AVOIDANCE-LEARNING DEFICITS IN CRIMINAL OFFENDERS

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Psychology

Ph.D.

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Avoidance-Learning Deficits

in Criminal Offenders

Subjects were prison inmates selected on the basis of avoidance-learning capacity. One group (ALFs) comprised those who showed failure to learn to avoid physical (shock) punishment and amelioration of this deficit following adrenalin injection. A second group (ALs) showed avoidance learning not improved by adrenalin.

Groups did not differ on personality, historical, or demographic variables recorded, and contrary to expectation, ALFs showed no greater evidence of psychopathy than ALS.

Several parameters of the adrenalin ameliorable avoidancelearning deficit were explored. ALFs' avoidance learning with the aid of adrenalin was not dissociated in the nondrug state and was equally as persistent as avoidance learning of ALs. The avoidance-learning deficit of ALFs was also manifest with nonphysical punishment (monetary reward loss); adrenalin injection again ameliorated this deficit. The avoidance-learning deficit was not found with empathically experienced punishment; ALF subjects could both learn a cooperative task and learn to avoid punishment delivered to another.

Deborah Blain

Evitabilité - Apprise Défauts chez les Criminels

Les sujets etudies sont des criminels choisis en vertu de leur évitabilité - apprise abilité.

Un premier group)ALFs) comprennent ceux qui ne peuvent pas apprendre à éviter la punition d', ordre corporel (shock) mais après une injection d'adrenaline montrent une amélioration a ce défaut. Le second group (ALs) est celui qui ne montre évitabilité-apprise défaut.

Les deux groups ne presentent pas de differences en ce qui concerne la personalité, l'histoire ou les components démografiques, et contrairement a ce qu'on pouvait s'attendre ALFs n'ont pas plus de psychopatie que les ALFs.

Autres aspects de l'amélioration à l'adrenaline dans l'évitabilité-apprise abilité furent explorés. ALFs évitabilitéapprise abilité n'est pas dissociée dans l'état sans medecine et aussi persistante que l'évitabilité-apprise des ALFs.

L'évitabilité-apprise défaut des ALFs persiste aussi avec la punition qui n'est pas d'ordre corporel (perte de compensation monetaire) encore ici l'adrenaline prouve qu'elle peut améliorer ce défaut.

L'évitabilité-apprise défaut n'est pas present dans la

punition empâtique.

ALF sujets peuvent tous apprendre à participer, dans une épreuve commune et apprennent à éviter une punition infligée à un autre.

AVOIDANCE-LEARNING DEFICIES

IN CRIMINAL OFFENDERS

Deborah Blain

by

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INTRODUCTION

This research is concerned with the elucidation of avoidance learning deficit in human subjects. Previous studies of this phenomenon had yielded some provocative results. The major studies in this area had shown that those with the clinical diagnosis "psychopath" were deficient in avoidance learning involving physically punished tasks. It was also found that adrenalin injection ameliorated this deficit, at least temporarily. Further, it had been suggested that there were differences in autonomic nervous system activity and responsivity between those who were deficient in avoidance learning and those who were not. Review of these studies indicated need for integration of these earlier findings and further exploration of their range of generality. Failure to learn the avoidance of punishment may have serious consequences. Prevention of these consequences calls for the development of new techniques capable of counteracting the effects of avoidance-learning deficits.

With respect to the, general relevance of avoidance learning to behaviour, there is a body of literature supporting the theory that acquired fear acts as a strong motivator and regulator of behaviour (Mower, 1947; Brown and Farber, 1968). Some investigations of the failure of fear to guide behaviour have been made but, as may be seen from review of this literature, these studies have seldom been systematic or integrated with one another.

It is generally accepted that in most instances, responses that serve to avoid conditioned stimuli for fear are readily learned (Solomon and Wynn, 1954). As Eysenck (1964) and Franks (1961) have noted, failure to learn appropriate avoidance responses might be expected to have behavioural consequences probably of an antisocial nature. Analysis of the socialization process suggests that many child-training procedures are directed toward the acquisition of various avoidance responses. If, for some reason, the avoidance responses required for socialization are not or cannot be learned, antisocial behaviours may result.

There have been no systematic studies of failure to learn punishment avoidance in normal human subjects. Baron and Kaufman (1966) however, have noted in a review of the literature on avoidance learning in laboratory situations that exposing normal, naive human subjects directly to an avoidance schedule may sometimes lead to the failure of as many as half the subjects to acquire avoidance responses.

In studying the acquisition of avoidance responses in human subjects, the influence of ego-involvement on performance must be considered. It has been demonstrated that to do well at a task is a powerful positive reinforcer. In avoidance tasks, if the criteria for "doing well" are manifest, correct avoidance responses may be learned on the basis of self-administered positive reinforcement rather than on the basis of avoidance of noxious stimuli. In latent avoidance tasks, the subject is not instructed to learn to avoid the noxious stimuli, and usually an ego-involving task using positive reinforcement is used to conceal the avoidance task. That the use of a latent avoidance situation does not interfere with avoidance learning and may, in fact, facilitate such learning has been demonstrated by Hefferline, Keenan, and Harford (1959).

Because of the possibility of different motivations operating in avoidance learning and because only avoidance learning motivated by fear of punishment is of interest here, unless otherwise noted, the review of the literature and the research that follows are restricted to the latent avoidance-learning situation.

Historical Background

Avoidance Learning, Emotion and Personality

In human subjects failure to learn punishment avoidance is supposedly associated with a number of emotional states or

personality characteristics (Bandura and Walters, 1963). One construct that has separated avoidance learners from nonlearners is anxiety, with the general finding that low anxiety is associated with avoidance-learning failure. Dorn (1964) found that subjects who were low in subjective anxiety performed avoidance tasks less well than highly anxious subjects, even when avoidance was defined as socially acceptable. Franks (1956) demonstrated that anxious subjects show superior eye-blink conditioning over nonanxious subjects. However, considering the Yerkes-Dodson Law (1908), low anxiety would lead to poor avoidance learning performance only when the avoidance situation was relatively simple in nature. As noted by Solomon (1964), most avoidance learning studies have used both a fairly simple task and noxious stimulus, and little research has been done on complex or learned punishment situations. These observations point to the necessity of taking into account both task complexity and anxiety in predicting avoidance-learning performance.

Given that at least a certain minimal level of anxiety is necessary for avoidance learning, one would expect subjects abnormally low in anxiety to show poor acquisition of avoidance responses. In the most general application of this prediction, Eysenck (1957) in his theory based on cortical dynamics states that subjects falling at the extravert extreme of the introversion-

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extraversion personality dimension will show poor conditionability.

One of the clinical categories associated with extreme extraversion is psychopathy (Eysenck, 1960). Even without ^d reference to extraversion, Cleckley (1955) in his classic description of psychopaths commented on their freedom from "any marked nervousness or other common symptoms of psychoneurosis", and their, "general poverty of affect" (p. 380-381). There seems to be general agreement that psychopaths are abnormally low in anxiety, which leads to the speculation that they would show avoidance-learning deficits.

It should be noted that from the time that the term "psychopath" was first used as a clinical diagnosis there has existed controversy as to its exact meaning. Generally, Cleckley's (1955) criteria (see Appendix) are used to establish this diagnosis, although his standards are applied with disagreement as to issues such as degree of necessary fit to the criteria, subcategories of psychopathy, and frequency of this disorder. In some clinical settings psychopathy has become a catch-all diagnosis, and there also exists confusion between the terms "psychopath" and "sociopath". For purpose of this review and the research to follow, "psychopath" will be used in preference to "sociopath" and the term will refer to individuals showing the

constellation of traits first described by Cleckley.

Lykken (1955, 1957) confirmed the existence of an avoidancelearning deficit in his experimental studies of psychopaths. He had psychopathic and nonpsychopathic criminals and normal noncriminals learn a pattern of 20 correct responses from a sequence of choices among four levers; one of the three possible incorrect responses at each choice point was punished by a strong electric Thus the subject had a two-fold task: the manifest task shock. was to make the correct responses and a latent avoidance task consisted of avoiding punishment by learning to avoid those levers that produced shock. The subjects were not told that it was possible to avoid punishment by a strategic selection of Each subject was given 20 trials, and the 20-choice errors. sequence was the same in each trial. Lykken found no difference between groups in the rate at which the manifest task was learned, indicating that each group was equally responsive to the influence of positive reinforcement. However, in the latent avoidancelearning task, while the normal group and the neurotic criminals could learn to avoid shock, the psychopaths could not.

Schacter and Latané (1964) essentially replicated Lykken's research as a preliminary step in their own study and also found that clinically identified psychopaths were deficient in avoidance, learning. Additional support for Lykken's findings has been

provided by Schmauk (1970), who found that psychopaths are unable to avoid either physical punishment (shock) or social disapproval (the experimenter's saying "wrong").

Some studies failed to confirm the finding that psychopaths have an avoidance-learning deficit. Schoenherr (1964), using the same type of task as Lykken had, altered the procedure so that there was a built-in conflict between the avoidance response and the positively reinforced response. He did not find the avoidance learning of psychopaths inferior to that of normal subjects, nor did he find a correlation between psychometrically measured anxiety levels and avoidance-learning performance. Schoenherr did find, however, that when psychopaths were allowed to choose which maze pattern to perform they failed to avoid the one in which they had previously experienced shock. He also found that, when only a certain portion of a pattern resulted in punishment, the learning performance of normals tended to deteriorate in that portion whereas that of psychopaths did not. Although Schoenherr's study showed little difference between psychopaths and normals in avoidance learning, the nature of the task he used should be considered in interpreting these results. In that task, punishment could be avoided only at the expense of a previously learned correct response; thus, the subject was placed in a double-bind situation. Absence of performance

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differences between groups in such a conflict situation does not necessarily lead to conclusions concerning the respective avoidance-learning capacities of normal and psychopathic subjects.

Schmauk (1970) found psychopaths able to learn as well as normals when punishment was money loss. Other studies of avoidance learning with verbal punishment found that psychopaths either learn as well (Elaylock, 1960; Bryan and Kapche, 1967) or better than normals (Bernard and Eisenman, 1967). Others (Johns and Quay, 1962; Quay and Hunt, 1965) however, found the converse to be true. Hare (1970), in reviewing these contradictory findings, noted that avoidance-learning failure associated with psychopathy may be greatly influenced by motivational variables which may account for differences in outcome.

An overview of avoidance learning in clinically identified psychopaths indicates that, although psychopaths do not suffer from a general learning deficit, they do not learn as well as normals when learning is motivated by fear or anxiety. This observation points to a possible operational definition for psychopathy, namely, manifestation in a laboratory setting of latent avoidance-learning deficit. Such definition would resolve much of the present controversy over this diagnostic category.

In a study of avoidance learning without reference to psychopathy, Walters and Parke (quoted in Bandura and Walters, 1963)

using a task similar to Lykken's compared the avoidance learning of criminal alcoholics, noncriminal alcoholics, and normal subjects. Both groups of alcoholics performed the avoidance-learning task less well than normal subjects. In their selection of the two alcoholic groups Walters and Parke assumed that the excessive use of alcohol by the criminals was caused by their inadequate socialization whereas the excessive use of alcohol by the noncriminals was caused by their need to reduce anxiety. Both groups showed high anxiety on paper-and-pencil tests and high psychological lability on polygraph recordings taken throughout the learning trials. From these data it is not clear whether Walters and Parke's antisocial alcoholics and Lykken's psychopaths, mentioned previously, can be compared. In relation to this research, however, it was interesting that other workers were able to find avoidance nonlearners who differed from normals in both behavioural pathology and physiological reactivity.

Physiological Correlates of Avoidance Failure

Some attempt has been made to establish a relationship between possible autonomic nervous system concomitants of psychopathy and avoidance learning failure. Two studies of avoidancelearning failure in psychopaths have included attempts to monitor autonomic activity and responsivity. In the first of these, lykken (1955) monitored GSR in a classical conditioning situation

(independent from the avoidance-learning task he used) and found a slight but not statistically significant tendency for psychopaths to be more reactive than normals. He pointed out, however, that methodological problems made these data difficult to interpret. Schachter and Latane (1964) obtained continuous heart rate recordings on eight subjects (four normals, four psychopaths) during avoidance-learning trials. Each subject was tested twice, once following injection of placebo and once following injection of adrenalin. They found the heart rate of psychopaths to show greater reaction to adrenalin than did the heart rate of normal subjects. There were no heart rate differences between groups for the placebo sessions. Of particular interest to the present investigation was their additional finding that, regardless of diagnostic category, a subject's heart rate response to adrenalin was a good predictor of avoidance-learning performance: strong heart rate reactors to adrenalin failed to avoid in the placebo In this context, Schachter and Latane also condition $(p \lt.005)$. discussed tentative findings from an unpublished animal study which indicated that, when increase in heart rate is used as an index of autonomic nervous system activity, rats sensitive to adrenalin fail to learn avoidance responses in a (nondrug) mild punishment situation presumed to release large amounts of endo-In these findings, there is a tentative genous adrenalin.

suggestion of an interrelationship between autonomic reactivity to adrenalin and avoidance-learning performance.

Claridge and Herrington (1963), in a review linking Eysenckian concepts to arousal theory, noted that the activity of the reticular formation depends both on afferent input from peripheral sensory receptors and on hormonal mechanisms, particularly of adrenal origin. The existence in the ascending reticular formation of an adrenalin sensitive component leads to the conclusion that sympathetic nervous system tone is an important source of cortical and behavioural arousal. In situations that cause sympathetic nervous system discharge (e.g., pain or fear), the reticular activating effect of adrenalin greatly enhances the central excitatory state. Hare (1970) has also noted that limbic mechanisms appear to play an important role in the regulation of fearmotivated behaviour, including learning to inhibit a response in order to avoid punishment. Hare has also reviewed studies which indicate that lesions in the limbic system produce perseveration of dominant responses even though these responses had been previously inhibited by punishment. From these observations, Hare concludes that the KEG abnormalities often found in psychopaths reflect some sort of dysfunction in the underlying temporal and limbic mechanisms. The relevance of these observations will be discussed later in connection with the findings of the present

study.

Amelioration of Avoidance-Learning Deficit

Although there is no clearly established causal basis for avoidance-learning deficit, there have been empirical attempts to correct this deficit. Working with rats, Latane and Schachter (1962) found that injecting low doses of adrenadin improved avoidance but injecting high doses of the drug did not. From this work and from their review of other studies in this area. they were led to assume that the influence of exogenous adrenalin In 1964 Schachter may follow an inverted U-shaped function. and Latané, having established the presence of an avoidancelearning deficit in clinically identified psychopaths, found that it was possible to ameliorate this deficit with injections of adrenalin. They reasoned that an autonomic nervous system stimulant, adrenalin, might enable psychopaths who apparently show a lack of emotional (autonomic nervous system related) responsivity to compensate for this lack and thus learn a latent avoidance task.

The Present Study

Previous research, and particularly that of Schachter and Latane, had raised a number of questions. These questions are focused upon in the present study in an effort to establish some parameters of avoidance-learning failure.

One question generated by previous findings was whether avoidance-learning failure and its behavioural consequences are central to the clinical application of the diagnosis of psycho-Most of the previous work on this deficit had been with pathy. reference to the deficit in psychopaths. Of the studies discussed earlier in this section, Lykken (1955), Schachter and Latané (1964), and Schmauk (1970) had all obtained subjects from clinicians' nominations of psychopaths and then retained those nominees who also showed low anxiety on psychometric tests. Some studies of avoidance learning reviewed earlier, however, had either not directly referred to psychopathy (Walters and Parke, 1963 used criminal and noncriminal alcoholics and normals) or had not found much evidence of the deficit in those labeled psychopaths (Schoenherr, 1964). These findings pointed to the necessity to establish whether a latent avoidance-learning deficit is a sufficient and/or necessary condition of psychopathy. In addition, as was discussed, Schachter and Latané (1964) found the avoidance-learning deficit of psychopaths to be ameliorated by adrenalin. This finding raised questions as to whether psychopathy was always associated with this drug ameliorable type of avoidance-learning deficit. As already mentioned, Hare (1970) reviewed studies implicating faulty adrenalin sensitive mechanisms in psychopaths. These observations, then, led us in the present

research to focus upon the relationship between behavioural manifestations of psychopathy and the adrenalin ameliorable type of avoidance-learning deficit.

Several approaches to this were possible. Other workers had selected clinically identified psychopaths and then found them to be avoidance-learning deficient. Because of the nature of the questions we wished to address, because of the unclarity of the diagnosis of psychopathy, and because of the type of setting available for this research, it was decided to first select avoidance-learning deficient subjects for whom adrenalin injection corrected the deficit and then to pursue issues of nosology. In addition, because of noise in the diagnostic labeling process, there may be more reliable variables intervening between the avoidance-learning deficit and the clinical categorization. Anxiety, autonomic reactivity, and behavioural history are examples of possible variables that might be more firmly associated with avoidance-learning than is the diagnosis of psychopathy.

State Specificity of Drug-Induced Responses

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Another question raised by Schachter and Latané's findings concerned the permanence vs. the state specificity of avoidance responses learned under the influence of adrenalin. If the avoidance learning acquired with the aid of adrenalin by an otherwise

avoidance-learning deficient person were as permanent as normally learned avoidance responses, then this might indicate a possible method of ameliorating the antisocial behaviour that is the likely consequence of this deficit.

A series of drug studies starting with the work of Girden and Culler (1937) indicated that responses learned in one drug state were not performed in the nondrug state, performance of the learned response being state specific and relying on the reinstatement of the conditions of learning. This phenomenon is termed drug dissociation and is defined as the lack of transfer of learning between two different drug states, one state being ⁶ induced by one drug and the other state being either a normal state or a state induced by another drug.

Madill's.(1967) review of literature in this field indicated that a consensus of investigations shows that dissociation is not a general property of drugs but is drug specific, occurring only with some drugs. A search of the literature revealed no work on the state specific properties of responses learned under the influence of adrenalin, but two studies of dissociation have been done with stimulant type drugs, namely, benactyzene (Jacobsen and Sonne, 1956) and amphetamine (Belleville, 1964). Both these studies found responses learned under the influence of these stimulants to be state specific.

Little work on the dissociation phenomenon has been done with human subjects, one study, that of Madill (1967), seeming to be the sole investigation of the state specificity of learned responses in humans. Madill using normal and alcoholic subjects found that operant reponses learned in sober conditions or under the influence of alcohol were state specific for both groups.

While the phenomenon of dissociation is not a focus of the present research, it was of interest to establish whether responses learned under the influence of adrenalin would be performed in the nondrug state. If avoidance responses acquired through the use of adrenalin are found to be state specific then manipulation of variables required for permanent amelioration of avoidance-learning deficit would revolve around the internal state of the subject rather than around acquisition of learned responses as such.

Avoidance Learning in Nonphysically Punished Tasks

Several questions addressed in this study arise from the observation that direct, immediate, and response-contingent physical punishment is at best an infrequent conditioning paradigm in the socialization of children or in the acquisition of avoidance responses in adults. With the possible exception of very early and sporadic instances of avoidance conditioning, it is probably the case that human avoidance learning is most often

based on cognitively mediated (verbal and/or social) types of punishment as well as observational learning (Bandura, 1969). This raised the question whether avoidance-learning deficits are present when nonphysical, cognitively mediated punishment is used. It is also important to ascertain whether failures of avoidance learning are based on insensitivity to physical punishment per se. It might be speculated that although in some adults physical pain does not currently supply motivation for avoidance behaviour, this was not the case developmentally, and in childhood physical pain had had the usual effect in mediating avoidance. In this instance, an avoidance situation involving punishment that is not physically painful, but which was mediated by secondary reinforcers, would not be expected to result in deficient avoidance learning. If such vere the case, avoidancelearning failure due to ineffectiveness of physical punishment would be an interesting but behaviourally inconsequential concomitant of psychopathy or other psychopathology. Because of these speculations the present study will explore the question of the generality of avoidance-learning deficits across several modes of punishment.

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A search of the literature indicates that few studies have made use of methods other than physical punishment to produce avoidance learning. However, Baron and Kaufman (1966, 1968)

demonstrated that nonphysical forms of punishment are effective in motivating avoidance learning in normal human subjects. These authors showed that avoidance learning can effectively be motivated by either a loss of or time out from positive reinforcement. They further showed that the variables controlling loss avoidance are essentially the same as those controlling shock avoidance. They also noted that the aversive aspects of punishment by removal of a positive reinforcer appear to generate more regularity in response rates than the aversive aspects of electric shock.

A few studies focusing upon avoidance-learning deficit using nonphysical forms of punishment have been done. A study by Schmauk (1968) compared the influence of physical and nonphysical punishment on avoidance learning in clinically identified psychopaths and in normal subjects. He found that psychopaths failed to learn to avoid punishment involving shock or social disapproval, but could learn to avoid monetary loss while normal subjects learned to avoid regardless of the punishment used.

The present study will explore the question of the generality of the avoidance-learning deficit across several modes of punishment. One likely type of avoidance-learning task to use in examining this generality is one in which the aversive stimulus is experienced directly by the subject but not as either physical pain or as verbally mediated interpersonal rejection; monetary

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loss punishment met these criteria. Monetary loss can, in terms of the subject's cognition, be related to the loss of pleasurable states, particularly when subjects are in a rather barren institutional environment. The effectiveness of this form of punishment for the normal avoidance learner has been demonstrated by Stone (1961) with loss of pennies, by Weiner (1963) with loss of points, and by Baron and Kaufman (1968) with time out from monetary reinforcement. Schmauk's (1968) work indicated that monetary loss was effective in producing avoidance learning in psychopathic subjects who failed to learn with shock as punishment. Since this information was not published at the time of launching the monetary loss phase of the present study, we were not deterred by Schmauk's finding that monetary loss punishment did not have the same avoidance-learning deficit as physical punishment.

The ability of adrenalin to ameliorate any deficit that may appear in nonphysical punishment avoidance will also be explored.

There are a few studies (reviewed by Hare, 1970) which have examined the influence of verbal punishment on psychopathic subjects' avoidance-learning performance. The results of these studies are rather contradictory possibly due to the complexities of verbal interaction. Because of these conflicting results, investigation of the effects of verbal punishment is not included

in the present study.

Interpersonal Implications of Avoidance Learning

The present study will also examine some interpersonal implications of avoidance-learning deficit. In actual life situations behaviour is often based on avoidance of punishment delivered to another as a result of an empathic understanding of another's experience. Presumably, empathy develops through awareness of one's own experience and an appreciation that others share one's responses to that experience. If, however, one's experiences are deficient or unusual, then it would be expected that the capacity for empathy concerning these experiences would suffer. When physical punishment does not serve to motivate avoidance learning, it would be predicted that the empathic appreciation of another's punishment would also fail to motivate avoidance learning.

Ax (1962) has suggested that empathy and the accurate perception of another's experiences may require the construction of an "emotional facsimile" involving the autonomic nervous system. If this system is impaired, there may be inability to create the "empathic hypotheses" needed to vicariously experience another's feelings. Hare (1969), referring to the possibility of psychopaths failure to empathize, has noted that if a deficit in empathy exists, an important source of information about the

contingencies in the environment (observational learning, role modeling, and the like) would be lacking. Bandura and Walters (1963) have pointed out the importance of vicarious avoidance learning based on empathy in the socialization of children via parental modeling of pain. For example, the child who is headed toward a hot stove sees his parent's emotional response of fear and alarm and aborts his behavioural sequence; after several such occurrences, the child may learn to avoid the hot stove even though he has never been in physical contact with it.

In discussions of empathic avoidance learning, a distinction must be made between the subject's ability to respond to another in any fashion and his ability to alter his own response style to prevent the other person's experiencing punishment. The importance of this distinction may be seen in instances where a subject might fail in positively reinforced cooperative behaviour as a result of hostility toward his partner. By the same reasoning, empathic pain avoidance might fail because of the ability (rather than the inability) to create empathic hypotheses about what another person is experiencing. The atypical characteristics of the autonomic nervous system that have been implicated (if not established) as the causal basis for avoidance-learning deficit would also be implicated in affecting empathic avoidance-learning behaviour. That is, if one cannot learn on the basis of changes

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in autonomic arousal caused by one's own punishment, one could not be expected to be motivated to learn on the basis of pain perceived as afflicting someone else. If adrenalin injection ameliorates an avoidance-learning deficit, the question arises as to whether it can also ameliorate an empathic avoidance-learning deficit should this, as is hypothesized, be concomitant with the avoidance-learning failure involving punishment-to-self.

Because of the implications of these questions for many aspects of social learning, this research investigates empathic avoidance-learning capacity and predicts that those who fail to learn to avoid punishment delivered to themselves will also fail to learn to avoid punishment in an empathic punishment situation.

Since empathic avoidance learning can fail either because of a general failure in cooperative behaviour or because of the more specific inability to form empathic hypotheses, this research examines cooperative behaviour as well as empathic avoidance learning.

Resumé of Avoidance-Learning Parameters to be Explored

This research, then, is, an effort to establish some major parameters of the adrenalin ameliorable type of avoidance-learning deficit that Schachter and Latane (1964) found in clinically identified psychopaths.

Exploration of the parameters of this deficit will proceed along several dimensions, including investigation of (1) personality traits and demographic data associated with the adrenalin ameliorable avoidance-learning deficit and autonomic nervous system reactivity to adrenalin, (2) the permanence of avoidance responses acquired through adrenalin injections, (3) the generality of the deficit and of adrenalin amelioration across tasks entailing nonphysical punishment, and (4) generality of the deficit and of adrenalin influence in empathically experienced punishment avoidance.

The first of these areas is a study of characteristics associated with normal avoidance learners vs. those who show the adrenalin ameliorable avoidance-learning deficit; this study will be included in the description of the subject sample. The other three areas to be investigated will be presented in separate sections including the research method and results.

Since we were interested in pursuing issues raised by Schachter and Latané it was necessary to insure that our subjects' were as similar as possible in performance type to the subjects those authors had used. It was decided to exclude from the study those who showed an avoidance-learning deficit which was not ameliorated by adrenalin. This decision was based on the speculation that there might be more than one basis for avoidance failure
or that absence of a change in learning capacity following pharmacologic autonomic stimulation might indicate that a subject was in some other regard different from the subjects studied by Schachter and Latané. By the same reasoning those who showed avoidance learning which improved with adrenalin medication were not of use for the purposes of this research.

EXPERIMENTAL SETTING AND SAMPLE SELECTION

The Setting

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The research was conducted at Clinton Prison, a maximum security facility of the New York State Department of Corrections, located in Dannemora, New York. There were many advantages to working in such a setting, such as the uniform environment, the availability of a detailed case record on every inmate, and the willingness of prison inmates to participate in less than enjoyable experiments as a relief from the boredom of prison life. However, the overriding factor in this choice of setting was that a prison population seemed a likely place to seek avoidancelearning failures. Although there are many paths to incarceration, failure to learn to avoid punishment may be one such course. Overview of Sample Selection

Two groups of subjects were selected for the study. They were drawn from the penitentiary inmates who met certain criteria (outlined later) and who volunteered to consider participation in the study. The two groups of subjects selected from among these volunteers were (1) those who showed latent avoidance learning and no improvement in avoidance-learning performance with adrenalin, and (2) those who showed a latent avoidance-learning deficit that was ameliorated by adrenalin injection.

Schachter and Latané (1964) had, in part, based subject selection on caseworkers' nominations of psychopathic and normal subject candidates; Lykken (1955), Schoenherr (1964), and Schmauk (1970) had used similar procedures. In the setting in which the present study was to be conducted, it was not feasible to ask for nominations of psychopaths. Also, a preliminary study of the volunteers had indicated that the demographic and personality variables previously found with psychopathy and avoidance-learning failure were not so associated in this group. Because of this it was decided to select subjects empirically for the adrenalin ameliorable avoidance-learning deficit and not on the basis of psychopathy or clinical characteristics associated with it.

The first step toward selection of subjects for the study was to recruit volunteers from whom subjects would be drawn. The Volunteers

Case folders of Clinton Prison immates were reviewed to select those who would be asked to volunteer for participation in the study. It was necessary to select prospective subjects whose avoidance-learning performance and response to adrenalin would not be influenced by extraneous factors. Therefore, beginning with the most recent admissions to Clinton Prison, inmate records were screened on the following bases: freedom from history of mental illness, freedom from history of drug addiction.

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age under 45 years, recorded I.Q. of 90 or above, and a prison health classification indicative of "good" health. In this process 637 records were screened, yielding 217 suitable candidates. Recorded for each candidate were: age in months, number of arrests, number of convictions, and percent of life time in incarceration above 100 months of age (100 months representing an age just under the earliest incarceration recorded).

Since the characteristics associated with psychopathy in this population were of interest the Revised Lykken Anxiety Scale (Lykken, 1955)(see Appendix) was administered to the 165 subject candidates able and available to complete this test. The decrease from 217 to 165 subjects candidates was due to a variety of factors but mainly to candidates inability to read or write and release or transfer out of the prison.

The Revised Lykken Anxiety Scale is a paper-and-pencil measure said to discriminate between the type of low anticipatory anxiety found in psychopaths and the normal anticipatory anxiety found in most people. The 80 items in this test involve a forced choice of preference between alternative activities one of which is simply unpleasant (e.g., "Copying four pages out of the dictionary" or "Having to give up eating desserts"), and one of which is unpleasant because it evokes anticipatory anxiety (e.g., "Walking near a whirling plane propellor" or "Making a parachute"

jump").

Next, letters explaining what participation in the experiment would entail were sent to these men (see Appendix). Prospective subjects were not asked at this time to volunteer but rather to agree to be interviewed by the investigator. This strategy was used to maximize the number of volunteers from the possible ones remaining. Prospective volunteers were then individually interviewed, and an effort was made to answer questions concerning the procedure as candidly as possible without revealing the nature of the study. Of 165 men tested, 85 inmates were willing and available to be thus interviewed; of these 85, 71 volunteered to take part in the experiment. The men who dropped out at this point did so for many different reasons including discharge or transfer* from 'the prison, a short remaining sentence, extreme anxiety in the interview situation, or a misinterpretation of the nature of the study.

Relevant Characteristics of the Volunteers

The volunteers were then given the Revised Beta I.Q. Test to have current and comparable I.Q. scores for every subject. Three subjects scored below 90, but since 84 was the lowest of these and since all 3 had previously recorded tests above 90, these volunteers were retained in the study.

 $^{\cup}$ Table 1 presents the means and ranges of several character-

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Means and Ranges of Variables Describing Characteristics

of the Volunteers

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Variabl e	Mean	Range
Age in months	[~] 367.6	254 - 5 43
Percent of life incarcerated (months incarcerated / age - 100 months)	28 .7%	3-72%
Number of arrests	7.3	1-28
Number of convictions	5.8	1-22
Revised Lykken Anxiety Scale (a high score indicates high anxiety, 80 items)	45.0	14-74
Revised Beta I.Q.	107.6	84-123

istics which had been found by other workers to be associated with either psychopathy or avoidance-learning capacity. The case folder of each volunteer was also examined for a history of several behavioural characteristics; these variables were selected on the basis of other workers' (Schachter and Latané, 1964; Cleckley, 1955) findings that these were associated with psychopathy and/ or avoidance-learning failure. The following information was recorded; crime leading to current incarceration, history of juvenile delinquency, indication of sexual perversion, nomadism, escape from incarceration, and juvenile truancy. The frequencies of occurrence of these characteristics are presented in Table 2.

At this point it was of interest to know if the volunteers were typical of the prison inmate population who qualified for inclusion in the study with respect to anxiety or if only the least anxious members of the prospective subject population had volunteered. The anxiety variable was considered important since if only nonanxious inmates became subjects, then the experiment would be based on a homogeneous sample with respect to this presumably relevant variable. If this had been the case, the findings would be on the basis of comparison between two artifactual groups. T-test comparison of scores of those who had been invited to volunteer and did not with those who did volunteer indicated that these two groups were not significantly different

Frequencies of Various Characteristics Indicated

in the Case Records of the 71 Volunteers

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Characteristic	Frequency
Crime type:	
Convicted of crime against person	39
Convicted of crime against property	32
Juvenile delinquency history:	
Present	44
Absent	27
Sexual perversion history:	
Present	10
Absent	61
Escape from incarceration attempted:	
Present	7
Absent	64
Nomedism:	
Present	12
Absent	59
History of childhood truancy or runaways:	
Present	26
Absent	45
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with respect to their Revised Lykken Anxiety Scale scores (t = 0.500, df = 87). Exactly which factors induced an immate to volunteer for the study are not clear. The general impression was, however, that those who volunteered were more stable mentally and more often Caucasian than the general immate popula-

Subject Selection

Apparatus

The equipment used to measure latent avoidance learning was a modified Jensen Alternation Board. This apparatus presented a mental maze which consisted of a sequence of 14 "problems", a problem involving a choice between 5 switches; for each problem the apparatus was programmed by the experimenter such that there was one correct switch, one punished switch, and three unpunished error switches. Choice of a correct switch advanced the apparatus to the next series of five choices, that is, to the next problem. Choice of a punished switch caused a brief electric current to be delivered to the subject via wrist electrodes, whereas unpunished error switches did not produce shock. The manifest task for the subject was to learn the sequence of correct switches while the latent task was to avoid punished errors.

Procedure

Subjects were medically examined by one of the prison staff

physicians for contraindications to the administration of adrenalin; there were no exclusions on this basis. Each volunteer was then tested on the latent avoidance-learning task, once following an injection of adrenalin, once following an injection of placebo.

The operation of the Jensen Alternation Board was explained to the immate in a manner that disguised the latent avoidancelearning task. Subjects tangentially questioned after this session never hinted that they perceived planfulness in the shocks they had received.

Following explanation of the apparatus, the electrodes used to deliver the punishing electric shock were attached to the wrist of the volunteer's nondominant hand. The rheostatically controlled current was slowly increased until the subject indicated that it was painful; this level of current was used for the shock level during the avoidance-learning task.

The effect of the adrenalin manipulation was monitored on the physiological level by examining heart rate changes. EKG leads were connected to the volunteer by an inmate assistant, and a resting heart rate recording was made. Following this a staff physician injected the prospective subject with either a placebo (1/2 cc sterile water) or 1/2 cc 1:1000 Parke, Davis Adrenalin Chloride solution. At 5, 10, and 15 minutes following injection EKG heart rate recordings were made.

At 3 minutes following the injection the volunteer proceeded to perform the series of 14 problems until he had either learned them perfectly or had performed the series 20 times.

Drug or placebo treatments, as well as test patterns, were administered in random order; approximately one week elapsed between testing sessions.

For each volunteer in each treatment condition the difference between the proportion of punished errors occurring in the first and last thirds of total errors was calculated. This value was the net avoidance-learning index using Schachter and Latané's method of calculation.

At this point the two groups of subjects for the study were selected from the 60 remaining volunteers who were tested with adrenalin. This selection was on the basis of latent avoidancelearning performance and the change in this performance induced by adrenalin. One group was composed of those who had shown avoidance-learning under the placebo condition and who showed either no improvement or deterioration in avoidance-learning capacity following adrenalin injection. There were 22 such subjects who formed the avoidance-learning group (ALs). The second group of 16 subjects were those who failed to learn the latent avoidance task in the placebo condition but were successful in the adrenalin condition. These subjects formed the

avoidance-learning failure group (ALFs). Those who either failed to show avoidance learning in both the adrenalin and placebo conditions or learned with placebo and improved with adrenalin were excluded from the study.

At this time an additional effort was made to find some paper-and-pencil measure relating anxiety to latent avoidancelearning performance. In a pilot study the Revised Lykken Anxiety Scale (80 items) had proven unsuccessful in this respect. Because Lykken (1955) and Schachter and Latané (1964) had used the 33 item Original Lykken Anxiety Scale in their work, this version (see Appendix) obtained from Dr. D. T. Lykken, was administered to the two subject groups.

The Autonomic Perception Questionnaire (see Appendix) was also administered. This scale, developed by Mandler, Mandler, and Uviller (1958), provides a measure of awareness of altered somatic functioning in the anxiety state. Mandler (1964) in commenting on Schachter and Latané's work pointed out that an inability to label changes in autonomic functioning might be causal in avoidance-learning failure. If this were the case, a relationship between avoidance-learning failure and this measure of the somatic experience of anxiety was expected.

Attrition of Subject Candidates

A review of the reasons for the sizeable attrition in the

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available subjects is in order: the winnowing of 38 subjects from 637 case folders might give the impression that the phenomenon under investigation was indeed rare in this population. Many factors combined to produce this attrition. One major one was candidates leaving the prison either by transfer or release. Contrary to what one might expect, the average length of stay for an immate in penitentiary is not long because of liberal parole regulations and short sentences. Also, transfer between prisons for educational, disciplinary, or family reasons are quite frequent.

If the study had been conducted over a short period of time these factors would not have produced such a great attrition in subject candidates; however, the nature of the study was time consuming and this time was further lengthened by the necessity of fitting the research schedule to prison routine. This latter factor caused considerable delay, with every additional delay increasing the loss of subject candidates: even with a cooperative attitude on the part of prison officials research projects in a large prison can have many operational problems. It was mainly for this reason that additional subject selection, described later, was made in a different setting.

There were also other causes of loss of subject candidates such as hospitalization for a lengthy period, discovery of

several immates who were found upon interview to be grossly psychotic, and immates refusing to continue in the experiment.

Initially, review of the case folders reduced the number of possible subjects from 637 to 217 who, from recorded information, met the age, I.Q., and other requirements of the study. From this number some were lost by being unavailable, unable, or unwilling to complete the first group test, and possible candidates were then reduced from 217 to 165. When volunteers were sought from those 165 men who had been tested, 71 volunteered. Further paroles and releases enacted during this time again reduced the number of participants as did some reversals of the decision to volunteer. Before the empirical subject selection criterion was applied, 60 possible candidates remained. Of these 60 tested, there were a possible 28 ALs and 20 ALFs, but by the beginning of the experimental procedures 3 ALFs refused further injections and 6 ALs and 1 ALF had been released, leaving the final total of 38 subjects.

Subject Characteristics

Table 3 presents the net avoidance-learning index for the 22 ALs and the 16 ALFs under placebo and adrenalin conditions in the physically punished avoidance-learning task. A positive index indicates that avoidance learning has occurred, an index of zero indicates no avoidance learning, and a negative index shows

Avoidance-Learning Index for AL and ALF Groups under Drug and

Table 3

Placebo Conditions in the Physically Punished Task

Group	. N	Drug	Mean Net Avoidance-Learning Index
AL	° 22 «	Placebo	+.087
1		Adrenalin	017
ALF	16	Flacebo	052
		Adrenalin	+.105
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an increasing tendency to make punished errors as trials progress. There is, of course, a strong reversal between groups and drugs since these subjects had been selected on exactly this basis.

It was of interest to know if the groups of subjects performed the manifest task equally well and also to determine if the shock levels which had been subjectively equal (the level of current used was that which the subject had termed "painful") were objectively the same. Table 4 presents the means of these two variables associated with subject selection. The number of total errors (punished and unpunished) accumulated by a subject until he had either learned the pattern perfectly or had completed 20 runs through the pattern is an indication of manifest task performance. Analysis of variance (Winer, 1962*) of total errors (Table 5) shows a significant difference between groups. From Table 4 it can be seen that the ALs perform the manifest task significantly more poorly than the ALFs in both the adrenalin and placebo conditions. Why this should be so is not clear, although one possible explanation is that ALs may have been attending to the latent avoidance task to the extent that their manifest task performance suffered. A related interpretation is

*Analyses of variance used throughout this study are the least squares solution for unequal group size (Winer; 1962, pg. 374).

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Task Variable Means for AL and ALF Groups

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during Subject Selection Procedure

		Treatment					
, -	*	Placeb	0	Adrenal	in		
Group	N	Manifest task total errors	Painful current level	Manifest task total errors	Painful current level		
AL	22	128.6	.243	134.5	•221 ·		
ALF	16	80 . 4	.284	99•5	•259		

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Analysis of Variance of Manifest Task Performance

During Subject Selection Procedure

Source of Variation	đr	Mean Square	F	р
Between Subjects	37	a da ang ng mang ng mang ng mga ng		· · · · · · · · · · · · · · · · · · ·
Groups (5)	1 。	32108.21	6.384	<. 05
Subjs. w. groups (error g)	36	5029.31 . 4		n
Within Subjects	5 38	Q ,	x	<u>.</u>
Drugs (D)	1	2489 .8 0	1.893	<u>a</u> / NS
GxD	1	,814.53	< 1 、	v
D x Subjs. w. groups (error d)	36	1315.25	¥ `	

NS = not significant at the 5% level.

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that the ALs were more disturbed by punishment than were the ALFs giving rise to the ALs' comparatively impaired manifest task performance. This difference between groups' manifest task performance was not found in any of the comparisons in later stages of the study. Analysis of variance of the current strengths used for all the AL and ALF subjects shows no group differences (Table 6).

AL and ALF groups were compared on the demographic variables. Table 7 gives for each group the mean ages, percent of life spent in incarceration, the number of arrests, and Beta I.Q. scores. All differences between groups failed to reach statistical signifleance. It is interesting, however, that the incarceration index and number of arrests, which were selection criteria for Schachter and Latané's psychopaths (avoidance-learning failures), not only fail to differentiate groups in the present study but also are in an opposite direction from the values presented by Schachter and Latané. Table 8, which gives the mean test scores by groups for the two forms of the Lykken Anxiety Scale and for the anxiety section of the Autonomic Perception Questionnaire, shows that again the groups do not differ significantly.

Table 9 compares the frequencies of various characteristics from the criminal history of the two groups of subjects. The entries in this table indicate no striking differences between

Analysis of Variance of Current

Strength Disconfort Level

Source of Variation	df	Mean Square	F	р
Between Subjects	37			
Groups (G)	1	.039338	3.738	<u>a</u> / NS
Subjs. w. groups (error g)	36	.010524	1	
Within Subjects	38	.001746		
Replications (R)	,1	.005907	3. 5 39	NS
G x R	1	.000363	<1	
R x Subjs. v. groups (error r)	3 6	.001669		

a/ NS = not significant at the 5% level.

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Characteristics of the AL and ALF Groups

Group	N	Mean months of age	Mean % life incarcerated	Mean no. of arrests	Mean Beţa I.Q.
Al	2 2	374.6	31.6	7.2	111.2
ALF	16	356.3	25.1	5.3	108.0
t value		[*] <1	2.152	1.715	<1
p value		8/ NS	NS	NS	NS

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NS = not significant at the 5% level.

Anxiety and Autonomic Perception Questionnaire Results for AL and ALF Groups

Group	N	Revised Lykken Anxiety Scale (80 item)	Original Lykken Anxiety Scale (33 item)	APQ
AL	22	<u>a</u> / 43.6	8 / 18.0	125.3
ALF	16	47.9	€ 20.1	123.1
t value		1°.2 29	1.440	<1
p value		b/ NS	NS	NS

A high score indicates high anxiety.

b/ NS = not significant at the 5% level.

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Frequencies by Groups of Historical Characteristics

Obtained from Case Records

			Frequ	uencies of p	persons sl	howing	
Group	N	Crimes against persons	Juvenile Criminal record	Sexual perversion	Escape attempts	Nomadism	Truancy or Runaways
AL	22	5	16	2	2	3	•11
ALF	16	7	9	2	1	1	4
X ² valu	ue	1.799	1.078		\$	· •	2.355
p value	9	<u>s</u> NS	NS				NS

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groups, and statistical tests, where frequencies are sufficiently large for such comparison, similarly indicate no group differences.

From the material presented in Tables 7, 8 and 9 it would seem that the ALs and ALFs are similar to each other with respect to the demographic, anxiety, and historical variables recorded. Autonomic Nervous System Responsivity to Adrenalin

As previously mentioned, ANS reactivity and adrenalin Sensitivity had been implicated by other workers to differentiate nonpsychopaths (avoidance learners) from psychopaths (avoidance nonlearners); with this in mind, heart rate recordings made during the drug and placebo avoidance-learning tasks were examined for the AL and ALF groups.

Table 10 gives the mean heart rates by groups for each of four samplings made during the placebo and adrenalin sessions. Analysis of variance of this data (Table 11) shows a significant difference between treatment conditions and heart rate samplings and shows that these factors interact; this result is the expected one indicating the influence on an autonomic level of the adrenalin manipulation. Schachter and Latane (1964) had found differential response to adrenalin between psychopathic and normal groups of subjects. The analysis of variance of the present data does not show this effect since both the groups x drugs and the

Mean Heart Rate Samplings by Groups

during Placebo and Adrenalin Sessions

Placebo Session						
Group	N	Pre- injection resting	5 minutes post- injection	10 minutes post- injection	15 minutes po st- injection	
AL	22	76.2	82.9	79.2	7 9.4	
ALF	16	7 9•5	89.8	88.1	81.4	

Adren	alin	Sess	sion
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Group	N	Pre- injection resting	5 minutes post- injection	l0 minutes post- injection	15 minutes post- injection
AL	22	76.2	90.5	92.5	86 . 8
ALF	16	80.4	99.1	96.9	9 3. 0`

Analysis of Variance of Heart Rate Recordings Taken

during Placebo and Adrenalin Sessions

Source of Variation	dſ	Mean Square	F	q
Between Subjects	37			- /
Groups (G)	1	2298.19	2 .37 7	NS NS
Subjs. w. groups (error g)	36	966.45		
Within Subjects	288	3		
Drugs (D)	1	4060.27	21.658	<.01
GxD	1	6.07	1	
D x Subjs. w _e groups (error d)	36	187.47	,	
Samplings (S)	3	2266.79	29 .41 9	<.01
GxS ~	1	206.60	2.681	NS
S x Subjs. w. groups (error s)	108	77.05		
D x S	3	436.24	10.116	<.01
GxDxS	3	62 .9 9	~ 1. 460	NS
D x S x Subjs. w. groups (error ds)	108	43.12		

B/ NS = not significant at the 5% level.)

groups x drugs x samplings interactions are not significant. Although the null hypothesis was not rejected by this test, a priori comparison of means was indicated by Schachter and Latane's findings. Specifically, they had found the greatest group differences in heart rate to occur approximately 5 minutes after adrenalin injection. For that reason the AL and ALF groups' heart rate means at the 5 minute post-injection recording were of particular interest in the present study, and a priori comparison was considered justified. T-tests of the AL and ALF groups' mean i heart rates taken 5 minutes after injection of placebo indicated no significant group differences (t = 1.303, df = 37). Comparison of the 5 minute recording of heart rate following adrenalin injection, however, showed a significant difference between groups (t = 1.723, df = 37, p < .05). While this result cannot be taken as strong support for the proposition that avoidancelearning deficient people are particularly autonomically sensitive to exogenous adrenalin, there is suggestion in these findings, as well as in those of Schachter and Latane, that this may be the case.

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Schachter and Latane had also found that average heart rate change over their continuous recordings in the adrenalin session when rated as above or below the median of all average changes could be used as a predictor of avoidance-learning capacity in

the nondrug state. The present study did not use continuous recordings, but the magnitude of maximum change attained from resting level did not differentiate between groups $(X^2 < 1,$ df = 1). Analysis of variance of mean heart rate maximum increase similarly showed no significant group effects (F = 1.160, df = 1, 36) and no significant group x drugs interaction (F < 1, df = 1, 36).

The data from the heart rate recordings is presented graphically in Figure 1. It would seem that in terms of this index of autonomic arousal the AL and ALF groups differ from each other in a fashion very similar to the differences between Schachter and Latané's normal and psychopathic groups, but in the present data this is not a strong difference.

Additional Subject Groups

Subjects for the study on the persistence of learned avoidance in the nondrug state were selected separately and at a later time. The reason for this was that the study on persistence of learned responses was the last to be performed, and the original subject group had dwindled considerably by this time; because of this it was necessary to select additional subjects. This additional subject group was also used to increase the total subject number in the study on cognitively mediated punishment avoidance, since, as described previously, attrition of subjects in





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Figure 1. Heart rate during the two experimental sessions for avoidance learners (ALS) and nonlearners (ALFs)

these groups had reduced the final numbers rather drastically.

At this time opportunity had arisen to draw these additional subjects from a special therapeutic community program within the prison. The major advantage of work in this setting and the reason for switching from the general prison was that the therapeutic community setting had a research orientation not found in the program of the larger prison. This orientation made flexibility in scheduling possible which was a critical factor in being able to carry out the response persistence study.

Criteria for admission to the therapeutic community program were identical to the initial screening criteria for selection of volunteers. Admission of inmates to the therapeutic community was involuntary, so these 100 men represented a population quite similar to the prison's 217 subject candidates. Thirtysix inmates from the therapeutic community setting volunteered to participate as subjects.

At the time these additional subjects were recruited, preliminary analysis of data from the original 22 AIs and 16 ALFs ⁴ had already shown that none of the demographic, behavioural, or personality characteristics examined bore any relation to avoidance-learning capacity. Because of this and to avoid further attrition due to delay much of the data presented in the previous sections (Tables 7, 8, 9) was not collected for the added AIs and ALFs from the therapeutic community population.

Selection of subjects from among the volunteers at the therapeutic community was conducted in a manner identical to that described for subject selection in the main prison with the exception that heart rate data was not recorded. While it would have been desirable to record this data, it was not possible in this setting both because of a lack of equipment and of technical assistance.

Subject selection showed that of the 36 volunteers, 16 were AL type, 13 ALF type, and 7 indicated unclear avoidance-learning style for adrenalin vs. placebo sessions.

For the subset of 36 volunteers from the therapeutic community the opportunity was presented to attempt to find differences in psychopathy between AL and ALF type subjects. In the therapeutic community, every inmate was known by the staff who were acquainted with inmates' case histories and had observed each man's behaviour in a variety of settings such as in community meetings, in group and individual psychotherapy, and on the living units. With this in mind, one of the clinical psychologists who was familiar with the inmates was shown the list of 36 volunteers and asked to indicate those inmates he thought to fit the Cleckley criteria (see Appendix) for psychopathy.

Eleven such nominations were made from the list of 36 names.

When avoidance-learning performances were examined for these ll people, 3 had generated unclear performances, 5 were AL type subjects, and 3 were ALF type. Clearly, this nomination procedure failed to reveal the type of personality differences on which subject selection by other workers had been totally or partially based.

The additional subject groups appeared in the study on the persistence of learned avoidance responses and also were pooled with the original 22 Als and 16 ALFs in order to increase the numbers in the study on cognitively mediated punishment avoidance.

The original AL and ALF groups had shown differences in the rate at which the manifest task was learned (Table 5). With the pooling of the additional and original subject groups (to give the final total of 35 AL, 26 ALF subjects used in the cognitively mediated punishment study) the group differences in manifest task disappeared with an analysis of variance of giving $\mathbf{F} = 3.660$, df = 1, 59 for the groups effect. Analysis of variance of discomfort level of current strength showed, as before, no differences between groups ($\mathbf{F} = 3.531$, df = 1, 59).

Finally, for the empathic avoidance learning study there was opportunity to add 3 ALF subjects. This arose because these 3 men having experienced the two injections involved in the subject selection had refused to continue because of the unpleasant-

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ness of these injections. The empathic avoidance study involved no injection so these men were approached again and agreed to participate so long as injection was not involved.

Table 12 summarizes the types of data collected from the original and additional subjects and indicates in which studies each group appeared.

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Summary of Source, Numbers, and Data Collected for the

Main and Additional Subject Groups

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	Subjects		
Data Collected	Clinton Prison main group (22 Als, 16 ALFs)	Special Thera- peutic Community group (16 ALs, 13 ALFs)	
Characteristics of volunteers and subjects (age, no. arrests, incarceration index, no. con- victions, Beta I.Q., crime type, J.D. history; sexual perversion, escape, truancy)	Yes	No	
Heart rate recordings during physically punished avoidance task	Yes /	No	
Subjects given Revised and Origi- nal Lykken Anxiety Scales, Auto- nomic Perception Questionnaire	Yes ,	No	
Subjects for study on cognitively mediated punishment avoidance	Yes	<u>a</u> / Yes	
Subjects for study on empathic avoidance learning	b⁄ Yes	No	
Subjects for study on persistence of learned avoidance over time	No	Yes	
Clinician's nominations for psychopathy	۰ ۲	Yes	

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Table 12 - continued

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13 ALs and 10 ALFs from the Therapeutic Community were available for the cognitively mediated punishment study giving a combined total of 35 ALs and 26 ALFs for that study.

Only 20 of the 22 ALs appeared in this phase of the research since 2 ALs had been released by the time this part of the project was reached. Also, 3 additional ALF subjects were recruited to give a total of 19 ALFs.

THE EXPERIMENTS

I. Persistence of the Latent Avoidance Learning

Acquired with Adrenalin or with Placebo

The first area of experimental investigation dealt with the question of the drug state specificity of the learning acquired with the aid of the adrenalin manipulation. The approach to this was to allow a subject to learn the latent avoidance task under the drug or placebo treatment condition and then later to test the subject under the nondrug conditions to measure his retention of the learned avoidance response. Comparisons were made between the final level of avoidance performance in the learning session and the initial avoidance performance on the retest days.

Apparatus

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The experimental task was performed on an apparatus designed and constructed especially for this study. This apparatus consisted of the following components:

> (1) Subject's board. The subject was seated facing a 4 x 4 foot board mounted vertically on a table top. In the center of this panel were four red buttons that could be depressed easily. A counter indicated in large illuminated figures which problem the subject was currently performing; when a subject solved any one prob-
lem, this counter advanced by one digit.

(2) Response programmer. The response programmer presented to the experimenter a switchboard of plugs. For any one problem in the series the apparatus could be set so that the rewarded response was button A, B, C, or D; the punished response could similarly be assigned to any button for a problem, leaving the remaining two buttons for unpunished/unrewarded responses. The response programmer made it possible to compose an almost infinite number of maze patterns. By changing the arrangement on the program bank the apparatus could be reprogrammed from one pattern to another within two minutes.

(3) Wrist electrodes. A pair of wrist electrodes were connected to a shock generator which delivered a brief pulse of current when punished errors were committed by the subject.

(4) Event recorder The final component of the apparatus was an Esterline-Angus Multi-Channel Event Recorder connected to record rewarded responses, punished errors, and unpunished errors as they occurred throughout a subject's performance.

This apparatus was designed so that there were 20 problems

in a maze sequence. A series of preexperimental trials were made to find programmed maze patterns the average inmate could learn. It was found that patterns of medium difficulty were ones which were arranged such that reward was obtained about equally among the four response possibilities and punishment was obtained at least 50% of the time from one response possibility. Twelve runs through a 20 problem pattern was established as sufficient to produce perfect or nearly perfect learning of the manifest task for most subjects.

Since in programming the maze sequence the punishment pattern could remain the same while the manifest or rewarded pattern was changed, two punishment patterns and three reward patterns to superimpose on each punishment pattern were devised. For example, punishment pattern "a" could be accompanied by reward pattern "u". "v" or "w".

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Sequences of treatment (adrenalin or placebo) presentation and of learning tasks were systematically altered so that an equal number of subjects in each group received one order of punishment patterns with the order of drug or placebo presentations. In this way, for example, one fourth of the AL group received the adrenalin treatment with the punishment pattern "a" first and placebo with pattern "b" second, and so on, thus filling for each group of subjects a two-by-two frequency table of

drug and pattern presentation order.

Procedure

The time sequence was arranged so that on Day 1 a subject was given one of the treatment injections and presented a maze This pattern was composed of one manifest task pattern to learn. (the "correct" responses) and a latent avoidance-learning task (the "punished" pattern); shock served as punishment for the latent avoidance-learning task. Twenty-four hours later (Day 2) this subject was asked to learn, without injection and without shock, a maze pattern in which the manifest task (reward) pattern was changed, but the latent avoidance pattern remained the same as in the first day's session. One week following this (Day 9) the subject was again asked to learn (without injection or shock) a different manifest pattern while the avoidance pattern remained the same as on Days 1 and 2. Just as a manifest task was used on Day 1 to mask the latent avoidance-leaning task, the manifest tasks of Days 2 and 9 masked the fact that these sessions were for the purpose of measuring retention of the learned latent avoidance pattern. After a three-week interval (Day 30) subjects were given the alternative latent avoidance punishment pattern to learn under the alternate treatment condition with shock. Subjects were subsequently tested for retention of latent avoidance learning one day later (Day 31) and one week later (Day 38). The

Day 1 and Day 30 procedures were, then, identical to the original subject selection procedures (i.e., drug or placebo treatment with a physically punished latent avoidance-learning task.) Days 2 and 9 and 31 and 38 involved neither treatment nor punishment and were, with respect to latent avoidance learning, a measure of performance rather than learning sessions. This design is presented in Table 13.

Subjects for this portion of the study were the 16 ALs and 13 ALFs from the special therapeutic community treatment unit within the prison whose selection was described previously.

On Day 1 subjects were individually called to the experimental room, seated facing the subject's board, and given a brief explanation of the procedure including the deceptions mentioned previously. Electrodes were attached to the wrist of the subject's nondominant hand and the rheostatically controlled current was turned up until the subject indicated that it was painful; this level was used for punishment in the learning session. Next, the subject was given one of the treatment injections (1/2 cc 1:1000 Parke, Davis Adrenalin Chloride or 1/2 cc sterile water) and proceeded to learn the manifest task. Day 30 procedure was identical although task explanation was unnecessary and the alternate injection was given. For Days 2, 9, 31, and 38 the procedure "

Table 13

Design of Experiment on Persistence of Latent Avoidance

	Sessions					
		Avoidance retention	learning testing		Avoidance retention	learning testing
	Avoidance learning session	One day after <u>learning</u>	One week after learning	Avoidance learning session	One day after learning	One week after learning
£ 8/	Day 1	Day 2	Day 9	<u>Day 30</u> .	Day 31	<u>Day 38</u>
Pattern			~	\mathbf{h}	•	、
Manifest	u	v	v	x)	y	Z
Latent	8.	8.	8	Ъ	Ъ	Ъ
Punishment	Yes	No	No	Yes	No	No -
Treatment .	Yes: adrenal: or placebo	No in	No 4	Yes: the al ernate treat	No Lt- e to ment	No
<u>`</u>			С,	used 1	жу 1	

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The pattern given is an example of one of several possible combinations.

subjects were simply told they would learn "another pattern" in the session.

Subjects were assigned serially to drug presentation/pattern presentation orders.

Results

Analysis of variance of learning performance on the manifest task (total errors over all trials) for both treatment conditions showed no significant differences for groups (F < 1, df = 1, 27), drugs (F = 1/156, df = 1, 27) or for the groups x drugs interaction (F < 1, df = 1, 27).

Avoidance-learning performance was measured by the proportion of punished errors in the first and last thirds of a session's total errors; for retest sessions this meant, of course, previously punished errors since no punishment was used in retest sessions. To examine the persistence of the learned pattern of avoidance behaviour, comparison was made between the final level of performance in the treatment learning session and the initial level in the two subsequent retention test sessions. Figure 2 presents these data.

Comparisons were made only following the treatment session in which a group had shown avoidance learning (the adrenalin session for the ALFs and the placebo session for the ALs). Both the ALs following placebo and the ALFs following adrenalin sessions



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Figure 2. Retention of learned avoidance response one day and one week following acquisition

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show a decrement between final avoidance-learning performance and initial retention test performance (Table 14), but analysis of variance (Table 15) shows that there is no significant difference between groups. The absence of group differences as well as the absence of significant learning loss clearly indicates that . state specificity does not apply in this instance of avoidance learning. The hypothesis that learning acquired with the aid of adrenalin would be lost in the nondrug state is not supported, and, in fact, the data are in the opposite direction with the ALF group's adrenalin-influenced learning found to be slightly (but not significantly) more persistent than is the ALS' learning acquired without drug assistance.

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The one-day and one-week post learning retention testing sessions would generally be viewed as extinction sessions since punishment was not used during them. These sessions can be seen in another light, however. In these testing sessions the alternatives in the maze that had previously brought punishment became unpunished errors, but although the other nonrewarded choices changed from session to session, the avoidance pattern choices could be "counted on" never to bring reward in any session. An overview of ALF performances throughout the study had led to speculation (discussed in detail later) that in the nondrug state this group might be seeking punishment. If a subject had failed



Table 15.

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Analysis of Variance of Persistence of

Learned Avoidance Responses

Source of Variation df Mean Square F Between Subjects .28 Groups (G) 1 .014948 1.700 Subjs. w. groups (error g) 27 .008791

Within Subjects 116

. .

 Practice (P)
 2
 .005809
 1.826
 NS

 G x P
 2
 .000174
 <1</td>

 P x Subjs. w. groups (error p)
 54
 .003181

NS = not significant at the 5% level.

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to learn to avoid punishment because he was seeking it, finding the alternatives that always had been wrong was possible in both the one-day and one-week post learning sessions. If a "guaranteed" nonreward could be punishing, this was a different mode of punishment from that used in the learning session. Viewed in this way, avoidance learning used physical punishment, whereas subsequent retention testing sessions could be said to involve cognitively mediated, self-delivered punishment. Because of the possibility of punishment seeking during retention testing, sessions, the slopes of the avoidance-performance indexes were examined for the one-day and one-week testing sessions. In this instance only the uninfluenced (nondrug) effect of punishment was of interest so post-placebo avoidance performance slopes were inspected for the AL and ALF groups. This examination was restricted to one-day and one-week post learning test slopes since AL and ALF subjects were selected originally on the basis of théir respective avoidance learning session success or failure. Figure 3 presents these retention test slopes. As can be seen from this figure, the ALF group shows an increasing preference for the "guaranteed errors over trials in both the one-day and one-week retention test sessions in the same manner they had for physically punished errors in the original session. The AL group, on the other hand, shows a constancy in avoidance behaviour

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throughout the trials in both sessions with the type of decrement that might be expected from the usual course of extinction.

Table 16 gives the net avoidance indexes (first third's index minus final third's index) for the two groups post placebo retention testing sessions. Table 17 summarizes the analysis of variance of these data and indicating that the main effect for practice is significant at the p < .05 level. T-tests comparing the means for net avoidance index change with practice for each group on each day were calculated by pooling the appropriate mean. squares from the analysis of variance. These t-tests indicated the AL group to show no significant change between initial and final performance levels (t \leq 1 and t = 1.000, df = 27) for either The ALF group, however, shos a significant change in session. avoidance index during the one-day testing session (t = 2.097, df = 27, p < .05) indicating change in the direction of an increasing preference for "guaranteed" errors. During the ALF's one-week session there is a suggestion of the same type of progressive deterioration in avoidance performance, although in this instance the change does not attain significance at the 5% level (t = 1.645, df = 27, .10 > p > .05).

Examination of the regularity of punishment seeking behaviour in the ALSS post placebo avoidance learning retention test session leads to the speculation that "avoidance-learning failure"

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		Table 10		
	Changes in	n Avoidance Performanc	es during Retention	5
,	Testing Sea	ssions Following Place	bo Session Learning	
	•]			
		· · · · · · · · · · · · · · · · · · ·		-
,		Mean Net	: Avoidance Index	σ
1	· · · · ·	One day	Oneweek	,
Å	Group	post learning	post learni	ing
·	AL	+.007	028	
,	ALF	065	·051	
		×	»	
		· , <i>*</i>	,	
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Table 17

Analysis of Variance of Avoidance Performance during Retention Testing Sessions for AL and ALF Groups Following

Placebo Treatment Session

Source of Variation	df	Mean Square	F	р
Between Subjects	28		o	ų
Groups (G)	l	.034860	4.110	<u>a</u> / NS
Subjs. w. groups (error g)	27	•0084 <u>8</u> 2 🧐		~
C C	*	6		
Within Subjects	58			
Weeks (W)	l	.000387	< 1	~
G x W	l	.009033	- 1.173	NS
W x Subjs. w. groups (error w)	27	.007 702		X
		v 1		
Practice (P)	ŀ	.034898	4.638	<. 05
GxP	1	.021319	2.833	NS
P x Subjs. w. groups (error p)	27	.007525	0	• •

Table 17 - continued

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Source of Variation	df	Mean Square	F	р
W x P	1	.003001	<1 3	`
GxWxP	1	.002186	८ 1	
W x P x Subjs. w. groups (error wp)	27	.00,4726	•	1

a/ NS = not significant at the 5% level. is a less apt description of the ALF's behaviour than is "punishment pattern learning". On the other hand, further examination of the ALFs' placebo and post placebo sessions (Figure 3) shows that there are wide discrepancies between the final levels of performance and initial levels of performance both for the oneday and one-week elapsed times: this suggests that the punishment pattern learning is not retained over time, although avoidance learning acquired with the aid of adrenalin is retained (Figure 2). From this observation it is questionable if the term "punishment pattern <u>learning</u>" is applicable; "punishment seeking" is more descriptive of this phenomenon that does not show the same characteristics as learning involving punishment avoidance. These findings will be discussed further in conjunction with other parts of the study.

II. Latent Avoidance Learning with Cognitively Mediated

Punishment under Drug and Placebo Conditions

This phase of the study was designed to investigate the cross-modal properties of the avoidance-learning capacities which were previously manifest by the two subject groups. A cognitively mediated punishment situation was used to replace the physical punishment used in subject selection. Adrenalin had ameliorated avoidance-learning deficit in a physical punishment situation;

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if the avoidance-learning deficit appeared in the cognitively mediated punishment situation, it would be of interest to determine whether adrenalin could also ameliorate the deficit in that instance.

The punishment used for this phase of the study was loss of a previously gained secondary reinforcer, money.

Apparatus

The apparatus used was the same sequential problem series apparatus used in the persistence of avoidance learning study except that the punishment was monetary loss rather than shock. The apparatus which has been described was modified in the following way:

> On the subject's board to the left of the four central response buttons was a slot; reinforcements of pennies issued through this slot into a bin. Above and to the left of the response buttons was a punishment counter that advanced one digit whenever the subject made a punished response. The punishment counter was clearly labeled "This number will be multiplied by 4, then subtracted from the total reward to determine the net reward." A red bulb immediately below the punishment counter lighted when a punished response was made. As in the study on the persistence of learning several

different programs of 20 problems were devised to meet the requirements that reward was obtained on the four alternatives about equally and punishment was obtained at least 50 percent of the time from one response possibility. Twelve runs through a pattern produced perfect or nearly perfect learning of the manifest task for most subjects.

Procedure

Subjects were called individually to the experimental room. They were given a card to read that explained the operation of the apparatus and included deceptions to disguise the avoidance task. This information led the subject to believe that he could gain pennies through correct problem solution, but at certain unpredictable times the counter would indicate that he had lost some of the money he had "earned". This supposedly random loss of reinforcement was explained to the subject as "testing the effect of annoyance on a motor-learning task". As before, subjects were interviewed to check the efficacy of the deception, which gave every indication of being successful.

When the subject indicated that he understood the operation of the apparatus he was seated before the response board and given an injection of either adrenalin (1/2 cc of 1:1000 Parke, DavisAdrenalin Chloride) or placebo (1/2 cc sterile water) by a prison

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• hospital nurse. After 3 minutes the subject was told to begin and to continue until he had completed 12 runs through the 20 problem series.

When the subject had completed this task, he was told that he would be called back in two weeks for his second appearance in this part of the study.

A factorial design with respect to drug order and problem series pattern was used.

Both subjects from the original AL and ALF groups and subjects later added from the special therapeutic community treatment unit of the prison were so tested. Data from these groups were combined when inspection of the distribution of scores and statistical comparison of subgroups showed no difference between the two groups of ALs and the two groups of ALFs. The numbers for these combined groups were ALs = 35, ALFs = 26.

Results

Analysis of variance of the manifest task performance shows no significant group differences (F = 1.674, df = 1, 59), nor any effect of treatment condition (F < 1), nor interaction of these main effects (F < 1). This indicates that both groups under either treatment condition are equally well able to learn the manifest task.

Avoidance learning was measured by the net avoidance-learning

index, calculated by the difference between the proportion of punished errors in the first one-third and the proportion in the last one-third of all errors. Table 18 presents the avoidancelearning indexes for the AL and ALF groups under drug and placebo conditions. This data is presented graphically in Figure 4.

Analysis of variance of the latent avoidance-learning performance for both groups under the two treatment conditions is presented in Table 19. The significant main effect for practice indicates that, as summarized over groups and drugs, learning did take place. The groups x drugs x practice interaction was of major importance in this study in order to demonstrate the ALF's avoidance-learning deficit and the amelioration by adrenalin of this deficit in the nonphysically punished avoidance situ-The groups x drugs x practice interaction (Table 19) is ation. associated with p < .06, however, considering that the performance types which were predicted are matched quite well by the four performances found in this experiment (Figure 4) there may be justification for application of a directional significance test reducing the probability level of the interaction to p < .03.

T-test comparisons were made of the change between initial and final avoidance index for each group under each treatment condition; these t-tests were calculated by pooling the appropriate mean squares from the analysis of variance.

Table 18

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Avoidance Learning with Cognifively Mediated Punishment

under Placebo and Adrenalin Conditions

	Place	bo Condition Avoidance Learning Avoidance Index During			
Group	N	lst third of errors	3rd third of errors	Net . Index	ę a
AL	3 5	.343 .	.3 05	+.038	
ALF	26	•347	.368	021	•
	 د ،		2	Ŷ	

Adrenation Condition Avoidance Learning

	• ,	Avoidance Ind	lex During	
Ĝroup	N	lst third of errors "	3rd third of errors	Net Index _
AL	3 5	332	.316	+.016
	26		.307	+.042 0



Analysis of Variance of Latent Avoidance Learning under Adrenalin and Placebo Conditions

Source of Variation	df	Mean Square	F	p
Between Subjects	60	٤	یونیون میلی میکند. این اور میلی میکند این	
Groups (G)	1	.021976	2.014	<u>a</u> / NS
Subjs. w. groups (error g)	59	• 0 10913		
Within Subjects	122		₁₂	-
Drugs (D)	1	.009885	2,229	NS
G x D	1	•012892	2,908	NS
D x Subjs. w. groups ~ (error d)	59	•004434	-	,
			A	
Practice (P)	. 1	.024221	6.449	<. 05
P x G	γ	.003912	1.042	NS
P x Subjs. w. groups (error p)	59	.003756		
D x P	- 1	.003238	<1	•
GxDxP	l	.027274	3.887	<.06
D x P x Subjs. w. groups (error dp)	∽ 59	.006997		

 $\frac{8}{NS}$ = not significant at the 5% level.

It was crucial, of course, to show that the normal learners (ALs) had shown avoidance learning in the placebo condition; that they did was indicated by the resulting t = 2.168, df = 59, Avoidance-learning indexes of the ALF group, on the p**<.**025. other hand, showed no significant difference between the first and the last third's scores (t = 1.050, df = 59) indicating that the ALFs did not learn to avoid the punishment in the placebo con-It should be noted that there was not only an absence . dition. of significant difference for the ALFs, but also there was a slight trend for performance to deteriorate in later trials as indicated by a negative net avoidance index (Table 18). The\lower portion of Table 18 indicates the avoidance-learning indexes for the two groups under the influence of adrenalin. In this instance, the avoidance-learning capacity of the AL group appears to be disrupted in the presence of adrenalin (t < 1), but the ALF group, who had shown no learning in the placebo condition, has a positive net avoidance-learning index in the adrenalin condition. The significance level associated with the ALFs' change in avoidance index as trials progressed is p < .025 (t = 2.100, df = 59) indicating the success of the adrenalin manipulation in ameliorating the avoidance-learning deficit.

From these findings, it appears that the previously estab-

similar trend in a nonphysically punished task and that adrenalin acts to ameliorate the deficit in this instance as well.

III. Responsivity to Modeled Punishment: Empathic

Avoidance Learning

A final phase of this research investigated if, in addition to an avoidance-learning deficit caused by the failure of directly experienced punishment to motivate learning, there also exists an avoidance-learning deficit caused by the failure of empathically experienced punishment to motivate learning. Avoidance learning involving punishment delivered to another and not directly to the subject has been here termed empathic avoidance learning.

To have a basis for distinguishing the aspects of interpersonal responsivity <u>per se</u> from empathically experienced punishment avoidance, it was first necessary to determine if subjects were able to cooperate with another in a nonavoidance situation. In a sense this digression was analogous to the between-group comparisons of positively reinforced learning (manifest task) capacity in the investigations of latent avoidance learning. To examine subjects' capability in cooperative behaviour and thus to provide the basis for exploration of empathic avoidance, a two-person cooperative task was designed. In this task, the subject was required to respond appropriately to a stimulus generated by his partner to gain rewards for them both. A second task using the same equipment was designed to measure interpersonal responsivity in the empathic avoidance situation so that the subject had opportunity to learn to avoid punishment supposedly administered to his partner.

If an empathic avoidance learning deficit were found it would be of considerable interest to determine if adrenalin could ameliorate this deficit. In the design of the investigations of avoidance-learning failure with the physically punished task and with the cognitively mediated punishment task, a drug/nondrug intrasubject comparison had been used. In the investigation of empathic avoidance learning, however, the nature of the task rendered the same type of design impossible. It was decided, therefore, to proceed without the inclusion of drug/nondrug comparisons until the existence of the deficit had in fact been established.

Apparatus

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An apparatus patterned after that used by Cohen (1962) was constructed for this phase of the study. This apparatus consisted of the following components:

> (1) Subject's and cooperator's response boards. Presented to the subject was a 2 1/2-foot-square panel mounted vertically on a table. In the center of the panel was a response button that was at times illuminated.

Also on the subject's panel were two lights immediately above the response button: a green light labeled "Partner responding" and an amber light labeled "Partner rewarded". Below and to the right of the response button was a bin that caught pennies (rewards) delivered through a slot opening above the bin. To this point the cooperator's panel was identical to the subject's, but in addition the subject's panel included a red light labeled "Partner punished". On the table top beside the two panels, which were mounted back-to-back, was another red light that served as a time-out signal and was clearly visible to both the subject and the cooperator.

(2) Response analyzer and event recorder. The remainder of the equipment consisted of a box containing the relays, timers, and electronic accessories needed to 'run the apparatus and the Esterline-Angus Multi-Channel Event Recorder used in previous phases of the study.
(3) Dummy electrode. In addition, a piece of electrical wiring emerged from the back of the response analyzer equipment. Attached to the end of this wire was a plate-type electrode. This electrode, although ominous in appearance, was in fact a "dummy" and was not actually

connected to the electrical current.

The apparatus was programmed for use in two ways. The first was for the cooperative learning task that did not involve punishment.

Procedure

The subjects used in this phase of the study were 20 ALs and 16 ALFs from the original subject group who remained in Clinton Prison at this time. As noted previously, an additional 3 ALF subjects were recruited at this time to increase the total to 19 ALFs. Each subject worked with a "cooperator" who was recruited from those of the volunteers who had been excluded as subjects on the basis of unclear avoidance-learning styles.

Subjects who were to perform in any any one experimental session were presented with a list of cooperators scheduled for that session. Each subject was asked to place a check beside the names of cooperators whom he either did not know or toward whom he felt neutral; each subject was then matched with a "neutral" cooperator.

A subject and his assigned cooperator were seated directly, in front of the appropriate response panels. The experimenter then read aloud the following instructions:

> "You might view this as a game that you are going to play together. I won't tell you how it works, since

that is up to you to figure out. Don't talk to each other or try to communicate in any other way. From time to time a penny will fall down this slot. As before, the number of pennies you win will be recorded and entered on your account. Try not to press the square green button while this red light (indicating the one on the table between the panels) is on. If you do, it won't break the equipment, but it does make the record very difficult for me to read, so try not

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to press while it is on. I will tell you when to stop." The apparatus was wired so that when one person pressed his response button, the partner's equivalent response button lighted. If the partner (subject (S) or cooperator (C)) in turn pressed his now illuminated response button within 0.5 second*, the following consequences occurred: The "Partner responding" and "Partner rewarded" lights flashed on the initiator's panel, the "Partner rewarded" light flashed on the responder's panel, a penny was

*The value of 0.5 second for the duration of the critical response per_od was selected on the basis of Cohen's (1962) investigation indicating that with this type of task the probability was slight that in 0.5 second a further response would follow the first by chance alone.

delivered with an audible click into both S's and C's reward trays, the response button became dark, and the time-out light came on for 5 seconds. After this 5 second interval had elapsed, the apparatus was again ready for operation. If the responder failed to respond within 0.5 second, the consequences were the same as those above except that there were no rewards. If a pair of responses were generated by one partner, the time-out was initiated without reward. This gave six different, response pair possibilities: a cooperative S-C (S initiates and C responds in less than 0.5 second), a cooperative C-S, a noncooperative S-C (C responds in more than 0.5 second), a noncooperative C-S and the autistic S-S or C-C responses.

A shortcoming of the sequence analyzer serendipitously provided two more possibilities for types of cooperation. These response types occurred when both partners pressed at almost the same moment so that the interresponse time was less than the tolerance of the equipment. When this happened the apparatus "considered" the two responses as one, delivered a reward, and then required a third response to initiate the time-out phase. This leaderless response type was termed a simultaneous cooperative response. The same deficit in the equipment led to another leaderless response type requiring extremely close cooperation between partners. This response type was termed a multiple

simultaneous cooperative response and occurred when one or more simultaneous responses followed an initial one within the critical 0.5 second period. In this way it was possible for a closely cooperating pair to receive two, three, or even four rewards within a single time-on phase.

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The final score recorded from this situation was the number of times the subject violated instructions by pressing his response button during the time-out phase, since the inclination to follow instructions indicates a type of cooperation with the experimenter.

Scoring of a subject's record was done on the basis of frequency of each response type in the total record. In an exploratory investigation, it was found that 15 minutes was sufficient time to allow for the establishment of a relatively stable response style between partners. After a subject-cooperator pair had worked at the cooperative task for this length of time, they were told to stop; the cooperator was asked not to reveal to anyone how the apparatus operated and was excused from the experimental room.

The empathic avoidance phase was then begun by telling the subject: "The rules of the game are changed; now Dick will be your partner." (Dick) was an assistant provided by Clinton Prison who had demonstrated by long tenure in a responsible position at

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the prison hospital that he was able to relate well to a variety of immates.)

The assistant then was seated in the cooperator's chair and, with some ceremony visible to the subject, the dummy electrode was attached to his forearm. During the procedure the experimenter said to the assistant, "I'm not going to turn the current any higher this time. I'll run it at the same level as before. That was high enough!" To which he responded as he had been instructed, to the effect that it certainly had been high enough before.

The apparatus was then switched to the empathic avoidance mode of operation in which the cooperator's board was not operative, and all trials were initiated by a small button held by the experimenter. When this button was activated the subject's response button became illuminated. If the subject failed to press his response button within 0.5 second, the red light labeled "Partner punished" on the subject's panel flashed on and remained on for 4.5 seconds. The subject's panel then went dark until the experimenter initiated another trial. If the subject pressed his response button within the critical 0.5 second the "Partner punished" light did not illuminate, and, as in unsuccessful trials, the response button remained illuminated for 4.5 seconds.

The subject was allowed to work at this task for 10 minutes,

a duration determined as sufficient to indicate the course of empathic avoidance learning. After this time the subject was asked not to discuss the procedure with anyone, and was excused from the experimental room.

Scoring for empathic avoidance learning was on the basis of thirds of total trials; also, both the number of successful trials and the number of responses by a subject were recorded. The comparison of the fractions of successful trials in the first third and the last third of all trials is a measure of empathic avoidance learning and the total number of responses (presses) may be viewed as some indication of the subject's concern for his partner's fate.

Results

Table 20 presents a summary of the results of the cooperative learning task. Routine examination of the data indicated the distribution of some variates not to be normal in shape; nonparametric statistical tests were used in those instances where the distribution of the variates departed greatly from normality. When departure from normality was not marked, t-tests were used.

A perusal of Table 20 indicates that there were no statistically significant differences between the AL and ALF groups in any of the cooperative behaviour measures. Similarly, there are no differences between the groups in the noncooperative responses

Table 20

Summary of Data Analysis for Cooperative Learning Task

			6		
Response Type	Mean no Respor AL	o. of 1 <u>ses</u> ALF	Type of Analysis	t or X ² value	р
Cooperative S-C	19.8	15.4	t-test	~ 1	
Cooperative C-S	3 2.8	45.9	t-test	1.285	<u>a</u> / NS
Leaderless cooperative	33.6	31.4	t-test	<1	
Total Cooperative responses as % of trials	67:2%	72.9%	t-test	, , 1	
Non-cooperative S-C	11.6	5.4	median test	t <l< b=""></l<>	
Non-cooperative C-S	15.9	14.6	median test	t < 1	
Non-cooperative S-S	1.8	5.8	median test	: < 1	
S's rule violations	13.1	10.9	median test	; < 1	

<u>a</u>/

NS = not significant at the 5% level.

(noncooperative S-C or C-S, or S-S responses).

Both the noncooperative S-S and the simultaneous multiple. cooperative response type were relatively infrequent in both AL and ALF groups and thus both response types were examined with respect to the frequency of subjects generating these rare responses. Table 21 gives these frequencies and the relevant statistical comparisons. For simultaneous multiple cooperative responses the difference in frequency of subjects in each group giving one or more such responses is not significant when Yates' correction for continuity is used.

For the noncooperative S-S responses, the distributions pr the AL and ALF scores were quite different in shape. Many subjects in both groups generated a few such responses before adopting a rewarded style of response. In a few instances however, subjects established the noncooperative S-S as part of their response repertory. If 10 or more S-S responses are arbitrarily defined as indicating more than a transcient use of this response, no AL subject gave 10 or more S-S responses, whereas 4 ALF subjects did so. Although there frequencies are too low for statistical test, there is suggestion that the ALFs are more likely to be "autistic" in their style of responding than the AL group.

The number of times the subject violated the rules of the task is of particular interest, since it might be expected that

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Frequency of Subjects Giving Rare Response Types in the Cooperative Learning Task (20 ALs, 19 ALFs)

Table a

Response Type	<u>Freque</u> AL	ency of S	ALF	X ² value	p``
Simultaneous multiple cooperative responses (1 or more)	4	-CôA	9	2.168	<u>a</u> / NS
Non-cooperative S-S responses (10 or more)	0	<i>Ъ</i>	4		
S's violation of rules (1 or more times)	13		1 1	~1	

<u>a</u>/ NS = not significant at the 5% level. •

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those who fail to learn to avoid punishment (the ALFs) would also fail to abide by rules. Table 20 indicates no difference between groups when the number of rule violations per subject is used as the variate; when frequencies of AL and ALF subjects with one or more violations of rules are compared (Table 21), again there are no significant differences between groups.

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For the empathic avoidance learning task, Table 22 presents the means and statistical comparisons between groups for the total number of successful avoidance trials and for the total number of responses. In each case, t-test comparison shows no significant differences between groups.

Learning in this task was examined by comparing the fraction of successful trials in the first third with that in the last third of all trials. It should be noted that this is a slightly different measure than the thirds of errors used to express learning previously in this study; this new avoidance index is expected to increase as learning progresses.

Table 23 presents the group means; Table 24 summarizes the results of analysis of variance of this data. It can be seen from these tables that both the AL and ALF groups show empathic avoidance learning as the task progresses with Table 24 giving a highly significant practice effect; there is no difference in empathic avoidance learning for groups, and the groups x practice inter-

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Table 22

Overall Scores from Empathic Avoidance Learning Task

·. ,	Gr	ns •	
Variable	ÂL		ALF
Total number of successful trials	68.9		65 . 0
Total number of responses ("concern")	432.6	, \$	527.0



Empathic Avoidance Learning Indexes

Group 🦻 🕅		<u>Mean Avoidance</u> lst third of trials	Learning Index 3rd third of trials	
AL	· 20	.511		
ALF	19	.500	.621	

Table 24

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Analysis of Variance of Empathic Avoidance Learning

for AL and ALF Groups

Source of Variation	df	Mean Square	F	р
Between Subjects	38	на на при на 1976 го 1976 година и селе Станции на при на селе на траници, на ексносни на селе на селе на селе		<u> </u>
Groups (G)	l	.009263	<1	
Subjs. w. groups (error g)	37	⁷ .103937	•	
Within Subjects	39	3:	< /	
Practice (P)	1	•332547	10.987	<. 01
Ğx₽ →	~1 Î	.010586	<1	•
P x Subjs. w. groups (error p)	37	.030266		<u>}</u>

action is not significant. Both groups, then, learn the empathic avoidance task equally well.

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Figure 5 graphically represents the course of empathic avoidance learning for the two groups.

An overview of the results of this phase of the study indicates that in terms of responsivity toward another person those who have failed to learn to avoid both physical punishment and cognitively mediated punishment (ALFs) are able to behave as responsively as those who perform normally with respect to avoidance learning (ALs). This appears to be the case both for cooperative behaviour and for empathic avoidance, and it would seem that the type of avoidance-learning deficit under scrutiny in this study is restricted to learning to avoid punishment delivered to the subject himself. Whether adrenalin administration would have a differential effect on AL and ALF groups' empathic avoidance learning becomes a moot point since a drug can hardly be expected to offset a learning deficit where no such deficit exists.



Figure 5. Empathic avoidance learning index by thirds of errors

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DISCUSSION

Avoidance-Learning Characteristics

Exploration of one parameter of avoidance learning indicated that the avoidance responses learned with the aid of adrenalin in an otherwise avoidance-learning deficient subject were not state specific and were performed in the nondrug state. This result is in contrast to previous workers' findings of state specificity for responses learned under the influence of a stimulant drug (Jacobsen and Sonne, 1956; Belleville, 1964) and for the learning of human subjects under the influence of alcohol Although the present finding of absence of state (Madill, 1967). specificity seems discrepant with previous work, it may be an important factor that in the present instance those who learn to avoid under the influence of adrenalin would not have learned otherwise; these responses are learned both with the aid of the drug and under its influence, rather than simply in the presence of the drug. Other research on state specificity has been comparison of subjects with (presumably) normal learning capacities. In the present research, the normal avoidance learners (ALs) do not learn to avoid under the influence of adrenalin (Table 3) so the data from that groups' post drug learning retention test could not give information about drug state specificity. The

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present study on persistence of the response was designed to examine a rather specific point with its major relevance centering about possibilities for permanent amelioration of a learning deficit. This design, while having elements of a state specificity study, was not quite the same thing. Extensions of these findings, therefore, to statements about drug state specificity can at best be made with caution and might appropriately be restricted to the questions the design addressed.

The learning acquired with the aid of adrenalin by the otherwise deficient ALFs was equally as persistent as the avoidance learning of normal learners (ALs' learning following placebo). This observation points to tentative conclusions concerning the relationship between adrenalin, learning and the experience of punishment. It seems that adrenalin does not simply temporarily alter the autonomic nervous system arousal of the subject; it appears from the results of this study that exogenous adrenalin (for ALFs) allows the occurrence of punishment to motivate avoidance behaviour which results, with practice, in avoidance learn-Presumably, when the adrenalin is no longer present the ing. motivation to avoid would also vanish and punishment would lose its temporarily gained aversive effect. It might reasonably be expected that in the absence of motivation a learned response would not be performed. However, the results of this study did

not bear out this expectation, and it appears that for the avoidance responses learned with the aid of adrenalin there is persistence of the motivational qualities of punishment leading to performance of these responses in the nondrug state.

Another aspect of this research indicated that those who fail to learn to avoid physical punishment also fail in learning to avoid loss punishment; adrenalin injection ameliorates this later failure just as it had in the physically punished task. From this finding it seems that the operative factor in this type of avoidance-learning situation is punishment, and not necessarily pain. Hare (1970) noted, in discussion of the avoidancelearning failure of psychopaths, that this deficit may disappear if the right value system is utilized in punishment. Apparently the loss of money does not meet this requirement, at least for the present group of avoidance-learning failures. Conversely, Schmauk (1970) found that there was no avoidance-learning deficit shown in psychopaths when punishment was the loss of money, afthough that group was avoidance-learning deficient in a physic In that study, Schmauk had punished subcally punished task. jects by taking 25¢ from a stack of quarters which had been This loss punishment was more severe than placed before them. that in the present study where each punishment involved loss of a few pennies. If the different amounts of money lost account

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for the difference in outcome between this research and Schmauk's, then additional support is given to Hare's suggestion that motivational factors are highly relevant in avoidance-learning deficits.

The final parameter of this deficit investigated indicated that this failure was not present in an empathic avoidancelearning situation where those who had failed to avoid punishment delivered to themseives were able to learn to avoid punishment delivered to someone else.

It is, in fact, quite interesting that the ALFs <u>do</u> learn to avoid empathically experienced punishment. Presuming the equivalence of the laboratory avoidance-learning situation to "real" situations, it can be said that the ALFs have not experienced punishment in a normal fashion, and yet they somehow learn to avoid physical punishment that will be experienced by another. Most people probably exercise empathy as motivation for learning to avoid punishment delivered to another; they, in a sense, understand on the basis of their own experience what the other fellow is experiencing. Certainly it would seem that the ALFs could not empathasize in the same fashion as the ALF, although the? possibility remains that at sometime in the past ALFs were normally motivated by punishment thus acquiring an empathic appreciation of it. It would be interesting to trace the course of

development of a capacity to avoid empathically experienced punishment in people who cannot currently avoid directly experienced punishment.

Nature of the Tasks

Before proceeding further with discussion of these findings, it is in order to examine the nature of the learning tasks used in this study. Four tasks were used. The first, the subject selection procedure, entailed a manifest task (pattern learning) to mask the latent avoidance task (physical punishment). The second, the study on permanence of learning, used an identical type of task. The third, the study of cognitively mediated punishment, consisted of a similar task which differed from the first two in that subjects were made aware that the punishment and reward were, in a manner, related in that punishment, although supposedly random, was reward loss. The fourth, the empathic avoidance-learning task, sacrificed some additional quali- . ties of latency: subjects were not told that the occurrence of punishment was contingent on their behaviour, but they were not told the converse either, and there was no manifest task to disguise the avoidance task. Of the three types of tasks used, the first two differed by the relevance of punishment to reward, but not by the degree of latency of the avoidance task. The empathic avoidance-learning task could be differentiated from the first

two tasks by the degree of the avoidance tasks' disguise or latency and by the recipient of the punishment. In questioning after the sessions, all subjects indicated that they were unaware that occurrence of punishment was contingent on their behaviour ' but were aware that punishment had been delivered.

The preliminary determination of discomfort level for electric current could also be viewed as a type of avoidance situation (although not a learning situation) with no latent qualities: the subject had only to indicate "enough" at a lower level of current to avoid additional painful stimulation. In this instance the ALs and ALFs performed alike; they also performed alike in the empathic avoidance task which involved less latent qualities than the other two avoidance tasks which indicated differences in performance between groups. It would seem that the degree of latency of the avoidance task may possibly have bearing on the ability to avoid punishment, although in the research design used this factor cannot be separated from the relation between punishment and reward.

The Effect of Punishment: Punishment, Seeking

In all these avoidance tasks, the distinction between learning and performance must be noted because, for a variety of reasons, a subject might be able to learn to avoid punishment but fail to perform this response in the experimental situation.

There is some suggestion that without the aid of adrenalin medication ALFs not only fail to avoid punished responses, but may even seek punishment. In the subject selection procedures, observation of the performance style of some of the eventual ALF subjects on the physically punished task had led to speculation about punishment seeking: some subjects, as trials progressed, headed unfailingly toward the punished response choice, which gave observers the strong impression that they were seeking punishment in preference to reward. Examination of the learning curves for the cognitively mediated punishment avoidance task and for the post learning retention testing sessions in the study on permanence of acquired avoidance responses support this sug-In both these instances, ALFs without drug showed an gestion. increasing percentage of punished errors as trials progressed, although this attained statistical significance only for the post learning retention test sessions. Similarly examination of the avoidance-learning curves generated by Lykken's (1955) psychopathic subjects indicates a tendency toward an increase in punished errors in later trials. Although these observations cannot be taken as extremely strong support for the punishmentseeking proclivities of ALR type subjects, it is notable that in those instances where subjects show an increase in punished errors over practice one cannot say that punishment has not influenced

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ر خا**و** نه محمد learning. In this case avoidance-learning deficit is not a learning deficit at all, but is rather an avoidance deficit: the subject learns the location of punishment but approaches it rather than avoids it. It may, then, be further stated that adrenalin acts upon those mechanisms which produce avoidance rather than upon learning capacity.

In this study, the qualities of punishment do not appear to be relevant to those who seek it; sought punishment may be either physically painful stimulation, reward loss, or "guaranteed" nonreward, but punishment must be delivered to the subject himself. The quantity of punishment may have a bearing on whether punishment is sought or avoided, and quantity factors may account for the difference in outcome between this study (4¢ losses led to apparent punishment seeking) and Schmauk's (1970) (25¢ losses led to avoidance learning) as previously discussed. In addition, since ALFs did not show higher pain tolerance levels than ALS, it may be a necessary condition that sought punishment has at least a partially disguised or latent quality so that a subject with these proclivities is not aware of the response contingent occurrence of the punishment. Hare (1970), in reviewing the literature on psychopaths' sensitivity to stimulation, noted that most studies have found no differences between psychopaths (avoidance-learning failures) and nonpsychopaths (avoidance learners)

in pain tolerance. Hare suggested that while psychopaths may be less sensitive to punishing events they may at the same time be less willing than normals to tolerate parn, and he pointed out the need to manipulate motivational variables in these studies.

In all of these tasks the avoidance-learning situation, although disguised, was in fact fairly simple because the latent nature of the avoidance task made it necessary that punishment occur approximately 50 percent of the time on the same response alternative. This leads to speculation that if a subject received more positive reinforcement from the punishment than from the rewarded response, then he could rather easily seek out the punished In a sense, such a subject would have brought his own responses. definition of reward to the situation, and for him the latent avoidance task would become the positively reinforced manifest task. It is tempting to equate this apparent punishment seeking behaviour with masochism, although the present study does not yield information to draw such a parallel.

Punishment seeking may be seen in the context of an explanation for avoidance-learning failure offered by Mandler (1964) in a critique of Schachter and Latané's (1964) study. It had been suggested by the findings in that study that those who fail to avoid punishment are people whose autonomic nervous system activity habitually remained at a high but undifferentiated level

leading to inability to label an event as punishing. Mandler suggested that such people might seek out some events sufficiently arousing to give them the opportunity to experience change in their characteristic physiological/emotional state. For such people (psychopaths in Schachter and Latane's study), the concept of punishment or an anxiety-arousing event loses its usual meaning and might better be termed an arousal-producing event without reference to pain or pleasure.

In reviewing research on psychopathy, Hare (1970) pointed out that a number of findings suggest that psychopathy is related to a lowered state of cortical arousal and to a chronic need for This observation might account for psychopaths' stimulation. avoidance-learning deficit because the fairly mild punishments used in avoidance tasks may meet their need for cortical arousal. In this case, mild punishment would not be aversive and might even be sought unless cortical arousal had already been increased by another means, as with adrenalin medication. While there is no equivalent body of research literature on the avoidance-learning deficient subject who is not necessarily psychopathic, the same explanation could be relevant to the apparent punishment-seeking behaviour of this group. One finding in the present study which mitigates against the cortical arousal explanation of avoidancelearning deficit is the lact of pain tolerance differences between

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learners and nonlearners. As previously mentioned, however, it may be possible to explain this absence of difference on the basis of any one of several motivational or task variables without throwing out the possibility that cortical arousal might account for avoidance-learning differences.

The latent quality of the avoidance task used in the present study makes it difficult to make firm statements about punishment seeking, and a different research design would be necessary to elucidate this matter. It might be suggested, however, that punishment seeking provides another possible motivation toward imprisonment, which is an easily available, punishing situation.

In several respects, this research verified previous indications of the existence of an avoidance-learning deficit in certain subjects. In other respects, however, there were interesting differences. One such difference was the comparison of personality characteristics between groups. Schachter and Latané (1964) and Lykken (1955) had found marked differences between groups in scores on paper-and-pencil measures of anxiety and in measures of psychopathy, as well as in clinical judgment of these subjects' anxiety and psychopathy. Schachter and Latané's normal (avoidance learners) and psychopathic (avoidance nonlearners) subjects also differed from one another in crime type, history of escape attempts,

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percent of lifetime incarcerated, and number of arrests. In the present research, differences in psychopathy did not provide the subject selection criteria; this study had worked from the other direction, as it were, and found those with an adrenalin ameliorable avoidance-learning deficit could not be characterized by high psychopathy (either in terms of clinical judgments or Lykken Scale scores), or any (supposed) behavioural reflection of psychopathy. The fact that the present research had selected subjects on this different basis could account for the discrepant outcome between this study and that of Schachter and Latane or That this could account for absence of personality of Lykken. differences in the present study can be seen if one considers the possibility that the present research might have drawn from a population containing no "true" psychopaths at all.

A less apparent factor which may serve to account for the lack of group differences in psychopathy, anxiety, or other behavioural reflections of anxiety and psychopathy is that previous research showing a relationship among these dimensions and avoidance-learning performance had begun with a diagnosis of psychopathy, and then determined differences along these dimensions. This approach tends to strengthen differences between groups by elimination the middle of the normal vs. psychopathic range.

At any rate, because the present research did find subjects

with a consistent adrenalin ameliorable avoidance-learning deficit who showed no behavioural indications usually associated with a diagnosis of psychopathy, it can be said that avoidance-learning deficit is not a sufficient condition for psychopathy.

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The lack of personality of behavioural characteristic differences between groups in this study is of considerable interest and suggests that the avoidance-learning deficit may have more than one kind of consequence in terms of personality development or may have no readily apparent consequence at all.

, Schachter and Latané had found psychopaths to be adrenalin sensitive in terms of autonomic reactivity and suggested that psychopaths' avoidance-learning failure and concomitant personality and behavioural characteristics were a consequence of having learned to ignore disruptively high levels of autonomic reactivity. In this research there was similar evidence of a higher level of autonomic reactivity in response to adrenalin injection in the ALF than in the normal learner. Although recognizing that entrance into the experimental session is already stressful and that the amount of stress increases with the addition of the injection and the introduction of exogenous adrenalin, it seems that the ALFs only learn to avoid when the highest state of arousal has been induced. Normal learners, however, do not learn to avoid punishment under the highest autonomic arousal condition.

This lends support to Schachter and Latané's explanation that the avoidance-learning deficient subject has a higher than normal threshold that must be reached before emotional labeling takes place. From the present findings on punishment seeking we would modify that statement slightly and replace the term "emotional labeling" with "labeling the experience of punishment as aversive".

Thus, the present findings are similar to those of Schachter and Latane in terms of autonomic arousal characteristics associated with latent avoidance-learning capacity; however, in terms of the behavioural accompaniments of these characteristics outcomes of the two studies were dissimilar. These differences in behavioural concomitants of similar autonomic styles associated , with avoidance-learning capacity point to the need for developmental studies of that capacity.

As previously mentioned, a number of workers (as reviewed by Hare, 1970) have attempted to link the avoidance-learning failure of psychopaths to their frequent EEG abnormalities with the suggestion that both are a consequence of limbic system dysfunction. Schachter and Latane found that the psychopaths' avoidance-learning deficit is also corrected by adrenalin. In addition, there was some evidence that manipulation of motivational variables may suffice to ameliorate an avoidance-learning deficit. These observations lead to questions concerning several issues

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which, simply put, revolve around the interrelationships of adrenalin (endogenous or exogenous), ANS activity levels, motivation, and avoidance-learning capacity.

Clinical Implications

One major stimulus influencing the present investigation was the hope of delineating a learning deficit that manifests itself as psychopathological symptoms across a number of behaviours. From a clinical standpoint, this would represent a significant step toward diagnosis on the basis of vague or disputable symptom constellations. In addition, if psychopharmacological amelioration of this incapacity could be shown, the understanding of this diagnostic category would be greatly increased, and a direction toward a specific and to-the-point treatment plan for one form of psychopathology could be established.

Unfortunately, reality did not wholly cooperate in meeting this immodest goal. From this study, it would appear that the avoidance-learning deficit does not exist in an orderly fashion in all modes of avoidance learning, since it was $\bigwedge^{n_0^1}$ out in the empathic avoidance situation. In addition, the results indicate that there is not necessarily any particular psychopathology or behavioural characteristic associated with the avoidance-learning deficit, making it questionable that there is any consequent psychopathology to correct. If avoidance-learning deficit can produce personality deviations but does not necessarily do so (for example, because of various orders of compensatory mechanisms), then the clinical relevance of this area of research appears in dealing with those who show the avoidance-learning deficit and psychopathology associated with it. Future studies will perhaps yield more information regarding the association between avoidance-learning failure and psychopathology and will possibly develop objective methods for identifying the patient with psychopathology consequent to this deficit.

This study was launched with the assumption that avoidancelearning deficit would result in faulty socialization which in turn would be one path to criminality and imprisonment. Although the results failed to show differential socialization characteristics between avoidance learners and nonlearners, it still may be the case that such differences do exist between these groups. It may also be the case that one day there will be found a clinical indication for the correction of avoidance-learning deficits as a method of correction or prevention of one form of criminality. The results of this study indicate several things about avoidance-learning deficit and its amelioration. For one, it was found that avoidance-learning deficit was an incapacity extending to a situation in which the subject was nonphysically punished. This would seem to bode favorably for this deficit leading to

faulty socialization, although this was not shown by these results. It was also found that the deficit vanished in tasks where punishment was experienced only empathically by the subject, suggesting normal social responsiveness in avoidance-learning deficient people. In addition, it was found that to "let the punishment fit the crime" is not effective; that adage might be better stated "let the punishment fit the motivational state of the subject". Punishment alone will not be aversive and may even be sought by those who are avoidance-learning deficient.

The event of punishment could be rendered effective by delivering it to someone else or perhaps, as others have suggested, by increasing its strength. Both these possibilities have unpleasant consequences either for the "someone else" or for the experimenter. From the present findings, it seems that punishment will produce the usual aversive effect when the motivation state of the subject is altered by ANS stimulation with adrenalin. This manipulation not only allows punishment to motivate avoidance learning, but, additionally, this learning seems to have normal qualities of permanence even after exhaustion of exogenous adrenalin has returned the subject to his usual state of motivational deficiency. These findings will perhaps at some time provide direction for formulation of a treatment plan for one or more socialization defects; before that day arrives, however, a

good bit of additional information must be accumulated. Suggestions for Future Research

In discussion of the findings of this and of previous studies, a number of suggestions for future research have been made. Summary of these yields several areas to be explored in elucidating the adrenalin ameliorable avoidance-learning deficit.

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The first such area concerns careful exploration of the avoidance-learning task variables. As has been suggested, the latent qualities of the avoidance task and the degree of relationship between punishment and reinforcing stimuli are two such parameters. Other task variables that may influence avoidancelearning performance are the amount and type of punishment given.

A second area for investigation concerns the course of development of avoidance-learning capacity in the normal and in the deficient learner. This has been indicated as a particularly interesting topic by the present finding that those who do not avoid punishment for themselves can do so for someone else. The perhaps unvarranted supposition that avoidance-learning deficit has always been present in a subject who currently shows that deficiency gives no historical basis for empathic avoidance learning, indicating the need for investigation of the development of avoidance-learning capacity. By the same reasoning, it would be of interest to trace the development of the avoidance-

learning deficiency in those with and those without accompanying psychopathology in an effort to understand the mutual influence of personality and learning factors.

Another area for further research is the suggested relationship between avoidance-learning failure and punishment seeking that was discussed earlier. In this context, the autonomic arousal characteristics associated with avoidance-learning capacity will be of particular interest. From the present study, there is some implication that a large factor in avoidance-learning performance may be that the subject behaves in such a way as to manipulate his characteristic level of autonomic arousal. If that is so, it should show up in types of measures other than avoidance-learning performance and should also be reflected in measures of autonomic activity other than heart rate. Heart rate recordings for avoidance learners and nonlearners both in the adrenalin and nondrug state, at rest and with various stimuli both pleasurable and punishing would also be of interest. Presuming that sort of 'study would yeild differences in free behavloural choice, KEG, and adrenalin response between learners and nonlearners then the next study would logically include examination of these factors developmentally; it could be speculated that even if adults show no psychopathology related to avoidancelearning capacity, children may do so with maturational or environ-

mental factors mitigating these behavioural manifestations of avoidance-learning deficit in the course of development.

Finally, depending at least in part on the investigation of the previous issues, the clinical dimensions and implications of avoidance-learning deficit should be elucidated both in terms of diagnosis and in terms of treatment recommendations.

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APPENDIX

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Appendix A

CRITERIA CHARACTERISTIC OF PSYCHOPATHY

(Cleckley, 1955, pg. 380-381)

- 1. Average of superior intelligence.
- 2. Free from irrationality and other commonly accepted symptoms of psychosis.
- 3. Free from any marked nervousness or other common symptoms of psychoneurosis.
- 4. No sense of responsibility.
- 5. Disregard for truth.
- 6. No sense of sheme.
- 7. Antisocial behavior without apparent compunction.
- 8. Inability to learn from experience.
- 9. General poverty of affect.
- 10. Lack of genuine insight.
- 11. Little response to special consideration or kindness.
- 12. No history of sincere attempts at suicide.
- 17. Sex life shows peculiarities (weak sex-craving, regards sex casually).
- 14. Onset of psychopathic characteristics no later than early twenties.

Appendix B

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ACTIVITY PREFERENCE QUESTIONNAIRE

<u>Directions</u>: In each item below, there are two activities or occurrences listed. Many of them are more or less unpleasant. Imagine that, under normal circumstances, you were forced to do one or the other of each pair. Which one would you choose? Choose the one of each pair that you would rather do or have happen and write its letter (a or b) in the parenthesis beside that item.

Example:

- (a) 0. (a) Hitting your thumb with a hammer; (b) Being run over by a train.
- () 1. (a) Having a gabby old woman sit down next to you on the bus; (b) Going out to dinner with someone for the first time.
- () 2. (a) Knocking over a glass in a restaurant; (b) Cleaning up a spilled bottle of syrup.
- (a) Standing on a ledge of the 25th floor of a building;
 (b) Having to cancel your vacation.
- () 4. (a) Having to "go out" with a visiting relative;
 (b) Having to introduce someone whose name you've forgotten.
- () 5. (a) Getting a Christmas present from someone you didn't give one to; (b) Getting up to go to work in the morning.
- () 6. (a) Spending a week in solitary on bread and water;
 (b) Being broke and having to beg money on the street for a meal.
- () 7. (a) Spending an evening with some boring people;
 (b) Being seen naked by a neighbor.
- () 8. (a) Reading a dull book for aschool report; (b) Getting a threatening letter.

- () 9. (a) Being balled out by a teacher; (b) Losing some money through a hole in your pocket.
- () 10. (a) Whitewashing a long board fence; (b) Being called on in school.
- () 11. (a) Getting caught at something; (b) Putting 1000 names in alphabetical order.
- () 12. (a) Having an accident with a borrowed car; (b) Cleaning out a cess-pool.
- () 13. (a) Falling down and breaking your arm; (b) Having to stay home every night for two weeks with a sick relative.
- () 14. (a) Being in an air raid; (b) Being bossed around by someone for a full day.
- () 15. (a) Getting up to answer the phone and finding it's a wrong number; (b) Having to ask where the bathroom is, at a party.
- () 16. (a) Getting stuck in traffic when you're in a hurry;
 (b) Finding you've lost your bus-fare when it's time to pay and get off.
- () 17. (a) Walking alone late at night; (b) Washing the dinner dishes.
- () 18. (a) Just sitting around with nothing to do on Sunday afternoon; (b) Being introduced to some new people.
- () 19. (a) Working all day when it's 90 in the shade;
 (b) Asking someone to pay you money that he owes you.
- () 20. (a) Having to walk five miles for gas; (b) Having a tooth pulled by the dentist.
- () 21. (a) Waiting for an over-due bus; (b) Having to complain to the neighbors about being too noisy.
- () 22. (a) Finding a dead body in an alley; (b) Carrying a ton of coal from the backyard into the basement.
- () 23. (a) Having a sick headache; (b) Having your name in the papers for drunken driving.
- () 24. (a) Being interviewed for a job; (b) Sewing on a button.
- () 25. (a) Being sent to the principal's office when you were in school; (b) Memorizing something for a test in school.
- (a) Going to work or to school with a black eye;
 (b) Banging your head on a cabinet door.

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- () 27. (a) Changing a baby's diaper; (b) Going to a doctor for a physical.
- () 28. (a) Digging a big rubbish pit; (b) Making a parachute jump.
- () 29. (a) Bringing home a bad report card; (b) Having a friendly dog jump up on you with wet and muddy feet.
- () 30. (a) Breaking a lamp at someone else's home; (b) Run a steam presser in a laundry for a week.
- () 31. (a) Walking a mile when it's 15 degrees below zero;
 (b) Swimming where sharks have been reported.
- () 32. (a) Having a barking dog run after you while you are walking along the street; (b) Having the phone ring when you're taking a bath.
- () 33. (a) Wanting to go out some night and not having any money; (b) Telling a lie to somebody.

Appendix C

Dear

The questionnaire you filled out several weeks ago was one part of a large research project being carried out by McGill University in Montreal. I am writing to you now to tell you about the rest of the project and to see if you would be interested in participating in it.

I am not, however, asking you to volunteer to be in the study now. But, if from the information this letter contains, you would be interested in meeting with me to hear more about the study, please detach the back sheet, fill in your name, Clinton number, and current work location and send this sheet to the Service Unit. Within a week or so I will arrange an appointment with you so that I can answer any questions you may have about the study, and at that time you can decide whether or not you would like to take part in this research project.

WHAT THE RESEARCH INVOLVES:

Part I: The first part of this study is really to make

sure you qualify to be a subject. This part measures your resistance to frustration or annoyance while doing a simple task. The annoyance is a mild shock to your wrist. You select the strength of the shock yourself as that amount which seems just uncomfortable to you.

This part of the study will take only a few minutes and will be completed in one session.

When the results of this part of the study are in, some of you (probably almost of all who have been in Part I) will be selected to go on to Parts II and III of the study.

<u>Part II</u>: In this part of the study we will be measuring the effect of a commonly used drug on another task. This task is very much like working a pin-ball machine or solving a puzzle by moving different levers. You have the chance to win a small amount of money (besides being paid as mentioned below) if you perform the task correctly.

We plan to give the drug by injecting it just under the skin. This feels like something between a mosquito bite and a bee sting. The effects you feel from the drug are not particularly unpleasant and will be entirely gone within an hour.

So you can be sure that there is nothing dangerous or terribly unpleasant about this part of the study, Dr. Pruski has written the attached letter indicating his approval of the study.

This part of the study takes four sessions (about 1 hour each). In only two of these sessions will you receive an injection.

Part III: This part of the study is working the "pinball" machine together with another person. Other than that, Part III of the study will be just like Part II although it will involve one additional one-hour session.

WHAT'S IN THIS FOR YOU:

1/ Pay: This is the pay schedule for participation:

•	· ·	plus winn (approx. \$. \$1.25 addi	ings 75 to tional)
TOTAL TIM	E: 10 sessions, 1 hour ea.	TOTAL PAY:	\$5.00
III	2 with injection, 3 with no injection	\$.50 ea.	\$2.50+?
II	2 with injection, 2 with no injection	\$.50 ea. plus winnings	\$2.00+?
I	l with mild shock	\$.50	\$.50
Part	Type and number of sessions	Pay rate	<u>Total</u>

If you agree to participate it is important that you plan to continue through all three parts of the study. If you drop out of the study midway through one of the parts, you will not be paid for the incomplete part, unless you must drop out for reasons beyond your control (for example, parole or transfer).

A Certificate of Cooperation: A Certificate of Cooperation will be issued to each man who continues through all three parts of the study or to anyone who begins and must drop out for reasons beyond his control. This Certificate, signed by myself and the Warden, will be placed in your permanent case folder. The results of your performance are strictly confidential and will not appear in your folder.

3/ Shop Pay, Shop Job, and Scheduling: You will still receive your regular shop pay while you participate in the study except for the actual time-off to come to the ten sessions. Also, whatever job you have will not be changed because of your timeoff from work to be in the study. Every effort will be made to schedule sessions so that they do not interfere with yard time. The study will extend over several months so the ten sessions will not occur within short period of time.

Remember, if, from what you have read here, you would

like to hear more about the study and think that you might possibly be interested in participating in it, fill out the attached form and send it to the Service Unit. The success of this project depends on you; I very much hope that you will see your way clear to participating in the study.

Sincerely yours,

D. Blain

TO: Inmates considering participation in the McGill University Research Project.

FROM: D. McMann, Warden

Men participating in the study will be excused from their work assignments to attend experimental sessions. Since the ten sessions involved per man in the study will be of a short duration and spread over several months, it will be possible to hold the work assignment of participants open for them while they are absent for experimental sessions.

Pay for participation in the study will be in accordance with the pay schedule drawn up by Miss Elain. This money will be deposited in the participant's account at the end of the study.

Also, a Certificate of Cooperation will be entered in the case folder of each participant where it will be available for the Parole Board.

The results of any individual's performance in the study are for research purposes only and not for the use of this institution.

TO: Inmates considering participation in the McGill University Research Project.

FROM: Z. Pruski, M.D.

The drug which will be used in the study is normally dirculating in our blood and is produced by the adrenal medulla.

Before injection of the drug, participants will be medically examined and EKG and blood pressure will be taken to check their value and action. There will be, then, no danger or unpleasant reactions.

The action of the drug is short and lasts about one hour. The injection itself is not painful and is only the pain of the needle puncture.

Appendix D

ACTIVITY PREFERENCE QUESTIONNAIRE - Form A

by D. T. Lykken, Ph.D.

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DIRECTIONS: In each of the items below you will find two alter-Each alternative describes what for most people would natives. be an unpleasant experience. Some of these experiences are quite unusual while others may have actually happened to you or to people you know. For each item, try to imagine yourself in both of the situations described and decide which of the two alternatives would seem worse to you and which would seem less bad. Choose the <u>latter</u>, the alternative which you would <u>prefer</u> as the lesser of evils if one or the other had to happen to you. If you choose the "T" alternative; mark the left-hand space beside that item's number on the IBM answer sheet. If you feel that the "F" alternative is preferable, mark the right-hand or F space on the answer sheet.

Example: 0. (T) Having to work late one night. (F) Being run over by a train.

Most people (!) will feel that "T" is the lesser evil and will mark the left-hand space on the answer sheet.

Answer every item in the test. Work rapidly but consider the alternatives of each item carefully. Do not mark the test booklet.

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------<u>Remember</u>: Indicate the alternative that you would

<u>prefer</u>.

- 1. (T) Being interviewed for a job.
 - (F) Mowing the lawn.
- 2. (T) Sitting through a dull movie for the second time because the person you're with hasn't seen it.
 - (F) Turning on a light switch when your hand is wet and you might get a shock.
- 3. (T) In the midst of traffic your horn sticks and begins to blow continuously.
 - (F) In school having to give a report in front of the class.
- 4. (T) Your group takes up a collection to buy a sick member a gift. You discover later that your donation was much smaller than any others.
 - (F) On doctor's orders, you can eat nothing for two weeks but a liquid dietary product.
- 5. (T) Taking a roller coaster ride.
 - (F) Wash three storm windows on both sides.
- 6. (T) Copying four pages of the dictionary. (F) Belching in church during prayer.
- 7. (T) Painting a large frame house.
 - (F) Shoveling the walks after a snowstorm.
- 8. (T) Attempting to beat a railroad train at a crossing.
 / (F) Spraining your ankle so that you have to have a cast put on it.
- 9. (T) Cleaning out a basement.(F) Going to a party where no one knows you.
- (T) Getting caught at something.
 (F) Having your empty car smashed by a runaway truck.
- (T) Having to get out of bed an hour earlier than usual.
 (F) You pass someone on the street and say, "hi, Charley", and then realize it isn't Charley.

- 12. (T) Watching an operation.
 - (F) Your favourite hat is lost or stolen.
- 13. (T) Accidentally dialong a wrong number twice in succession.
 (F) Giving a loud, uncontrollable sneeze during a quiet moment at the symphony.
- 14. (T) Walking a mile when it's 15 degrees below zero.
 (F) Being near where a volcano erupts.
- 15. (T) People at a party are telling jokes. You tell a long drawn out story but no one laughs.
 - (F) You catch a bad cold the day before a big party.
- 16. (T) Hitting your thumb while hammering a nail.
 (F) After eating in a restaurant, you find that you can't pay the bill.
- (T) Jumping down 15 feet into soft earth.
 (F) Taking down the Christmas tree and cleaning up after it.
- 18. (T) Whitewashing a long board fence.
 (F) Washing 20 storm windows on both sides.
- 19. (T)^{*} It is the first day in a new class. The teacher asks each person to stand up and tell about himself.
 (F) Sweep the kitchen floor.
- 20. (T) You must walk around all day on a blistered foot.
 (F) Sleeping out on a camping trip in an area where rattlesnakes have been reported.
- 21. (T) Several people push ahead of you in line but you can't bring yourself to say anything.
 - (F) Wanting to go out some night and not having any money.
- (T) Letting a large but harmless spider run up your arm.
 (F) Going to the morgue to identify an acquaintance who has been killed in an accident.
- 23. (T) Breaking your shoelace while getting dressed.
 (F) Your dog has torn up the neighbor's newspaper and you have to go over and apologize.
- 24. (T) Finding a big cockroach under your pillow.
 (F) Getting stuck in traffic when you're in a hurry.

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- 25. (T) After a school exam, names and grades are posted on the wall. Yours is at the bottom of the list.
 - (F) You find you must clean up the floor where someone has vomited.
- 26. (T) Having to run until your throat is sore and there's a pain in your side.
 - (F) Help push a stalled car on a winter morning.
- 27. (T) Getting ready to watch something important on television and having the set fail.
 - (F) Upsetting a glass of milk on a neighbor's carpet.
- 28. (T) Finding a wrecked car in the ditch with three occupants unconscious and bleeding.
 - (F) You go on a two-week ocean cruise and are seasick the entire time.
- 29. (T) You find that you must cancel your vacation.
 - (F) You are arguing with friends and get so frustrated and upset that you choke up and your eyes fill with tears.
- 30. (T) Having someone get made and tell you off.
 (F) Playing cards with people who are more skilled than you are and then making a dumb mistake.
- 31. (T) Asking someone to pay you money that he owes you. (F) Sleeping one night on the floor.
- 32. (T) Balancing along the top rail of a picket fence.
 (F) Walking up four flights of stairs.
- 33. (T) Having to stay in bed with the flu and a sick headache.
 (F) Having your hands shake and your mouth go dry as you try to talk in front of a group.
- 34. (T) Having to spend half a day in a closet.
 - (F) You overhear a friend say something sarcastic about your parents.
- 35. (T) Dispose of a dead mouse from a mousetrap.

(F) Being caught in a bad thunderstorm.

- 36. (T) Being wheeled into the operating room to have your appendix removed.
 - (F) A doctor has examined a sore in your throat and you are waiting to find out whether it's cancer.

- 37. (T) You're on stage in the school play and realize that you have forgotten your lines.
 - (F) You return to your car parked downtown to find you left the lights on so that the battery is dead.
- 38. (1) Standing in a long line for something.
 - (F) Being given an electric shock as part of a medical treatment.
- 39. (T) Having your hair cut by an inexperienced barber.
 (F) You slip in the mud and get your new spring clothes soaked and dirty.
- 40. (T) Put on a skirt or a blouse and finding a button missing.
 (F) Having to ask where the bathroom is at a party.
- 41. (T) You're in a bank and suddenly three masked men with guns come in and make everyone raise their hands.
 (F) Sitting through a two-hour concert of bad music.
 - (L) PICTUR PUROTRI & PRO-HOUR CONCELL OI DAY MUSIC.
- 42. (T) Counting the beans needed to fill a four quart candy jar.
 - (F) At high school picnic, they choose up sides for baseball and you are the last one picked.
- 43. (T) Washing a car.
 - (F) Driving a car at 95 miles an hour.
- 44. (T) Having to ask the person behind you at the movie to stop kicking your seat.
 - (F) Watching a long headache-pill commercial on TV.
- 45. (T) You are paddling a canoe across a large Canadian lake and a storm blows up.
 - (F) Stumbling into an electric fan.
- 46. (T) You have taken a neighbor's child to the circus and realize you have lost him in the crowd.
- (F) While on vacation your car breaks down and you have to wait in a small town while parts are sent for.
- 47. (T) You must scrub the kitchen floor on hands and knees. (F) You must make a speech to 100 people.

- 48. (T) Having your car swing into a skid on an icy corner.(F) Having to walk five miles for gas.
- 49. (T) Having your grocery bag break and spill on a crowded street.
 - (F) Having your empty car smashed by a runaway truck.
- 50. (T) You go to a party and find that you're the only one dressed up.
 - (F) Wet mopping the floor of a hospital corridor.
- 51. (T) You're at summer camp and must do 30 minutes of stiff calesthenics each morning before breakfast.
 - (F) Rowing out in a boat to bring in a drowned body you've seen floating off shore.
- 52. (T) Digging a rubbish pit.
 - (F) A high pressure sales clerk bullies you into buying the higher-priced pair of shoes that you didn't really want.
- 53. (T) Having a doctor stick a needle in your arm for an injection.
 - (F) Falling out of a boat.
- 54. (T) Losing your wallet to a pickpocket.
 (F) Having someone say loudly to you at a party, "Why don't you go home? Nobody wants you here."
- 55. (T) Being chased by a huge and angry bull. (F) Spending a month in bed.
- 56. (T) Introducing yourself to a total stranger. (F) Having to stand up on the bus.
- 57. (T) Making a parachute jump.
 (F) Cleaning up your house after floodwaters have left it filled with mud and silt.
- 58. (T) Being a restaurant dishwasher for one week.
 (F) You get a chance to be interviewed on TV to advertise a
 " charity drive but you become tongue-tied and make a poor showing.
- 59. (T) Finding that you have been short-changed and having to return to the store to ask for the rest.
 - (F) Sandpapering a wooden chair to get it ready for repainting.

- 60. (T) Spending a week with nothing to eat but bread and water. (F) Going to the hospital to have a minor operation.
- 61. (T) Running out of gas in the middle of a crowded downtown intersection.
 - (F) Waiting in line for two hours to pay a parking ticket.
- 62. (T) Having to give up eating desserts.(F) Swimming in very rough ocean water.

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- 63. (T) Just sitting around with nothing to do on a Sunday afternoon.
 - (F) Cutting out the spoiled parts of a bushel of potatoes.
- 64. (T) Walking into a room full of people, you stumble on a footstool and sprawl on the floor.
 - (F) You must wash out a dozen of someone else's dirty handkerchiefs by hand.
- 65. (T) Having your date at a dance leave without you.
 (F) Sitting through a long lecture with a runny nose and no handkerchief.
- 66. (T) Being caught on a sandbar by the rising tide.
 (F) Being stranded in an off-shore lighthouse for a week by high tides.
- 67. (T) Being sick to your stomach for 24 hours.
 - (F) Finding out you've overslept and missed an important apointment.
- 68. (T) You are introduced to a girl (man) who is so attractive and poised that you become very shy and awkward.
 - (F) You must find where someone else parked your car in a big lot at the State Fair.
- 69. (T) Being in a flood.
 (F) Carrying a ton of coal from the backyard into the basement.
- 70. (T) Spilling paint all over your shoes.

(F) Discovering your feet are dirty when you undress for a medical examination.

- 71. (T) Having a gabby old woman sit down next to you on the bus.
 - (F) Catching a bad cold the day before a big party.
- 72. (T) Having to walk half a mile through a soaking rain without a coat.
 - (F) Walking near a whirling plane propeller.
- (T) You agree to supervise a child's birthday party but the children won't mind you and race around out of control.
 (F) Spending an evening with some boring people.
- (T) Laughing at something not meant to be funny.
 (F) Clean up the popcorn and candy wrappers in the neighborhood movie theater.
- 75. (T) Walking around all day in tight, uncomfortable shoes. (F) Finding yourself in the midst of a fighting mob.
- 76. (T) You have spent all day preparing for a picnic but it rains just as you start to eat.
 - (F) You overhear someone comment on how strangely you are dressed.
- 77. (T) Being threatened by a much bigger and more powerful person.
 - (F) You're caught in a speed trap driving through a small town and must wait for an hour to pay a \$20 fine.
- 78. (T) Lick stamps for 1,000 letters.
 - (F) Watch someone make a fool of himself on a television quiz program.
- 79. (T) You are given an IQ test in front of a college class as a demonstration.
 - (F) Having to go down to the courthouse to renew your driver's license.
- 80. (T) Cleaning up the living room after the plaster has all fallen down.
 - (F) Standing on the very top rung of a ladder in order to wash a second floor window.
- 81. (T) You are broke and have to beg money on the street for a meal.
 - (F) Distributing handbills in mailboxes from door to door.

- 82. (T) Having a bad head cold.
 - (F) Having your employer get mad about mistakes in your work.
- 83. (T) Looking for something in an attic storeroom on a stifling hot day.
 - (F) Going into a dark, rat-infested cellar.
- 84. (T) "Having it dut" with someone. (F) Sitting from midnight to 4:00
 - F) Sitting from midnight to 4:00 a.m. in a railroad station waiting for your train.
- 85. (T) Walking barefoot in a room where some glass has been broken.
 - (F) Walking barefoot across a deep, hot sandy beach.
- 86. (T) Coming home hungry and having to eat a cold supper.
 (F) Stumbling in a crowded bus and dropping your load of packages.
- 87. (T) Coming out of a movie in your summer shoes to find it's snowed a foot deep.
 - (F) Getting out of a warm bed'in a room so cold that you can see your breath.
- (T) Sorting out a pailful of nuts and bolts.
 (F) While flying home from a trip you get air
 - (F) While flying home from a trip you get airsick and have to dash down the aisle to the washroom.
- 89. (T) Taking a long ride in a taxi and then finding out you don't have enough money for a tip.
 - (F) Getting paint in your hair.
- 90. (T) While dining at home, you spill a very hot cup of coffee in your lap.
 - (F) You go with your date to a party but she (he) slips away later and goes home with someone else.
- 91. (T) Waiting in a dentist's office to have a tooth pulled. (F) Having an earache.
- 92. (T) Having to go out to a party with a large red pimple on the end of your nose.
 - (F) Losing a book that you borrowed from a teacher and which can't be replaced.

- 93. (T) Your family, along with three others, must spend a month underground testing a fallout shelter.
 - (F) You want to join a social club, but the members vote not to let you in.
- 94. (T) Out in the middle of a frozen lake, you realize the ice is unsafe.
 - (F) You find that vandals have slashed all four tires on your car.
- 95. (T) Waiting for an overdue bus. (F) Meeting a friend on the str
 - (F) Meeting a friend on the street and not being able to remember his name.
- 96. (T) Giving blood for the blood bank.
 (F) You're in the back seat of a driverless car which suddenly starts rolling downhill.
- 97. (T) You go to the beach with some friends and realize that they all have a better build (figure) than you.
 - (F) Washing ten storm windows on both sides.
- 98. (T) Run a steam presser in a laundry for a week.
 (F) Being caught in a blizzard.
- 99. (T) Being asked for a contribution when you haven't any money.
 - (F) Untying a hard knot in a shoelace.

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100. (T) Having to "go out" with a visiting relative.
(F) Banging your head on a cabinet door.

Appendix E

QUESTIONNAIRE ON THE PERCEPTION OF FEELING

	· · · ·	
Name :		
Number:		
Age:		
Date:		

In this questionnaire we are interested in finding out about your subjective experience of various emotions. We assume that people differ in the ways in which they experience emotions. We are particularly interested in how widely people differ in describing these feelings.

The value of this questionnaire depends on how frank you are in stating your feelings, attitudes, and experiences. There are no right or wrong answers, and there are no catch questions in this questionnaire. Please read each question very carefully and consider your answer. There is no time limit.

Part I

In this part we are interested in your description of two general feeling states. The important thing is that you use your own words in describing these experiences.

The first state we are concerned with is PLEASURE, HAPPINESS, A STATE OF WELL-BEING. Please describe in a few brief sentences how you feel when you are in this state. We are concerned with <u>how you feel</u>, not why you feel this way. <u>Remember to use your</u> <u>own words</u>. Later when we refer to the feeling of HAPPINESS we will expect you to understand by this term the description that

Now add to this-description the outstanding bodily reaction which you associate with this experience. The second state we are concerned with is ANXIETY, APPREHEN-SIVENESS, TENSION. Please describe in a few brief sentences how you feel when you are in this state. We are concerned with how you feel, not why you feel this way. <u>Remember to use your own</u> words. Later when we refer to the feeling of ANXIETY we will expect you to understand by this term the description that you give below.

Now add to this description the outstanding bodily reactions which you associate with this experience.

Part II

This part will consist of five sections. Answer all questions in each section. Do not omit any.

For each question there is a line or scale on the ends of which are statements of extreme feelings or attitudes. You are required to put a mark (X) on that point on the line which you think best indicates the state of your feeling or attitude about the particular question. You may put the mark anywhere on the line. Please read each question in each scale very carefully. You will have ample time to consider each question.

You may find it difficult to answer some of these questions. This is because people differ widely in their emotional experiences. It is this variation in individual experiences which we are trying to assess. Therefore, it is extremely important that you give as much thought as possible to each of your answers. When you find it difficult to mark a particular scale, use your best possible estimate of how you might feel.

There are no catch questions in this questionnaire. Its success depends entirely upon your cooperation.

E.

Section I

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY FUT THE MARK ANYWHERE ON THE LINE.

1. When you feel anxious, are you aware of many bodily reactions?

Aware of very many When you feel anxious, how often are you aware of your bodily reactions?

Always Never

3. When you feel anxious, does your face become hot?

Does not change Becomes very hot

4. When you feel anxious, do your hands become cold?

No change

2.

Very cold

5. When you feel anxious, do you perspire?

A great deal

Not at all

6. When you feel anxious, does your mouth become dry?

Always		 		Never
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7. When you feel anxious, are you aware of increased muscle tension?

No increased tension A great deal of tension When you feel anxious, do you get a headache?

8.

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Always				Y		Never
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## Section II

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

9. When you feel anxious, how often are you aware of any change in your heart action?

Never Always

10. When you feel anxious, do you experience accelerated heart beat?

No change Great acceleration

11. When you feel anxious, does the intensity of your heart beat increase?

Does not change Increases to extreme pounding

12. When you feel anxious, how often are you aware of change in your breathing?

¥

Always Never

No change

Very rapid

۲ سا 14. When you feel anxious, do you breathe more deeply?

Much more deeply No change

15. When you feel anxious, do you breathe more shallowly?

Much more shallowly

•No change

4.5.

**A** 

## Section III

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

16. When you feel anxious, do you feel as if blood rushes to your head?

	· · · · · · · · · · · · · · · · · · ·
Always	Never
,	

17. When you feel anxious, do you get a lump in your throat or a choked-up feeling?

	Always		Never
18.	When you feel anxious,	does your stomach	get upset?
	Not at all		Very upset

19. When you feel anxious, do you get a sinking or heavy feeling in your stomach?

Never

t

Alvays

20. When you feel anxious, do you have any difficulty talking?

	a a construction of the second se
Never	Always

21. When you feel anxious, are you bothered by your bodily reactions?

Bothered very much

## Section IV

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

22. When you feel happy, are you aware of many bodily reactions?

Aware of very many 23. When you feel happy, are you aware of any change in your heart action?

Always Never 24. When you feel happy, do you experience accelerated heart beat?

No change Great acceleration

25. When you feel happy, does your face become hot?

Not at all

26. When you feel happy, do you ever feel weak or shaky?

فيستعم والمنافعة والمنافعة والمتعادة والمتنافعة والمتحد والمتحد والمتحد والمتحد والمتحد والمتحد والمتحدة والمتح		ويتواصد مستلا المعيورية الكدن الشرحية ومستجرب والمستجرة ويشتكا التلقة فتسبيعها كالا السب
Always	•	Never

27. When you feel happy, do you get a lump in your throat or a choked-up feeling?

Always

Very hot

28. When you feel happy, do you have any difficulty talking?

s.

	Never	·····		Always
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### Section V

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER.

29. Do you think in general that this type of questionnaire is valuable in appraising individuals differences in emotional experience?

Very valuable

Not very valuable

Ş

30. How adequately do you think that the preceding questions have elicited a

Very adequately

Very inadequately