

EFFECTS OF LONG PENAL IMPRISONMENT
ON FLEXIBILITY IN PROBLEM-SOLVING

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ABSTRACT OF THESIS

A review of the literature regarding effects on behaviour of decreased environmental stimulation, emotional stimulation variables, personal solitude, and imprisonment indicated that behaviour can undergo significant and sometimes permanent changes under these conditions. The concept of behavioural rigidity was also examined and found valid as a variable for investigation, especially when assessing inefficiency in cognitive behaviour.

The investigation was designed to reveal possible changes in intellectual efficiency, as shown in the degree of rigidity-flexibility of subjects in solving problems, which might arise after a prolonged period of imprisonment in a Canadian penitentiary.

A sample of 30 inmates who had already served a term of 15 months or more in Manitoba Penitentiary was compared with a matched control group of 22 new admissions in terms of their scores on five rigidity tests and a composite battery score for general cognitive rigidity, composed of four of the tests. Both the Wisconsin Card Sorting Test and the composite cognitive rigidity score showed the long-term group to be significantly more rigid in their problem solving approaches than the new admissions.

In addition the data revealed a significant positive relationship between the length of time which had been served by the long-term group and the degree of problem-solving inflexibility or rigidity as measured by the composite score.

It was concluded that imprisonment could have contributed in itself to increased rigidity in the long-term group but that in time the prisoners might have developed resources which permitted some recovery from rigidification effects in their cognitive behaviour.

Test intercorrelations were interpreted as showing that a common factor involving rigidity was measured by the tests used, but that individual differences affected the particular activities or contexts in which the rigidity was demonstrated.

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CHAPTER I

THE PROBLEM AND INTRODUCTION

I. STATEMENT OF THE PROBLEM

Recent psychological research has focussed attention on the effects of non-stimulating environments and personal isolation on perception, intellectual processes, and emotional reactions. The evidence suggests that under conditions of sensory deprivation and isolation the mental functioning of organisms suffers losses in efficiency for coping with the demands of living.

The penal institution can be considered as one type of restricted environment in which stimulation from the cognitive environment has been reduced through social isolation. Penal institutions have been undergoing revisions in administrative approach such that the treatment and rehabilitation of offenders is now a major goal. This raises problems for the professional treatment staff in determining the potentialities of inmates for emotional and attitudinal retraining. The inmate population is noted for adverse traits and personal deficiencies which distinguish it from the normal population. Many authorities attribute these deficiencies to unstimulating childhood backgrounds experienced by most offenders.

The question raised in the present study has to do with the possible restrictive effects of prison life itself on the intellectual efficiency of inmates. Investigation has been limited to a measurement of the trait or condition implied in the concept of flexibility-rigidity in problem solving. Does the deprivation of needs and social stimulations often involved in a long penitentiary term act to decrease the flexibility of inmates in solving certain types of intellectual problems? The study that follows will describe a preliminary exploration of this question.

II. INTRODUCTION

Interaction between an organism and the sensory stimulations which make up its environment has long been a major concern of psychologists. In the past few years, however, some interesting experiments at McGill University and elsewhere have created new perspectives in the analysis of this interaction.

A key figure in this progress has been D. O. Hebb (42) whose work has drawn attention to the vital importance of general sensory stimulation to the continued adaptive functioning of animals and humans. Dr. Hebb has also helped clarify the issue experimentally by distinguishing the significance of childhood deprivation effects as

contrasted with the effects of deprivation suffered during adulthood. A series of experiments which were stimulated by the Hebb proposals will be reviewed in the historical section of this chapter.

Among the applied fields of psychology, assessment and psychotherapy in penal institutions have become expanding and promising areas for application of psychological knowledge and techniques. With an increasing demand put upon psychologists for techniques which will aid reform and rehabilitation of offenders, the need for a body of research and information in corrections work is rapidly becoming more essential.

Inmates of a penitentiary are obviously drawn from a population of people who suffer from a lower degree of personal control and a higher degree of distorted attitude about the requirements of their society than ordinary citizens. Commission of an offence can be viewed as symptomatic, among other things, of maladjusted attitudes toward other people and often of deficiencies in judgement. Professional writers in the field of psychiatry, sociology and social work show consensus in their belief that early restricted or mismanaged childhood development is a major contributor to criminal behaviour (11, 59, 80.)

Thus a typical criminal comes to serve his sentence with already deeply-ingrained deficiencies and very often

with resistances toward new learning or re-learning in the significant areas of his personality and intellect from which his act of offence may have arisen. The present study goes beyond this pre-existing limitation in inmate behaviour to investigate the degree to which imprisonment itself contributes toward either intensifying the limitations on new learning or at least preventing an improvement in the condition.

A primary necessity in the learner is, in common language, teachability. In essence this seems to imply a certain flexibility of outlook and behaviour which will permit the inception of new outlooks and development of new reactions. For this reason the present research has undertaken the measurement of the variable, rigidity-flexibility in solving problems. The subjects have been drawn from a representative Canadian federal penal institution, Manitoba Penitentiary. In order to show the effects of living in a penitentiary, a group of prisoners who had already been serving terms for a period of years will be compared with a group of newly admitted prisoners in terms of their "rigidity" scores on a series of problem-solving tests.

The procedure, results, and conclusions of the experiment will be discussed in later chapters. The remainder of this chapter will be devoted to a review of the literature relevant to the investigation.

III. HISTORICAL BACKGROUND

In this chapter, an attempt is first made to clarify the rigidity-flexibility concept. Following this comes the historical background, including: reports of research into variables which increase rigidity of behaviour, effects of early restrictions on development in the mature organism, effects of sensory deprivation in adults, and a review of some relevant reports on prison effects.

The Behavioural Rigidity Concept

The rigidity-flexibility concept in behaviour is a useful one, especially in clinical work. In its present usage the term is so variously applied and refers to such a complex chain of behavioural events that it lacks precision as a scientific variable. Because the concept and term will be used as a basis for a measurement continuum in this study, it is perhaps worthwhile to outline some of its usages by other authors, in an effort to increase its denotational properties.

For convenience in discussions of measurement, the concept will be used in this report in the sense of a polar trait in behaviour. At the more desirable or "healthy" pole is flexibility, while decreasing degrees of flexibility overlap into the opposite, less desirable pole or extreme of rigid or inflexible behaviour. This in referring to

the concept, the term "rigidity-flexibility" has been used. As will be seen, there appears to be a number of facets to it, representing varieties of inflexibility which occur in different contexts of behaviour.

The term "rigidity" has been in fashion among psychiatrists and clinical psychologists for some time. Synonymous expressions used to convey the same idea of inflexibility of behaviour include: perseveration, stereotypy, concretism, inability to shift set, fixation, and disposition rigidity.

Factor analytical and other critical reviews of the phenomenon have revealed that the concept does not refer to a unitary trait or characteristic. Correlations between tests set up to measure inflexibility have been low (47.) Difficulties in standardizing and establishing reliability of the tests have further complicated the matter. Many writers have nonetheless continued to use the term "rigidity" or its equivalents and to stress the need for such a concept in describing degrees of efficiency of humans and other organisms in cognitive or intellectual operations.

D. M. Johnson (47) in reviewing the literature on rigidity of thought, used the term broadly in the sense of inability to shift set in a flexible way when conditions of a problem require it; that is, when the existing set is

unrewarding.

The way in which rigidity-flexibility is defined seems to depend to some extent on the frame of reference or professional interest of the author employing the concept. For example, Landis and Bolles (56) referred to "mental rigidity," defining it as a disorder of determining tendency, or volition, in which flexibility is lacking. The concept was distinguished from normal ability to concentrate in terms of the degree of conscious control employed by the rigid or the "concentrating" individual.

On the other hand, Vinacke (104) defined the term as a low degree of efficiency of transfer in learning. Scheier and Ferguson (88) considered rigidity to be a negative transfer effect. Cattell (13) likewise saw it as related to learning, or as the opposite pole from learning. He has also discussed the concept as a characteristic of personality.

G. W. Allport, in his text on personality (1), did not consider the term rigidity directly, but implied it in the trait "persistence-vacillation." This personality trait was considered by him to be a controlling factor in behaviour which effects "gradual veering about in the place of sudden shifts." Rigidity was seen as a disorder in this controlling trait.

Psychoanalytic writings suggest an approach to the dynamics of rigidity in the term "fixation" (38, 40.) Early affectional relationships are seen as limiting the range and flexibility of response in later life.

Wendell Johnson (48), working in the speech and language area, described a type of inflexibility considered to arise from faulty language habits as "neuro-linguistic rigidity." Three subclassifications of this rigidity were (a) "content" rigidity as seen in difficulty in shifting from one topic of discussion to another; (b) the "formal" variety, involving a "degree of monotony of sentence form, style, word usage, and mannerisms," and (c) "evaluational," the "persistence of verbally expressed beliefs."

Duncker, (104) implies the rigidity idea in his term "recentering." This is the ability to alter observed properties of an object, or to alter the object itself, in order to facilitate "signalling" of its possible uses in an analytic or rational solution of a problem.

Goldstein (32) developed the term "concrete attitude" to indicate forms of rigid behaviour exhibited by his brain trauma cases. He defines it as a "dependence on immediate claims of sensory experience and manifest as inability to shift from one aspect or modality to another as required by a problem or situation." Goldstein used the term

"categorical attitude" as the normal condition opposite to "concrete attitude."

Attempts to discover the nature of rigidity through factor analysis were reviewed by Cattell (13). Only the perseveration (p) factor, or "disposition rigidity," had been definitely identified. Cattell and Tiner (14) also suggested an "ideational inertia" factor as basic. Distinctions were made by Cattell among (1) "pseudorigidity" as seen in low drive states, (2) a possible innate rigidity with slow motor learning, (3) an acquired rigidity in psychopathologic states and (4) rigidity specific to perceptual or motor states.

Lovell (60) stated that three factors have been clearly demonstrated to influence intellectual efficiency: general cognitive ability (g), verbal (v), and spatial ability (k). He then defined a fourth factor, categorization (c), after a factorial experiment. It appears related to Goldstein's "categorical attitude" and is described as ability to group ideas to a criterion and to switch from one criterion to another. Some indication was also given for a motor perseveration factor, comparable to Cattell's disposition rigidity referred to above.

Oliver, Scheier and Ferguson (76, 88, 89) in three experiments also explored a form of rigidity by factor

analysis. Rigidity was defined as inability "to perform overlearned operations in an unusual or unaccustomed manner." They distinguished "motor" rigidity tests from "cognitive" or problem-solving rigidity tests. Factor analysis showed that their motor rigidity test performances could be largely predicted from motor speed tests. On the other hand, Scheier found that the "cognitive rigidity" tests were heavily saturated with the "reasoning" factor. He concluded that rigidity, defined operationally in terms of reversal tasks, was not a distinct factor. Nonetheless he felt predictions of ability to perform overlearned tasks in an unaccustomed or reversed manner were a practical necessity in applied fields.

The concept of rigidity and the terminology, then, are by no means agreed upon as yet. For this reason the present study has adopted an operational approach by selecting five tests, each of which seems to be weighted with a form of rigidity measurement. Most of these tests have already been used by others to measure forms of rigid cognitive behaviour. The contribution of each will be discussed in the next chapter, covering the investigation and test materials. Meanwhile, evidence is available to indicate that inflexibility, in the sense of inability to shift thought approaches, perception, and reactions in accord with changing external situations, is a factor or

a group of factors which can account for inefficiency in problem solving.

Variables Influencing Rigidity-Flexibility of Behaviour

The polar concept of rigidity-flexibility as a trait or condition in behaviour has already been discussed. This section will review some experimental work which has shown the effect of certain environmental and organismic variables on this trait. The animal work will be reviewed first and this will be followed by material on human reactions to more complex variables.

Animal studies. D. M. Johnson (47) has summarized a variety of studies concerned with the effects of frustration and emotion-creating circumstances on the flexibility of behaviour. Some animal studies have been carried out in this area and will be described first.

Maier (62), in a study with rats, concludes that frustration can produce a fixation of unrewarding response patterns. This study made use of a serial discrimination problem. This has been adapted to humans by Marquart, and will be discussed with the other findings on human subjects.

Birch (9), working with chimpanzees, administered difficult problem tasks requiring insight under varying degrees of motivation. He concluded that intermediate degrees of motivation were the most effective, in terms of

problem-solving efficiency. With a low degree of motivation, distractions occurred, while with high degrees, the animals showed frustration at failure and developed inability to shift from an unsuccessful attack to a new attempt.

Hamilton (37) showed that emotional excitement reduces the flexibility of problem-solving attempts in primates and rodents.

Two other studies revealed that a frustrated animal will often continue using an unrewarding pattern of behaviour and, in this way, fail to solve a problem that it would be capable of solving if not excited (23, 36).

Human studies. Among the research reports reviewed by Johnson (47) on human subjects, was an experiment by Marquart (64). This used an adaptation of Maier's serial position problems, and showed severe disturbance in what would ordinarily be a simple learning task when subjects experienced electric shock. In the human form of this test, subjects were presented with doors and asked to locate or discover a pattern in the "correct" doors. Shock was initially administered randomly through the two handles, so that arbitrary punishment acted as a frustration in a "no solution" task. A very large increase occurred in the number of trials required to master the simple, two-position habit in which the left door was consistently the "correct"

response. The results, using an "index of stereotypy" showed slow learners were much more stereotyped or less flexible than normal learners.

Patrick (77), working with college students, administered shocks to bare feet, turned on horn blasts, and introduced cold showers as emotional conditions for his subjects. The task was to choose one of four doors to allow escape from a small room. Results showed significant increase in stereotyped and perseverative reactions. This was defined as "unmodified primitive tendency to repeat an activity."

Two studies have made use of the Luchins Jar Test and the Wisconsin Card-sorting Test. Cowen (18) applied "strong" stress, "mild" stress, and no stress by (a) telling subjects of pathological signs in their projective tests, (b) by giving practically insoluble puzzles to work on, and (c) with no stress applied to the control subjects. Administration of the Luchins Jar Test showed that stress, as defined here, was accompanied by an increase in "rigid" solutions. The second study by Ross, Rupel and Grant (87) used the Wisconsin Card-sorting Test with human subjects and supplied emotional disturbances in the form of heckling and distraction and, again, electric shock. The heckling and distraction produced only small disturbances in the

test, but electric shock, by itself, produced significant reduction in performance.

Luchins (61) developed his so-called "Jar Test" partly from an interest in the improvement of teaching methods. His monograph outlines evidence that intended to show that teaching which uses drill and repetitive methods is conducive to non-critical approaches to problem solving. This in turn is reflected in the type of test task which Luchins provided for testing rigidity-flexibility in his Jar Test. Subjects accustomed to learning problem solution by rote will tend to follow practised methods blindly even though simpler methods are possible.

Friend and Zubek (29) suggest that inferior performance of older subjects on the Watson and Glaser test of critical thinking ability (106) was partly a result of inflexibility of approach and outlook.

In the Morgan and Morgan study on syllogistic reasoning (70) it was found that personal convictions in the subjects as measured by attitude tests, had about a thirty-five per cent distorting effect on the outcome of the reasoning. Such personal convictions might be considered to be related to the evaluational rigidity concept of Wendell Johnson already discussed (48).

It would appear from the above studies then, that

frustration and emotional circumstances are accompanied by pronounced changes in the efficiency of the organism's perception and cognition.

The next section deals with effects of early restricted environments as reflected in adult behaviour.

Effects of Restricted Environment During Early Development

Animal studies. The field of research involving effects of environmental stimulation on behaviour has recently been clarified by distinctions drawn between (a) the effect of early environments on adult behaviour and (b) effects of later environmental experience on adult behaviour. Hebb (41, 42) has played a leading part in this work and stimulated an increasing amount of research on the question. His conclusion is that decreased stimulation through sensory channels during childhood, particularly in the visual system, often results in profound and permanent decrements in adult behavioural efficiency. Since the present research is concerned with a decrease in customary stimulations occurring in a penitentiary and since the subjects in question are noted for their poor environmental backgrounds during childhood (11, 80), it is necessary to review briefly some of the findings in this area.

Hebb, in Organization of Behaviour (42), has

demonstrated that rats raised in a complex and stimulating environment during infancy show a greater ability to profit from new experiences at maturity. These results were later confirmed by Hymovitch (45), who also showed that enriched experience during adulthood failed to make up the deficit in learning ability of rats which had been raised in a "restrictive" environment.

Forgays and Forgays (26) found that actual contact with environmental objects seemed to play an important part, along with visual experience, in development of learning ability. Evidence is also cited by these authors indicating that a stimulating early environment has a beneficial effect on activity, emotionality and spatial ability in adulthood.

Other studies have supported the importance of early experience in development of animal behaviour by showing that early impoverished or decreased perceptual experience decreases abilities at maturity in rats, especially in tests resembling human intelligence tests (41, 42, 110).

Cooper (17) has reviewed animal work concerned with this early deprivation of experience during the developmental period. At the same time, his research indicates that the effects of deprivation are different in young rates of intellectually inferior strains, as compared with superior strains. Only dull rats showed a gain in adult learning ability as a result of early "enriched environment."

This gain brought their performance on a maze up to that of bright rats. On the other hand, bright animals raised in restricted environments were similar in performance to dull animals when tested at maturity.

A series of related studies with dogs amplifies the findings with rats (15, 67, 68, 99, 100.) The dogs in most of the experiments were raised in special "restriction" cages so that they never saw humans nor were allowed to explore or see the larger world. Again, severe intellectual retardation effects were noted, not only for dogs raised in complete isolation, but also for those subjected to partial restriction only. The implication drawn was that early perceptual experience has greater significance in the development of animals higher in the evolutionary scale, (17, 96, 97.) A similar conclusion was reached by Riesen (84).

Restricted early experience studies have also been done with chimpanzees, (84). When the animals were blindfolded for the first twenty months of life and then tested for visual proficiency at maturity, they revealed very poor ability to recognize objects for some time afterwards.

Restriction of tactile and motor stimulation in another study with chimpanzees (75) resulted in animals actively seeking such stimulation at maturity. They also failed to perceive normally painful stimuli as such. The dog studies cited above and work with rats (39) revealed

similar effects.

Human studies. In view of the longer life-span of humans and the humanitarian reluctance toward the experimental procedures which were used with animals, there are few human studies available in which direct experimental observations of the effects of early restricted environments have been made. Information has mostly been gained indirectly from study of groups of humans whose developmental background has been assumed to have been deprived of opportunities for stimulation. Thus little or no control was possible over the crucial period when restriction was presumed to have been active.

Von Senden (42) observed congenitally blind humans who had had their sight restored in adulthood. He found that pattern vision was absent at first and only appeared after many weeks of visual stimulation. Similar findings were reported in a study comparing early and late-blinded humans (21).

Reports on orphanage children (108), Kentucky mountain children (3), and canal boat children (73) all of whom live in restricted environments, have been inconclusive with regard to supposed losses in intellectual ability with increasing age, mainly because of criticisms of methodology, measurement and control procedure in the

studies (33, 65, 50).

Evidence on effects of educational enrichment through special schools and institutions have been conflicting, with the suggestion that such enrichment can only be effective with pre-school children. Studies by Reymert (82) and Reymert and Hinton (83) showed that experience in special schools had significant effects only on children under the age of seven. Again, it was difficult to assess the real degree of enrichment or restriction of experience effective in the situations, since with the human subject the whole problem becomes so much more complex to control and define. It is, for example, difficult to guarantee adequate selection of teachers or, on the other hand, to rule out external influences which could well negate the possible effects of the school.

Thus, the effects of "stimulating" or "impoverished" environment during childhood remain ambiguous. Lack of adequate control and definition of the particular environment, the sheer complexity of human intellectual development, limitations of measuring instruments, and subject-selection pose the bigger obstacles to direct experimentation with human subjects (17).

The present study is, however, concerned mostly

with effects of environmental deprivation in adult human subjects. The question of early experience in this study raises problems for control of pre-existing conditions in the subjects, so that the effects resulting from more recent adult experience can be more clearly revealed. In the next section, then, reports on the effects of environmental restrictions at maturity in humans will be reviewed.

Restriction of Environment at Maturity

Scientific interest in the effects of varied environmental stimulation on behaviour has been clarified, as already mentioned, by distinguishing between early or developmental experience, and later or adult experience in the environment. One significance of this distinction lies in its implication that early development in a stimulating environment results in a behavioural repertoire of responses which help the adult organism to fend off deleterious effects from an impoverished or unusual environment. Thus it is common knowledge that human adults vary widely in their ability to continue functioning efficiently under unusual conditions such as social isolation, "brain washing," or physical isolation. The degree to which lack of early experience affects this tolerance for adult deprivation of stimulation is yet to be determined. The

question poses methodological problems.

However, some recent research has been focussed on the area of temporary loss of stimulation in adults. In addition, there have been various biographical accounts of personal isolation which provide some interesting hypotheses for research.

Biographical accounts of personal isolation. In spite of the inadequacies of biographies as scientific tools, biographical accounts of personal isolation show a regularly recurring theme. That is, personal isolation is frequently accompanied by many and possibly all of the symptoms of mental disorders at one time or another (57).

For example, it is reported that survivors in a life-boat (31), suffering from lost hope, thirst and sunburn, develop hallucinations, commit suicide, murder or cannibalism, and show personality reorganization as a result of intense survival efforts. Similarly, extended solitary sea voyages (10, 96) are accompanied by hallucinations, increased superstitiousness, and conversations with inanimate objects.

Solitary life in the polar areas of the earth also resulted in hallucinations and changes in mental activity and outlook (12, 85). All of these experiences apparently

have in common the need of the subjects to seek escape from boredom or reduced external stimulation through conscious or unconscious variation of stimulation in a monotonous situation.

Further related accounts will be outlined in the section on effects of imprisonment on human subjects. The next topic will be a discussion of recent controlled observations of personal isolation with human subjects.

Experimental studies of isolation. A series of controlled observations of human subjects under conditions of personal and sensory isolation was carried out at McGill University under the direction of D. O. Hebb and W. Heron. The main sensory restrictions imposed were accomplished through wearing of translucent goggles supplying only diffused, unpatterned light, masking of hearing with "white noise," and tactile limitation through lying in a cubicle on sponge rubber with hands encased in cardboard tubes. A monetary incentive was supplied and subjects were invited to remain in isolation as long as possible.

In the first of these experiments by Bexton (7), interviews with subjects showed that various phenomena developed as the duration of isolation continued over a period of two or three days. After the first phase of resting and reminiscence, increasing attempts were made to

mentally to fend off monotony. Then the effort became too great and thinking appeared to "drift." A sense of irritation followed, together with some loss of logical perspective and occasional delusional ideas. Finally a series of increasingly complex hallucinations appeared in most subjects, involving not only visual but auditory and tactile senses. These findings compare with those in mental illness, mescaline intoxication, subjection to prolonged flickering light (57, 105), and the biographical accounts of geographic isolation cited in the last subsection.

In addition to these phenomena, isolated subjects were found to be significantly more suggestible, and receptive to propaganda or auditory verbal material which under normal circumstances was distasteful or considered illogical. Again the phenomena were associated with the desire to escape boredom or monotony.

A second experiment by Scott (90), using similar methods of isolation, was concerned with decreases in intellectual efficiency. Simple oral tests of an intellectual nature were administered before isolation and at various intervals up to three days after subjects came out of isolation cubicles. Average performances of isolated subjects were uniformly inferior to those of

non-isolated subjects on all tests administered except digit span and analogy problems. Thus sensory deprivation can result in severe intellectual impairment of at least a temporary nature.

A third experiment by Doane (20) indicated the nature of perceptual disturbances reported by isolated subjects. Prominent among these were a general loss of perceptual constancy for size, linearity and colour saturation. For example, objectively straight lines were seen as curves and also were seen in motion, while colours appeared very strongly saturated in comparison with normal. Duration of these effects was mainly for about fifteen to twenty minutes after three days or more of isolation. In the case of other effects, including colour saturation, they lasted sometimes for several hours after the translucent goggles were removed. Comparison with subjects who were subjected only to visual restriction, using translucent goggles, showed that the visual-perceptual distortions were specific to visual deprivation alone and not to auditory or tactile isolation.

It is of interest that hallucinations were present only when diffused, non-patterned light from the translucent goggles was used. Subjects in darkness did not experience hallucination. This seems to explain why experiments along

the same lines, carried out at Princeton (102) brought negative results with respect to the effects seen in the McGill studies. At Princeton, the subjects were kept in total darkness and in conditions of maximal silence. Under these conditions there was an improvement in the ability to learn adjective lists.

Another study (4) used psychiatric patients as subjects. Isolation consisted of a small darkened hospital room, translucent goggles, and cardboard cylinders over arms and hands. The period of isolation was from two to six days. Eight out of fifteen patients showed depersonalization and visual, auditory and gustatory hallucinations. Free association and Rorschach tests were administered before and after as indices of the changes. Some beneficial effects were noted in the conditions of the patients following the experiment, especially with the depressed cases.

The above studies, generally, have in common the findings that the loss of patterned sensory stimulation results in hallucinations, loss of intellectual direction and efficiency, an active search for self-stimulation, perceptual distortions and emotional changes. A minimal level of diffuse sensory stimulation does seem requisite, however, if the effects are to be observed. This provides evidence of the importance of constantly varying stimulation and the

dependence of the human system on the arousal effect provided by this stimulation. Presumably boredom is an intolerable condition in the functioning organism and can have destructive results of varying duration in behaviour.

The following section will review some reports on the effects of imprisonment on human subjects.

Effects of Imprisonment on Behaviour

Imprisonment presents a complex situation to its subjects. Individuals vary widely in their reactions toward the factors with which they are faced during incarceration, and in addition the prison situation itself takes many forms.

However, there are probably some common factors regardless of individual differences or particular institutions. These might include frustration at loss of freedom of choice, enforced dependence on the institution, some experience of boredom or monotony, and at least temporary loss of status and loss of contact with ordinary events of life.

These and other factors constitute a form of deprivation of some stimulations from the normal life of most people, and increases, sometimes, of other forms of stimulation which may be disturbing to behaviour. The

following discussion provides a brief review of reports giving some indication of the nature of these deprivations and disruptive stimulations, together with some of their results on the behaviour of prison subjects.

In prison the deprivation is not ordinarily sensory, as in the studies already cited. It is, rather, a complex social, personal and intellectual deprivation. The effects, reviewed previously, of frustration and other disturbing psychological factors on flexibility-rigidity in behaviour are suggestive of similar influences which may be found in the prison situation.

As an example of extreme disruptive conditions and severe general deprivation, the first topic in this section will be a discussion of experience in a Nazi concentration camp. Then follows a review of some professional views on penal institutions in general.

Concentration camp experiences. Bettelheim (6) has recorded his own experiences and his observations of others in the role of a psychologist subjected to the extreme physical, personal and social deprivations in concentration camps of Nazi Germany. He has reported that the most severely felt threat to prisoners in these camps was that to self-esteem. Physical pain seemed easier to adjust to than lost prestige or self-respect. A characteristic

reaction to such threat was a narrowing of interests and decreased aspirations, which amounted to regressive tendencies, and rigidifying of behaviour reactions to everyday experiences. Degrading tasks, in the eyes of the inmates of the concentration camps, seemed at least as important as physical mistreatment in explaining the disintegrations of personality which occurred. In prisoners who had spent more than three years in the camps, for example, the following phenomena were noted by the observer: (1) loss of self-objectivity and loss of awareness of an outside world, with tendency to day-dreaming; (2) fear of returning outside the camp or of being released; (3) attempts to improve position in the camp at all costs; (4) regression to infantile behaviour. This was reinforced by the socially-enforced childlike dependence on the guards, in which no initiative or individual judgement was permitted. Also as a part of the regressive trend was a shortened time perspective, in which the subjects lived more and more in the immediate present, and lost a feeling for sequence of time. They became unable to plan for the future and sought immediate gratifications. (5) Narrowing of interests increased, so that the camp became their whole world; (6) loss of hope for the future occurred; (7) there was a feeling of having atoned for all guilt, and intra-aggression occurred

as a defence against the real threat of the Nazi keepers. Thus in many ways the behaviour of these prisoners could be considered within the framework of this discussion of rigidity.

Professional views on penal institutions. The penitentiary, as an experimental environment, requires some discussion. Evidence has been cited (81) to show that the effects of imprisonment depend largely on the particular institution under consideration. In any penal institution there are both stimulation and isolation factors to be considered. In addition to this, many penitentiaries and other penal institutions have been undergoing revisions in their organization and these involve widespread changes in their effects on inmates therein, (80, 2, 25, 30). An introduction to the interpersonal relationships in the average North American penitentiary may be found in a descriptive account by Pescor (79). With a background in correctional psychiatry, he outlines the typical conflicts between staff personnel and inmates, arising from the traditional roles played by each in the institution.

Many professional writers in the field of correction express opinions of strong doubt as to the beneficial effects of imprisonment, particularly as it has been

administered up to recent times (80, 59, 30). Mertz (69), basing his opinion on experience gained in giving free psychiatric service to offenders, feels that a prison sentence does not usually lead to any positive change in the defendant. Lindner (58) feels that punishment is not a deterrent to crime. He believes that a psychodynamic approach would be more fruitful. Reckless (80), after surveying other professional opinions, emphasizes that social isolation, as experienced by inmates in many North American and other institutions, defeats the purpose of the imprisonment, and has a general tendency to create deficiencies in those imprisoned.

A variety of reports gives experimental and observational evidence for a need in the human organism actively to seek stimulation of various kinds. Pescor (74) mentions behaviour in inmates of a penitentiary seemingly following the dictates of such a need. Thompson (97) has given support for an active search, particularly during childhood, for tactile stimulation. Other experimenters (16) conclude that there is a need cognition, which they would propose adding to the list of needs provided by Murray (71, 72). Bettelheim's report (6) on observations and experiences in concentration camps, also seems to support a desire or need in prisoners, particularly in the first months of

imprisonment, to escape the depersonalizing and rigidifying influences of their environment. The McGill perceptual isolation studies (8) give introspective evidence which suggests that those kept in perceptual isolation tend to seek self-stimulation by solving problems, thinking over their past day's experience, and so on. Thompson (97) has also pointed out that various forms of deprivation of receptor stimulation from the environment in the adult, as contrasted with early childhood, is a stressful experience. One would therefore expect that efforts would be made by the human organism to escape the stress by seeking return of the missing stimulation. Clinical observations in the penitentiary setting also suggest that inmates often go out of their way to keep themselves active, whether in sports, hobbies, reading or other facilities now being offered in many institutions. Some stimulation is presumably derived also from the characteristic attempts by inmates to circumvent institutional regulations and prohibitions.

Kellogg and Morton, in their manual for the Revised Beta Examination (51) which is used in Canadian penitentiaries for general intelligence measurement, advise that the test be administered within the first week of imprisonment, because they have found that modes of thought and

expression tend to stereotype fairly rapidly after one week from admission. On the other hand, reports by some prisoners suggest that the first week after admission imposes special problems of adaptation to the new environment, in terms of heightened frustration. This might be expected, in view of the serious disruption in living habits which admission to a penal institution must represent to many prisoners.

On the other hand, the inmate population as a group has been reported as being deficient, from an early age, and often prior to conviction, in such areas as reading and spelling skills (46) and in perceptual completion (49).

Lovell (60) has shown that the "non-stimulated" groups which he studied in English institutions were deficient in what he called categorization, while they tended to be better in the spatial-mechanical factor. It is difficult to say from Lovell's report whether such conditions existed before imprisonment.

A study by Kephart (52), dealing with young delinquents, is relevant to the present research with adult offenders. A group of 47 boys was tested by means of a word association technique, first on their admission to an institution for delinquents, and then again after six

months. Another group of 50 subjects who had already been in the institution for 18 months was also tested. Statistically significant differences were found between the groups tested, suggesting that the longer subjects were detained in the institution, the more their test responses approached those characteristic of psychoneurotics and delinquents.

In addition to the aspects already discussed above, there seems little doubt that time perspective, as discussed by Frank (27, 54), together with its relationship to length of sentence, must play an important part in determining the effect of stimulation, or its lack, in a particular institution. That is, an inmate who views his present situation as hopeless and non-progressive, may react negatively to the available facilities for self-stimulation in the institution. To quite an extent, this could nullify the need for stimulation or need-cognition, which we have already described. Also, length of sentence can play an influential part in determining the individual's time perspective.

Pennington and Berg (78) state that there is a wide range of individual reactions to confinement. Some of the more significant reactions include: anxiety and somatization reactions, strong guilt with ideas of reference,

excited states, escape mechanisms, as illustrated by malingering and the Ganser Syndrome, reactive depressions, and psychotic episodes. Kinberg (54) also stresses the importance of individual differences in reactions to not only prolonged imprisonment, but to the supposed effects of early environmental deprivation on development of criminal behaviour.

The above discussion would therefore tend to suggest that a variety of forces is operating on any particular inmate in a penitentiary. The effect of the institutional environment would therefore be expected to depend on the dynamic balance between these forces. Influences affecting the prisoner, then, would include: (a) present decrease in certain kinds of stimulation; (b) a need for stimulation; (c) the inmate's view of his present in relation to his past history and a projected future; (d) certain characteristics found to be typical of the delinquent population in general.

Summary of Historical Review

The preceding review of the literature on the effects of environmental isolation and frustration has indicated that the mammalian organism, whether animal or human, child or adult, is dependent on an optimal level of stimulation

from its environment if behavioural and adaptive efficiency is to be maintained. This review also suggests that penal institutions, with the social isolation and frustration they impose, may interfere with normal efficiency in inmates admitted from the community. Many opinions on the effects of these institutions have been expressed on the basis of clinical experience, but there appears to be little research on the subject.

Accordingly, the present study has been set up to investigate some possible effects of a long period of imprisonment in a representative Canadian penitentiary. An increased official emphasis on the rehabilitative approach to penology points up the practical need for information on what incarceration actually does to inmates, and on what changes may be necessary in the institutions in order to make rehabilitative approaches more effective. In addition, the findings have a relevance for the general theoretical area of environmental isolation effects.

The investigation to be outlined in the following chapters was designed to measure changes, as the result of prolonged imprisonment, in the degree of flexibility displayed by inmates while solving intellectual problems. Flexibility in intellectual operations is considered to be related to efficiency in learning new or more appropriate attitudes or responses.

Chapter II will describe the procedure of the investigation.

CHAPTER II

THE INVESTIGATION: MATERIALS, SUBJECTS AND PROCEDURE

In this chapter the details of the present investigation are outlined. The first section will re-define the experimental problem. The second section describes the influences in Manitoba Penitentiary which together constitute the experimental setting of this study. Section three deals with the test materials, their method of administration and scoring, and the rationale for their use as tests of rigidity. Then follow details of subject selection. Finally, the general procedure of the investigation will be outlined.

I. THE PROBLEM

In this study the question has been raised: does a relatively long period spent by convicted offenders in a representative Canadian penitentiary have any effect on efficiency in problem-solving?

It is the purpose of this investigation, therefore, to explore, in one aspect of prisoner behaviour, the presence or absence of effects which the prison life may induce. The aspect of behaviour chosen for study has been rigidity-flexibility, a trait or factor in intellectual behaviour and in personality generally. This trait has

been defined broadly as the ability to shift perception and problem-solving approaches in order to adapt behaviour to the objective requirements of a problem situation.

Rigidity-flexibility, as has been suggested, is a complex trait or factor which can characterize behaviour as a whole, as in the pathologically rigid behaviour of brain damage cases (32). On the other hand, it can be highly specific, in many individuals, to one or more sense modality, situation or context (13).

II. EXPERIMENTAL ENVIRONMENT: THE PENITENTIARY

As has already been mentioned, imprisonment seems to have a general influence in terms of frustration and threat to self-esteem, but the specific conditions of an institution can widely vary the effects. Subjects for this study were drawn from the inmate population at Manitoba Penitentiary. A discussion of the experimental conditions, as observed clinically in this institution, will follow here.

Manitoba Penitentiary is a representative institution within the Canadian federal penitentiary system. For about ten to fifteen years the formal emphasis has been increasing toward a classification and treatment approach in these institutions, in contrast to a more purely penal

or custodial outlook which prevailed in the past. This change in emphasis is largely the result of two Royal Commissions, the Archambault (2) and the Fauteux (25), set up in the years 1938 and 1956 respectively. Although the formal change has been made administratively, the process is taking time to effect, particularly in terms of plant and personnel. As a result, the subjects for this study were under the influence of the changing conditions during the period of transition. Some of the longer-term prisoners belonging to the experimental group have lived in the "pre-treatment" period. Thus, any effects found in the rigidity tests of this study must be considered in the light of changing conditions.

Isolation of the prisoners is by no means complete at present, even socially. In terms of present-day communication with the outside world, inmates are permitted the following facilities: limited correspondence with approved persons; limited visitors, also under approval; a choice of two radio stations in their cells; entertainment supplied by visiting groups from the nearby city area; subscription to newspapers and magazines, a library containing fiction and non-fiction books and magazines; and, of course, contact with newly-admitted inmates.

Welfare services include psychiatric consultation, visits from post-release agencies for after-care, religious

advisors and church services, psychological counselling and full medical services.

All inmates, except for those under medical, psychiatric or disciplinary attention, are assigned to regular work posts, five to seven days a week. Some of these posts are for purely institutional maintenance, others involve vocational training. In addition, a school department offers conventional teaching, leading to officially recognized school grades. A variety of correspondence courses of an academic or vocational nature is also available.

In addition to the officially prescribed activities as outlined above, inmates carry on a sports programme, which is largely organized and scheduled by themselves under the guidance of recreation officers. A variety of hobbies is allowed during approximately sixteen hours when inmates must remain in their cells. These hobbies are financed out of inmates' personal funds and through loans from a "hobby fund" established partly by a commission charged on sales of hobby work. Those who carry on hobbies are able to accumulate financial returns often well beyond the initial investment.

It also appears that the mere presence of increasing numbers of professional staff has a stimulating effect

on the population in general. Inmates' remarks betray an interest in the new developments and a critical eye for what sometimes seems to them to be a lack of progress toward rehabilitation measures.

Stimulation versus Isolation in the Penitentiary

We have already discussed, in the review of literature above, the forces for and against stimulation in penal institutions. It will also be seen that the inmate of this particular penitentiary is by no means unstimulated.

Clinical observation reveals that there are various periods during the prisoner's stay which are more generally threatening, emotionally, than others. For many inmates, these are the first few days after admission, the period of a month or so prior to release, and the period immediately after release. These times are particularly threatening to many, as can be seen by the number of inmates who require treatment or special handling by the psychiatrist or psychologist during or in preparation for these times. In addition, sporadic treatment may be given to inmates suffering from tension at any time during their stay. This, with other observations, seems to support the conclusion that, in spite of all the stimulation and facilities available within the institution, there are seriously disrupting forces at

work. It appears clear that commitment to a penitentiary such as this is an emotionally upsetting experience for most people.

The resources available to penitentiary inmates have already been listed and these appear to provide a fair degree of intellectual stimulation for those inmates willing or able to make use of them. However, there still remains a number of influences in the direction of mental inefficiency, including the following: boredom, especially with long sentences; upset time-perspective (27, 55); loss of contact with outside responsibilities; dependency on the institution; lack of opportunity to work actively toward vocational goals under the competitive terms of the outside world; increased anonymity as persons; the subjective feeling of imprisonment; and sixteen hours spent in cells with limited physical privacy.

The above description will then serve to indicate something of the experimental conditions under which the subjects of the present study had been living.

III. TEST MATERIALS

The five tests of rigidity which were selected for the investigation are the Shipley-Hartford Scale (44, 93, 94, 95, 109), a series of "jar" problems devised by Luchins, (61), a verbal fluency test adapted to this study by the

experimenter, the Wisconsin Card-Sorting Test of Grant and Berg (5, 34), and an adaptation of the mirror drawing technique (101). These are described in detail below.

Shipley-Hartford Scale: Conceptual Quotient, (C. Q.)

Description of test. The test (93, 94, 95), has 40 multiple-choice vocabulary items on one side of the sheet and 20 abstract reasoning problems on the other. Problems involve both numerical and verbal-alphabetical progressions and call for the discovery of a separate logical principle for each item. Items are in increasing order of difficulty, statistically determined.

Administration. Administration allows ten minutes time limit for each portion and the vocabulary portion was administered first in every case. It was given as a group test. Directions printed on the test sheets were read aloud to the subjects prior to the test period.

Scoring. Scoring, for the purposes of this study, involved the obtaining of tabular values from the test manual for the "Conceptual Quotient," an index to the degree of disparity between vocabulary and abstract reasoning scores. The higher conceptual quotient or "CQ" values reflect smaller differences between these scores.

Rationale. Rationale for using the CQ as a measure

of rigidity lies in the fact that a relatively greater shift in set is required in moving from one abstract reasoning problem to another, than is needed in vocabulary items (47, page 273.) The inclusion of a vocabulary score in the quotient tends to control intellectual factors other than rigidity.

Thus, the purpose of the Shipley test in the experimental battery was to measure relative ability to shift approach rapidly in moving from one abstract principle to another.

Luchins Jar Test (L. J. T.)

Description of test. The Luchins technique (61) was intended to measure and observe the tendency of subjects to accept a demonstrated and practised method of solving numerical problems, even when the method becomes ineffective or an easier solution is possible.

Each problem presents a set of imaginary empty jars or containers of various specified capacities. The task calls for discovery of a procedure for obtaining a required amount of water from an unlimited source, using the empty containers in some sequence. Two demonstrations are given by the examiner and then the subjects are asked to solve the remaining problems without further comment. The first four items worked by the subject follow the same formula

as that demonstrated by the examiner. The next two can also be solved by this formula but are also solvable by a simpler procedure involving only two of the three jars. The next item can only be solved by using a simpler two-jar method and constitutes a critical test of the set or "Einstellung effect," which the technique was designed to test. Finally, two further problems can be solved either by the demonstrated, three-jar approach, or by a simpler two-jar method.

Administration. In the administration of the test, subjects in groups of from two to five were given sheets like the one shown in the Appendix. They were then informed as follows:

"On your sheets you will see sets of drawings representing empty jars or containers, each one capable of holding a certain exact quantity of water. Try to imagine a situation where you have all the water you need, for example, sitting beside a river, and you are required to obtain a certain exact amount of water, using only a set of these jars for measurement."

The first two-jar problem was then demonstrated verbally, and the method of recording responses by arrows (as shown in superimposed markings in Appendix B) was described and also illustrated on a demonstration card. Subjects were instructed to complete the first item themselves as illustrated. Then the second, or three-jar

item was demonstrated in the same manner. In all problems, a vertical arrow pointing to a jar indicated that jar was filled from the water supply, and arrows looping from one jar to another indicated transfer and discard of a measured quantity of water from the first jar. Each separate looping arrow represented one measured discard of water.

Finally, the subjects were instructed to work the rest of the problems on their own, with no further instructions. Providing the original instructions were clear to all subjects, no further questions were answered, except by the reply, "It's up to you."

Scoring. Scoring of the Luchins test was carried out in two ways. In the first, one point was assigned for each of the last five critical problems, for which the subject used a simpler or "direct" solution. This resulted in scores from zero to five, inclusive, with the expectation that a large number of subjects would obtain zero scores (61). The other scoring approach was simply to divide subjects into two groups, according to whether they had or had not failed to use the direct solution for one or more of the five critical problems.

Rationale. The Luchins test attempts to bring out a factor of problem-solving rigidity, as distinct from

perseveration or disposition rigidity. It has been rather widely used and Luchins has given it fairly intensive study as a technique (61). In the present study its use would be expected to some extent to reflect a resigned attitude among long-term prisoners, along with other possible causes of inferior performance. Luchins suggests that the subjects who resist habituation to method on this test are characterized by a variety of individual attitudes. Those who adopt the automatic or Einstellung approach to the problems seem divisible into two groups: those who are genuinely blind to possibilities and almost compulsive, and those who noticed the other methods of solution but acted on invalid assumptions as to what the experimenter expected of them. We have assumed for this study that both of these types of subject were handicapped in such a situation. Thus, the technique was adopted as a measure of lost efficiency in the central processes, contributing information to the total test battery about numerical problem approaches more specifically. Evidence to date shows that "change of set scores are specific to the task, rather than measures of a general flexibility factor" (47, page 216.)

Luchins found, in numerous studies published in his monograph (61) that most subjects, irrespective of intelligence, tend to become set or habituated through

demonstration and practice, so that they fail to notice simpler methods of solution than those practised. Various factors are found to increase or decrease this tendency. Imprisonment might therefore be expected to have some effect on this particular test of rigidity.

Verbal Fluency Ratio (VFR)

Description of test. The Verbal Fluency Ratio compares verbal output under two different conditions. The first is a verbal free-association, and the second requires the subject to change the content area of his associations at regular intervals. Thus, the ratio is made up of a numerator consisting of the difference between "free" content and varied content, (F-V) and a denominator which is the total output of words involving free content (f). The mathematical ratio is symbolized as $F-V/F$.

Administration. Sheets of ruled foolscap paper, with four columns marked, were distributed to groups of from two to five subjects at a time. The first run was essentially for familiarization with the procedure.

Subjects were instructed:

"Write down, as rapidly as possible, any different words beginning with the initial letter "C" [for example]. Keep on writing until I say 'Stop.' Whenever you hear the

word 'Mark,' from the examiner, draw a line under the word you are writing at the time, and then continue writing."

Time was called at ten minutes, and the individual "markings" were at one-minute intervals. The one-minute intervals in this practice case served two purposes: (a) to obtain some index of the varying rate of output over time, and (b) to prepare the subjects for the portion of the test which would call for regularly varied content of association.

In the second stage of the test, the free association, administration followed the same pattern and time limits as the first part, except that the subjects were instructed:

"Write down rapidly any different words at all, that you can think of, until I say 'Stop.' Again, each time when you hear me say 'Mark,' draw a line under the word you are writing, as you did before."

In the third stage of the test, the varied content period, the following instructions were given:

"Now, I'll ask you to start writing all the words you can think of, belonging to a certain type. But from time to time, instead of saying, 'Mark,' I'll ask you to change the kind of word to some other kind. For example, all words beginning with the letter 'Q' or 'Z.' Each time you change the kind of words you're writing, draw a line under the one you happen to be writing at the moment, just as you did before."

The varied word categories may be found listed in Appendix C.

The same time interval, ten minutes, applied in this portion of the test. Two different lists were used randomly to minimize possible practice effects arising from surreptitious practice by subjects before testing.

Scoring. Score on the Verbal Fluency Ratio was taken as the ratio: difference between free and varied output, divided by the total number of words or output under the conditions of free content, $\frac{F - V}{F}$.

Rationale. Fluency tests are of special interest with a delinquent or criminal population since it has been discovered that many such subjects have special trouble in the reading and spelling areas, as contrasted with arithmetic (46). There is also some indication of relationship between verbal fluency and the personality factor "surgency" (13).

However, in keeping with the present focus on rigidity-flexibility, an attempt has been made to adapt fluency tests in such a way as to bring out individual difficulty in "changing the subject," so to speak. To this extent it tends to sample Wendell Johnson's "content rigidity" (48).

Penitentiary inmates, as a group, appear clinically to suffer from "mental compartmentalization," and to be prone to harping on a narrow range of subjects, often relating to their imprisonment. As a group, they expend

much conversation in decrying penal conditions, justice, administrative procedure and the like. Therefore the question is, does a narrowed ability to discuss general topics characterize inmates, especially those who have served long terms?

In scoring, the F - V/F Ratio has been used to control for the factor of individual fluency as distinct from the ability to shift rapidly from one thought-content area to another.

Thus the Verbal Fluency Ratio was included in the test battery to sample group differences in what is partly meant, in common language, by "narrow mindedness," another aspect of mental rigidity. This is the sort of test that Wendell Johnson suggests in testing for the "neurolinguistic" rigidity type which he calls "content rigidity" (48).

Wisconsin Card-Sorting Test (W. C. S.)

Description of test. The card-sorting technique (5, 34) makes use of a set of 64 stimulus cards on which are printed varied arrays of form, colour and number attributes. In this study, the materials were in four colours: black, blue, red and green; used four forms: cross, triangle, circle and star; and the elements were in groups of one to four on the cards. The task was to sort

these cards into four piles, using four arbitrary standard combinations as criteria of classification.

The standard cards were: single red triangle, two green stars, three black crosses, and four blue circles.

Administration. Testing was administered individually. The four criterion cards were arranged in the order listed above, in front of the subject, on the test table. They were to remain in view throughout the test trials. The following instructions were then given verbally before starting the test:

"Here are four cards on the table. I want you to sort this pack of cards into four piles, just underneath these on the table, one card at a time. Each time you put a card on one of the piles, I will tell you whether it is right or wrong. That is, you put a card into one of the four spaces, wait for me to tell you whether it is right or wrong, then go on to the next card."

The deck of test cards was then handed to the subject and he was told: "Go ahead, sort these into four piles." All queries were answered, "It's up to you to sort them as you think they should go." Occasionally, minor procedural errors required correction. For example, some subjects began to sort rapidly without waiting for some confirmation from the examiner. These were told to wait until the examiner informed them whether they were right or wrong, with each card. Others sorted directly

on top of the criterion cards, in which case the examiner indicated the correct position below the criterion cards, so that these remained in view.

One of the attributes, form, colour or number, was chosen at random by the examiner, as the beginning "correct" sorting criterion. The subject was not informed as to this choice. After five correct responses were made, that is, cards were sorted into piles in which the designated attributes were matched with the criterion, the examiner shifted without giving notice to the subject, to another attribute. Again, five "correct" responses were accumulated and again a shift was made in "correct" attribute, unannounced by the examiner. A predetermined series of attributes was followed for each subject, so that six changes of these completed the test. If the subject ran out of cards before completing the series, the cards were picked up by the examiner, shuffled and handed back to the subject with the indication that he should "go on sorting."

Scoring. Score on the test consisted of the total number of "perseverating" errors. These were the incorrect responses, that is, those unmatched with the selected attribute of the moment, which showed a matching with the immediately previous correct attribute which had been secretly abandoned by the examiner. Some responses were ambiguous, in that they matched two or three attributes at

once, and here the intention of the sorter was indeterminate. In these cases the response was considered "perseverating" if it was both preceded and followed by a clearly perseverating response.

Rationale. The Wisconsin Card-Sorting Technique of Grant and Berg (34) was devised to show individual differences in the ability to adapt intellectually to an ambiguous classificatory task. Here the required or adequate response is not only dependent upon the pattern of responses given by the subject, but it changes arbitrarily according to factors and patterns determined by the examiner, unknown to the subject.

Such a test situation is paralleled often in daily living where responses must be made according to indeterminate odds based on past experience, rendered irrelevant by present conditions and responses. A rigid response to such a situation would be revealed in a tendency to repeat past successful responses and slowness to respond to errors with a new attribute response. One of the significant problems experienced by recidivists interviewed clinically has been a reported inability to change established compulsive acts which led in the past to convictions. It was hypothesized that the Wisconsin Card-Sorting Test would tap some of the personal inefficiency which may help to explain such inflexible, non-adaptive behaviour.

Mirror-Drawing Test (M. D. T.)

Description of test. For this technique, a portable apparatus was constructed along the same general principles as found in the many previous forms used in experimental learning studies which involved mirror drawing (101). Essentially, the subject is presented individually with an inverted image of the test stimulus pathway by shielding the original and arranging for its reflection in a mirror adjustable to the sight lines of the subject. The response hand and arm were unimpeded by the mask during drawing motions required in the test.

Administration. Stimulus material consisted of a double sheet of dots or circles in a star pattern, as shown in Appendix D. The task required of the subject was to connect the numbered circles by means of a continuous pencilled line as quickly as possible, beginning with and finishing with the circle numbered "1." Actual procedure involved, first, three trials without the mirror as a practice run to establish procedure. Then five succeeding trials were run with the mirror. Five trials allowed for some determination of practice or habituation effect.

Pre-test instructions were given as follows:

"Can you see all the circles and numbers in the mirror? I'm going to ask you to connect the circles in the order

they are numbered, while you are looking in the mirror. Do this without lifting your pencil off the paper. You will begin with circle number one and end with this same circle.

"Whenever you reach a circle, make sure your mark goes into or through the circle, or I'll have to get you to go back and put it there. Remember, don't lift your pencil off the paper. Understand? Now I'll set your pencil mark in the first circle. Ready? Go ahead."

Timing began with "Go ahead," and continued until the subject's mark returned to the first circle and crossed into it.

Sometimes subjects became quite anxious when they found themselves apparently out of control and occasionally these threatened to give up. They were encouraged to "just go ahead," with remarks indicating general progress. None actually refused to complete under extra urging. Occasionally, subjects were reminded of the correct procedure.

Scoring. Scoring, for the purpose of the study, made use of the time in seconds required by the subject to complete the first trial with the mirror. This appears to be the most significant trial in terms of adjustment to unfamiliar demands on the psychomotor system. However, times were recorded for all tracings, in the interests of qualitative observation of the technique and in determining the rate of habituation to the mirror task. No error score was obtained. The subjects were merely required to complete

the tracing connections, no matter how devious they became. This afforded opportunity to the examiner to make continuous observation of the subject at work. A sample mirror tracing is shown in Appendix D.

Rationale. This mirror-drawing task appears primarily to demand rapid and flexible adjustment to a reversed psychomotor situation which has undergone years of practice in the opposite direction. This is one of the types of test suggested by Cattell for measuring what he calls "disposition rigidity." Solution of the problem under time pressure calls for a special kind of flexibility, presumably not sampled in the other four tests employed in this experiment. A minimum of the "cognitive" problem-solving flexibility of the other tests seems to be called for by this task. On the other hand, it was early apparent that marked anxiety was created in many subjects by the task. This was manifest variously in increased perspiration, tremulousness, spontaneous vocalization, despairing remarks, and so on. Apparently the subject feels especially challenged or threatened, judging from the remarks of many. Personal characteristics are often amplified under this stress and the test therefore appeared to tap the deeper personality resources of flexibility under temporary frustration.

It was proposed, at the design stage of the study, that a psychomotor test of flexibility was needed to extend the focus of the study beyond the more "cognitive" flexibility task and so round out the data as an exploratory work. The question arises, in view of the symptoms of anxiety, as to whether it may be tapping some forms of situational rigidity or lack of flexibility, such as reported in the review of effects of frustration on flexibility. This would be in contrast to the more enduring rigidity habits which were the main focus of interest in long-term subjects of this study.

Reliability and Validity of Tests

The tests selected for measurement of rigidity effects, as described above, have been used widely by others for this purpose (47). However, with the possible exception of the Shipley-Hartford Conceptual Quotient, the tests do not lend themselves to a determination of reliability by statistical means. Johnson and others, in reviewing work on the rigidity phenomenon, have remarked on this difficulty with rigidity tests in general. Many of the tests used for the purpose involve tasks which cannot be repeated without changing the task.

Alternate forms for the Shipley Conceptual Quotient are not available and split technique is not practicable.

Luchins provides no figures on reliability for the Jar Test. The Wisconsin Card-Sorting technique does not lend itself to alternate forms, retesting or split-test techniques, without endangering the essential rigidity-measuring properties of the test task or situation. Similar conditions exist for the Verbal Fluency Ratio and Mirror Drawing.

Thus all the tests are basically one-time-only procedures, presenting a single situation with which the subject must deal. In the process he probably gains practice which is sufficient to nullify equivalence in second measurements.

The difficulty in defining rigidity and in establishing a suitable external criterion of rigidity, also hampers attempts to calculate validity coefficients. Thus these factors in the measuring techniques must be accepted on a rational basis in terms of the operations carried out by the subject. The test tasks have been accepted by other authorities (47) as demanding the shift in behaviour patterns which has been shown to be common to most of the definitions of rigidity-flexibility surveyed in Chapter I.

IV. SUBJECTS

Two groups of subjects were selected from the general inmate population at Manitoba Penitentiary. The experimental

or "long-term" group (30 cases) was prepared systematically from the files of the institution. The initial list consisted of all inmates who had been admitted three years or more prior to the beginning of the experimental testing. Finally, a small number of additional subjects was arbitrarily chosen to fill out the sample after culling of unsuitable subjects from the original list had been carried out. Suitability was judged on the basis of availability for testing and willingness to be tested, experience from an early age in an English-speaking culture, literacy and understanding of the English language, and absence of psychosis according to available records.

Of 42 subjects originally scheduled for testing in this long-term group, ten refused to be tested, one who had refused earlier later agreed to it, and one was excluded arbitrarily to achieve the present matching with the control group.

The second group, the "new admission" subjects were arbitrarily selected from new admissions to the penitentiary on the same grounds (except for length of time served on present sentence) as were used for long-term subjects. The group contained 22 cases. In addition, those who had served a previous penitentiary term (minimum sentences of two years) were eliminated, except for one subject who had

been released over four years previous to testing, after having served fifteen months of his sentence. Gaol terms were not considered, since most of these involved less than a year of incarceration. The final selection showed very few of these control subjects who had lengthy previous gaol experience. None of the eligible new admission subjects refused testing.

Selection Variables

Matching of groups was aimed at control of the factors of sex, age, general intelligence (I. Q.) education, socio-economic and occupational status, and the general experience of being imprisoned. It was not found practicable to match for length of sentence because too few with long sentences were admitted during the course of the study.

Table I summarizes the sampling characteristics of the two groups for age, I.Q., and educational achievement. Means, standard deviations and ranges for each of these matching variables are shown. It will be seen that group differences are not significant and a good match has been achieved in this regard. Two measures of I.Q. were obtained, using the Revised Beta Test (51) and the vocabulary portion of the Shipley-Hartford Scale (93, 94).

TABLE I
COMPARISON OF GROUP SAMPLING CHARACTERISTICS

Group	Age (Years)	Revised Beta IQ	Shipley Vocabu- lary IQ	Educa- tion (Grades)
New Admission (N=22)				
Mean	25.7	102.3	104.2	8.36
S. D.	7.15	8.76	18.74	2.25
Range	17 - 40	83 - 121	67 - 130	5 - 12
Long-term (N=30)				
Mean	29.5	103.3	105.3	7.83
S. D.	6.00	11.00	14.01	1.93
Range	19 - 43	85 - 125	69 - 130	3 - 12
Difference	3.8	1.0	1.1	.53
t	0.12	0.76	0.68	0.89
p	Highly Non-significant			

In addition all subjects were matched for sex, since the penitentiary admits only males. Both groups were from roughly equivalent socio-economic backgrounds, as are the majority of inmates in this population. Occupational composition was also similar. Reference may be made to Appendix "A", showing data on individual subjects for both groups. All subjects were natural-born Canadians except for three in the long-term group, one of which was born in England, one in the United States and one who was Hungarian, raised and schooled in Canada.

Group Comparison in Terms of Imprisonment

Table II gives some additional information on the composition of the two groups of inmates. It can be seen that the long-term group has a much longer mean sentence (Present Sentence) with 123.0 months. New admissions, by contrast, had a mean value of 28.9 months for Present Sentence. As to length of time served up to the date of testing (Time Served at Test), long-term subjects had served 51.1 months after date of present admission, as contrasted with less than a month in all new admission cases.

Of the long-term subjects, 16.7 per cent were first offenders, contrasted with 40.9 per cent of the new admissions. There were 76.7 per cent of long-term subjects

TABLE II
GROUP COMPARISON IN TERMS OF PENAL RECORD

	Present Sen- tence (Mos.)	Time Served at Test (Mos.)	Total Time Served (Mos.)	First Off- ence %	Prev. Gaol Terms %	Prev. Pen. Terms %	Life or Indeter- minate Sentence* (No.)
New Admis- sions Group (N=22)				40.9	59.1	5.0	0
Mean	28.9	0	7.0				
S. D.	7.75		9.64				
Range	24 - 60	0	0 - 33				
Long- Term Group (N=30)				16.7	76.7	53.3	4
Mean	123.0*	51.1	92.5				
S. D.	83.35*	25.40	49.30				
Range	24 - 300*	15-132	15-238				
Group Mean Differ- ence	94.1	51.1	85.4				

* Life and indeterminate ("habitual") sentences were taken as 300 months for convenience in calculations with the Long-term group data. The value of 300 months is based roughly on previous trends which have been indicated in the granting of remission of sentence or parole on these two types of sentence.

with previous gaol terms, and 53.3 per cent with previous penitentiary sentences. The new admission group, on the other hand, had 59.1 per cent previous gaol and 5.0 per cent previous penitentiary imprisonments. Average total lifetime imprisonment to the date of testing was 92.5 months for the long-term subjects and seven months for the new admission subjects. Two of the long-term subjects had just completed 21 days in isolation cells, just previous to testing.

Thus the two groups seem to be clearly differentiated in terms of penal record and amount of time imprisoned. Amount of time served up to the test date (Time Served at Test) is of central concern to this study. This seems to leave only the matter of pre-imprisonment personality make-up and length of present sentence as uncontrolled factors. It has been assumed that some control has been exerted over the former by drawing both groups from the penitentiary population. It is not possible, for the purposes of this study, to show clearly whether or not rigidity in the pre-imprisonment personality may contribute to longer sentences.

V. PROCEDURE

The experimental environment, Manitoba Penitentiary, the test materials and subject selection techniques have been

described in previous sections. The general procedure and rationale will be outlined below.

Two groups of subjects, both drawn from among inmates of a representative Canadian penitentiary, were compared as to their performances on a group of tests designed to measure the degree of flexibility-rigidity shown in their problem-solving behaviour.

All subjects were given the selected five tests of rigidity by the experimenter, following standard procedure. The Wisconsin and Mirror-Drawing tests are individually administered, while the other three were given to small groups of subjects. Procedure of administration for each test is described in the section on test materials.

Scores were obtained for each test as already outlined. In addition, a "composite" score was obtained from the four tests of "cognitive" rigidity, (as opposed to the "motor" rigidity of the Mirror-Drawing test, which was excluded.) This composite score was derived from the summed and averaged z-scores on the four tests for each individual subject. It was intended to assess, for each subject, the over-all tendency toward rigidity in cognitive problem-solving for all tests at once. The composite score represents a general-factor test with the four subtests comprising a test battery.

In order to obtain the composite score, all four

individual cognitive tests were scored and these scores were first arranged, using reciprocals when necessary, so that the increasing scores moved uniformly in the direction of increasing flexibility in problem-solving. Then all scores were converted to z-scores in terms of the distribution of fifty-two cases.

Z-scores were obtained by use of the formula:

$$z = \frac{\text{raw score} - \text{mean}}{\text{standard deviation}}$$

The four z-scores for each subject were summed, then divided by four to obtain a mean z-score or "composite" rigidity score for each subject.

The composite score thus represents an index to the joint contribution of four "cognitive rigidity" tests, the contribution of each test being equally weighted. The four tests were: Shipley-Hartford C. Q., Luchins Jar Test, Wisconsin Card-Sorting Test, and the Verbal Fluency Ratio.

Questionnaire Responses Regarding the Perceived Environment

In order to obtain objective support for clinical observations of the penitentiary environment and information on inmate perceptions of the environment, a ten-item, open-end type of questionnaire was circulated among a small group of inmates of the penitentiary, these being, for the most part, members of the group psychotherapy

sections conducted by the investigator. Questionnaires were returned to the investigator anonymously. The instructions to the subjects requested that no names or identification appear on the sheets. A total of twenty questionnaires was returned voluntarily.

The most crucial items for this study were: "What have you felt to be your worst problems while living in the penitentiary?" "Describe things you did not like about the penitentiary," "What have you found to be the most bothersome to your frame of mind while here?" and "How have you found you could best fill your time while serving your sentence?" These items were used in the analysis of the group responses received.

CHAPTER III

RESULTS AND DISCUSSION OF RESULTS

The mean raw scores obtained by the two groups of subjects on the five tests of rigidity and the composite z-scores are given in Table III. The converted raw scores (in z-scores) for each individual subject are listed in Appendix "A." Here, scores in the positive direction represent increasing degree of flexibility.

I. THE RESULTS

Table III summarizes the performance of the two groups on the five tests of rigidity. It can be seen that only on one test, the Wisconsin Card-Sorting Test, was there a statistically significant difference in means ($p = .05$; $t = 2.08$) between the long-term and the new admission groups. This indicates that the long-term inmates are much more inflexible in their performance on the Wisconsin Card-Sorting Test than those who have just entered the penitentiary. Furthermore, there is a suggestion that they are also more inflexible in the Shipley-Hartford Scale ($p = .10.$)

Table III also indicates that there is no statistically significant difference in performance between the

TABLE III
SUMMARY OF DATA

	C.Q.	*LJT	VFR	WCS	MDT	** $\Sigma z/4$	$\Sigma z/5$
	Raw Scores					z - scores	
<u>New Ad-missions</u>							
Mean	85.50	1.45	.150	14.86	186.86	.200	.156
S. D.	15.58	1.62	.172	8.74	129.40	.609	.614
<u>Long-term Prisoners</u>							
Mean	77.77	1.07	.190	17.20	181.67	-.166	-.086
S. D.	15.85	1.48	.157	8.67	140.21	.536	.563
Diff. Means	7.73	.38	.040	2.34	5.19	.366	.242
t value	1.72	.86	.85	2.08	.10	2.26	1.45
p	.10	.40	.40	.05	.45	.05	.15
New Ad-missions superior	not sig.	not sig.	not sig.	yes	not sig.	yes	not sig.

* Luchins Jar Test was also analyzed by chi-square technique (McNemar), giving a chi-square value of 4.43, which has a p of .50 (df = 5.)

** $\Sigma z/4$ refers to the sum for each individual subject, of z-score transformations for the "cognitive" rigidity tests: Shipley C.Q., Luchins, Verbal Fluency and Wisconsin Card-Sorting tests. Mirror-Drawing z-scores were included in the $\Sigma z/5$ values.

Abbreviations used in table:

- CQ - Shipley-Hartford Scale, Conceptual Quotient.
 LJT - Luchins Jar Test, number of "flexible" solutions.
 VFR - Verbal Fluency Test, ratio: $\frac{\text{Free - Varied content}}{\text{Free Content}}$
 WCS - Wisconsin Card-Sorting Test, "perseverating" responses.
 MDT - Mirror-Drawing Technique, time taken in first trial.

two groups of inmates on all five tests of rigidity, taken together. However, there is a significant difference ($p = .05$; $t = 2.26$) when the comparison is restricted to the four tests of "cognitive" rigidity (excluding the Mirror Drawing test, a motor test of rigidity.) This appears to indicate that the long-term subjects were also more rigid than new admissions in dealing with cognitive problem-solving tasks generally, and suffered from a generalized handicap when faced with a battery of such tests.

When the group of long-term subjects was being selected, it was found that, out of forty-two eligible subjects from which the final selection of thirty was made, nine men flatly refused to be tested. It is interesting to note that of these nine who refused, eight subjects had served much longer sentences than the others in the long-term group. This may represent a tendency to rigidity in the long-term group which could not be measured by the statistical tests, since the performances of these subjects could not be included in the testing data.

A record was kept of the circumstances of the refusals, which permits some analysis of these questions. The refusals appear to fall into three categories: (a) strong emotional negativism, (b) suspicion that the data would be used to the detriment of the inmate, and (c) abandonment of hope for rehabilitation. All of these

reactions suggest a degree of clinical rigidity and might be considered to involve what Wendell Johnson (48) called "evaluational rigidity." (See Chapter I.)

Possibly then, the refusals offer some further non-statistical evidence of greater rigidity tendencies among inmates who have served long terms of imprisonment.

Table IV summarizes the correlations which exist between scores on each of the five tests of rigidity and time served at testing and present sentence. It can be seen that both the Card-Sorting Test and the composite cognitive rigidity score showed a moderate relationship, at better than the five per cent level of significance, with the "time served" variable. This suggests that, for those subjects who had already served a longer period on a sentence in the penitentiary, there may be some tendency for more flexibility to be associated with increasing time served.

As the table shows, none of the correlations between scores and Present Sentence achieved the required level of statistical significance. This indicates that length of sentence awarded by the courts plays little part in encouraging rigidity in inmate behaviour. Also, there is no relationship between total time spent in institutions generally and composite "cognitive" rigidity score ($r = .01$).

TABLE IV
TEST CORRELATIONS WITH SENTENCE AND TIME SERVED

	C.Q.	LJT	VFR	WCS	MDT	$\Sigma z/4$	
Time served at test:	r	.21	.20	-.16	.38	.19	.40
	p	(n.s)	(n.s)	(n.s)	(.05)	(n.s)	(.05)
Present sentence:	r	.19	.17	-.10	.30	-.02	.32
	p	(n.s)	(n.s)	(n.s)	(n.s)	(n.s)	(n.s)
Total: All terms to date							.01

- Note: 1. Long-term subjects only were used for this calculation (N = 30.) This explains differences in values of Present Sentence correlation indices between this table and Table VI.
2. Positive scores are related to increasing degrees of flexibility.

Symbols used in Table:

- n.s.: Not significant for p = .05 criterion
 C.Q.: Shipley-Hartford Conceptual Quotient
 LJT: Luchins Jar Test
 VFR: Verbal Fluency Ratio
 WCS: Wisconsin Card-Sorting Test
 MDT: Mirror-Drawing Test
 $\Sigma z/4$: Composite "cognitive" rigidity score,
 (four tests.)

Apparently only the sentence being served has an influence on general flexibility.

Table V gives the correlation coefficients between the five individual tests themselves and the composite or battery score for "cognitive" rigidity. These calculations were made in an attempt to throw further light on the problem of whether rigidity-flexibility is indeed a complex factor as seems to be suggested in the literature.

TABLE V
TEST INTER-CORRELATIONS

		C.Q.	LJT*	VFR	WCS	MDT	$\Sigma z/4$
C.Q.	r	X	.06*	-.24	.06	-.24	.68
	p						.01
LJT*	r	.06*	X	-.17*	.26*	.12*	.50
	p						.01
VFR	r	-.24	-.17	X	.00	.19	.48
	p						.01
WCS	r	.06	.26	.00	X	.31	.41
	p						.01
MDT	r	-.24	.12	.19	.31	X	X
	p				.01		

* The Luchins Test was correlated with other tests by means of point biserial r.

(N = 52)

Among the five individual tests of rigidity, a positive relationship, significant at the five per cent level, was found only between the Mirror-Drawing and the

Wisconsin Card-Sorting tests. An assessment of the meaning of this relationship would have to be based on mere conjecture in the absence of further studies.

On the other hand, the composite cognitive score was found to be positively correlated with each of the four cognitive rigidity tests which comprise it. The level of significance of relationship here is much better than the one per cent level for each of the four tests.

These results would seem to suggest that the individual tests are rather independent of one another in the factors they measure, but that all contribute significantly in a pooled measurement. Some common factor involving rigidity-flexibility is suggested. It is not within the scope of the present study, however, to carry out further factor analytical research.

Relationship Between Test Scores and Sampling Variables

Table VI has been provided to show possible relationships between the different tests of rigidity and some of the subject-sampling variables. In this table, positive test scores indicate greater degrees of flexibility in the subjects.

As shown in the table, the Shipley Conceptual Quotient was related negatively to age, and positively to

the Beta I. Q. and education variables at better than the one per cent level of significance.

TABLE VI
TEST AND SAMPLING FACTOR CORRELATIONS

		C.Q.	LJT*	VFR	WCS	MDT	$\Sigma z/4$
Age	r	-.35	.01	.36	.06	-.27	-.27
	p			.01		.05	.05
Beta IQ	r	.46	.35	.05	.07	.42	.35
	p	.01	.01			.01	.01
Vocab IQ	r	.18	.48	.05	.36	.21	.36
	p		.01		.01		.01
Education	r	.55	.40	-.08	.23	.31	.46
	p	.01	.01			.05	.01
Present Sentence	r	-.06	.01	-.05	.11	.00	.01
	p						

(N = 52)

The Luchins test was related positively with both the Beta and the Shipley Vocabulary I. Q.'s, and with education.

Mirror-Drawing was significantly and negatively related with age and positively with education. The strongest positive relationship of the test was with the Beta I. Q.

The composite rigidity score was significantly and positively related to all four variables: age, Beta and

vocabulary I. Q.'s, and education.

In general, then, the tendency was for higher levels of education and I. Q. to be associated with higher degrees in flexibility scores, and for greater age to be related to lower flexibility scores, except for the composite score. The influence of these variables on the main findings of this study should be negligible in view of control exerted by matching the groups of subjects. These variables are of interest, however, in the study of the development and control of rigidity tendencies in penitentiary subjects.

The questionnaire submitted to a group of inmates on a voluntary basis offers some information on the perceptions by inmates of their environment. The returns of the distribution included twenty protocols which were submitted to analysis. Responses on practically all of these questionnaires were detailed and apparently quite spontaneous.

After a process of condensation by the investigator, the total of specific points made by the twenty respondents was sorted and frequencies were tallied under general categories. The categories were then ranked in terms of the frequencies shown for each.

For the three questions having to do with perceived

obstacles, dislikes and irritants in the penitentiary (see Page 67), those categories which obtained the greatest frequencies were: social and physical irritants within the institution (which accounted for a fifth of the total responses), monotony and routine, objection to administrative policies together with irritations with staff members, and loss of status and of personal privacy. A combination of the categories which included difficulty in accepting self, loss of contact with the community, depressant effect of the institution, and obstacles to personal progress, accounted with about equal weight for twenty-three per cent of the total responses.

This is, of course, a crude method of appraisal. It does, however, provide some basis for observation of the irritating influences as perceived by a group of inmates in the experimental environment under discussion.

These above categories might be further combined to form two major categories: irritants perceived in the external environment, and irritants perceived as subjective. The much greater preponderance of responses tending to project blame on the environment suggests ego-defensive attempts on the part of these respondents.

It will be noted that the perceived irritants as reported here compare with the clinical evaluation of the experimental environment already outlined above.

One of the items included in the questionnaire was: "How have you found you could best fill your time while serving your sentence?" The responses to this item, for twenty respondents in the penitentiary, were classified and the categories ranked. Categories which occupied ranks one to four and together accounted for 54 per cent of the responses, were: studies and courses (eighteen per cent of the total,) hobbies (fourteen per cent of the total,) work assignments, and reading.

It might be noted how frequently the "mental stimulation" activities were indicated as techniques for passing time in the institution. Out of a total of sixty-five response units, twenty-seven (forty-two per cent) involved the taking of courses, reading, self-study, and taking part in groups and classes. Some inmates indicated general attempts to keep busy while serving a sentence.

This, then, is a list of techniques which a group of inmates in the penitentiary say they use to fill their time while imprisoned.

II. DISCUSSION OF RESULTS

The results of the study have suggested that the group of long-term prisoners selected for this experiment were less flexible in a general way in the problem-solving

tests administered than were a comparable group of new admissions to the same penitentiary. If these two groups of subjects were equated in terms of pre-sentence rigidity-flexibility, it may be assumed that some factor or factors specific to the serving of time in this penitentiary contributed to this lower degree of flexibility in the long-term inmates.

The design of the study permitted some control over variables which were suspected of contributing to greater rigidity tendencies. As shown by correlations between test scores and the variables of I.Q., school grade and age, this control was warranted.

Systematic random selection of subjects for the groups tended to provide control, to some extent, over group differences in pre-existing rigidity tendencies. However, it might be questioned at what point the size of the samples could be considered sufficiently to decrease sampling error in this regard.

If the above problems in design could be solved, the conclusion might be drawn from the present data that a period of fifteen months or more spent in the penitentiary can contribute, in itself, to increased rigidity in problem-solving. The results are suggestive enough to indicate need for further, more refined investigations of this process.

The long-term inmates appear, as a group, to be more rigid than the matched group of new admissions. On the other hand, it has been indicated by the data that, for the thirty long-term subjects, rigidity decreased as the length of time they had served in the penitentiary increased.

This raises some question as to the course of development of rigidity tendencies, if such do actually develop with imprisonment. Is the relationship linear in the sense that rigidity may continuously increase as more and more time is served? Or is there a tendency to develop, through some adaptation process in the inmate's behaviour, an ability to counteract rigidity tendencies? The above finding suggests the latter possibility.

Thus it might be conjectured that human behavioural resources permit the development of devices to prevent monotony, frustration, and the other deleterious effects of penitentiary life from encroaching on the more desirable flexibility in approaching problems.

As a possible explanation for such resistance to rigidifying influences, reference could be made to the evidence, cited in Chapter I, of a spontaneous need of the organism to vary stimulation levels in its environment. Perhaps with increasing time this need can become effective

enough, through increased skills and knowledge of the means for varying the psychological environment both subjectively and objectively, to counteract the deleterious influences which seem to account for the group differences in this study.

In this connection reference may be made to the questionnaire responses as summarized in the results. It will be recalled that nearly a third of the responses indicated that "mental stimulation" was resorted to in order to pass time while serving a sentence. One also gains the impression clinically that those inmates who carry on a hobby, take a correspondence course, read, or attend group discussions, suffer less from incarceration than those who do not take advantage of such mental stimulants.

What effect did time spent in prison previous to the present commitment have on rigidity scores? When the time already spent on the present sentence was added to all previous time in institutions, the correlation was found to be practically zero for the composite score for the long-term group. Presumably the past history of imprisonment has very little relationship to rigidity scores and can be discounted as a variable influencing such rigidity. It is possible that release from the penitentiary and a sojourn in the community tends to diminish

rigidity acquired while serving a term. Also, the rigidity tendencies may only be manifest while inmates are actually incarcerated, possibly as a result of ego defense against boredom and frustration.

The data suggest that an increase in problem-solving rigidity is associated with a prolonged period of imprisonment in the penitentiary. What then is the nature of this rigidity and what other factors influence it?

It has been shown that the groups of subjects differ significantly in the Wisconsin Card-Sorting Test score and in the composite score for "cognitive" rigidity. As mentioned in the discussion of tests used in the study, the Wisconsin test requires the ability to perceive bases for classification and to shift to new, more appropriate bases of classification as the situation demands. The resemblance of this task to what is involved in Lovell's categorization factor was pointed out. Lovell, it will be recalled, used a prison group to represent understimulated populations and found them deficient in categorization tests (59.) It may be presumed, then, that the present group of long-term subjects had suffered a loss in categorization ability during their period of incarceration.

The composite rigidity score was composed of the mean for each subject's z-scores on four tests: the

Conceptual Quotient, the Verbal Fluency Ratio, the Luchins, and the Wisconsin tests. The component tests show very low and non-significant inter-correlations among themselves. In addition, all but the Wisconsin test failed to discriminate significantly between the groups. However, relationships of each test with the composite score were strong enough to suggest a general factor involving rigidity running through all four tests in the battery.

As described in Chapter II, each test seems to measure a unique aspect of rigid behaviour in the same way as do the subtests of a general intelligence test. These specific aspects were mainly non-discriminating for the inmate groups. A possible deduction from this combination of results is that the influence of imprisonment can lead to a generalized tendency to approach problems in a rigid fashion, but that individuals vary in the situation and contexts in which they will demonstrate rigidity. Possibly the Wisconsin test involves a more general demand on flexibility of approach than the others and hence its ability to discriminate between the groups along with the more general composite cognitive score. Ferguson suggested that other types of rigidity may exist besides the cognitive form, such as perceptual (71). Johnson (45), in surveying the studies of rigidity also indicated that several factors

may be involved in the one concept.

In addition to the above conjectures, the possibility exists that the unknown reliability of the various tests may have been low enough to obscure any real relationship that could exist between them.

A further consideration would be the factors which influence the development of rigidity tendencies. In the main, increasing age has been seen to be modestly associated with more rigidity in the separate tests, while I.Q. and school grade were found to improve parallel with flexibility in the tests used. This agrees essentially with the findings on rigidity reviewed in the historical section. With regard to intelligence, it will be recalled that Scheier (89) found his rigidity tests strongly saturated with the "reasoning" factor. (See Chapter I.)

Friend and Zubek (29) suggested that rigidity and decreased objectivity seemed to account for some of the inferiority of older subjects on the Watson-Glaser Critical Thinking Appraisal (106). Luchins (61) found relationships between type of education and ability to perform on his Jar Test. In addition, both Luchins and Watson and Glaser suggest that more and better education can improve the efficiency of thought processes. Since inadequate educational background seems to be frequently associated with

offenders, development of educational facilities should help to decrease rigidity among inmates.

Intelligence had a low but significant correlation with some of the test scores. It might be expected that higher levels of intelligence tend to provide resources for resisting to some extent the tendency toward rigidity in some subjects, by improving insight and ability to employ methods of self-improvement.

It will be recalled that the composite rigidity score was positively related to age, suggesting that increasing age may be associated with greater general cognitive flexibility. This may require explanation. It is difficult, however, to determine the significance of the contrasting negative relationship between age and the rigidity subtests.

Friend and Zubek showed that the peak of efficiency on the Watson-Glaser Critical Thinking Appraisal (106) seemed to be reached in the thirty to forty age group. Inasmuch as the present group of fifty-two subjects ranged in age from seventeen to forty-three years, it might be reasoned that these subjects were showing an improvement in critical judgement and objectivity with age. However, a further extension of the age range for the present subjects might have resulted in a falling off in the composite scores after about the age of forty. According to the

Friend and Zubek study, the decrease in Critical Thinking scores was partly explainable on the basis of greater rigidity and less objectivity shown by the approaches to the test on the part of the older subjects.

Improvements in Design

Hindsight, as might be expected, has revealed weaknesses in the present research design. Some of these present problems which make their correction impracticable in terms of time and facilities.

A generally more solid case might have been made for the effects of imprisonment on rigidity if it had been possible to use the longitudinal approach, in which the same group of subjects was tested at admission and then again at varying intervals as their elapsed time increased in the penitentiary. The fact that this was not feasible for the present study has increased the importance of sample size as a sampling-error control factor. It is difficult, for example, to rule out entirely the effects of possible inter-group differences in rigidity tendencies existing before imprisonment began.

A further problem raised by inability to apply the longitudinal approach is the fact that more serious and thus often more violent crimes tend to be associated with longer terms. It is possible that greater rigidity may be one of the characteristics of the more violent offenders.

In building up a control group of new admissions which is adequately matched with the long-term group on this variable, it would require too long a period to accumulate a sufficient proportion of more serious offenders in the new admission group. This is because of the relatively slow rate at which such cases are admitted at this penitentiary.

There is, of course, the problem of measurement of rigidity. The criticism of existing rigidity tests, raised by Lovell(60) and others (47), may be consulted on this issue. Probably better tests could be devised than those used here. The whole concept of rigidity could also stand more searching examination (25, 53.)

III. SUGGESTIONS FOR FUTURE RESEARCH

The results of the present investigation raise some further hypotheses for possible future testing.

As already mentioned, the course of development of rigidity or other tendencies, as the length of imprisonment increases, offers an interesting problem for experimental study. It has been conjectured that there might be a turning point in the deterioration process in inmates serving long terms, when techniques are developed for resisting the forces which increase rigidity tendencies.

A design might be set up to examine this possibility by taking into account the continuous development of problem-solving approaches from admission onward.

This might naturally lead into a study of individual differences in ability to tolerate the rigidifying nature of the penitentiary environment. A further extension could involve study of the most effective techniques used by inmates for counteracting the rigidifying influences.

The present study has focussed on the rigidity-flexibility aspect of problem-solving behaviour. It is possible that many other aspects of behaviour may show decrements as a result of imprisonment as well.

Once the general question of effects of imprisonment is opened up, it becomes necessary to look into the subjective meaning of this particular kind of environment for the inmates. What happens to the "time perspective" (27, 55) of those incarcerated, when faced with a long or perhaps indefinite period involving loss of contact with society? What are the most difficult aspects of this environment with which the inmate is faced? These and other questions have been barely touched on in the present investigation.

The next chapter will conclude the report with a summary of the investigation.

CHAPTER IV

SUMMARY AND CONCLUSIONS

This study is concerned with examining the effects of long periods of imprisonment on problem-solving behaviour in a group of penitentiary inmates. The dimension of behaviour which was chosen for measurement was rigidity-flexibility, as manifest by the demonstrated ability to shift approaches to an intellectual problem or task as the objective situation demanded. Flexibility in solving problems was considered to be an important aspect of inmate behaviour, related to teachability, which could have an influence on attempts to rehabilitate, or change the attitudes of the inmate subjects.

A review of the literature on the nature of the rigidity-flexibility concept revealed that it was a valid concept for measurement and a significant consideration both for the theory of behaviour and for the practical application of theory to inmate rehabilitation.

After reviewing some studies of the effects of variables such as frustration, strong emotion, shock, intellectual stimulation, and anxiety on the flexibility of behaviour, it was concluded that these and other variables could have significant effects on the efficiency of

cognitive behaviour. The literature also showed that deprivation of sensory and social stimulation, both during early development and in adulthood, had the effect of creating widespread inefficiency in animal and human behaviour.

The effects of imprisonment of various kinds was found to be generally deleterious in the view of many authorities. Some experimental evidence supported this opinion. Accordingly, the present study was designed to explore experimentally the possible effects on inmates of time spent in a representative Canadian penitentiary.

The penitentiary was seen to provide varying degrees of both social-perceptual deprivation as well as over-stimulation due to frustration and psychological irritations. Inmates would be expected to vary in their vulnerability to these forces and in their resources for counteracting them. Canadian penitentiaries provide a number of facilities which offer avenues of beneficial stimulation to the inmate.

Two groups of subjects were drawn from the Manitoba Penitentiary population. The long-term or experimental group, thirty in number, had all served fifteen months or more on present sentence. They were in this way distinguished from the matched group of twenty-two new admissions

who, in addition, were mainly first offenders or had little previous penal history and had shorter sentences. The groups were matched for sex, age, education, intelligence, socio-economic level and, of course, the experience of having been committed to prison.

A battery of five tests of rigidity was administered to all subjects. These were the Shipley-Hartford Scale, Luchins Jar Test, a special verbal fluency test, the Wisconsin Card-Sorting Test, and a version of the mirror-drawing technique. The four cognitive tests, excluding the motor rigidity mirror test, were also used together as a battery to give a "composite cognitive rigidity" score for general rigidity assessment. In addition, an open-end questionnaire was given to a group of twenty voluntary inmate subjects to assess perceptions of and reactions toward the penitentiary environment.

The data revealed that the two groups differed significantly in their mean scores on the Wisconsin test and for the "composite cognitive rigidity" test battery; that is, the long-term inmates were more rigid. However, a significant relationship was found between decreasing rigidity scores and increasing time spent in penitentiary by the long-term subjects. This was interpreted as suggesting that the penitentiary life contributed to

greater rigidity in problem-solving among these subjects, but that some unknown factors, possibly learned techniques for dealing with the environment, tended to assist the subjects to fend off rigidification. Questionnaire responses showed that many inmates find monotony and frustration threatening to personal organization and accordingly seek activities involving mental stimulation as a counterbalance.

In addition, correlation data suggested that a general factor of behavioural rigidity seemed to be tapped by the "composite" score. At the same time, the groups were not discriminated by four of the individual tests, suggesting that individual differences could be expected in the situations and contexts in which rigidity would be manifest. The Wisconsin test seemed a more general estimator of rigidity than the other four used in the study.

A P P E N D I C E S

A P P E N D I X "A"

TABLE VII (a)
INDIVIDUAL SUBJECT DATA, NEW ADMISSIONS GROUP

Sampling Data (Mean = 0.0; Standard Deviation = ± 1.0)									
No.	TSAT	PS	TT	Off.	Age	Ed.	BIQ	VIQ	Occ.
1	1	24	1	Auto Th.	24	8	93	110	Sailor
2	0	27	0	Robbery	20	6	83	82	Baker
3	0	24	12	"	22	7	95	82	Labour
4	0	30	32	Theft	24	10	121	123	Soldier
5	0	24	33	Fraud	39	9	104	115	Salesm.
6	0	24	5	B.E.&T.	24	6	86	77	Miner
7	0	39	5	Aslt. Fem.	22	9	99	115	Labour
8	0	24	0	B.E. & T.	25	9	106	123	Sailor
9	0	60	0	"	25	7	109	123	Labour
10	0	24	3	"	40	12	102	130	"
11	0	42	0	Extort.	32	12	110	123	Storekp.
12	0	24	0	Robbery	18	9	105	113	Labour
13	0	24	0	"	19	6	99	100	Tr.Driv.
14	0	30	0	B.E. & T.	21	10	115	113	Machin.
15	0	36	18	Indec.	37	5	92	79	Pulp.Cut.
16	0	24	0	B.E. & T.	17	9	112	97	Labour
17	0	24	6	"	21	5	99	67	"
18	0	24	0	"	22	12	100	97	Tr.Driv.
19	0	24	1	"	24	7	96	82	Labour
20	0	36	15	Theft	30	11	103	130	Plastr.
21	0	24	10	B.E. & T.	18	9	113	108	Millwr.
22	0	24	11	Forgery	34	10	109	104	Dies.Op.

Abbreviations used in Table:

- TSAT: Time Served at Test Date, Present Sentence.
 PS: Present Sentence in months.
 TT: Total Time Accumulation, all sentences (Mos.)
 Off: Offence Category, Present Sentence.
 Ed.: Education, Stated Grade Level.
 BIQ: Revised Beta Examination I.Q.
 VIQ: Vocabulary I.Q., Shipley-Hartford Scale.
 Occ.: Stated Occupation.
 B.E. & T.: Break, Enter and Theft.

TABLE VII (b)
INDIVIDUAL SUBJECT DATA, NEW ADMISSIONS GROUP

Test Data (z-scores)*								
No.	C.Q.	LJT	VFR	WCS	MDT	$\Sigma z/4$	$\Sigma z/5$	
1	-.06	.50	-.46	-.75	-.18	-.19	-.19	
2	-.31	-.79	-.02	2.44	-.18	.33	.23	
3	-1.12	-.79	-.36	1.32	-.93	-.24	-.38	
4	1.30	2.43	.23	-.61	-.72	.84	.53	
5	.99	-.15	-.67	.63	-1.00	.20	-.04	
6	-.68	-.79	-.78	-.03	-.45	-.57	-.55	
7	.99	1.14	1.00	-.69	-.51	.61	.39	
8	.99	-.79	.23	-.17	-.35	.07	-.02	
9	-1.36	-.79	-.57	.35	.10	-.59	-.46	
10	.74	.50	.80	-.31	.16	.43	.38	
11	-.50	-.15	.23	.63	1.09	.05	.26	
12	1.11	-.15	-.38	.35	-.74	.23	.04	
13	-.87	-.79	-.30	-1.35	-.92	-.83	-.85	
14	1.98	1.79	-.43	1.78	2.30	1.28	1.88	
15	.18	-.79	-.64	-.69	-.89	-.48	-.57	
16	1.92	1.14	-.88	-.69	-.40	.37	.22	
17	-.37	-.79	1.12	-1.49	-.30	-.38	-.55	
18	.43	1.14	1.68	-.03	-.54	1.11	1.22	
19	.00	-.79	-.30	1.78	-.27	.17	.08	
20	1.30	1.79	-1.46	1.32	-.61	.98	.67	
21	.80	-.79	-.02	.16	2.50	.04	.45	
22	-1.05	1.14	.12	-.03	1.18	.04	.27	

* Mean = 0.0; Standard Deviation = ± 1.00 .
Scores in the positive direction indicate increasing flexibility in behaviour.

Abbreviations used in Table:

- C.Q.: Shipley-Hartford Conceptual Quotient.
LJT: Luchins Jar Test.
VFR: Verbal Fluency Ratio.
WCS: Wisconsin Card-Sorting Test.
MDT: Mirror-Drawing Test
 $\Sigma z/4$: Composite score, four tests of cognitive rigidity.
 $\Sigma z/5$: Composite score, all five tests.

TABLE VII (c)
INDIVIDUAL SUBJECT DATA, LONG-TERM GROUP

Sampling Data									
No.	TSAT	PS	TT	Off.	Age	Ed.	BIQ	VIQ	Occ.
1	20	24	27	Theft	20	7	101	108	Labour
2	45	60	95	"	34	10	96	112	"
3	43	62	133	Auto Th.	34	9	124	128	Drftm.
4	132	300	135	Mansltr.	31	8	124	130	Tr.Drv.
5	48	120	48	Shoot w int.	25	12	116	105	Mech.
6	68	244	90	" " "	27	8	102	120	Waiter
7	57	93	73	B. E. & T.	26	9	88	108	Labour
8	61	96	107	Rob. w viol.	32	6	99	94	Clerk
9	64	132	143	B. E. & T.	34	8	109	120	Cafe Op
10	87	300	87	Murder	24	7	110	110	Labour
11	104	178	183	Arm. Rob.	33	8	108	117	Dies.Op
12	42	84	74	Rob. w viol.	28	6	108	97	Labour
13	44	132	44	Mansltr.	28	7	91	105	Farm.
14	43	180	47	Shopbrk.	25	8	97	94	Garment.
15	19	30	82	Forgery	26	12	122	102	Bkpr.
16	54	180	104	Ind. Asslt.	32	8	97	110	Labour
17	50	120	66	Arm. Rob.	32	9	109	105	Mech.
18	61	300	238	Poss. Drugs	43	7	89	92	Paint.
19	69	144	190	Arm. Rob.	42	8	106	115	Waiter
20	52	84	99	Fraud	38	8	85	94	Clerk
21	18	84	75	Arm. Rob	24	7	107	111	Labour
22	68	108	124	B. E. & T.	28	8	93	95	"
23	34	30	63	"	19	7	96	77	"
24	15	24	15	Forgery	19	5	96	69	"
25	44	90	44	Mansltr.	29	3	87	92	Guide
26	43	60	69	Arson	27	8	109	108	Labour
27	44	300	44	Murder	21	9	117	120	Clerk
28	31	60	63	Arm. Rob.	36	8	105	123	Miner
29	18	96	123	Robbery	36	4	96	94	Labour
30	46	62	92	"	31	11	110	105	"

Abbreviations used in Table:

- TSAT: Time Served at Test Date, Present Sentence, (Mos.)
 PS: Present Sentence in Months.
 TT: Total Time Accumulation, all Sentences (Mos.)
 Off: Offence Category, Present Sentence
 Ed.: Education, Stated Grade Level.
 BIQ: Revised Beta Examination I.Q.
 VIQ: Vocabulary I.Q., Shipley-Hartford Scale.
 Occ.: Stated Occupation
 B.E.& T.: Break, Enter and Theft.

TABLE VII (d)

INDIVIDUAL SUBJECT DATA, LONG-TERM GROUP

Test Data (z-scores)*							
No.	C.Q.	LJT	VFR	WCS	MDT	$\Sigma z/4$	$\Sigma z/5$
1	.24	-.79	-.59	-.69	-.76	-.46	-.52
2	.00	.50	-.43	-.03	-.83	.00	-.16
3	.12	1.79	-.06	-.03	.39	.45	.44
4	1.54	1.14	-.51	.63	.10	.70	.58
5	-.31	-.79	-.64	-1.41	2.61	-.79	-.11
6	.18	1.14	-.57	-.03	-.71	.18	.00
7	-.75	1.79	1.37	-.42	-.21	.50	.36
8	.86	-.79	2.54	-1.22	1.67	.35	.62
9	.43	-.79	-.53	-.31	.80	-.30	-.08
10	1.85	-.79	1.24	.63	.50	.73	.68
11	-.50	1.79	.90	.16	1.74	.59	.82
12	-.37	-.15	-.77	-.91	1.32	-.55	-.18
13	-.13	-.79	1.24	1.32	.26	.41	.38
14	.12	-.79	-.41	-.75	-.30	-.46	-.43
15	1.85	1.79	.28	-1.16	2.61	.44	1.07
16	-1.42	-.15	-.53	-.89	-.73	-.75	-.74
17	-1.05	-.79	-.36	.16	.13	-.51	-.38
18	-.99	-.79	-.43	-.91	-1.03	-.78	-.83
19	-1.55	-.79	-.58	.16	-.88	-.72	-.73
20	-.93	-.79	-.77	-.53	-.99	-.76	-.80
21	-1.36	.50	-.55	-.03	-.55	-.36	-.40
22	-1.36	-.79	-.62	1.78	.71	-.25	-.06
23	.68	-.79	1.37	.63	-.48	.47	.28
24	.43	-.79	-.53	-1.85	-.84	-.68	-.72
25	-1.30	-.79	-.02	-.83	-.72	-.74	-.73
26	-.56	-.79	-.53	-.83	-.91	-.68	-.72
27	.18	.50	.34	2.44	-.31	.87	.63
28	-1.36	-.79	-.61	.93	-.31	-.46	-.43
29	-1.36	.50	-.27	-1.00	-.83	-.53	-.59
30	.93	-.79	-.38	-.31	.27	-.14	-.06

* Mean = 0.0; Standard Deviation = ± 1.00
 Scores in the positive direction indicate increasing flexibility in behaviour.

Abbreviations used in Table:

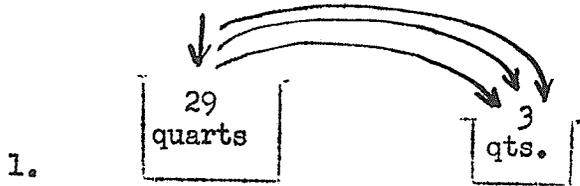
- C. Q.: Shipley-Hartford Conceptual Quotient.
 LJT: Luchins Jar Test.
 VFR: Verbal Fleuncy Ratio.
 WCS: Wisconsin Card-Sorting Test.
 MDT: Mirror-Drawing Test.
 $\Sigma z/4$: Composite score, four tests of cognitive rigidity.
 $\Sigma z/5$: Composite score, all five tests.

A P P E N D I X "B"

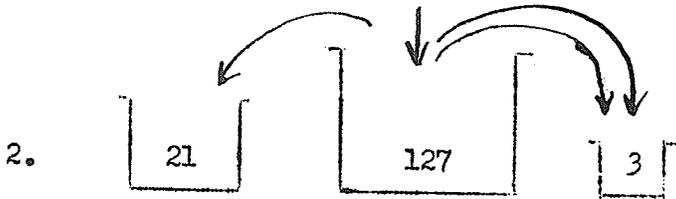
NO. _____ NAME _____

IMPORTANT : DO NOT START WORKING TILL THE INSTRUCTIONS HAVE BEEN GIVEN.

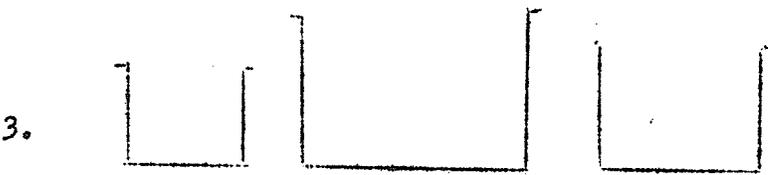
S#.....
LJT.....
D.....
Sc.....



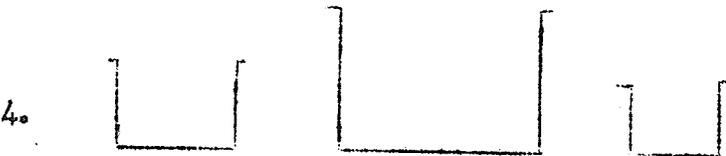
HOW CAN YOU GET 20 QUARTS?



HOW CAN YOU GET 100 QUARTS?



HOW CAN YOU GET 99 QUARTS?



HOW CAN YOU GET 5 QUARTS?



HOW CAN YOU GET 21 QUARTS?



HOW CAN YOU GET 31 QUARTS?



HOW CAN YOU GET 20 QUARTS?



HOW CAN YOU GET 18 QUARTS?



HOW CAN YOU GET 25 QUARTS?



HOW CAN YOU GET 22 QUARTS?



HOW CAN YOU GET 6 QUARTS?

A P P E N D I X "C"

APPENDIX "C"

VERBAL FLUENCY RATIO
VARIED CONTENT CATEGORY LISTSList A

Animals
Tools
Foods
Occupations
Offences
Girls' Names
Countries of the World
Small Objects
Parts of the Body
Clothing

List B

Animals
Occupations
Cities of the World
Clothing
Boys' Names
Tools
Offences
Long Objects
Books
Parts of the Body

Note:

The two lists were used randomly to limit possible practice effects arising from the passing on of test information by inmate subjects to other subjects not yet tested.

A P P E N D I X "D"

A P P E N D I C E S

A P P E N D I X "A"

NO. _____ NAME _____

S#.....
MT.....I
D.....

D" = _____
TSc _____

1 0

3 0

0 5

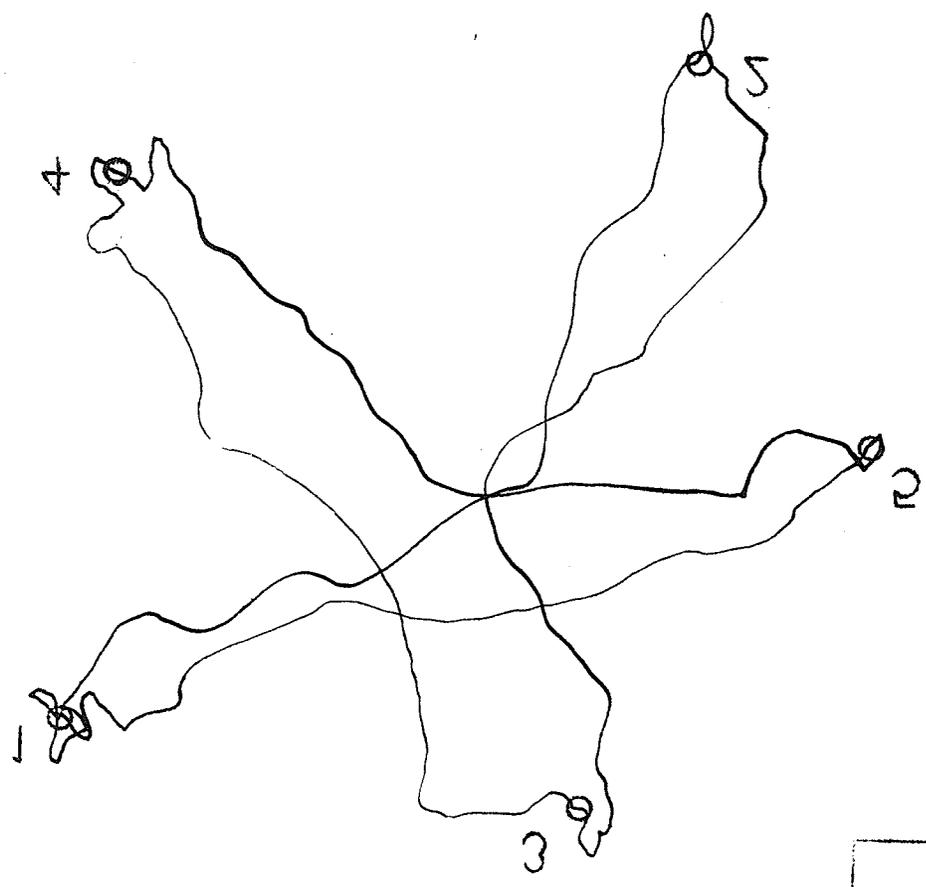
4 0

0 2

T1 _____ "
Sc1 _____

NO. _____ NAME _____

S#.....
MT.....II



T II _____ "
Sc2 _____

B I B L I O G R A P H Y

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