. Air—Water		
8. Table—Chair		
9. Egg—Seed		
10. Poem—Statue		
11. Wood—Alcohol		
12. Praise—Punishment		
13. Fly—Tree		

3. ARITHMETIC			
	R or W	Time	SCORE
1. 15"			0 1
2. 15"			0 1
3. 15"			0 1
4. 15"			0 1
5. 30"			0 1
6. 30"			0 1
7. 30"			0 1
8. 30"			0 1
9. 30"			0 1
10. 30"			0 1
11. 60"			0 1 ¹⁻¹⁰ / ₂
12. 60"			0 1 ¹⁻¹⁰ / ₂
13. 60"			0 1 ¹⁻¹⁵ / ₂
14. 120"			0 1 ¹⁻²⁰ / ₂

5. DIGIT SPAN		SCORE
Digits Forward		Circle
5-8-2		3
6-9-4		3
6-4-3-9		4
7-2-8-6		4
4-2-7-3-1		5
7-5-8-3-6		5
6-1-9-4-7-3		6
3-9-2-4-8-7		6
5-9-1-7-4-2-8		7
4-1-7-9-3-8-6		7
5-8-1-9-2-6-4-7		8
3-8-2-9-5-1-7-4		8
2-7-5-8-6-2-5-8-4		9
7-1-3-9-4-2-5-6-8		9
Digits Backward		Circle
2-4		2
5-8		2
6-2-9		3
4-1-5		3
3-2-7-9		4
4-9-6-8		4
1-5-2-8-6		5
6-1-8-4-3		5
5-3-9-4-1-8		6
7-2-4-8-5-6		6
8-1-2-9-3-6-5		7
4-7-3-9-1-2-8		7
9-4-3-7-6-2-5-8		8
7-2-8-1-9-6-5-3		8

F _____ + B _____ = _____
Highest numbers circled

	SCORE 2, 1 or 0	6. VOCABULARY
1. Bed		
2. Ship		
3. Penny		
4. Winter		
5. Repair		
6. Breakfast		
7. Fabric		
8. Slice		
9. Assemble		
10. Conceal		
11. Enormous		
12. Hasten		
13. Sentence		
14. Regulate		
15. Commence		
16. Ponder		
17. Cavern		
18. Designate		
19. Domestic		
20. Consume		
21. Terminate		
22. Obstruct		
23. Remorse		
24. Sanctuary		
25. Matchless		
26. Reluctant		
27. Calamity		
28. Fortitude		
29. Tranquil		
30. Edifice		
31. Compassion		
32. Tangible		
33. Perimeter		
34. Audacious		
35. Ominous		
36. Tirade		
37. Encumber		
38. Plagiarize		
39. Impale		
40. Travesty		

9	2	8	1	7	9	4	6	8	5	9	7	1	8	5	2	9	4	8	6	3	7	9	8
6	2	5	1	9	2	8	3	7	4	6	5	9	4	8	3	7	2	6	1	5	4	6	3
1	5	4	2	7	6	3	5	7	2	8	5	4	6	3	7	2	8	1	9	5	8	4	7
2	1	3	7	2	4	8	1	5	4	2	1	3	2	1	4	2	3	5	2	3	1	4	6

SAMPLES

7. DIGIT SYMBOL

--	--	--	--	--	--	--	--	--

SCORE

8. PICTURE COMPLETION	
	SCORE 1 or 0
nob	
ail	
lose	
andles	
iamond	
Vater	
lose piece	
eg	
ar lock	
ns or Lugs	
ag	
og tracks	
ornwall	
tacks	
eg	
rm image	
inger	
hadow	
tirrup	
now	
yebrow	

9. BLOCK DESIGN				
	Time	SCORE		
1. 60"	$\frac{1}{2}$	0	2	4
2. 60"	$\frac{1}{2}$	0	2	4
3. 60"		0	4	
4. 60"		0	4	
5. 60"		0	4	
7. 120"		0	4	$\frac{31-40}{1-30}$ 5 6
8. 120"		0	4	$\frac{46-70}{1-45}$ 5 6
9. 120"		0	4	$\frac{61-90}{1-90}$ 5 6
10. 120"		0	4	$\frac{61-90}{1-60}$ 5 6

10. PICTURE ARRANGEMENT				
	Order	Time	SCORE	
1. Nest	60"	$\frac{1}{2}$	0	2 4 WXY
2. House	60"	$\frac{1}{2}$	0	2 4 PAT
3. Hold up	60"		0	4 ABCD
4. Louie	60"		0	4 ATOMIC
5. Enter	60"		0	4 OPENS
6. Flirt	60"		0	2 4 JANET JANET AJNET
7. Fish	120"		0	2 4 5 6 EGFHIJ EFGHIJ EJFGHI
8. Taxi	120"		0	2 4 5 6 SALMUE SAMUEL AMUELS

11. OBJECT ASSEMBLY													
	Time	SCORE											
Manikin	120"	0	1	2	3	4	5	$\frac{16-20}{6}$	$\frac{11-15}{7}$	$\frac{1-10}{8}$			
Profile	120"	0	1	2	3	4	5	6	7	8	9		
Hand	180"	0	1	2	3	4	5	6	7	$\frac{41-50}{9}$	$\frac{31-40}{10}$	$\frac{1-30}{11}$	
Elephant	180"	0	1	2	3	4	5	6	7	8	$\frac{31-90}{10}$	$\frac{21-30}{11}$	$\frac{1-20}{12}$

SCORE

Appendix 3: Summary of results x total imprisonment

(i) First Cross Sectional Results

Group	1	2	3	4
Range of total imprisonment:	0 - 3yrs.11mos	4 - 5yrs.11mos	6 - 8yrs.8mos	8yrs.8mos.- 40 yrs.
N	50	50	50	25
Reaction Time: Simple (mean)	0.26	0.25	0.27	0.26
(s.d.)	0.06	0.04	0.05	0.07
Choice	0.36	0.37	0.37	0.37
	0.06	0.06	0.06	0.10
Reversed Choice	0.46	0.49	0.50	0.54
	0.10	0.10	0.17	0.15
Gibson Spiral Maze:				
Time	43.03	45.44	44.27	44.66
	11.36	14.85	13.32	15.51
Errors	10.72	11.46	10.00	9.32
	9.15	12.94	8.38	6.66
Errors (time partialled out)	49.06	48.16	47.72	46.76
	22.47	25.51	25.01	20.55
Time ² + Errors ²	2173.24	2570.28	2313.52	2437.72
	976.91	1601.89	1432.70	2049.89
Breaks	0.46	0.30	0.22	0.48
	0.81	0.65	0.58	1.29
G.A.T.B. Form Matching	30.04	31.26	28.44	29.03
	6.72	9.23	6.83	7.18

(Appendix 3 continued)

	1	2	3	4
Wechsler Memory Scale:				
Associate Learning	13.84	14.68	15.28	14.46
	3.53	3.91	3.21	3.54
Visual Reproduction	10.18	9.70	9.34	9.24
	2.27	3.27	2.77	2.73
Purdue Pegboard:				
Simple Practice	14.74	15.04	14.86	14.92
	2.18	1.65	2.11	2.29
Dominant Hand	15.86	15.94	15.94	16.04
	1.75	1.95	2.05	1.90
Non-Dominant Hand	14.74	14.68	14.48	14.48
	1.74	2.13	1.79	1.66
Both Hands	11.94	12.06	11.80	12.12
	1.57	1.49	1.53	1.96
Total Simple (D + N-D + B)	42.54	42.68	42.22	42.64
	4.36	5.00	4.49	4.77
Assembly Trial I	35.26	36.46	33.40	35.16
	5.48	6.65	6.72	6.56
Assembly Trial II	38.42	40.24	36.92	39.68
	5.02	6.24	5.85	8.06
Total Assembly (I + II)	73.68	76.70	70.32	74.84
	10.01	12.40	12.06	13.85
W.A.I.S.				
Information	11.16	11.30	11.76	12.00
	2.67	2.80	2.63	2.04
Comprehension	12.38	12.78	12.62	13.48
	3.28	3.18	2.98	2.74
Arithmetic	11.46	11.38	11.00	11.52
	3.00	3.62	2.66	2.42

	1	2	3	4
W.A.I.S.				
Similarities	11.30	11.64	11.42	11.72
	2.15	2.28	2.32	2.01
Digit Span	10.60	10.98	10.08	10.60
	3.02	2.98	3.31	3.08
Vocabulary	10.74	11.16	11.60	11.44
	2.72	2.34	2.62	2.02
Digit Symbol	9.48	9.42	9.12	9.16
	2.38	2.81	2.50	2.12
Picture Completion	12.44	12.30	12.54	12.60
	2.60	2.70	3.27	2.16
Block Design	11.82	11.48	11.50	11.80
	2.66	3.16	3.02	2.72
Picture Arrangement	10.44	10.40	10.88	10.64
	2.43	2.73	3.01	1.91
Object Assembly	10.38	10.70	10.54	10.00
	2.12	2.94	3.04	2.45
Verbal I.Q.	107.28	109.02	108.34	110.16
	13.16	14.03	12.85	9.89
Performance I.Q.	108.36	108.80	109.56	108.64
	12.27	14.36	13.99	9.69
Full Scale I.Q.	108.32	109.48	109.34	110.20
	11.89	13.51	12.43	8.59
Verbal-Performance Discrepancy	- 1.08	0.22	- 1.22	1.52
	12.20	12.43	12.73	10.79
Analytic Index	35.44	35.34	35.48	35.52
	5.65	7.15	7.62	5.62
Deterioration Index	0.57	1.86	5.90	3.27
	11.78	11.22	10.71	13.94
Masculinity/Femininity	2.92	2.28	2.10	2.72
	2.75	4.34	4.33	3.96

(ii) Longitudinal Results (viz differences between test and retest scores)

N	Total Prison Sample		Control Group	
	154		30	
	mean	s.d.	mean	s.d.
Reaction Time:				
Simple	0.01	0.08	0.03	0.08
Choice	- 0.00	0.10	- 0.01	0.10
Reversed Choice	- 0.02	0.14	- 0.00	0.11
Gibson Spiral Maze:				
Time	1.70	10.53	0.61	13.63
Errors	- 4.71	9.71	- 1.73	8.41
Errors (time partialled out)	-11.35	25.96	- 5.53	29.87
Time ² + Errors ²	-111.69	1091.06	-16.90	2569.31
Breaks	- 0.20	1.04	- 0.20	0.75
G.A.T.B. Form Matching	2.58	5.65	2.63	6.17
Wechsler Memory Scale:				
Associate Learning	0.19	3.18	1.20	2.44
Visual Reproduction	0.47	2.30	0.60	1.87
Purdue Pegboard:				
Simple Practice	0.73	1.81	0.83	2.19
Dominant Hand	0.73	1.91	0.80	1.64
Non-Dominant Hand	0.32	1.66	0.63	2.07
Both Hands	0.24	1.47	0.37	1.28
Total Simple	1.30	3.78	1.80	3.29
Assembly Trial I	1.10	5.78	2.17	4.80
Assembly Trial II	0.53	5.57	0.97	5.00
Total Assembly	1.63	10.60	2.50	9.51
W.A.I.S.				
Information	0.57	1.12	0.27	1.03
Comprehension	1.14	2.33	0.50	2.39
Arithmetic	0.66	2.01	0.03	2.11

	mean	s.d.	mean	s.d.
Similarities	0.70	1.64	- 0.03	2.04
Digit Span	0.23	2.56	0.17	2.13
Vocabulary	0.80	1.40	- 0.30	1.55
Digit Symbol	0.49	1.17	0.53	1.06
Picture Completion	0.73	2.07	0.27	1.69
Block Design	0.51	1.97	0.20	2.12
Picture Arrangement	0.72	2.34	0.97	2.48
Object Assembly	1.04	2.50	1.07	2.02
Verbal I.Q.	4.23	5.65	0.83	4.85
Performance I.Q.	5.27	7.05	5.57	5.74
Full Scale I.Q.	4.80	4.95	2.73	4.57
Verbal-Performance Discrepancy	- 1.04	8.51	- 4.10	6.67
Analytic Index	2.69	4.04	2.43	3.24
Deterioration Index	1.63	11.46	0.36	11.72
Masculinity-Femininity	- 0.07	4.10	0.53	3.72

(iii) Second Cross Sectional Results

Group	1	2	3	4	
N	35	38	32	14	
Reaction Time:					
Simple	(mean)	0.28	0.28	0.27	0.29
	(s.d.)	0.07	0.05	0.06	0.04
Choice		0.36	0.37	0.35	0.36
		0.06	0.10	0.06	0.04
Reversed Choice		0.48	0.47	0.46	0.47
		0.09	0.13	0.12	0.11
Gibson Spiral Maze:					
Time		43.88	45.35	46.14	44.56
		11.48	11.21	12.38	15.42
Errors		6.68	7.73	5.96	8.21
		4.38	9.00	4.64	5.49
Errors (time partialled out)		36.94	40.78	36.15	43.28
		14.86	21.24	17.35	18.47
Time ² + Errors ²		2121.98	2323.46	2340.13	2321.42
		1129.31	1117.88	1258.61	1613.90
Breaks		0.11	0.28	0.21	0.21
		0.39	0.79	0.59	0.41
G.A.T.B. Form Matching		33.65	33.21	31.46	29.85
		8.31	9.08	7.76	8.18
Wechsler Memory Scale:					
Associate Learning		14.48	14.63	15.43	14.46
		3.30	3.91	3.44	2.85
Visual Reproduction		11.05	10.10	10.25	9.85
		2.30	3.01	2.44	2.79

	1	2	3	4
Purdue Pegboard				
Simple Practice	15.42	15.78	15.46	15.14
	2.00	1.57	2.01	1.45
Dominant Hand	16.65	16.89	16.37	16.64
	1.86	1.61	1.74	1.58
Non-Dominant Hand	15.17	15.07	14.59	14.42
	1.87	1.59	1.67	1.17
Both Hands	12.11	12.42	12.00	12.14
	1.58	1.29	1.58	1.40
Total Simple	43.94	44.39	42.96	43.21
	4.75	3.89	4.41	3.44
Assembly Trial I	37.20	37.86	34.00	35.64
	7.08	5.83	7.01	7.94
Assembly Trial II	39.46	41.42	37.28	38.35
	6.19	5.57	7.27	8.52
Total Assembly	76.82	79.28	71.28	74.00
	13.00	10.97	14.04	16.39
W.A.I.S.				
Information	11.94	12.50	12.15	11.57
	2.55	2.74	2.80	1.49
Comprehension	13.77	14.65	13.09	12.92
	3.07	3.47	3.24	2.49
Arithmetic	12.14	12.52	11.56	11.57
	2.75	2.97	2.46	2.19
Similarities	11.77	12.34	12.21	11.92
	2.34	2.16	2.61	1.33
Digit Span	11.22	11.23	10.84	10.57
	2.82	3.47	3.11	3.39
Vocabulary	11.71	12.23	12.09	11.35
	3.06	2.89	2.68	2.05

	1	2	3	4
Digit Symbol	10.00	10.07	9.53	9.50
	2.50	2.99	2.24	2.32
Picture Completion	13.22	13.44	13.09	12.35
	2.60	2.89	2.50	1.54
Block Design	12.40	12.18	11.81	12.35
	2.62	2.71	2.59	2.66
Picture Arrangement	11.17	11.44	11.62	11.00
	2.56	2.88	3.11	2.82
Object Assembly	11.80	11.52	11.00	10.28
	2.29	2.98	2.95	2.63
Verbal I.Q.	112.05	115.31	111.78	109.71
	13.22	14.49	12.85	9.23
Performance I.Q.	114.37	115.55	112.78	111.21
	11.78	14.24	11.90	12.26
Full Scale I.Q.	113.65	116.26	112.84	110.78
	12.36	13.81	11.86	10.16
Verbal-Performance Discrepancy	- 2.31	- 0.23	- 1.00	- 1.50
	9.66	11.97	10.79	8.91
Analytic Index	38.37	38.60	37.25	36.57
	4.93	7.02	5.65	6.63
Deterioration Index	2.91	3.29	5.13	1.49
	17.26	12.26	11.01	10.91
Masculinity/Femininity	3.02	2.78	2.18	2.57
	3.85	3.57	3.44	3.79

(iv) Prisoners Released x Prisoners Detained

N	Released		Detained	
	36		84	
	mean	s.d.	mean	s.d.
Reaction Time:				
Simple	0.27	0.07	0.28	0.10
Choice	0.37	0.08	0.38	0.12
Reversed Choice	0.51	0.11	0.50	0.15
Gibson Spiral Maze:				
Time	47.17	14.39	45.10	13.87
Errors	8.14	6.52	10.39	8.66
Errors (time partialled out)	45.94	20.62	48.86	22.79
Time ² + Errors ²	2533.47	1617.00	2406.95	1480.00
Breaks	0.17	0.56	0.32	0.88
G.A.T.B. - Form Matching	30.22	8.69	29.11	7.41
Wechsler Memory Scale:				
Associate Learning	14.25	3.25	14.73	3.48
Visual Reproduction	9.39	2.68	9.19	2.68
Purdue Pegboard:				
Simple Practice	15.00	2.08	14.88	2.03
Dominant Hand	16.08	1.90	15.94	2.15
Non-Dominant Hand	14.25	1.81	14.43	1.77
Both Hands	11.83	1.56	12.00	1.68
Total Simple	42.17	4.35	42.37	4.73
Assembly Trial I	34.33	7.43	33.77	6.11
Assembly Trial II	37.78	7.39	37.80	6.56
Total Assembly	72.11	14.22	71.57	12.20
W.A.I.S.				
Information	12.28	2.63	11.49	2.30
Comprehension	13.42	3.47	12.94	2.69
Arithmetic	11.69	3.13	11.14	3.03

	mean	s.d.	mean	s.d.
Similarities	12.33	2.08	11.25	2.13
Digit Span	10.53	3.32	10.73	3.26
Vocabulary	12.17	2.56	11.58	2.43
Digit Symbol	9.50	2.65	8.63	1.97
Picture Completion	12.86	3.04	11.96	2.65
Block Design	11.75	2.84	10.33	2.47
Picture Arrangement	11.36	2.70	9.98	2.15
Object Assembly	10.67	3.17	9.91	1.97
Verbal I.Q.	112.50	14.54	109.25	11.83
Performance I.Q.	111.92	13.44	107.75	10.73
Full Scale I.Q.	112.97	12.99	107.96	16.03
Verbal-Performance Discrepancy	0.58	14.16	1.50	10.30
Analytic Index	37.06	6.92	35.19	6.34
Deterioration Index	4.22	14.17	2.04	12.08
Masculinity/Femininity	1.97	4.21	1.98	4.14

(v) Control Group Results

Test	First Time of Testing Results		Second Time of Testing Results	
	mean	s.d.	mean	s.d.
Reaction Time:				
Simple	0.26	0.04	0.28	0.07
Choice	0.37	0.05	0.37	0.07
Reversed Choice	0.51	0.16	0.50	0.10
Gibson Spiral Maze:				
Time	44.58	20.62	45.19	20.22
Errors	9.30	8.04	7.57	5.45
Errors (time partialled out)	42.37	26.26	36.84	17.88
Time ² + Errors ²	2547.51	2879.65	2530.61	1654.42
Breaks	0.40	0.97	0.20	0.90
G.A.T.B. - Form Matching	31.67	8.45	34.30	7.95
Wechsler Memory Scale:				
Associate Learning	14.07	3.48	15.26	3.37
Visual Reproduction	10.20	2.80	10.80	2.52
Purdue Pegboard:				
Simple Practice	14.70	2.47	15.53	2.14
Dominant Hand	15.93	1.98	16.73	1.69
Non-Dominant Hand	14.50	2.26	15.13	2.09
Both Hands	11.90	1.99	12.26	1.93
Total Simple	42.33	5.58	44.13	4.98
Assembly Trial I	34.33	7.68	36.50	7.57
Assembly Trial II	37.77	7.66	38.74	7.91
Total Assembly	72.10	15.10	74.60	15.37
W.A.I.S.				
Information	11.37	1.90	11.63	2.00
Comprehension	13.40	2.40	13.90	2.83
Arithmetic	12.30	2.60	12.33	3.06

	mean	s.d.	mean	s.d.
Similarities	11.73	1.96	11.70	1.94
Digit Span	11.50	2.86	11.67	2.99
Vocabulary	11.33	2.06	11.03	2.05
Digit Symbol	9.07	2.43	9.60	2.67
Picture Completion	13.37	2.61	13.64	3.00
Block Design	11.90	3.38	12.10	2.80
Picture Arrangement	10.07	2.94	11.04	3.21
Object Assembly	10.67	2.82	11.73	3.02
Verbal I.Q.	111.50	9.35	112.33	9.43
Performance I.Q.	110.03	11.76	114.96	13.21
Full Scale I.Q.	111.40	9.41	114.13	10.53
Verbal-Performance Discrepancy	1.47	10.77	- 2.63	10.65
Analytic Index	36.93	6.43	39.36	6.60
Deterioration Index	0.89	11.44	1.25	14.13
Masculinity/Feminity	4.20	3.83	4.73	4.06