The Effects of Stimulus Intensity and Task Complexity on Learned Helplessness in Humans

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March 1994

Awarded 1995

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Learned helplessness theory proposes that experience of uncontrollability over an outcome should lead to subsequent behavioural debilitation, regardless of the physical properties of stimuli associated with that outcome. Evidence contrary to this has been presented here.

Following an experience of response-outcome noncontingency in a treatment task, test task performance debilitation was found to be affected by the intensity of the sounds used in these tasks. Furthermore, the extent of this debilitation was influenced by the order of presentation of the sounds. Specifically, performance was debilitated in a test task requiring escape from a low intensity sound if the preceding treatment sound intensity was high, but not when it was low. On the other hand, when the test intensity was high performance was facilitated, regardless of treatment intensity.

The effects of stimulus intensity were also found to interact with task complexity. In contrast to the findings with high complexity treatment tasks above, when low complexity treatment tasks were used the subsequent test task performance was debilitated regardless of the intensity of the treatment sounds. This difference between high and low complexity treatment tasks was attributed to response-outcome contingencies being easier to perceive when complexity was low. Nevertheless, the size of the performance deficits was not affected by increases in treatment task complexity, nor by increases in test task complexity.

There was some indication that the effects of sound intensity may be attributable to the yoking procedure used in the experiments, as Ss treated with high intensity sounds experienced greater levels of exposure to uncontrollable outcomes than did Ss treated with low intensity sounds. Support for this was provided by a lack of differentiation in the effect of sound intensity when the treatment task involved a fixed pattern of sounds.

A disproportionate number of studies in the research literature reporting performance debilitation have used treatment tasks involving high intensity sounds and low complexity problems. As these factors have been found to increase the likelihood of observing performance debilitation, some doubts are raised over the claimed generality of ‘learned helplessness’ effects and the assertion that they are solely attributable to the experience of uncontrollability of an event, regardless of any associated stimulus properties.

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

I give consent for this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

E. J. Hejka

23rd of March, 1994

I would like to thank the following members of the Department of Psychology at the University of Adelaide for their assistance:

Associate Professor Anthony H. Winefield,
for his supervisory criticism and guidance;

Mr. Robert Willson and Mr. Jeff Blows,
for computer programming support;

Mr. Geoffrey Matthews and Mr. Theo Sudomlak,
for technical support.

Chapter One:

Introduction

It is now more than twenty-five years since Seligman and his associates reported two experiments which were to initiate an ever-burgeoning field of research and a continuing controversy (Overmier & Seligman, 1967; Seligman & Maier, 1967). The remarkable feature of these studies was that when dogs were exposed to inescapable electric shock they adopted a behavioural pattern which was characterised by a marked passivity, even in the face of continued shock. This phenomenon was labelled ‘learned helplessness’, and a theoretical framework was developed around the finding. This framework relied on both traditional learning and cognitive principles. Although the cognitive aspect of the theory provided a good deal of discomfort amongst traditional behaviourists, subsequent studies found support for the basic assumptions of the theory and, despite alternative explanations being put forward by a number of investigators, the theory gained in support.

The early experiments investigating the phenomenon were confined to animal subjects, but it was not long before it was tested in the human context. Indeed, Seligman (1975) proposed that human depression shares similar symptoms to that of learned helplessness and that the two conditions may be instigated by the same factors. However, as researchers increasingly found conflicting results they began to question the theory’s suitability for application to humans. Qualifications of ever increasing complexity have been put forward in an attempt to account for the majority of conflicting findings. This accumulating body of evidence of the inadequacies of the theory prompted a major reformulation involving an attributional process in determining the expression of the condition (Abramson, Seligman & Teasdale, 1978). The theory had thus developed beyond the boundaries of the initial discoveries which instigated it. Unfortunately, with the reformulation the basic concepts of the theory became more difficult to test, and particularly so because of the problems associated with measures of perceptions and attributions.

It is felt that the increased complexity of the reformulated theory has made researchers lose sight of the original concepts. Alloy & Seligman (1979) had once declared that ". . . learned helplessness theory occupies a special position in contemporary learning theory in two respects. First, it is cognitive. It is one of the few learning theories which postulates subjective representations of contingencies as a mediator between objective contingencies and behavioural effects. . . . Second, it is unique among contemporary theories in explicitly proposing the same cognitive mechanism as an account for both human and animal maladaptive behaviour. In this regard, it is similar to more traditional theories of learning . . ." (p.220).

The current state of the theory is such that it cannot be interchangeably applied to both the animal and human contexts. It is of course difficult to imagine how it could be so. A major concern, however, is that the experiments with humans have not sufficiently delineated the conditions under which 'learned helplessness' occurs. In 1976, Maier & Seligman noted that the boundary conditions of the effect were not clearly specified and lacked empirical evidence. Even though a large variety of experimental procedures have been employed in studying helplessness in humans, very little has been done to determine the influence of certain situational parameters on the effect. For instance, many experimenters have employed either high or low intensity sounds yet no study has yet been carried out to determine whether the intensity of the sound itself plays any role in the demonstration of learned helplessness. Maier & Seligman stated that the theory ". . . does not make any predictions regarding the results of such experiments. Further, there are very few experiments directed at answering these questions. The learned helplessness hypothesis will have to become more specific, and experiments designed to delineate these boundary conditions will have to be conducted" (1976, p.40). The aim of this thesis is to take a step towards meeting that challenge.

Chapters One to Four present a brief summary of the original theory of learned helplessness and its reformulation, and outline a number of alternative explanations. Chapter Five briefly defines the terminology used in the experiments and describes a number of procedural considerations. Chapters Six to Ten present the experiments and their results. Finally, Chapter Eleven summarises the findings and discusses their implications for the learned helplessness theory.

EARLY EXPERIMENTS

The findings of Seligman and his associates were not the first documented experimental instances of marked passivity in animals which had experienced aversive stimuli. For example, a number of studies indicated that activity levels of rats were debilitated with exposure to high levels of electric shock (Carlson & Black 1960; Dinsmoor & Campbell, 1956a; Mullin & Mogenson, 1963). A very dramatic, and indeed excessive, example of the effects of experience of aversive stimuli is the series of experiments carried out by Richter (1957), in which he reported the 'sudden death' by drowning of wild rats. He found that rats could normally survive by swimming for up to 60 hours in a vat filled with warm water before drowning from exhaustion. On the other hand, rats which had previously been held in the experimenter's hands, and squeezed until they stopped struggling, drowned within 30 minutes of being placed in the vat. Richter assumed that these rats had died from a sense of 'hopelessness' obtained from learning in the experimenter's hands that escape was not possible. In effect, it was supposed that the rats 'gave up the struggle' after experiencing an inability to escape.

In the initial experiment by Overmier & Seligman (1967) three groups of dogs were exposed to different intensities and durations of inescapable shocks while strapped into a cloth hammock. The hammock prevented escape and minimised movement. Twenty-four hours later the dogs were placed in a two-way shuttle-box, consisting of two compartments, separated by a shoulder-high barrier, and with an electrified grid-floor. Escape from shocks administered through this floor could be achieved by jumping the barrier from one compartment to the other. A fourth group of dogs was not exposed to any shock treatment prior to being placed in the shuttle-box. Whereas the No-Treatment group learned to escape in the shuttle-box within a few shock presentations, the dogs in the No-Escape groups took considerably longer, with approximately half of these completely failing to learn to escape. All of the dogs initially reacted to the shock by barking and moving frantically within the shuttle-box compartment. The No-Treatment dogs did so until they managed to jump the barrier and escape the shock. On the other hand, the behaviour of the No-Escape dogs was extraordinary. These animals stopped their vocalisation and movement soon after the testing session began, and lay down and passively accepted the shocks without attempting to escape. Furthermore, it was found that for No-Treatment dogs, successful escapes from the shock led to more frequent escape attempts with shorter latencies, whereas this did not occur with the No-Escape dogs. The escape attempts, if any, of these dogs appeared haphazard. Finally, the effects of this inescapable shock appeared to carry over to outside of the laboratory. When the experimenters attempted to remove the non-helpless dogs from their housing cage, they barked, ran to the back of the cage, and resisted being handled. In stark contrast to this behaviour, the helpless dogs did not try to resist. They passively sank to the bottom of the cage. On occasions they even rolled over and adopted a submissive posture.

It is possible that the extremely passive behaviour of the dogs may have been due to some sort of incapacitating properties of the shock stimulus itself. In Chapter Four such alternative explanations are presented. However, Overmier & Seligman claimed that this was not so, as they had observed that some of the 'never-escaping' dogs occasionally jumped the barrier between trials when no shock was present, while others jumped the barrier when the experimenter opened the door to the shuttle-box at the completion of the experiment . To test this, Seligman & Maier (1967) carried out an experiment involving three groups of dogs. All three groups received escapable shocks in a shuttle-box test task. However, they differed in the type of treatment administered to them prior to the test task. One group received no experience of shocks (No-Treatment). A second group received escapable shocks in a hammock (Escape). The shocks could be escaped by pressing either one of two head-panels. The third group received the same mean durations of shocks for corresponding trials as did the Escape group, but could not themselves terminate the shocks (No-Escape). The results showed that while the Escape and No-Treatment groups performed similarly in the shuttle-box with only one of sixteen dogs failing to escape, the No-Escape group performed significantly worse with six of the eight failing to escape. When the mean performances were calculated, it was seen that the No-Escape group took twice as long to escape the shocks, and failed to escape on approximately three times as many trials. As the Escape and No-Escape groups had both received similar amounts of shock, the experimenters concluded that the behaviour of the dogs was not due to some properties of the shock stimulus itself, but was more likely to be due to the inescapability of the shock.

Seligman & Maier proposed that in the hammock the No-Escape group learned that shock termination was independent of responding. As a result, the incentive to respond was eliminated. The dogs then generalised this response-outcome independence to the shuttle-box, resulting in a decreased probability of producing escape responses in the new environment. Not only were the dogs debilitated in their ability to escape from shock, but also in their ability to avoid shock (Overmier, 1968). They were said to be suffering from a state of 'learned helplessness'. However, it should be noted that the experimenters did not suggest that exposure to inescapable shock would inevitably lead to this state of learned helplessness. Indeed, Maier & Seligman noted that up to 1976 they had subjected 150 dogs to inescapable shock, but not all of them had become helpless. About two-thirds of them failed to learn to escape, with the rest escaping as efficiently as naive dogs. In contrast to this only about 5% of all dogs not given prior inescapable shock failed to learn to escape in the shuttle-box.

Many of the studies which followed the initial 'learned helplessness' experiments were aimed at discovering the extent to which the effect could be reproduced in other animal species, and under what circumstances it occurred. Although the early experiments demonstrated the effect quite dramatically in dogs, efforts to show the effect in other species of animals proved to be more difficult. For instance, while using rats as subjects a number of experimenters failed to show any decrements in test task performance following exposure to inescapable shock (e.g. Beatty, 1979; Cogan & Frye, 1981; Freda & Klein, 1976) while others found an improvement in test task performance (e.g. Anisman & Waller 1971a, 1971b; DeToledo & Black 1967, 1970). Typically, these experimenters used some sort of restraining apparatus, such as a glass tube, for the delivery of inescapable shocks in the treatment task and a shuttle-box or a bar-pressing chamber for the escapable shocks in the test task. An FR-1 schedule of reinforcement was used for the correct response. However, it was not until the behavioural requirements for a correct test-task response were increased that successful demonstrations of the effect were eventually obtained. For example, performance decrements were demonstrated by increasing the reinforcement schedule to FR-2 shuttling (Cotton, Benger, Fyfe, Moorehouse & Russell, 1982; Freda & Klein, 1976; Maier, Albin & Testa, 1973; Maier & Testa, 1975) or FR-3 bar-pressing (Seligman & Beagley, 1975), or by the use of more difficult responses, such as those required by a wheel-turning apparatus (Maier, Albin & Testa, 1973) or by a jump-up platform (Seligman & Beagley, 1975). Other experimenters demonstrated the effect by not allowing escape until a few seconds after shock onset (Anisman, de Catanzaro & Remington, 1978), or by imposing a delay between a successful response and shock offset (Maier & Testa, 1975), or by varying the shock frequency (Looney & Cohen, 1972).

Attempts to produce the effect in other animal species experienced similar problems to those found in rats. However, it has been successfully demonstrated in goldfish (Davis, 1983; Padilla, Padilla, Ketterer & Giacolone, 1970), chickens (Job, 1987b), monkeys (Rush, Mineka & Suomi, 1983), gerbils (Brown & Dixon, 1983), and cockroaches (Brown, Howe & Jones, 1990; Brown, Hughes & Jones, 1988; Brown & Stroup, 1988).

It is important to note that unlike the initial experiments, in which dogs became extremely passive as a result of exposure to uncontrollable shock, other animals tended to continue to respond to the aversive stimuli. In such cases, helplessness has been inferred from a comparatively retarded level of test-task responding i.e. lower levels of successful activity rather than no activity. This is particularly true of studies reporting learned helplessness in humans (e.g. Hiroto & Seligman, 1975). Miller & Norman (1979) made the observation that the difference in performance between the contingent and noncontingent groups is often small. For example, they noted that the respective mean latencies in the study by Hiroto & Seligman were 8 seconds versus 7.3 seconds, and stated that "Although statistically significant, the small absolute difference raises questions about the importance of these results" (p.93). Indeed, Winefield (1982) noted that no experiments purporting to show learned helplessness in humans have paralleled the effects exhibited in studies using animals. He suggested that one of the reasons for this is the lack of similarity between the experimental procedures used with animal and human subjects. After an extensive study of the learned helplessness literature it would appear that now, more than a decade after Winefield's observation, this is still the case. Of course, there are good reasons on the grounds of ethics and personal safety as to why this should be so.

TRIADIC DESIGN

From the early experiments carried out by Seligman and his associates to the present it has generally been accepted that the most effective way of demonstrating the learned helplessness effect is with the use of a 'triadic design'. This involves three separate groups of subjects and a procedure employing two phases, a treatment phase followed by a test phase. In the test phase, all three groups of subjects are administered an identical task. This may take the form of, for example, bar-pressing in rats or solving anagrams in humans. In the treatment phase the subjects experience events which may or may not be contingent upon their behaviour. The effects of these treatments are are then measured by differences in performance of the test task. The treatment phases for the three groups are outlined below.

(i) Contingent group: These subjects are allowed to escape, or to avoid, a stimulus (which may not necessarily be aversive) after making a particular response determined by the requirements of the task at hand. Thus the outcomes are said to be contingent upon the responses of the subjects.

(ii) Noncontingent group: The subjects cannot escape or avoid the stimulus, and the onset and offset of the stimulus are independent of behaviour. Hence outcomes are said to be not contingent upon responses.

(iii) No Treatment group: These subjects are not exposed to any response-outcome contingencies at all. They either perform the test task only, or else spend an length of time in the treatment apparatus equivalent to that spent by the other two groups, but without the presentation of stimuli and without the escape mechanism being present.

According to Seligman's definition of the triadic design, the Noncontingent group is exposed to the same number, duration and pattern of stimulus presentations as the Contingent group, via a direct yoking procedure. Hence, the Noncontingent group experiences identical experimental conditions, except that stimulus termination is not dependent upon responses. This is the main focus of interest. The learned helplessness theory predicts that the test task performance of this group should be the worst of all three groups. The two other groups are, in effect, control groups, with one showing the effect of prior experience of response-contingency, and the other determining the performance level of the test task without any prior treatment. Maier & Seligman (1976) claimed that the triadic design is a direct test of the hypothesis that learned helplessness is the result of learning that a stimulus is uncontrollable, and is not the result of any characteristics of the stimulus itself.

It should be noted that a large number of studies of learned helplessness have not used a triadic design employing a direct yoking procedure. In particular, many experiments involving humans have exposed the Noncontingent group to insoluble concept-formation problems. Thus they have confounded uncontrollability with insolubility, as the subjects experience failure to solve the problems, rather than noncontingency between responses and outcomes. It has been argued that any debilitation measured by the test task can be attributed to this failure (e.g. Coyne, Metalsky & Lavelle, 1980). On the other hand, the use of a strict yoking design is itself problematic. Some of the methodological difficulties of the design are discussed in Chapter Ten.

THE LEARNED HELPLESSNESS THEORY

The initial learned helplessness hypothesis was further developed by Seligman (1975) and Maier & Seligman (1976). Generally, the theory proposes that when an organism is exposed to outcomes which are uncontrollable, it learns that its own behaviour does not alter or affect the situation i.e. that outcomes are independent of voluntary responses. The organism learns about the probability of an outcome given a particular response, and at the same time learns about the probability of an outcome given that the response is not made. After exposure to a response-outcome noncontingency, the essential requirement for learned helplessness to occur is the formation of an expectation that future behaviours and outcomes are independent, regardless of the actual degree of response-outcome contingency. This subjective representation of the degree to which an outcome is dependent upon responses has been called a perception, belief, or expectation of control. Such a cognitive state then negatively transfers from the treatment phase to the testing phase, and is opposed to any facilitative motor response which may have been acquired in the treatment phase. When later exposed to a situation in which there is response-outcome contingency, the organism will i) not initiate attempts to respond, and ii) not form the appropriate associations between its responses and the outcome even when a successful response is made, thereby failing to learn of the change in response-outcome contingency. These two characteristics have been labelled a 'motivational deficit' and a 'cognitive deficit', respectively. The expectations of noncontingency between response and outcome are then generalised to physically dissimilar responses.

Regarding the motivational deficit, Maier & Seligman (1976) stated that ". . . the incentive to initiate voluntary responses to control any outcome . . . comes, in part, from the expectation that responding produces that outcome. . . In the absence of this incentive, voluntary responding will decrease in likelihood" (p.18). This is the aspect of the theory that is most readily measured because it is assumed that the level of motivation is related to the activity level of the organism.

The cognitive deficit component of the theory is characterised by a difficulty in learning the association between responses and outcomes. Instead, what is learned is that responses and outcomes are independent. At some later point in time, this proactively interferes with learning that outcomes have now become dependent upon responses. Maier & Seligman (1976) had stated that uncontrollability may retard the perception of control. The cognitive deficit is not directly observed. It is inferred by the assumption that any failure to respond following successful responses is not attributable to motivational or emotional deficits. The fact that this cognitive deficit is inferred, rather than directly observed, makes the concept difficult to test. A number of experimenters have attempted to do this by measuring expectancies of future success in human subjects (Klein & Seligman, 1976; Miller & Seligman, 1975). However, the use of such methodology is questionable, as other research has shown that changes in expectancy are more closely related to unstable factors such as the likelihood that conditions under which previous successes occurred will be the same in the future, rather than to any perception of response-outcome contingency (Miller & Norman, 1979; Weiner, Nierenberg & Goldstein, 1976). Other studies have found no consistent relationship between performance, attributions and expectations of future performance (e.g. Danker-Brown & Baucom, 1982). However, some evidence of a cognitive component has been provided by Sedek & Kofta (1990), who found test task performance deficits following a treatment task in which subjects were required to observe a series of single Levine-type figures, with the experimenter indicating whether each one did or did not contain a particular target stimulus. The subjects were required to indicate their solutions to the problems, but no feedback of any kind was given to them. Following this treatment, performance in a button-pressing test task was found to be debilitated. The authors claimed that such 'non-necessity' of outcome information and evaluative feedback pointed to a cognitive rather than a motivational deficit.

The theory also proposes an emotional deficit. This is only evident when the uncontrollable outcomes are aversive, since the effect of such an experience is a heightened state of emotionality as expressed by increased levels of fear or anxiety. If the organism learns that the situation can be controlled this anxiety is reduced and may disappear altogether. However, if the situation cannot be controlled the anxiety is replaced by symptoms of depression. There is evidence indicating that emotions such as depression, anxiety and hostility are indeed increased in subjects who have experienced noncontingency (Gatchel, Paulus & Maples, 1975; Griffith, 1977; Liu & Steele, 1986; Pittman & Pittman, 1980; Roth & Kubal, 1975), although other studies have not found such increases (Cohen & Tennen, 1985; Fox & Oakes, 1984).

The traditional view of learning is that there needs to be a contiguity between a response and an outcome for learning to take place. If a response is closely followed by an outcome, the association between response and outcome is strengthened, and the response is said to be reinforced. This occurs regardless of whether the outcome is resultant upon any response that an organism may make. In this way an outcome will always strengthen a preceding response and, as a reinforcer, then increases the likelihood of the same response recurring. Contrary to the traditional view, learned helplessness theory suggests that organisms can actively learn that a response and an outcome are independent of each other. This is achieved by comparing the probability of an outcome in the presence of a response with the probability in the absence of the same response. This learning then interferes with later learning of response-outcome dependence. In relation to the strengthening of a response, Maier & Jackson (1979) suggested that the organism performs an analysis of the causal structure of the environment and that the learning of a response-outcome dependence will depend on the organism's previous experience of the association between that response and that outcome, and the expectation of future associations of the same two events. Thus, the simple contiguity of response and outcome is not seen as sufficient to produce some sort of automatic strengthening of the response. In fact, what is learned is ". . . more like a concept developed by spurious relationships between various behaviours and reinforcement" (p.164). In this way, the expectation that an outcome is independent of responses is not limited to only those responses that have been made in the process of learning the relationship. The organism comes to expect that the outcome is independent of other responses as well.

The suggestion that the strengthening of the response is related to expectations of future noncontingencies places the theory in a cognitive perspective. Alloy & Seligman (1979) suggested that it is the subjective representation of the experience of uncontrollability that results in the helplessness effect. Indeed, simply being exposed to uncontrollability is not enough – the organism has to form an expectation of future uncontrollability. Furthermore, if there is an expectation of uncontrollability without actually experiencing it – and hence the expectation is inappropriate – an organism can still become 'helpless'.

In summary, the initial learned helplessness theory stipulated that there are three stages in its occurrence. First, there is an objective contingency between a response and an outcome. Then the organism makes a subjective representation of this contingency. This is a two-part process where there must be a perception of the contingency, followed by the expectation of similar contingencies in future situations. Finally, the organism engages in a behaviour based upon its cognitive mediation of the contingency situation.

THE REFORMULATED THEORY

As already mentioned, experimenters found that the theoretical constructs derived from the animal experiments tended to be inadequate when attempting to explain the effects found in humans. For instance, although the original theory assumed that past experiences of response-outcome contingencies were used in forming the expectation of future response-outcome contingencies, it did not take into consideration differences in interpretation or attribution for the past experiences. An example of this can be seen in terms of the concept of locus of control (Lefcourt, 1966; Rotter, 1966). People who exhibit external locus of control are those who associate outcomes as being independent of their own behaviour, and attributable to chance or the control of another person. Those exhibiting internal locus of control associate outcomes to being the consequence of their own behaviour and attributable to skills and abilities. Hiroto (1974) found that subjects who were identified as having an external locus of control exhibited greater performance debilitation following an experience of uncontrollability than did subjects identified as having internal locus of control. Furthermore, regardless of locus of control, subjects given an experience of uncontrollability in the treatment task performed worse in the test task than did those subjects given an experience of controllability in the treatment task. Other examples are that manipulations of attributional factors such as task importance (Roth & Kubal, 1975) or task difficulty (Tennen & Eller, 1977) influence whether or not the learned helplessness effect is observed.

Another shortcoming of the original theory was that it assumed that an experience of uncontrollability in one situation would lead to an expectation of future uncontrollability, and this expectation would generalise to similar situations. However, there is evidence to suggest that learned helplessness would sometimes generalise to a number of different situations while at other times it would be confined to a specific type of situation. For example, Dweck & Reppucci (1973) found that when children were given unsolvable problems by one teacher (i.e. failure experimenter) interspersed with solvable problems given by another teacher (i.e. success experimenter), their performance on similar, but now all soluble, problems was worse when the failure experimenter administered them, even though they continued to successfully complete almost identical problems presented by the success experimenter. It would seem then that although the children did generalise their experiences of the treatment phase to the test phase, this generalisation was tied to specific characteristics of the situation in which the failures originally occurred.

To overcome the inadequacies of learned helplessness theory in explaining the results of experiments such as those mentioned above, Abramson, Seligman & Teasdale (1978) presented a reformulation of the theory. This reformulation incorporated an attributional framework, and consequently was aimed at explaining the experimental findings with human subjects. The authors stated that "We do not know whether these considerations apply to infrahumans. In brief, we argue that when a person finds that he is helpless, he asks why he is helpless. The causal attribution he makes then determines the generality and chronicity of his helplessness deficits as well as his later self esteem" (p.50). Regarding the applicability of the reformulation to the animal context, Alloy & Seligman (1979) acknowledged inherent difficulties and stated that: "We feel a bit uncomfortable talking about perceptions and expectations in animals because such entities are a bit less observable than stimuli, responses, and reinforcers, which are themselves not directly observable. We are more uncomfortable ascribing attributions to animals because they are even more inferential and may require a level of cognitive complexity which animals do not have, and most importantly because no operational definitions exist for attributions in animals" (1979, p. 241).

In relation to the original model, the flow of events was changed to the following: Firstly, there is an objective noncontingency. The person perceives this noncontingency and remembers past noncontingencies. The person then makes an attribution for this present and/or past noncontingency. This noncontingency can be attributed to internal or external factors, to temporary or long lasting causes, and to specific situations or across many different situations. These attributions then form the basis for the expectation of future noncontingency. As with the original hypothesis, it is the expectation of future noncontingency which results in learned helplessness. However, the generality, chronicity and type of helplessness is determined by the initial attributions.

If the attribution for outcomes is to stable factors, helplessness is said to be long-lived or chronic, whereas if the attribution is to unstable factors, helplessness is likely to be short-lived or transient. Orthogonal to this 'stable-unstable' dimension is the 'internal-external' dimension. Internal attributions for an outcome, where a person believes that he or she cannot control a situation (or solve a problem) while relevant others can do so, is termed 'personal helplessness'. External attributions for an outcome, where a person believes that he or she cannot control a situation, but also relevant others cannot do so, is termed 'universal helplessness'. The 'relevant' others are usually the person's peer group, and are distinguishable from 'random' or 'any' others. Finally, orthogonal to the two previous dimensions there is the 'global-specific' dimension. A global attribution leads to helplessness that occurs across different situations, whereas a specific attribution leads to helplessness that will occur only in the original situation. The generality of the learned helplessness effect is determined by this attribution.

Abramson et al attempted to use the reformulated theory to account for the findings of a number of experiments. For example, Roth & Kubal (1975) had found that subjects were more affected by noncontingency when the treatment task was portrayed as important than when it was portrayed as unimportant. The test task was presented as being part of a different experiment. Hence, in the important condition, the subjects were supposed to have made global, internal and stable attributions, while the subjects in the unimportant condition were said to have made more specific and less stable attributions. Douglas & Anisman (1975) found that failure on simple tasks produced later performance deficits while failure on more complex tasks did not. Abramson et al suggested that failure on simple tasks could produce global and internal attributions (e.g. I'm stupid) whereas failure on complex tasks could produce specific and external attributions (e.g. the problems are too difficult). The effects of therapy and immunisation were said to be due to subjects changing their attribution for failure from being global to being situation-specific.

Some support for the theory has been found in an experiment carried out by Anderson, Anderson, Fleming & Kinghorn (1984), where it was found that global-specific subjects were more affected by noncontingency in a Levine treatment task than were specific subjects, and global-stable subjects performed worse than specific-stable, global-unstable and specific-unstable subjects, as indicated by performance in an anagram test task. Furthermore, Miller & Norman (1981) have found that depressive mood can be alleviated by guiding depressed people to make internal and global attributions for success in a task involving button pressing to escape moderate intensity noise. Alloy, Peterson, Abramson & Seligman (1984) found that subjects with Global Attributional styles exhibited test task performance deficits following an experience of uncontrollable aversive noise in a button-pressing treatment task, regardless of whether the test task was similar (i.e. a hand-shuttle task) or dissimilar (i.e. an anagrams task). On the other hand, subjects with Specific Attributional styles exhibited test task performance deficits only when the treatment and test tasks were similar. Other studies (Anderson, 1983; Mikulincer, 1986a; Mikulincer & Nizan, 1988; Pasahow, 1980) have shown that when subjects are encouraged to make global attributions for failure they perform worse in a subsequent test task than do subjects making specific attributions. Maldonado, Martos & Ramirez (1991) found that subjects' attributional style (in terms of global vs. specific) had no influence on their ability to detect response-outcome contingency, although support for the original model of learned helplessness was provided in that the experience of previous contingency influenced judgements of current contingency.

In summary, learned helplessness theory suggests that if a noncontingency between responses and outcomes is perceived by an organism, which then forms the expectation that similar responses and outcomes would be noncontingent in the future, that organism will suffer from learned helplessness. This holds true for both humans and animals. However, with humans, the extent of this helplessness is influenced by the causes to which the individual attributes the original noncontingency. There is a large volume of evidence to suggest that experiencing a noncontingency between responses and outcomes leads to later behavioural debilitation. However, what has not yet been discussed is whether this debilitation is specific to situations similar to the original event, or whether it affects behaviour more generally. After all, there are many events in one's life which are uncontrollable, so why are we not all suffering from learned helplessness? Furthermore, if this helplessness is indeed learned, can it be prevented from occurring? Can it be undone once it has occurred? These questions are addressed in the next chapter.

Chapter Two:

Characteristics of Learned Helplessness: Generalisation, Immunisation & Alleviation

As already outlined, the theory of 'learned helplessness' suggests that following a perception that responses and outcomes are independent, learned helplessness will occur if an expectation is formed that responses and outcomes will be independent in the future. Furthermore, this expectation may be generalised to other possible responses and outcomes. Hence, one characteristic of helplessness is that the effects of experiencing uncontrollability in one situation should carry over to other situations, particularly if those other situations are similar to the original. Maier & Seligman (1976) stated that "We believe that what is learned when the environment is uncontrollable can have consequences for a wide range of behaviour" (p.10). Another aspect of learned helplessness is that it should be possible to treat its effects. Indeed, Seligman, Maier & Geer (1968) originally suggested two categories of treatment. These were immunisation and alleviation.

Immunisation involves exposing an organism to response-outcome contingency before it has been subjected to uncontrollability. This allows it to form the expectation that outcomes are controllable, which proactively interferes with the formation of expectations to the contrary should the organism be placed in a situation where outcomes are independent of responses.

Alleviation involves exposing an organism to response-outcome contingency after it has been subjected to uncontrollability. This then retroactively interferes with the already learned contingency of response-outcome independence. Hence, once an organism is helpless, actively exposing it to response-outcome contingency should eliminate the interference effect.

GENERALISATION FROM TREATMENT TO TEST TASK

Maier & Seligman (1976) claimed that the 'learned helplessness effect' is easily produced in dogs in a variety of situations. However, this 'variety' was confined to differences in shock parameters (e.g. frequency, intensity, duration, and temporal pattern) and to the interchangeability of the inescapable shock treatment situation and escape/avoidance test situation (e.g. the shuttle box and hammock could be used in either task). Upon closer examination of the procedures used in their early experiments, it is clear that although the treatment and test tasks employed different sets of apparatus, they also had a number of similar features (e.g. the use of shock in treatment and test, the same experimenters present for both tasks, the same laboratory) that would have allowed any learning effects to generalise more easily than if the two situations were completely dissimilar and unrelated. Consequently, it may be that the extent to which the effect is generalisable is dependent upon the degree of similarity between the treatment and test situations. Interestingly, Maier & Seligman observed that learned helplessness in rats is more difficult to establish than it is in dogs, and suggested that the ". . . response used in the test for learned helplessness must be difficult, and not something the rat does very readily" (p.8). The requirement of a specific level of complexity or novelty of behaviour must weaken the argument concerning the generalisability of the effect. Furthermore, there must be limitations on the generalisability of the effect, otherwise the end result would be total passivity in all situations following the initial experience of uncontrollability. As organisms experience situations of noncontingency regularly and yet can appear to function adequately, it would appear that the degree of generalisation must be limited. This point was noted by Maier & Seligman themselves, who went further in saying that the limits of the generalisation of the effect need to be explored and delineated.

Attempts to illustrate the generality of the learned helplessness effect have relied upon the transfer of the effect from a treatment to a testing situation, and usually by employing a different set of response apparatus and/or different stimuli. Although with both the animal and human experiments the stimuli used have mostly been aversive in nature, there have been a number of experiments which have attempted to test whether helplessness can also occur in non-aversive situations. The following section describes a portion of the body of research that has either supported or failed to support the notion of generalisation. A separate section is devoted to examining the possibility of obtaining learned helplessness with non-aversive stimuli.

Experiments with Animals

Learned helplessness has been demonstrated with rats using a pole-climbing treatment task followed by swimming in a flooded alley as the test task (Braud, Wepmann & Russo, 1969), inescapable shock followed by escape from cold water (Altenor, Kay & Richter, 1977; Braud, Wepmann & Russo, 1969), noncontingent shock in a platform-jumping treatment task followed by bar-pressing for food (Rosellini, 1978), inescapable shock followed by escape from shock in a wheel-turning apparatus (Maier, Albin & Testa, 1973), and inescapable shock followed by hurdling to escape shock (Rosellini & Seligman, 1975). Other experiments have shown how uncontrollability may affect social and foraging behaviours. For instance, Rapaport & Maier (1978) found that rats given inescapable shock were less dominant, than rats which had not been shocked, in a situation in which pairs of rats were required to compete for food. Also, Maier, Anderson & Lieberman (1972) found a higher incidence of shock-elicited aggression following the administration of inescapable shock.

A number of experiments which failed to produce the learned helplessness effect in animals, or else found facilitation of test task performance, have already been mentioned in Chapter One. The fact that these experiments also used various types of apparatus, responses and stimuli would indicate that helplessness may be situation and/or task specific. Indeed, Freda & Klein (1976) attempted to replicate exactly an experiment carried out by Maier, Albin & Testa (1973) but initially failed to find an effect. However, they managed to do so on a second attempt even though they had not changed any of the procedures between the two experiments. In subsequent experiments they varied the procedure by either lowering the test task shock intensity or by increasing the behavioural requirements of the test task for shock offset from an FR-2 shuttle to an FR-3 shuttle. Once more they failed to find an effect. The experimenters noted that ". . . failures to replicate the basic effect under slightly different conditions in different laboratories is disturbing given the degree to which the 'helplessness' findings have been generalised. If minor procedural variations prevent inescapable shock interference, then the cognitive theory proposed by Seligman and Maier would seem to lose explanatory power. Minor procedural variations should not affect an organism that is learning it has no control over its environment" (p.405). From this and other studies it would seem that perhaps the limits of the effect are more stringent than Maier & Seligman have admitted, and that the effect is not as readily generalisable as they have suggested.

Experiments with Humans

a) Similar Treatment and Test Tasks

Support for the occurrence of learned helplessness in humans has been demonstrated in experiments that have used similar treatment and test tasks. For example: Fosco & Geer, (1971) used a button pressing treatment task requiring subjects to escape from shock followed by an identical test task; Thornton & Jacobs (1971) used two similar button-pressing tasks, also requiring escape from shock in both; Hiroto (1974) gave subjects a single button task followed by a hand-shuttle task, with a high intensity noise being the aversive stimulus in both tasks; Krantz, Glass & Snyder (1974) required subjects escape high intensity noise by rotating knobs in the treatment task and by operating a hand-shuttle in the test task; Tiggemann, Barnett & Winefield (1983) and Tiggemann & Winefield (1978, 1987) gave subjects a single-button treatment task followed by a two-button test task, and in which subjects were required to escape from a low intensity sound; Trice & Woods (1979) employed arithmetic-sequence treatment and test tasks; Alloy, Peterson, Abramson, & Seligman (1984) used a 3-button pressing treatment task followed by a hand-shuttle test task, with both tasks requiring escape from a high intensity noise; Mikulincer & Caspy (1986) used Levine-type and Raven-type concept-formation problems in both tasks.

Although the above experiments clearly showed that it is possible to demonstrate performance deficits in a test task following the experience of uncontrollability in a similar treatment task, this is not strong evidence in support of generalising characteristics of learned helplessness. It may be that helplessness is task-specific or else the effect could better be described in terms of the 'mental set' or 'altered hypothesis pool' explanations of Levine, Rotkin, Jankovic & Pitchford (1977) and Peterson (1978), which are outlined in more detail in Chapter Four. Nevertheless, if the notion of generalisation of learned helplessness is to be supported, it is necessary to show that the effects of an experience of uncontrollability in one situation carries over to a second <u>different</u> situation.

b) Different Treatment and Test Tasks

Performance deficits following noncontingency between responses and outcomes have been found in a number of experiments in which the test task has been different from the treatment task. The tasks used in some of these have included the following: a treatment task consisting of number comparison, addition and stimulus search problems together with high intensity sounds, followed by test tasks consisting of figure tracing and proofreading with no noise

(Glass & Singer, 1972a; 1972b); a button-pressing treatment task with high intensity sounds followed by an anagram task with no noise (Miller & Seligman, 1975; Raps, Peterson, Jonas & Seligman, 1982; Tennen, Gillen & Drum, 1982); a concept-formation treatment task requiring subjects to find the principle underlying a series of figures, followed by a test task consisting of a Stroop Colour-Word test and a set of figure tracing problems to test tolerance for frustration (Cohen, Rothbart & Phillips, 1976); uses of objects followed by an anagrams test (Buys & Winefield, 1982); anagrams, analogies and number sequences followed by word-finding test tasks (Trice, 1984); Levine-type problems followed by Raven-type problems (Dor-Shav & Mikulincer, 1990; Mikulincer & Caspy, 1986); Levine-type problems followed by a visual search task with a memory component (Mikulincer & Nizan, 1988); Levine-type problems followed by anagrams (Young & Allin, 1986). A concept-formation treatment task followed by a maze test-task failed to show performance debilitation (Hanusa & Schulz, 1977).

A much cited study which purported to demonstrate the generality of the helplessness effect was that carried out by Hiroto & Seligman (1975). They conducted four experiments using human subjects: Levine-type discrimination problems in the treatment task followed by a hand-shuttle test task with high intensity sounds; Levine followed by anagrams; button-pressing followed by hand-shuttle, both with high intensity sounds; button-pressing with high intensity sounds followed by anagrams. All experiments showed performance debilitation following exposure to noncontingency or failure. The cognitive problems were said to demonstrate that learned helplessness can be produced by insoluble cognitive tasks, without aversive stimuli or instrumental tasks. Interestingly, the authors claimed that the experiments were measuring the generality of helplessness between cognitive and instrumental tasks. They also claimed that their results refuted any competing motor response interpretation of the effect, as proposed for the animal experiments using electric shock, in that ". . . no competing motor response could generate cognitive interference from instrumental inescapability or instrumental interference from cognitive insolubility" (p.326). However, it would seem that the degree to which the button-pressing task can be labelled instrumental depends on how one defines the experimental situation. In the Hiroto & Seligman experiments, the button-pressing and shuttle tasks were said to be instrumental by the fact that a mechanism was required to be manipulated for the tasks to be carried out. The anagrams and Levine problem tasks were said to be cognitive because the solution required an underlying concept to be found. In reality, both types of tasks required subjects to find a solution and hence they both required some sort of mental process in determining this solution. Consequently they could be both labelled cognitive tasks. Alternatively, if the subjects had been required to register their responses in the 'cognitive' tasks by pressing response keys, say on a computer keyboard, would these tasks have been then labelled as instrumental? Surely an instrumental task is one which entails manual dexterity with little, if any, problem-solving ability. Wortman & Brehm (1975) have expressed a similar stance, saying: "What Hiroto and Seligman call an instrumental task is a problem solving task not unlike that used in the cognitive pre-treatment conditions. Whether the instrumental task was to push a button or operate a shuttle manipulandum, from the subject's point of view it required figuring out a particular response in order to obtain reinforcement. Thus in all conditions of this experiment, both training and test tasks involved problem solving" (p.299-300).

Although Trice & Woods (1979) found performance debilitation when the treatment and test tasks were similar (i.e. when both involved finding arithmetic sequences), they found a facilitation effect when the two tasks were different (i.e. arithmetic-sequence treatment followed by anagrams test). Within-group variability was large, possibly due to insoluble subjects perceiving that the solution to the problems was that there was 'no solution'. However, similar results were found when the number of insoluble number sequences were decreased from 7 to 5, with 2 soluble sequences allowed. Unfortunately, the interpretation of these results is made difficult by the fact that all subjects in all groups were run simultaneously. Hence, insoluble subjects would have been able to see soluble subjects successfully completing the treatment problems. The authors suggested that this may have intensified the effects of failure. If so, it is difficult to reconcile the fact that there was no performance deficits in all three experiments.

The experiments outlined above would indicate support for the notion that learned helplessness can generalise to different situations. However, if the experience of uncontrollability is accompanied by a perception of uncontrollability together with the expectation of future uncontrollability, it follows that experiencing uncontrollability in a number of distinctly different situations will lead to a greater level of generalisation of the expectation. The evidence regarding whether learned helplessness can be observed when treatment and test task are presented as totally different situations is outlined below.

c) Different Treatment and Test Tasks Presented as Different Experiments

Because most studies have employed treatment and test tasks given as part of the same experiment by the same experimenter, it can be argued that the effect would easily be generalised from one task to the next. However, if learned helplessness does indeed readily generalise to other situations, the most effective test of the ability for the effect to generalise involves having treatment and test tasks which are not only different, but which are presented by different experimenters under the guise of a different experiment.

The number of studies that have found generalisation of learned helplessness from one experimental situation to another have been few. Although some of these have demonstrated a clear generalisation (e.g. Lamb, Davis, Tramill & Kleinhammer-Tramill, 1987) the results of other studies had been complicated by interactions between situational or personal factors which often have resulted in either a debilitation or a facilitation effect upon performance. For instance, Roth & Kubal (1975) found facilitation effects when the treatment and test tasks were carried out under the guise of being different experiments, but only when the treatment task was presented as being unimportant. When it was presented as being important, performance in the test task was once again facilitated, but only if the amount of noncontingent experiences was small. When the subjects were given a greater amount of noncontingent experiences, performance debilitation did indeed occur. Tennen & Eller (1977) suggested that this experiment may have confounded causal attributions for performance with amount of helplessness training. They replicated it but used only the high importance condition, and did indeed find performance deficits when subjects were told that the insoluble problems were getting progressively easier. However, when subjects were told the problems were getting harder, a facilitation effect was obtained. Similarly, Pittman & Pittman (1979) obtained a helplessness effect that was determined by an interaction between the number of insoluble problems in the treatment task and the subjects' locus of control. Indeed, subjects with internal locus of control who had experienced a few noncontingent treatment-task problems exhibited test-task performance facilitation, whereas external subjects showed performance debilitation. On the other hand, subjects who had been given a greater number of insoluble problems exhibited test-task performance debilitation regardless of their particular locus of control. Finally, Wortman, Panciera, Schusterman & Hibscher (1976) found that subjects who were not told anything about the treatment task or who were led to believe that failure in the treatment task was attributable to the task itself exhibited performance debilitation in the 'other experiment' test task. However, subjects led to believe that their treatment-task performance was attributable to their incompetence performed better than the other 'failure' groups, and at a level matching that of a 'success' group.

The studies mentioned above did not compare the performance level of subjects when administered test tasks as supposedly part of a different experiment to that of subjects given such tasks as part of the same experiment. Those which have done so have found that helplessness generalises readily when the two tasks are presented as part of the same experiment, but not when they are presented as different experiments (e.g. Cole & Coyne, 1977; Tiggemann & Winefield, 1978). Furthermore, although Alloy, Peterson, Abramson, & Seligman (1984) found performance debilitation when the two tasks were presented as part of the same experiment, no debilitation occurred when subjects made specific attributions for their failure in the treatment task.

Overall, it is apparent that the similarity of two situations is an important determinant of whether helplessness will generalise from one to the other. Indeed, Pasahow, West and Boroto (1982) suggested that, with humans, the transfer of 'helplessness' from one situation to another is determined by the interaction of two factors: the causal attributions made by the subjects for the uncontrollable event; and the degree of similarity between the two situations. They even went further to predict that ". . . performance deficits should not occur when subjects are tested on extremely dissimilar tasks or under differing situational contexts even though they may have global attributions for prior failures" (p.596-597).

GENERALISATION FROM UNCONTROLLABLE POSITIVE EVENTS

The suggestion by Maier & Seligman (1976) that response initiation to control negative (i.e. aversive) events may be impaired by experience with uncontrollable reward extended the notion of the generalisation of learned helplessness to encompass the effects of an inability to control neutral and, more to the point, positive events. If support for the above premise could be found in the experimental literature, then it would strengthen the view that it is the uncontrollability of an outcome, rather than its aversiveness, that is accountable for the performance deficits following experience of uncontrollable outcomes. What follows is a brief outline of relevant research findings regarding the possibility of helplessness resulting from uncontrollable positive events. The findings regarding performance debilitation following exposure to neutral (or non-aversive) stimuli is dealt with in Chapter Seven.

Experiments with Animals

Helplessness derived from the uncontrollability of positive outcomes has often been referred to as 'appetitive helplessness', one reason being that the initial experiments with animals have concentrated on using food as a stimulus. These studies have, once again, predominantly used rats and pigeons as subjects, and have shown that experience of noncontingent food administration leads to subsequent retardation of later food-obtaining behaviour (Calef, Choban, Dickson, et al, 1989; Engberg, Hansen, Welker & Thomas, 1973; Job, 1987a, 1989; Mullins & Winefield, 1977; Oakes, Rosenblum & Fox, 1982; Sonoda & Hirai, 1993; Welker, 1976; Wheatley, Welker & Miles, 1977). Other studies have shown that lack of control over attainment of food can result in performance debilitation in a later test task involving escape from shock (Bainbridge, 1973; Goodkin, 1976; Wight & Katzev, 1977). Furthermore, lack of control over electric shock has been found to lead to decrements in later appetitive behaviour (Rosellini, 1978; Rosellini & DeCola, 1981; Warren, Rosellini, Plonsky & DeCola, 1985), although a number of studies have failed to show such an effect (Beatty & Maki, 1979; Chen & Amsel, 1977; Mauk & Pavur, 1979; Rapaport & Maier, 1978; Rosellini & Seligman, 1975; Wheatley, Welker & Miles, 1977). Plonsky, Warren & Rosellini (1984) demonstrated that this interference in food-obtaining behaviour in rats cannot be attributed to any decrease in motivation to initiate responding, and concluded that the interference is probably due to an associative deficit. Job (1988) found that when rats were given response-independent food, response debilitation in the test task occurred only when the rats were pre-exposed to the test-task manipulandum.

Overall, the bulk of the literature involving noncontingent food reward being administered in either the treatment or test tasks indicates that test task performance debilitation does indeed occur, lending support to the notion of appetitive helplessness in animals.

Experiments with Humans

Attempts to demonstrate appetitive helplessness in humans have employed a number of different reinforcers such as, for example, monetary rewards, social approval, and 'success' feedback. Benson & Kennelly (1976) administered a Levine-type concept-formation treatment task, in which all responses were answered with noncontingent success feedback, followed by an anagrams test task. This group performed worse than a group of subjects given soluble problems in which feedback was contingent upon their responses, but better than subjects given insoluble problems. In contrast to these differences in performance of the test task, the noncontingent success group and the insoluble-problems group did not differ in their perceptions of perceived treatment-task uncontrollability, and both groups rated the task as more uncontrollable than the soluble-problems group. The experimenters claimed that their results indicated that uncontrollable positive events, when presented on a continuous schedule, do not induce helplessness. However, because in most naturally occurring situations uncontrollable rewards would occur intermittently, they could <u>indirectly</u> contribute to the development of a sense of helplessness. Unfortunately, it is difficult to accept these claims with confidence as the results showed significant differences on only the trials-to-criterion measure of performance, while, more importantly, in the latency and failures measures the control group actually performed worse than any other group, although these differences were not significant due to a large variance in some of the groups.

Griffith (1977) noted that the Benson & Kennelly (1976) procedure created an asymmetry between the noncontingent success and failure groups, since the noncontingent success group received 100% success feedback, whereas the failure group received a mixture of success and failure feedback. Hence he employed a noncontingent failure and a noncontingent success group, the difference being that both received identical feedback after each response, except that when subjects gave their solution, the 'success' group was told their solution was correct whereas the 'failure' group was told their solutions were incorrect. The results indicated that both of these groups performed significantly worse than subjects administered solvable problems.

An experiment by Koller & Kaplan (1978) found performance debilitation following noncontingent success feedback in a button-pressing task requiring escape from a high intensity noise, although this debilitation was less than that following noncontingent failure feedback. The authors suggested that "When exposed to contingent feedback, a subject can test strategies through trial and error until the correct solution is found. In effect, exposure to noncontingent failure empties the set of possible solutions by informing subjects that all their approaches are unlikely to be successful. Exposure to noncontingent success leaves the reservoir of potential solutions full. The increased motivation and resultant high rate of responding enhance the likelihood that the correct solution will be found" (p.1183).

Other studies have found performance debilitation following the experience of noncontingent success feedback (O'Rourke, Tryon & Raps, 1980; Tiggemann, 1981). However, as noted earlier, a variety of stimuli have been used as positive events and have successfully been shown to instigate some sort of helplessness effect when made noncontingent upon behaviour. These have included social approval (Eisenberger, Kaplan & Singer, 1974; Lamb, Davis, Tramill & Kleinhammer-Tramill, 1987); money (Alloy & Abramson, 1979, 1982; Jardine & Winefield, 1981, 1984; Buys & Winefield, 1982; DeVellis, DeVellis & McCauley, 1978; Harris & Tryon, 1983; Winefield, 1983); and poker chips that could be exchanged for attractive rewards such as food or movie passes (Lamb et al, 1987) or games (Dweck & Reppucci, 1973).

Issues Regarding 'Positive Outcomes'

After considering the above evidence supporting the possibility of appetitive helplessness in both the human and animal contexts, it is necessary to note some doubts about the effect as expressed by a number of researchers. For instance, Benson & Kennelly (1976) questioned whether noncontingent positive events can actually produce learned helplessness, or whether these events must indeed be aversive in nature. They pointed out that, as suggested by Amsel (1972), non-reward in a context of reward produces frustration which in itself is an aversive event. Therefore, any positive reinforcement presented noncontingently upon behaviour in an intermittent schedule would have associated with it an aversive stimulation in the form of frustration. Miller & Norman (1979) adopted a similar stance in stating that appetitive helplessness is actually difficult to demonstrate because of the difficulty in disassociating the effect of experiencing uncontrollable positive outcomes from the associated frustration. In addition, Tennen, Gillen & Drum (1982) noted that noncontingent escape from aversive events may not be equivalent to a noncontingent receipt of a positive event. The fact that an event is beyond an individual's control may ensure that it is experienced as being aversive, regardless of whether the event is positive or negative. It may be that subjects experience noncontingent events as being positive only when they mistakenly perceive them as being contingent upon their own behaviour. Tennen et al also stated that they were unaware of any experimental evidence that would suggest that outcomes which are perceived as noncontingent could also be perceived as being positive. Confirming such a view, Sergent & Lambert (1979) checked the literature concerning perception of contingency relationships and noted that such perceptions were related to the relative percentage of success feedback given to subjects, and did not reflect true response-outcome relationships. Furthermore, it has been shown that as the number of 'successes' increases, regardless of whether they are contingent or not upon behaviour, so does the perception of contingency and control increase (Alloy & Abramson, 1979, 1982). The implication is that subjects are more likely to attribute personal control to desired outcomes, but not to undesired outcomes. Individuals are also more likely to make internal attributions for successful outcomes (Griffith, 1977; Streufert & Streufert, 1969), although some studies have found there to be no difference between noncontingent success and noncontingent failure subjects (e.g. Benson & Kennelly, 1976).

Extending the notion of debilitated test task performance being attributable to frustration, it could be that other emotions can be brought into play by uncontrollable experiences. For instance, Oakes & Curtis (1982) noted that subjects receiving noncontingent success feedback may have another source of information other than what the experimenter tells them. This source takes the form of testing whether the given solutions conform to the rules/requirements set by the experimenter at the beginning of the experiment. If the subjects suspect that the two do not match, once again, emotions such as anger and frustration may be produced. These emotions may then have a detrimental effect on test task performance.

It is also possible that the noncontingent success feedback itself may contribute to performance debilitation. Indeed, Oakes & Curtis pointed out that the word 'good' can act as a positive reinforcer when made contingent upon a person's behaviour. However, when the word is not contingent upon behaviour it can become meaningless, and even ludicrous, and doesn't function as a reinforcer. "When a detrimental effect of such noncontingent 'goods' on later learning or performance is demonstrated, it may well be the effect of the feelings or emotions that the subject experiences upon recognising that the experimenter has been behaving strangely, rather than on the effect of noncontingency per se" (p.390).

In summary, in many of the studies of appetitive helplessness in humans there may be a confounding of the effects of noncontingency with the emotions that are also produced. Therefore, it is difficult to draw a firm conclusion from the research literature regarding this aspect of the purported generalisability of learned helplessness.

ALLEVIATION

Seligman, Maier & Geer (1968) proposed that the behaviour exhibited by an organism as a result of inescapable trauma might be alleviated, or even altogether eliminated, by ". . . exposure of the individual to the trauma under conditions in which his responses were instrumental in obtaining relief" (p. 262). The literature on alleviation of learned helplessness is described below.

Experiments with Animals

Seligman, Maier & Geer (1968) administered inescapable shock to dogs immobilised in a hammock and which subsequently failed to learn to escape/avoid shock in a shuttle-box test task. The experimenters then attempted to administer a 'therapy' for the 'helplessness' being experienced by the dogs. This consisted of forcing the animals to be exposed to the response-outcome contingency by dragging them from one end of the box to the other while the barrier was removed. This was continued until the dogs responded to the shock by crossing to the other side of the box without force. Later, they were re-tested in the shuttle-box to assess the effectiveness of this 'directive therapy'. During this test, the barrier was reintroduced to the box and eventually all of the dogs learned to jump over it. The experimenters assumed that the learned helplessness in these dogs had been alleviated.

A number of experiments have been carried out confirming the effectiveness of such directive therapy. Seligman & Beagley (1975) found that rats which could not learn a difficult response, such as the jump-up response for platform escape tasks, could be shaped in the desired response by forcibly being dragged up onto the platform by the experimenter pulling on the electrode planted in the rat's back. Similarly, Seligman, Rosellini & Kozak (1975) found that learned helplessness could be reduced (if not completely eliminated) in rats which have experienced inescapable electric shock by dragging them to the bar and forcing them to escape the shock by pressing the bar. When later tested in the same task, these rats made the appropriate responses and escaped successfully. Brett, Burling & Pavlik (1981) successfully alleviated helplessness in rats using a single electro-convulsive shock. Rush, Mineka & Suomi (1983) found that learned helplessness effects in monkeys caused by the experience of uncontrollable shock could be reversed by the introduction of a different fear stimulus. This was a restraining net to which the subjects had been previously exposed. When the net was placed over the top of the shuttle-box where the helpless monkeys were experiencing escapable shock the monkeys readily learned to escape to the other side.

Experiments with Humans

A number of studies with human subjects have claimed to have successfully reduced the behavioural after-effects of uncontrollable experiences. For instance, Thornton & Powell (1974) and Koller & Kaplan (1978) found that if subjects were told about the noncontingency between responses and outcomes in the treatment task prior to doing the test task, any performance debilitation of the test task was removed. However, the interpretation of the Thornton & Powell results is complicated by the fact that different instructions were given to each of the groups. Whereas the Escape group was told that the treatment-task shock was controllable, the inescapable subjects were told that the shock was in no way related to the task and that the test task was a new task to be performed. In contrast to the inescapable groups, the 'alleviation' group was told that the shock would be contingent on reaction time. Because the inescapable group may have assumed that the same contingencies as those pointed out by the experimenter in the treatment task would apply in the test task, the performance differences between the groups could well be due to these differences in instructions. The subjects may have generated the expectation that responding is futile, but this would have been obtained directly from the experimenter and would not have been learned in the course of the experiment. Using the definitions of learned helplessness theory itself, one could say that the instructions ensured situation-specific attributions for the Escape group and the alleviation group, with global attributions for the inescapable group.

Dweck (1975) found no improvement in test task performance by children with extreme reactions to failure when they were given attributional retraining by being taught to take responsibility for failure and to attribute it to lack of effort. However, it should be pointed out that subjects who were given success experiences without the attributional retraining showed decrements in performance of the task.

Other experimenters have demonstrated successful alleviation of learned helplessness, under the following conditions:

a) Therapy is more effective with greater amounts of controllable experiences (Klein & Seligman, 1976; Nation & Massad, 1978);

b) Subjects are more persistent in a failure situation following experience of 50% success therapy than subjects who experienced 100% success therapy (Nation & Massad, 1978);

c) Therapy in the form of actual success at a task is more effective than recalling successes from earlier tasks (Teasdale, 1978);

d) Effective alleviation can be obtained by merely allowing subjects to watch a demonstration of the correct solution to problems previously experienced by subjects as being insoluble (Hirt & Genshaft, 1981);

e) Therapy is mainly effective if there is given a logical reason for the 'therapeutic exercise' that can be perceived as being relevant, or at least similar, to the uncontrollable experience (Coyne, Metalsky & Lavelle, 1980; Friedlander & Chartier, 1981);

f) Allowing subjects a degree of potential control over an aversive stimulus is enough to reduce performance deficits (e.g. Glass & Singer, 1972a; Reim, Glass & Singer, 1971). Indeed, having a perception of indirect control over an aversive event is sufficient for inducing feelings of control and easing the costs of adaptation to the aversive event. This may occur even though there is no guarantee that the person with direct control will come to one's assistance. However, this may be seen as immunisation rather than alleviation.

Considering that learned helplessness has been likened to depression (Seligman, 1975), it has been shown that guiding depressed subjects to make internal and global attributions for success in various tasks helps to alleviate the depressive moods (Miller & Norman, 1981).

There have also been a number of experiments carried out in natural settings. The most notable of these have involved aged people in institutions. Schulz (1976) proposed that a lack of personal control over their environment and their own lives may be an important factor in the development of helplessness in aged persons in such settings. Indeed, simply giving subjects control over when and how long visits would occur improved the physical and psychological well-being of the subjects, while making the institutional environment more predictable by giving accurate information about it actually gave them a greater 'zest for life' (Krantz & Schulz, 1980). Similarly, Langer & Rodin (1976) found that giving the aged more responsibility (e.g. caring for a plant) made them happier, more alert, and more active in the institution's activities. A follow-up study by Rodin & Langer (1977) carried out 18 months after the first experiment indicated that the effects of the intervention were still visible. However, Schulz & Hanusa (1978) found that the effects are only temporary.

Overall, it would appear that the debilitative effects of experiencing uncontrollability can be alleviated by exposure to controllable outcomes. However, many might say 'prevention is better than cure'. Are the effects of experiencing uncontrollable events preventable, as suggested by learned helplessness theory?

IMMUNISATION

In one of the early experiments on helplessness it was shown that it was possible to immunise against the effects of experiencing uncontrollability. Seligman & Maier (1967) found that when dogs were given a pre-treatment of escapable shock in a shuttle-box, prior to receiving an inescapable shock treatment in a hammock, they were successful at learning to escape when placed back in the shuttle-box. They performed as well as a control group which was given the same shuttle-box pre-treatment and test task but without any intervening inescapable shock treatment. Both of these groups performed significantly better than a group that was not given an escapable-shock pre-treatment. Not only did the pre-treatment group perform better than the No-Escape group, but when placed in the hammock, this group made more presses on the head panels than did the No-Escape group. This seemed to indicate that a situation where either escape is possible and/or there is controllability of outcomes, experienced prior to being subjected to a situation involving uncontrollable outcomes, prevents the occurrence of helplessness. There was, however, the possibility that the pre-treatment group's higher degree of panel-pressing in the hammock and its better performance in the final test task was due to its freedom of activity in the shuttle-box prior to the restrictiveness of the hammock. To test for this possibility, a fourth group of dogs was given inescapable shock in the shuttle-box, followed by inescapable shock in the hammock, and then finally, escapable shock on the shuttle-box. It was found that this group performed significantly worse in the test task than did the 'immunised' group, and similarly to the inescapable group. Furthermore, the number of panel presses made in the hammock was similar to that of the inescapable group.

What is the reason for this immunisation effect? Seligman (1975) proposed that immunisation against learned helplessness can occur because prior experience of control over a particular outcome leads to a generalised expectation that similar outcomes are controllable, and that such prior experience may allow the discrimination of controllable situations from uncontrollable situations. Maier & Seligman (1976) stated that ". . . prior experience with controllable shock should proactively interfere with the subject's learning that shock is uncontrollable . . ." (p.20). The end result is that learning that outcomes are controllable makes an organism more persistent in a situation in which outcomes are not controllable, thus reducing the possibility of learned helplessness occurring.

Most experiments which have examined the possibility of immunisation against helplessness have used three experimental phases. These usually included a pre-treatment involving response-contingent outcomes, followed by a treatment involving response-noncontingent outcomes, and finishing with a test involving, once again, response-contingent outcomes. The performance of such a group was usually compared to that of subjects in the normal triadic design.

How similar do the pre-treatment and treatment phases need to be in order to produce an immunisation against helplessness? Once again, research testing the hypothesis using animals will be presented before progressing to experimentation with human subjects.

Experiments with Animals

Seligman, Rosellini, & Kozak (1975) found that it was possible to immunise rats against the debilitative effects of uncontrollable shocks. A pre-treatment with a 'platform jump-up' task was followed by inescapable shock treatment, and then finished with a 'bar-pressing' test task. The experimenters claimed that the pre-treatment task (i.e. platform jump-up) required an escape response of considerably different topology than that of the test task (i.e. FR-3 bar press), and that regardless of this difference learned helplessness was still prevented. Similar demonstrations of immunisation using a variety of tasks have been reported in rats (Kirk & Blampied, 1986; Weiss & Glazer, 1975; Williams & Maier, 1977) and in cockroaches (Brown, Howe & Jones, 1990). Furthermore, Mullins & Winefield (1977) demonstrated immunisation against the effects of rats experiencing uncontrollable food reward, while Ferrandiz & Pardo (1990) found that an appetitive response-contingent pre-treatment immunised dogs against the effects of inescapable noise. However, Warren, Rosellini, Plonsky & DeCola (1985) found immunisation in rats against uncontrollable shock in an appetitive test task involving response-contingent outcomes but not when the test task involved response-noncontingent outcomes. Finally, Troisi, Bersh, Stromberg, Mauro & Whitehouse (1991) only found an immunisation effect in rats when the shock was signaled by light in both the pre-treatment (immunisation) and treatment phases of the experiment. When a different stimulus (i.e. a tone) was used to signal shock in the pre-treatment phase, no immunisation effect was found. The experimenters suggested that the effects of exposure to escapable and inescapable shock are subject to stimulus control. Hence, immunisation against the effects of inescapable shock may depend on the degree of resistance of the pre-treatment signal for escapable shock to counterconditioning by the treatment phase signal.

Experiments with Humans

The animal experiments mentioned above indicate that it is possible to immunise animals against helplessness, but what of humans? A number of studies have found an immunisation effect when test task performance deficits following exposure to uncontrollable/inescapable events were either eliminated by pre-exposure to controllable events (Douglas & Anisman, 1975; Hirt & Genshaft, 1981; Klee & Myer, 1979; Prindaville & Stein, 1978; Williams & Moffat, 1974) or else they were facilitated (Thornton & Jacobs, 1972). However, similar to the work mentioned earlier on the generality of the helplessness effect, when other factors are taken into consideration the results of attempts at immunisation are not clearly defined. Indeed, whether or not immunisation against helplessness can be achieved appears to be influenced by the similarity of the tasks used (Eckelman & Dyck, 1979; Thornton & Jacobs, 1972) while being unaffected by the similarity of experimental settings (Eckelman & Dyck, 1979). It has also been shown to be influenced by the ratio of success/failure feedback (Jones, Nation & Massad, 1977; Nation, Cooney & Gartrell, 1979; Nation & Massad, 1978), by the sequence of success/failure feedback (Stein, 1980), by the perceived importance of the treatment task (Dyck & Breen, 1978), and by the presence of additional feedback allowing subjects to attribute success or failure to their level of effort (Stein, 1980).

An interesting point raised by Wortman & Brehm (1975) is that the literature generally regards helplessness as being undesirable. Immunisation is said to 'protect' individuals from the effects of helplessness, whereas therapy removes these effects. Seligman's (1975) view is that ". . . individuals should be given therapy or training that makes it clear to them that they can control their outcomes. Such immunisation will presumably make people more resistant to helplessness effects" (p.330). Yet Wortman & Brehm noted that there are many situation in life in which control is impossible. In such situations, perhaps the most adaptive response is to give up. Attempting to exert control over an uncontrollable outcome may lead to more stress than would simply giving up and remaining passive. Helplessness experiments are characterised by a test situation in which outcomes are controllable. But what if it was not controllable? As prior experience with control is said to immunise against helplessness by making organisms more persistent in the face of uncontrollability, this may lead to greater levels of stress. In relation to therapies involving personal causation training, such training may be dangerous in that it may lead individuals to respond maladaptively in truly uncontrollable situations. "Perhaps the best kind of therapy procedure would involve giving individuals experience with both controllable and uncontrollable outcomes, and instructing them on how to tell the difference between the two" (p.331). Wortman & Dintzer (1978) add to this by stating that if organisms can recognise noncontingency or uncontrollability, this is not necessarily maladaptive or detrimental. In fact, it is quite the opposite, in that time and effort will not be expended on something that cannot be controlled. It is only when an outcome is controllable that misconceived perceptions of uncontrollability are detrimental.

In summary, the experimental literature indicates that the generality of the learned helplessness effect, and immunisation against it, is restricted by a number of factors. The most influential of these is the similarity between the treatment and test tasks. In attempting to fully describe the learned helplessness phenomenon, it is necessary to outline the other factors that have been shown to affect it. These are reviewed in Chapter Three. Knowledge of these limiting factors is essential for delineating the boundaries of the learned helplessness effect. Perhaps more importantly, these factors point to weaknesses in the theory itself. Indeed, the restrictions that these factors have placed on demonstrating performance deficits have led to a number of alternative explanations for the effect. These are described in Chapter Four.

Chapter Three:

Factors Influencing Test Task Performance Debilitation

From the review of the literature summarised in the preceding chapters it should be apparent that a number of factors play a role in whether or not performance deficits following exposure to uncontrollability occur. It has already been shown that the similarity of the tasks and experimental situations is an important determinant of whether performance deficits will be observed following an experience of noncontingency. There is also considerable evidence emphasising the role played by other task-oriented factors, such as complexity and the amount of noncontingency experienced. Aspects of the stimuli used also need to be considered. Reference has been made to the reinforcing properties of the stimuli, particularly in relation to whether they can be regarded as positive or negative outcomes. However, other influential factors include the predictability and intensity of these stimuli. Finally, procedural variations tend to show differences in the observation of the effect. The most notable of these is the type of instructions given to human subjects, particularly in relation to instructions which imply that insoluble problems do in fact have a solution, or which manipulate the subjects' perceptions of task importance, or their perceptions of task difficulty. This chapter will attempt to present these factors in more detail, together with the experimental evidence for their role in determining test task performance deficits.

AMOUNT OF NONCONTINGENT EXPERIENCE

The learned helplessness theory suggests that the greater the amount of experience with noncontingency or uncontrollability, the greater is the likelihood of helplessness generalising to a subsequent situation or task. In support of this, researchers who have varied both the number <u>and</u> type of noncontingent experiences have found that increasing the number of treatment tasks magnifies test task performance deficits. For instance, Krantz, Glass & Snyder (1974) administered two different manipulative treatment tasks (rotating knobs and pulling levers) to one group, and only one of these tasks to another group, with both groups being required to escape high intensity sound. They found that subjects given the two tasks exhibited greater amounts of performance debilitation a hand-shuttle test task than did subjects who had experienced only one task. Similarly, Trice (1984) used three different types of tasks in the treatment phase: anagrams, analogies and numerical sequence problems. The test task consisted of word-forming and word-finding problems. No aversive stimuli were involved. Performance on the test task decreased in proportion to the number of different treatment tasks. Subjects who received all three problem types performed worse in the test task than those who had received anagrams and analogies only, who in turn performed worse than subjects given anagrams only. The possibility of the result being caused by differences in level of exposure to noncontingency was discounted by the fact that the experimenters administered equivalent numbers of trials to all groups.

The majority of studies examining the effect of the amount of noncontingent experience have used one type of treatment task, with variations in the number of problems administered in that task. For instance, Fosco & Geer (1971) found that the greater the number of insoluble problems administered in the treatment task, the more errors were made in the test task. Although these were button-pressing tasks requiring escape from shock, most of the studies have been restricted to using either information-processing tasks or concept-formation tasks involving no aversive stimuli. Direct comparisons of the effects of experiencing high numbers of treatment problems (i.e. between three and six) against low numbers of problems (i.e. one or two) have found debilitation with the high number, and either facilitation with the low number (Mikulincer, Kedem & Zilkha-Segal, 1989; Pittman & Pittman, 1979, 1980; Roth & Kubal, 1975) or no debilitation at all (Dor-Shav & Mikulincer, 1990; Mikulincer & Caspy, 1986). Furthermore, other studies which have not directly compared the effects of the number of problems, have generally supported these findings. For instance, performance deficits have been found with four, or five, Levine-type problems (Barber & Winefield, 1986a; Danker-Brown, 1982; Klein, Fencil-Morse & Seligman, 1976; Mikulincer, 1986b) while no effect has been found for one or two problems (Roth & Bootzin, 1974).

It would seem from the above that performance is more likely to be debilitated with greater numbers of treatment problems. However, there have been exceptions to this, as performance deficits have <u>not</u> been found using either three Levine-type problems (Hiroto & Seligman, 1975), four problems (Frankel & Snyder, 1978; Mikulincer, 1986b) or six problems (Bihm, McWhirter & Kidda, 1982). It may be that the performance of the subjects in these experiments had been influenced by attributional factors. For instance, a higher level of perceived importance of the experiment had been shown to decrease the facilitation effect with one problem and increase the debilitation effect with three problems (Roth & Kubal, 1975). Furthermore, Tennen & Eller (1977) found debilitation when the three problems were perceived as being easy, but no debilitation when they were perceived as being difficult. Similarly, Dyck, Vallentyne & Breen (1979) showed that when subjects were made to attribute poor performance on a short duration (i.e. consisting of 12 problems) 'concealed figure' treatment task to incompetence, they were more persistent on a figure-tracing test task than were subjects who were led to attribute failure to task difficulty. However, when a different group of subjects were given a longer treatment task (i.e. consisting of 25 problems), the pattern of persistence was reversed. Those subjects who were led to attribute failure to task difficulty were more persistent than those who were led to attribute it to incompetence.

Other studies have also found that persistence in the test task increases with greater numbers of problems in the treatment task (Eisenberger, Masterson & McDermitt, 1982), or the amount of effort required (Eisenberger & Leonard, 1980). This indicates that experiencing noncontingency in more than one problem or task should lead to greater levels of persistence, with performance in a subsequent task not being debilitated, and possibly being facilitated. Why then have so many researchers found the opposite, namely, that limited experience of noncontingency results in performance facilitation, while greater levels of experience lead to performance debilitation? It may be that the effect of the amount of noncontingency experienced is a curvilinear function, as Eisenberger & Leonard (1980) had also found that continued failure, together with feedback indicating the impossibility of success, tended to diminish the increased persistence effect. Therefore, it could be that a low level of exposure to noncontingency results in an increase in persistence that is observed as performance facilitation in the following test task. With continued exposure to noncontingency this persistence is replaced by the inactivity said to be characteristic of learned helplessness.

The increase in performance debilitation following exposure to higher levels of noncontingency conforms to learned helplessness theory, which predicts that an increased experience of uncontrollability serves to confirm the perception of the noncontingency, and strengthens the expectation of future noncontingency. However, the finding of facilitated test task performance with limited exposure to noncontingency is not predicted by the theory.

TASK COMPLEXITY

Experiments on task complexity using animals have concentrated on the level of complexity of the test task. On the other hand, experiments using humans have examined the level of complexity of both treatment and test tasks.

Animal Experiments

The initial inability to demonstrate performance debilitation in rats following exposure to uncontrollable aversive events questioned the validity of the learned helplessness theory. It was not until the response requirements of the test task was increased from FR-1 to FR-2 (Maier, Albin & Testa, 1973) or FR-3 (Seligman & Beagley, 1975) that deficits were observed. Consequently, Maier (1975) suggested that increasing response complexity of the test task would enhance the probability of obtaining the response debilitation effect in rats experiencing inescapable shock. However, it was evident that there were limitations to how much this complexity could be increased, as Freda & Klein (1976) found performance debilitation using an FR-2 shuttling response, but not with an FR-3 shuttling response. Furthermore, although Moran & Lewis-Smith (1979) found that rats on an FR-2 bar-pressing schedules did not exhibit performance deficits, while those put on either FR-3 or FR-4 schedules did, they found no performance deficits when the complexity of the test task was increased to an FR-5 schedule.

Maier, Albin & Testa (1973) suggested that one reason for the difficulty in demonstrating performance deficits using an FR-1 shuttling response was that the behavioural requirements of shuttling are merely reflexes to the shock. Such a reaction would guarantee exposure to response-outcome contingency in a normal shuttle-box test task. Hence, the rats may learn the association between shuttling and shock termination even though they may be initially suffering from associative interference. Maier et al. (1973) tested whether the shuttling response is reflexive by subjecting naive rats to inescapable shocks in a shuttle-box. They found that the rats did shuttle initially, but stopped after about 10 trials. They concluded that the shuttling response is not reflexive as it is not maintained by the continued exposure to shock, and that an escape contingency is necessary for the maintenance of the behaviour.

It is possible that the debilitation observed with the FR-2 shuttling response occurs because the rats are exposed to longer durations of shock, or because the physical effort required by the response is considerably greater. In examining this, Maier & Testa (1975) found that performance deficits were not obtained when the contingency between FR-2 shuttling and shock offset was simplified by having a 1-sec interruption of shock after the first crossing. As the same amount of shock was administered with or without the interruption, it was concluded that the duration of shock was not a factor determining the effect. In a second experiment the contingency between response and outcome was made more complex by creating a time delay between an FR-1 shuttling response and shock termination. Rats which had been exposed to inescapable shocks were considerably more affected by this time delay than were rats which experienced escapable shocks. It was concluded that the amount of physical activity involved in the tasks is not a determining factor in the occurrence of performance deficits. However, as Alloy & Seligman (1979) pointed out, the interruption of the shock in the first experiment may have transformed the FR-2 response into two FR-1 responses. Hence the helplessness effect may have been eliminated because, as Maier, Albin & Testa (1973) had previously shown, inescapable shock does not interfere with the acquisition of high-probability FR-1 responses in a shuttle-box test task. Nevertheless, the results of the Maier & Testa experiments are perhaps the most frequently cited in support of the cognitive deficit in learned helplessness.

Finally, more recent studies have shown that exposure to inescapable shock does not interfere with a simple excitatory Pavlovian association between a conditioned stimulus and an unconditioned shock stimulus (Rosellini, DeCola & Warren, 1986; Rosellini, Warren & DeCola, 1987), but does interfere with the formation of a more complex discrimination (DeCola & Rosellini, 1990; Rosellini, Warren & DeCola, 1987).

Human Experiments

An experiment by Thornton & Jacobs (1970) gave some indication of the effect of task complexity on human performance. It consisted of only one phase, which involved either a simple reaction-time task requiring a response on a single button or a more complex choice-reaction-time task requiring movement of a lever. Three stressors were employed: shock, threat of shock, or noise. Each S was subjected to one of these stressors. However, for 10 trials this stressor was task-related, then for 10 trials task unrelated, and finally, for 10 trials not administered at all. The experimenters found that performance on the simple task was retarded when offset of the stressor was not contingent on task performance, in comparison to when offset was contingent on performance. However, there was no difference between any of these conditions when the task was complex.

In an examination of treatment task complexity, Douglas & Anisman (1975) administered a task consisting of either a simple one button-light matching problem or a more complex three-button sequence-matching problem. This was followed by a test task consisting of 10 maze problems. They found that in the simple condition, test task performance of subjects given the insoluble treatment problem was significantly worse than that of subjects given the soluble treatment problem. On the other hand, in the complex condition there was no statistically significant difference between the soluble and insoluble groups, although the latter tended to perform better than the former.

Results contradictory to those above were reported by Peterson (1978) who found that in comparison to relevant no-treatment groups, the NCT subjects given a complex treatment task (which required them to determine a sequence of target stimuli) performed worse in the test task than did NCT subjects who were given a simple treatment task (which required them to find a single target stimulus). However, this only occurred when the test task was simple. When the test problem was more complex there were no differences between the two levels of treatment complexity.

The findings of the experiments described above do not give a clear indication of the effects of varying treatment task complexity in humans. Furthermore, the study by Peterson highlighted an important consideration, namely, that of the interaction between the effects of treatment and test task complexities. Sedek & Kofta (1990) also manipulated the actual complexity level of a button-pressing test task and, and contrary to Peterson's results, found performance debilitation with a complex problem, but not with a simple problem. Similarly, Mikulincer (1989a) found that test task performance of an NCT group was significantly worse than a no feedback control group only under higher test task complexity conditions (i.e. six-letter targets in a visual search task as opposed to two- and four-letter targets.)

The experiments outlined so far have involved tasks differing in their actual level of complexity. However, further information on the effect of task complexity is provided by manipulating perceptions of complexity, without varying the actual complexity of the tasks. Tennen & Eller (1977) gave subjects attributional cues regarding the level of complexity of the treatment task, and found that those who were told that insoluble problems were getting progressively easier exhibited subsequent performance debilitation, while those who were told that the problems were getting progressively harder showed performance facilitation. Similarly, as described earlier in this chapter, Dyck, Vallentyne & Breen (1979) manipulated subjects' attributions by suggesting that their poor performance in the treatment task was due to either incompetence or task difficulty, and found that following a short duration treatment task the 'difficulty' group performed worse than the 'incompetence' group, while following a long duration treatment task the situation was reversed, with the 'difficulty' group performing better than the 'incompetence' group.

Williams & Teasdale (1982) used a single button-pressing task requiring escape from high intensity sounds, but for half the subjects the sounds in the first eight trials (out of twenty trials) were inescapable. The experimenters manipulated perceived task difficulty and found that when it was perceived as being easy there was no difference between the escapable and inescapable groups. However, when the task was perceived as being difficult, the inescapable subjects performed significantly worse than the escapable ones.

Finally, Tang, Liu & Vermillion (1987) found that when subjects were told that anagrams were either difficult or easy, even though they were exactly the same, their performance was differentially affected. However, the direction of this effect was influenced by the subjects' self-esteem. Subjects with low self-esteem performed worse in the 'perceived-easy' condition than in the 'perceived difficult' condition, while for high-esteem subjects the results were reversed. Interestingly, Klein, Fencil-Morse & Seligman (1976) had found similar results, but only with depressed subjects. There was no difference in performance in an anagrams test task between non-depressed subjects who had been led to believe that an insoluble Levine treatment task was either easy or difficult (they were told either that 85% of subjects solve three or more of the four problems, or that 90% of subjects fail all four problems). However, when depressed subjects were used, the 'perceived-difficult' group performed better than the other two groups. The authors suggested that this difference between depressed and non-depressed subjects may have been due to a difference in interpretation of the instructions. Depressed individuals generally believe that their performance is inferior to others. This, together with the false knowledge that 90% of subjects had failed the problems, may have led the depressed subjects to believe that they were certain to fail with the consequence that they considered the task as being unimportant. On the other hand, non-depressed subjects may have perceived the task as being important because it gave them an opportunity to compare their performance with their peers.

Two experiments have manipulated perceptions of test task complexity. Frankel & Snyder (1978) found that following a Levine-type concept formation treatment task, a group given solvable problems in an anagrams test task, and were told that these problems would be moderately difficult, performed significantly better in an anagrams test task than did a group given unsolvable problems. However, when the subjects were told that the test task was highly difficult the unsolvable group performed better in the test task than did the solvable group, although not to a statistically significant extent. A similar experiment was reported by Mikulincer (1989b). He manipulated perceived difficulty of the test task. Following a treatment task of four Levine problems, in which subjects were led to make attributions for failure either to internal or to external causes, subjects were given a Ravens test task. When the subjects were led to believe that failure was attributable to external causes, performance deficits were greater under high perceived test task difficulty, whereas when failure was attributable to internal causes, performance deficits were greater under low perceived test task difficulty.

The conflicting findings of the experiments described above give no clear indication of the effects of varying the level of either actual, or perceived, complexity of the treatment and test tasks. Furthermore, predictions of performance in relation to task complexity are confounded by other factors, such as task duration, perceived task importance and subject self-esteem. The 'self-esteem' factor is taken up in the next chapter when alternative explanations to learned helplessness are presented, while research on the 'importance' factor is described in more detail below. The effects of varying actual task complexity will be examined further in a number of the experiments presented in this thesis.

TASK IMPORTANCE

It is apparent that the debilitative effect of an experience of noncontingency is influenced by other perceptions. One of these is the perceived importance of the experiment or tasks being performed. As mentioned earlier in the section on the effect of the amount of noncontingency experienced, Roth & Kubal (1975) found that increasing the perceived level of importance of the experiment increased the likelihood of test task performance debilitation with a three-problem treatment, and decreased the likelihood of performance facilitation with a one-problem treatment. Additional evidence of the effect of importance was provided by Dyck & Breen (1978) who found that only in a condition of high importance, where subjects were told that pre-treatment and treatment task performance was correlated to IQ and academic achievement, was performance debilitation produced. Under conditions of low importance, where subjects were told that the task was only a series of concept formation problems, there was no performance debilitation at all. Similar effects have been demonstrated by Barber & Winefield (1986a), Mikulincer (1986b, 1988a), and Skinner (1979), while Samuel, Baynes & Sabeh (1978) not only found performance debilitation in a high importance condition but performance facilitation in a low importance condition.

It should be noted that having instructions that attach high levels of importance to the task does not guarantee that performance debilitation will be obtained. For instance, Mikulincer (1986b) found an interaction between perceived task importance and success expectations. High task importance instructions produced the helplessness effect when subjects had low expectations of success, while similar results were obtained when the instructions implied low task importance but the subjects had high expectations of success. Performance was best when subjects with low success expectations were given instructions that indicated low task importance.

Contrary to these studies, Hanusa & Schulz (1977) found that when subjects were given possible attributions for their performance in a high-importance concept formation treatment task, those subjects who were led to attribute poor treatment task performance to ability actually performed better in the maze test task than did subjects led to believe that their performance was attributable to either their own effort or to the task itself. It was concluded that information about one's lack of ability to control an outcome in a condition of high importance facilitates rather than debilitates performance in a subsequent task. Furthermore, Williams & Teasdale (1982) found that performance of a hand-shuttle task involving response-contingent offset of a high intensity sound was affected by perceptions of task importance, with performance being worse with low levels of perceived importance than with high levels. However, this only occurred when the task was also perceived as having a high level of difficulty. When it was perceived as having a low level of difficulty no differences were found between the high and low importance conditions. Finally, Mikulincer (1989b) found that when subjects were led to believe that the test task had a high level of importance, test task performance debilitation was found, but only when the subjects were led to attribute treatment task performance to internal factors. When subjects were led to believe that treatment task performance was attributable to external factors, performance debilitation in the test task was found only under low importance conditions.

It is clear from the evidence presented here that although a perception of high-importance increases the likelihood of performance debilitation, this effect is influenced by other attributional factors, such as effort, ability and perceived task difficulty.

INSTRUCTIONS

Most studies that show evidence of a learned helplessness effect attribute test task performance debilitation to the experience of response-outcome contingencies within the treatment task. However, there is a possibility that these effects may be a direct result of the instructions given to the subjects. What evidence is there for the effects of instructions on obtaining performance debilitation following an experience of noncontingency?

A variety of methodologies have been employed regarding the type of treatment task instructions given to human subjects. It had been indicated in earlier sections of this chapter that a number of experiments have included instructions which manipulated the subjects' perceptions of the task. For instance, instructions which suggested particular levels of task importance and task difficulty were shown to influence the impact of experiences of uncontrollability on subsequent test task performance. Such instructions give attributional cues to the subjects for explaining their treatment task performance. They are therefore useful in differentiating theories which are reliant on such attributions, such as the reformulated learned helplessness theory, as well as 'egotism', 'reactance' and 'test anxiety' theories. These will be described in more detail in Chapter Four.

In some instances the experimenter has given different sets of instructions to each of the groups in the experiment in an attempt to manipulate perceptions of noncontingency. For example, Thornton & Jacobs (1971) and Thornton & Powell (1974) informed the contingent groups of the contingency between responses and offset of shock, while the noncontingent groups were told that they would receive inescapable shock that was unrelated to the task. As Winefield (1982) pointed out, such designs are methodologically unsound, as it is impossible to separate the effects of the instructions from any effects resulting from differences in experience of noncontingency.

There is, however, another category of instructions that may play an influential role in determining test task performance deficits. This includes instructions which imply that a solution to the treatment task exists, when in fact there is <u>no</u> solution for the noncontingent treatment group. Most of the studies which have used such instructions have followed a procedure similar to that originally used by Hiroto (1974), in which subjects were given a button-pressing apparatus and were told that when a loud tone came on there was something that they could do to stop it (e.g. Barber, 1989; Gatchel & Proctor, 1976; Gregory, Chartier & Wright, 1979; Hiroto & Seligman, 1975). Such instructions imply that there is a solution to the problem, and do not raise the possibility that in fact there may be no solution at all. Experimenters who have used other types of tasks have given similar instructions – for instance, requiring subjects to find an underlying principle or rule in a concept-formation task (e.g. Cohen, Rothbart & Phillips, 1976) or to find the words hidden in an anagrams task (e.g. Hiroto & Seligman, 1975) or to find the 'correct' sequence in a button-pressing task (e.g. DeVellis, DeVellis & McCauley, 1978)

Wortman & Brehm (1975) stated that the use of such instructions makes it is difficult to determine whether performance deficits in test tasks are due to impaired cognitive functioning or simply due to the subjects not believing the experimenter when told that the test task is soluble. A similar view was expressed by Buchwald, Coyne & Cole (1978) who emphasised that, in order for the learned helplessness effect to be observed, the instructions need to imply that a solution for the problem does exist. As a result, any differences between the performance of the groups may arise in terms of fulfilment of expectancies. Typically, when subjects are told or are led to believe that a task is soluble, the controllable subjects experience confirmation of this information, whereas the uncontrollable subjects do not. Hence, these latter subjects may not believe the experimenter that the test task is soluble, and accordingly show poorer levels of performance. The experiment can thus be more accurately described as 'experimenter-induced failure'.

If failure is a necessary component of the effect, defining helplessness in terms of perceptions of noncontingency between responses and outcomes is not appropriate, particularly since research has shown that subjects have difficulty in perceiving noncontingency (e.g. Jenkins & Ward, 1965). Indeed, Peterson (1980) had found that subjects were more aware of noncontingency only when they received instructions indicating that randomness was a possibility or when they had experienced an initial random sequence of events. Otherwise, subjects did not readily recognise noncontingency.

There has been some support for the notion that failure instructions are necessary for the effect to be observed. For instance, Thornton & Powell (1974) demonstrated performance debilitation following an experience of unavoidable shock, but failed to demonstrate immunisation against this debilitation. This may be attributable the treatment task instructions not being the same for all groups. While subjects in the avoidable shock group were told that they could avoid the shock by exhibiting fast reaction times in a choice-reaction-time task involving buttons and lights, subjects in the unavoidable shock group were told that the shock was in no way related to the task. The 'immunised' group was given avoidable shock followed by unavoidable shock. The instructions in the unavoidable shock phase of this last group indicated that the shock was in no way related to the task. All subjects were tested in a similar task which also required avoidance of an electric shock. However, they were told nothing about this new task. Therefore, it is distinctly possible that the instructional set administered in the treatment task may have carried over to the test task, thus negating any facilitative effects of prior exposure to contingency.

A more direct test of the effect of failure instructions was done in an experiment carried out by Harris & Tryon (1983). They found that performance debilitation following exposure to noncontingency was obtained only when the instructions were incongruent with the task (i.e. when subjects were led to believe that the treatment task was soluble when in fact it wasn't). Neither noncontingency alone, nor incongruency alone, were sufficient to induce significant performance debilitation. Furthermore, when subjects were led to believe that the treatment task was not soluble, when in fact it was, there was no test task performance debilitation.

There are, however, experimental findings which are inconsistent with the notion of a requirement of experimenter-induced failure for performance debilitation to be observed. For instance, Thornton & Jacobs (1972) carried out two experiments in which subjects in the noncontingent group were told that they could do nothing to avoid shocks in a choice reaction-time treatment task, while subjects in the contingent group were told of the relationship between shock onset and speed and correctness of responses. Even with the explicit 'failure instructions' given to the noncontingent group, the test performance of these subjects was enhanced in comparison to their performance on a similar pre-treatment task. Similarly, Lubow, Rosenblatt & Weiner (1981) found no difference between two groups of subjects exposed to noncontingent noise even though one group was given specific failure instructions. One group was led to believe that there was something that could be done to offset the noise when in fact nothing could be done, while the other group was told nothing except they were about to hear a series of loud tones and that they should remain seated throughout the series. Both groups exhibited performance debilitation when compared to a contingent-treatment group and a no-treatment group. Furthermore, Winefield, Barnett & Tiggemann (1985) found performance debilitation in subjects regardless of whether they were told that their performance was better than average, about average, or worse than average.

Additional evidence against the notion of experimenter-induced failure was provided by Barber & Winefield (1986a). They manipulated subjects' expectations of success in a concept-formation (i.e. Levine-type) treatment task together with expectations of control over a moderately loud tone which was presented during the same task. The feedback to the subjects after each response followed a fixed pattern i.e. outcomes were not contingent upon responses. The experimenters found that subjects who were given 'expectations of success' in the treatment task, regardless of whether or not they were given 'expectations of control' over the offset of the tone, did not perform any differently in an anagrams test task from subjects given both 'no expectations of success' and 'no expectations of control'. All three of these noncontingent groups performed significantly worse in the test task than did a no-treatment group. The experimenters concluded that ". . . failure *adds* to the effect of uncontrollability, but . . . does not *explain* the effect of uncontrollability" (p.153, their italics). However, the fact that there was no difference between the two 'expectations of success' groups, which differed in whether or not they had 'expectations of control' over the tone, might also suggest that differences in expectations of uncontrollability add little to the effects of experiencing failure. In any case, labelling the inability to obtain the desired outcome of 'correct' feedback in a concept-formation task as 'failure', while labelling the inability to obtain the desired outcome of tone offset in the same task (using exactly the same response mechanism) as 'uncontrollability' seems rather tenuous. One could just as easily argue the converse – that being unable to turn off the tone is a failure experience while being unable to determine the correct sequence of responses in the task itself is an uncontrollability experience. Nevertheless, it would appear that it is the experience of noncontingency, regardless of whether this is regarded as failure or uncontrollability, that leads to performance deficits in subsequent tasks.

Other evidence that suggests that failure instructions are unnecessary has been the experiment by Kofta & Sedek (1989) in which no test task performance differences were found between two groups of subjects given noncontingent treatment, where one group received the standard type of incorrect feedback while the other received no feedback at all. Furthermore, Sedek & Kofta (1990) employed a treatment task procedure in which subjects were required to watch as the experimenter presented single Levine-type stimulus figures and indicated whether or not each figure contained the target stimulus. They were only required to indicate their solutions at the end of each problem, but were not given any feedback as to whether these solutions were correct. It was found that these subjects performed worse in a button-pressing test task than did subjects given solvable treatment problems. On the other hand, subjects given the standard Levine problem procedure with feedback after every response, and failure feedback for their solutions, showed no such decrement in test task performance.

There is, of course, the possibility that performance debilitation in experiments employing failure instructions may be attributable to factors other than those said to be associated with learned helplessness. For instance, subjects may experience an increase in anxiety associated with the experiment. Lavelle, Metalsky & Coyne (1979) found that high test-anxious subjects are more likely to become debilitated by failure instructions than are low test-anxious subjects. Alternatively, some subjects who re-interpret the experimental instructions in light of their treatment task performance may become preoccupied with explanations for their inability to solve the problems, and it is this preoccupation which results in debilitation of subsequent task performance (Cole & Coyne, 1977). Being unable to find a solution to a problem can induce frustration in the subject, which would increase the probability of incorrect competing responses to occur (Schmeck, 1970), and which may result in differences in test-task performance that are a function of the subjects' characteristic habitual response to frustration (Dor-Shav & Mikulincer, 1990).

PREDICTABILITY OF THE STIMULUS

It is evident that another factor influencing the performance deficits found following uncontrollable stimuli is the predictability of the stimuli. This is particularly applicable to highly aversive stimuli such as electric shocks or high intensity sounds.

Animal Experiments

Experiments using procedures in which rats have been given a choice of stimuli have indicated that there is a preference for predictable shock over unpredictable shock (Abbott, 1985; Badia & Culbertson, 1972; Frankel & Vom Saal, 1976; Lewis & Gardner, 1977; Lockard, 1963; Perkins, Levin & Seymann, 1963) and for fixed-interval shock over variable-interval shock (Badia, Harsh & Coker, 1975). Alloy & Bersh (1979) found that when rats were allowed to control the level of shock intensity received in the treatment task, but not the occurrence of shock, they performed significantly better in a shuttle-box test task than did yoked subjects.

Strong evidence of the effect of predictability of the stimulus is the finding that signalling shock offset decreases the performance deficits associated with inescapable shock in rats (Jackson & Minor, 1988; Mineka, Cook & Miller, 1984; Volpicelli, Ulm & Altenor, 1984) and in dogs (Overmier & Wielkowicz, 1983). Similarly, DeCola & Rosellini (1990) found that unsignalled inescapable shock offset interfered with the acquisition of an appetitive Pavlovian discrimination, whereas signalled shock offset did not. Furthermore, Sonoda & Hirai (1993) varied the predictability of a sound in a treatment task in which rats received either controllable or uncontrollable food. They found that performance of a test task requiring escape from shock was debilitated only for the unpredictable sound NCT group.

Unpredictable shocks tend to instigate higher levels of physiological stress in rats, as reflected in a greater incidence of ulcers (e.g. Sawrey, 1961; Weiss, 1968). One explanation has suggested that when shock is made predictable by being signalled, this allows the subjects to make some sort of preparatory response that effectively lessens the pain of the shock (Kimmel, 1965; Perkins, Levin & Seymann, 1963). With unsignalled shock the animals are in a constant state of fear because there is no signal which acts as a predictor of periods of 'no shock' (Seligman, Maier & Solomon, 1971). Volpicelli et al (1984) reasoned that "If a procedure which reduces fear also reduces interference effects, then it implicates fear as a mediator for these interference effects" (p.284). Similarly, Minor (1990) and Minor, Dess & Overmier (1991) suggested that for the subjects given escapable shock, the escape response itself acts as a safety signal that reduces the amount of fear experienced in the treatment phase. On the other hand, there is no such safety signal for the inescapable shock subjects and, as a result, these animals cannot distinguish between safe and unsafe periods and are therefore exposed to a relatively greater amount of fear. This fear invokes behaviours which transfer to the test phase, thereby debilitating successful escape from shock. Hence, light signals may lead to decreased performance debilitation because they reduce the amount of fear associated with the experience of inescapable shock.

There have been some conflicting findings regarding the effect of signalled shock. For instance, Bersh, Whitehouse, Blustein & Alloy (1986) found that although the test task performance deficit associated with exposure to inescapable shock diminished with repeated exposure to escapable shock, it did not diminish in rats exposed to signalled shock in both, the treatment and test tasks. Furthermore, Bersh, Whitehouse, Laurence, Blustein & Alloy (1990) found that inescapable-shock subjects performed worse when the <u>duration</u> of the shock was signalled than when it was unsignalled. In spite of these findings, it is evident that performance debilitation in animals is greater following an experience of unpredictable shock.

Human Experiments

Similar findings regarding predictability have been made with humans in that, if given a choice, human subjects prefer predictable aversive events over unpredictable ones (e.g. Miller & Grant, 1979; Pervin, 1963). Furthermore, studies on the effects of noise have shown that performance of a task in the presence of intermittent noise is usually poorer than in the presence of continuous noise, and that task performance is even worse when the intermittent noise is unpredictable (e.g. Eschenbrenner, 1971; Kohfeld & Goedecke 1978; Percival & Loeb, 1980; Warner & Heimstra, 1971).

A number of studies have shown that giving subjects a greater degree of control over an aversive stimulus decreases their physiological measures of level of anxiety and arousal (Geer, Davison & Gatchel, 1970; Geer & Maisel, 1972; Hokanson, DeGood, Forrest & Brittain, 1971; Solomon, Holmes & McCaul, 1980; Stotland & Blumenthal, 1964), and lowers their perceptions of the aversiveness of the stimulus (Glass, Singer, Leonard, Krantz, Cohen & Cummings, 1973; Lefcourt, 1973; Lepanto, Morney & Zeahausern, 1965; Staub, Tursky & Schwartz, 1971). Glass & Singer (1972a) found that increasing the number of different aspects of the experimental procedure under the control of subjects tends to improve performance in a subsequent task, and suggested that exposure to unpredictable stressful stimuli induces feelings of an inability to control the environment. The individual experiences not only the aversiveness of the stimulus but also the anxiety of not being able to do anything about it. It is this experience which contributes to the exhibition of performance deficits as an after-effect of exposure to the stimulus. However, if the subject is provided with information about when to expect the stimulus, this allows him/her to exert a degree of cognitive control over the situation that reduces any adverse effects of the experience of uncontrollability. This has been supported by other studies (e.g. Mikulincer, 1988b; Sherrod, Hage, Halpern & Moore, 1977).

A number of experiments have examined the effect of schedules of reinforcement on task performance in the presence of high intensity sounds. Glass, Singer & Friedman (1969) found that subjects were more persistent in trying to find a solution to insoluble figure-tracing problems after exposure to predictable (i.e. fixed interval) sounds as opposed to unpredictable (i.e. random interval) sounds. This effect was obtained with both high and low intensity sounds. The experimenters also found that in the unpredictable conditions, subjects were less persistent in the high intensity noise, whereas in the predictable condition, there was no difference between high and low intensity noises. The persistence was assumed to measure degree of frustration tolerance. The experimenters concluded that post-noise frustration tolerance is less dependent on the intensity of noise than on its unpredictability, although they did admit that intensity did, however, appear to exert an effect. Furthermore, Pennebaker, Burnam, Schaffer & Harper (1977) found that subjects engaged in an FR schedule for cessation of noise reported greater perceptions of control than did subjects engaged in a VR schedule. It was proposed that noise offset in an FR schedule is more predictable and more easily perceived as being due to a particular pattern of responding.

Even the predictability of the duration of the sound seems to affect subsequent performance. For instance, Tiggemann & Winefield (1987) performed an experiment in which subjects were required to offset a sound in a single-button treatment task where the duration of a sound was either predictable (i.e. fixed length) or unpredictable (i.e. variable length). They found that 'noncontingent unpredictable' subjects performed significantly worse in a two-button test task than did contingent-unpredictable or no-treatment subjects, while no such differences were found for 'noncontingent predictable' subjects.

Another way of manipulating predictability is by varying the intensity of the stimulus employed. For instance, Thornton & Jacobs (1971) found that performance deficits in a button-pressing test task, which had followed an experience of uncontrollability of shock in a button-pressing treatment task, were greater when the shock intensity was varied from trial to trial as opposed to being fixed at a constant intensity for each trial. Similar results were reported by Sanders (1961), who found that performance in a repetitive number-cancelling task exhibited greater variability from one minute to the next when a noise of varying intensity was present in the background than when continuous white noise was presented. In a review of experiments on the effects of exposure to noise, Broadbent (1979) noted that the less variation in an unfamiliar noise, the less likely that it would have a detrimental effect on task performance.

Predictability has also been bestowed on the subjects by allowing them a greater degree of potential control over the offset of an aversive stimulus. In such experiments, these subjects do not exhibit performance deficits following the exposure to the uncontrollable stimuli, even though actual control over the stimuli has not been exerted (e.g. Glass & Singer, 1972a).

Although the studies mentioned above have concentrated on the stressors such as noise and shock, the effects of unpredictability in the presence of other stimuli have also been examined. For instance, Prindaville & Stein (1978) found that VI schedules of success feedback produced greater levels of performance debilitation than did FR schedules. Furthermore, Winefield & Tiggemann (1978) found that subjects given both control and prediction over anagram difficulty and sequence of presentation performed significantly better than subjects given prediction by itself with no control, or control by itself with no prediction. The authors concluded that the effects of uncontrollability in helplessness experiments cannot be solely attributed to the unpredictability of outcomes. Finally, Jardine & Winefield (1984) found that the effects of noncontingency are greater in subjects with high achievement motivation when the uncontrollable reward (i.e. money) is also unpredictable.

Overall, it would seem that performance debilitation following an experience of uncontrollable aversive events is greatest when those events are unpredictable. Furthermore, this unpredictability tends to increase the perceived aversiveness of the events.

STIMULUS INTENSITY

A variety of stimulus properties have been examined in relation to determining the limiting parameters of the experience of uncontrollability. For instance, differential performance effects have been obtained with variation in the type of shock used with rats, namely, alternating current versus direct current, and pulsating versus continuous shock (Lawry, Lupo, Overmier, Kochevar, Hollis & Anderson, 1978). Long duration shocks have been shown to lead to greater performance debilitation than have shorter duration shocks (Anisman, De Catanzaro, & Remington, 1978; Overmier & Seligman, 1967), although other studies have found no difference (Altenor, Volpicelli & Seligman, 1979; Kelsey, 1977). However, the stimulus property that has been most closely studied has been that of intensity. This is particularly true of human experiments. The evidence for any differential effects on performance resulting from experiences of different intensities of a stimulus, in both animals and in humans, is presented below.

Animal Experiments

Prior to the first experiments that ultimately led Seligman and his associates to formulate the learned helplessness theory, a number of experimenters had found that when animals were given noncontingent aversive stimulation their behaviour in later test tasks was debilitated. For instance, Dinsmoor & Campbell (1956b) exposed rats to a treatment of continuous, inescapable shock, followed 24 hours later by a test task in which the subjects had to press a bar to temporarily escape continuous shock. The mean latency of the first response of the rats exposed to a high intensity shock treatment was significantly longer than for those exposed to a low intensity shock treatment. Furthermore, the test task response rate was inversely proportional to the treatment shock intensity, regardless of the test task shock intensity. Similar results with operant chamber tasks were found by D'Amato, Fazzaro & Etkin (1967) and Mullin & Mogenson (1963), and with shuttle-box test tasks by Levine (1966), Moyer & Korn (1964), and Theios, Lynch & Lowe (1966). It is apparent from these studies that performance debilitation in the test task is influenced by the intensity of the treatment shock. More specifically, performance debilitation is greater with higher treatment shock intensities.

The learned helplessness literature reveals that for a number of years it was claimed that the interference effect following inescapable aversive stimuli was independent of the intensity of the stimuli (Maier & Seligman, 1976; Maier & Testa, 1975; Overmier & Seligman, 1967; Seligman, Maier & Solomon, 1971; Winefield, 1982). It was indeed the case that early attempts to examine the effect of different shock intensities on test task performance in rats were unsuccessful (e.g. Maier, Albin & Testa, 1973). However, as has already been mentioned in Chapter One, subsequent studies were able to attribute these failures to the insensitivity of the test task. When the test task was made more complex, performance deficits were observed (e.g. Seligman & Beagley, 1975). Therefore it was only when higher complexity test tasks were employed that differences in performance attributable to the intensity of shock were successfully demonstrated. Anisman, DeCatanzaro & Remington (1978) found that a moderate intensity inescapable shock treatment resulted in performance deficits in a test task involving low intensity shock. On the other hand, when the treatment and test shock intensities were both low, no such performance deficits were obtained. However, it should be pointed out that this was only evident when the duration of the shock was 6 seconds. No differences between intensities were observed when the duration of the shock was 2 seconds. Nevertheless, this lent support to the notion that performance debilitation is differentially influenced by the intensity of the treatment stimuli.

Somewhat contradictory findings were reported by Rosellini & Seligman (1978). They used three levels of shock in rats, and found significant main effects for both treatment and test intensities, as well as a significant interaction effect. Regarding <u>treatment</u> task intensity, performance debilitation in a bar-pressing test task was evident with both the low and moderate treatment intensities, but only with low and moderate test intensities. Performance debilitation following high treatment intensity was only evident when the test intensity was also high. Furthermore, regarding the effect of <u>test</u> task intensity, performance <u>improved</u> as shock intensity was increased. However, a group both treated and tested with high intensity shock did exhibit performance debilitation.

Some experiments (e.g. Glazer & Weiss, 1976a) have employed stimuli of an intensity that could only be classified as severe, and these have usually found high levels of performance debilitation when compared to the debilitation found using lower intensities. Glazer, Weiss, Pohorecky & Miller (1975) raised the possibility that the performance deficits attributed to learned helplessness are actually the result of stress-induced neurochemical change, resulting in a lowered amount of motor activity which is insufficient for the learning and performance of the correct response in the test task. Unfortunately, with the use of very high levels of shock intensity it is difficult to separate performance debilitation which may be caused by exposure to response-outcome noncontingency from debilitation attributable to neuromuscular failure (Rosellini & Seligman, 1976).

Overall, the animal studies indicate that test task performance deficits following a treatment with high intensity aversive stimuli tend to be greater than deficits following a treatment of low intensity stimuli. There are also indications that these performance deficits are decreased as test task intensity increases.

Human Experiments

Most experiments which have employed aversive stimuli in examining the effects of the experience of noncontingency in humans have used either electric shock or high intensity sounds. Unlike the animal studies, however, none of these studies has properly examined the role played by stimulus intensity in determining the effect on performance of prior experiences of noncontingency. One reason for this may be the initial prevalence of the belief that the interference effect of experiencing noncontingency was independent of stimulus intensity. Nevertheless, two studies (Barber & Winefield, 1987; Krantz, Glass & Snyder, 1974) have compared sound intensities, if only to a limited degree. They contrasted the effects of high and low intensity treatment sounds, but with the test tasks having the same intensity sounds as the treatment tasks. These experiments are described in more detail below.

Krantz, Glass & Snyder (1974) compared the effects of very high intensity sounds of 107 dB(A) with moderate intensity sounds of 78 dB(A). The treatment task involved two rotating knobs, with the test task being a hand-shuttle. Two groups in each intensity were run: an escapable group, and a yoked inescapable group. The experimenters found a significant difference between the escapable and inescapable groups for each of the sound intensities. However, this difference was larger with moderate intensity sounds than with high intensity sounds, with the overall performance of the high intensity groups being somewhat better than that of the moderate intensity groups. The high intensity groups also showed higher levels of skin conductance, and regarded the study as more important, than did the moderate noise intensity groups. The authors suggested that the high intensity sounds were sufficiently aversive to overcome the effects of the noncontingent treatment and that the subjects in this condition may have been more motivated to escape the sounds. They also claimed that such a motivational interpretation was not consistent with stress-arousal explanations of the effects of experiencing noncontingency, which would predict greater levels of interference with high intensities than with moderate intensities. They concluded that stress, as determined by the intensity of noise, did not facilitate the production of helplessness and its behavioural consequences. However, they also noted that although performance deficits can be observed under both high and low intensities of noise, there could be no assurance that the behavioural consequences of experiencing noncontingency are unaffected by the intensity of the noise. In fact, the results suggested that the aversive properties of noise tend to reduce differences between the contingent treatment and noncontingent treatment groups.

In their second experiment, Krantz et al. used two treatment tasks instead of just one. The original treatment task was followed by a task requiring subjects to flip a number of switches to offset the sound. This time, only high intensity sound was used. The total number of trials for the two tasks was made equivalent to the total number in the first experiment. Any differences in performance between this and the first experiment could therefore be attributed to the increase in the number of treatment tasks, rather than to an increase in the level of exposure to noise. The results showed that performance of the test task between the contingent and noncontingent groups was greater than in the first experiment. The authors concluded that the experience of repeated failure overcomes the possibly motivating properties of highly aversive noise. Indeed, two-thirds of the noncontingent subjects gave up trying to escape from the sounds.

The other study that has compared different intensities of sound is that of Barber & Winefield (1987). They compared the effects of a high intensity sound administered in both treatment and test tasks, with that of low intensity sound administered in both tasks. The treatment task involved only a single button, while the test task involved two buttons. The level of motivation of the subjects were measured using the Personal Interests Inventory. The experimenters found that highly motivated subjects were more affected by noncontingency between responses and offset of the low intensity sound than were subjects who scored low on motivation. However, with the high intensity sounds performance deficits were found in both groups, regardless of their motivation scores. The authors speculated that the high intensity sound may have increased the urgency of the low motivation subjects to control the sound, stimulating them to higher levels of activity. In having a higher level of activity, these subjects were more likely to perceive the noncontingency between responses and outcomes. However, these speculations were not backed up with further data analyses.

The studies described above had compared the effects of using high intensity sound in both treatment and test tasks with the effects of using low intensity sound in both tasks. No experiments have compared other combinations of sounds. To get some idea of the possible effects of administering high/low intensity and low/high intensity stimuli, it is necessary to draw upon collective evidence from a number of different experiments.

When a high intensity stimulus is used in the treatment task, and this is followed by a low intensity stimulus (or even no stimulus), performance debilitation following exposure to noncontingency is observed. For instance, Hiroto & Seligman (1975) employed a treatment task in which subjects were required to offset a high intensity sound using a single button. The test task involved anagrams, but with no sounds at all. As expected, there were no differences between the contingent-treatment group and the no-treatment group, whereas the noncontingent treatment group performed significantly worse than each of the other groups. Other studies have found similar results using similar tasks (Alloy, Peterson, Abramson, & Seligman, 1984; Barber & Winefield, 1987; Gatchel, Paulus & Maples, 1975; Tennen, Drum, Gillen & Stanton, 1982; Tennen, Gillen & Drum, 1982).

Regarding evidence of the effects of low treatment stimuli followed by high test stimuli, once again it is necessary to refer to the series of experiments reported by Hiroto & Seligman (1975). They used Levine-type problems in the treatment task with no sound, followed by a hand-shuttle test task requiring escape from a high intensity sound. Performance deficits were obtained in the noncontingent treatment group. Other studies have also found test task performance debilitation using similar tasks (Jones, Nation & Massad, 1977; Kofta & Sedek, 1989; Prindaville & Stein, 1978; Stein, 1980; Thornton, 1982; Sedek & Kofta, 1990).

From the above experiments it would appear that the intensity of a stimulus does influence the magnitude of the performance deficits following experience of noncontingency. The literature on animal experiments indicates that treatment and test intensities interact in influencing performance deficits. However, no study as yet has systematically compared the effects of different intensities of stimuli using human subjects. An attempt is made to address this in this thesis.

INDIVIDUAL DIFFERENCES

Bridgman, Snyder & Law (1981) used a factor analytic approach to study the effects of noncontingency in a treatment task in which a single button needed to be pressed 4 times to escape a 90 dB(A) sound. The test task was a concept learning task in which subjects had to identify the underlying commonality in a series of shapes varying on 4 dimensions. It was found that the experience of noncontingency tended to interfere with concept identification, either by impairing hypothesis development or by inhibiting response selection. However the impact of the noncontingency differed greatly between individuals. The authors suggested that such large individual differences could account for the conflicting findings in the literature. Indeed, there is growing evidence that performance deficits following exposure to noncontingency are also significantly influenced by individual differences. Some of these include:

i) Achievement motivation
  - High achievement-motivated individuals tend to exhibit facilitated performance following experiences of noncontingency, whereas low achievement-motivated subjects show little or no debilitation (Jardine & Winefield, 1981).

ii) Intelligence
  - Individuals with higher IQ tend to be more susceptible to the effect of uncontrollability than are those with lower IQ (Winefield, Barnett & Tiggemann, 1984).

iii) Pre-experimental experiences

- Pre-experimental experiences may render individuals either helplessness-resistant or helplessness-prone (Allen & Wuensch, 1993; Thornton, 1982).

iv) Sex of the individual

- Females are more affected by failure than males (Dweck & Bush, 1976; Dweck, Davidson, Nelson & Enna, 1978; Dweck & Reppucci, 1973; Hirt & Genshaft, 1981; Wilson, Seybert & Craft 1980).
- Males are more affected by failure than are females (Petiprin & Johnson, 1991; Samuel, Baynes & Sabeh, 1978)
- There is no difference between the sexes (Breen Vulcano & Dyck, 1979; Tiggemann & Winefield, 1987; Winefield & Tiggemann, 1978).
- Any differences may be the result of sex-role identity and not a person's sex *per se* (Baucom, 1983; Baucom & Danker-Brown, 1979, 1984). Alternatively, performance differences may stem from perceived differences in the value of avoiding a 'label' of low ability (Miller, 1986).

v) Introversion

- Introverts are more affected than are extroverts (Tiggemann, Winefield & Brebner, 1982).

vi) Personality

- Individuals with Type-A personalities are more impaired than are Type-B personalities (Glass, 1977; Krantz, Glass & Snyder, 1974).
- Subjects who are administered insoluble problems and are subsequently categorised on the basis of their test task performance (i.e. performance debilitation, facilitation, no effect) show differences in personality profiles (Winefield & Rourke, 1991).
- Extrinsically motivated subjects are more affected than are intrinsically motivated subjects (Boggiano & Barrett, 1985)

vii) Locus of control

- Externals are more affected than are internals (Albert & Geller, 1978; Cohen, Rothbart & Phillips, 1976; Hiroto, 1974; Pittman & Pittman, 1979).
- Internals are more affected than are externals (Gregory, 1978; Gregory, Chartier & Wright, 1979; Hirt & Genshaft, 1981; Pittman & Pittman, 1979).
- There is no difference (Adams & Dewson, 1982).
- Subjects high in resourcefulness, i.e. with an extensive repertoire of self-controlling behaviours, are not debilitated by an experience of noncontingency, whereas those with low resourcefulness are (Rosenbaum & Ben-Ari, 1985; Rosenbaum & Jaffe, 1983).

viii) Response to frustration

- Intrapunitive subjects (i.e. those who respond to frustration by blaming themselves) are more affected by failure than are extrapunitive subjects (i.e. those who respond to frustration by attacking the external frustrating agent). On the other hand, Intrapersistent subjects (i.e. those who try to reach a goal through their own forces) show facilitation of test task performance (Dor-Shav & Mikulincer, 1990).

ix) Attributional Style

- People who habitually make internal, stable and global attributions for failure or uncontrollable events are said to have a 'depressive explanatory style' which makes them more likely to exhibit debilitated performance following failure and more prone to depression (Anderson, 1983; Kammer, 1983; Mikulincer, 1986a; Mikulincer & Nizan, 1988; Peterson & Seligman, 1984; Peterson & Villanova, 1988; Seligman, Abramson, Semmel & von Baeyer, 1979)

Because it is difficult to control for all possible influences on the individual in an experimental situation, individual differences will account for a good deal of the variability found in helplessness experiments. When one considers that in many of the studies described in this chapter the difference in test task performance between the contingent treatment and noncontingent treatment groups is small, albeit statistically significant, and that the direction of the differences is so readily altered by a large number of factors, it raises some doubt about the explanatory power of the learned helplessness theory. After all, apart from a small number of experiments performed by Glazer and Weiss (described in the review of alternative explanations in the next chapter), no other experiments have so dramatically demonstrated the learned helplessness effect as those experiments performed by Seligman and his colleagues using severe electric shocks with dogs.

It is also evident from the present review that learned helplessness theory has generated a considerable amount of research, much of it purporting to be in support of the concept. However, the large array of discrepancies in the research literature has inevitably led to a number of alternative explanations. Any review of learned helplessness theory would be incomplete without describing these alternative explanations, and hence they are presented in the next chapter.

Chapter Four:

Alternative Explanations

Any theory that is generated as a description of a phenomenon, regardless of its complexity, remains merely a description unless it can make predictions that can be supported by evidence. Many studies have provided such evidence for the learned helplessness theory. However, as described in the preceding chapters, there has also been a considerable body of research that has presented results which are not easily explained by the theory. This conflicting research had necessitated the theory's reformulation by Abramson, Seligman & Teasdale (1978). Inevitably, however, the large volume of research generated has also been accompanied by alternative explanations of the phenomenon. This chapter presents these different views.

Because the initial learned helplessness experiments used shock stimuli, many of the early alternative explanations focused on the detrimental effects that these stimuli had on the subjects involved. Later experimentation with humans instigated explanations based on a myriad of psychological factors, for example, self-esteem and locus of control. The first five sections of this chapter describe the explanations that have been derived from the animal research, while the remaining sections deal with those explanations that have principally been concerned with the human context. This distinction is made because although most explanations derived from animal experiments can also be applied to humans, the converse is not always possible. This is particularly true of explanations which rely on attributional constructs, such as self blame and ego-defensiveness, which cannot readily be shown to exist in other species.

ADAPTATION TO THE STIMULUS

Overmier & Seligman (1967) offered alternative explanations to account for the results of their experiment. One of these was that continued exposure to a shock stimulus may lead subjects to adapt to it, and thereby not be sufficiently motivated to escape the shock when the opportunity is presented in a later situation. Overmier & Seligman argued that this cannot be the case as they had found that when the intensity of the test task shock was increased there was no significant difference in performance (although it should be pointed out that there was indeed a noticeable reduction in performance debilitation). They also argued that if adaptation to the stimulus is a factor in the effect, both escapable and inescapable shocks should lead to the same level of adaptation and therefore to the same level of performance in a test situation. In a subsequent experiment performed by Seligman & Maier (1967) this was shown not to occur.

LEARNED INACTIVITY

A number of experimenters noted that the activity level of the animal exposed to the stimulus frequently decreased following the onset of a shock stimulus (Anisman, De Catanzaro & Remington, 1978; Glazer & Weiss, 1976b). It was proposed that, because the termination of the shock stimulus often coincided with inactivity in the animal, the animal learned to be passive. However, this argument was weakened by the finding that rats exposed to short durations of inescapable shock did not perform any differently in a test task from rats exposed to long durations of inescapable shock (Altenor, Volpicelli & Seligman, 1979; Kelsey, 1977). Furthermore, the learned inactivity explanation suggested that subjects which have learned to be inactive when treated with inescapable shock should exhibit facilitated performance in a test task requiring a low-activity escape response and debilitated performance in a test-task requiring a high-activity escape response. Although Glazer & Weiss (1976a, 1976b) did indeed find facilitation of performance of a low-activity escape response, a replication by Samuels, DeCola & Rosellini (1981) failed to do so. In addition, Maier (1970) had earlier shown that the performance of dogs was not debilitated in a test task requiring high levels of activity when this task followed a treatment task that required the animals to be inactive in order to escape shock. On the other hand, studies with rats have failed to replicate these findings (Anderson, Crowell, Cunningham & Lupo, 1979; Crowell & Anderson, 1979; Nation & Matheny, 1980) and instead were interpreted as lending support for the 'competing motor response' explanation, described in the next section. Other evidence against the learned inactivity explanation was provided by Kirk & Blampied (1985) who found that test task activity levels in rats following exposure to inescapable shock was directly related to the level of activity in the treatment phase, while Job (1989) found that rats exposed to uncontrollable food were no less active in the treatment phase nor in a subsequent extinction phase, than were rats given response-contingent food.

COMPETING MOTOR RESPONSES

This explanation had been put forward as an alternative to the learned helplessness theory by a number of authors (e.g. Anisman & Waller, 1973; Bracewell & Black, 1974; Glazer & Weiss, 1976a), although the concepts were formulated before the advent of the theory (i.e. Carlson & Black, 1960; Dinsmoor & Campbell, 1956a; Mullin & Mogenson 1963). Essentially, it proposes that the subjects may learn to make certain responses which will reduce the experienced severity of the shocks. These responses may include simple reactions such as the tensing of muscles or jumping off the floor, and subsequently interfere with the learning of different responses required for escape from shock in later situations. A variation of this was the suggestion that exposure to shock induces changes in an organism's response repertoire. As 'freezing' is the behaviour adopted by most organisms when there is no other coping response available, this behaviour would thus compete with the appropriate response in an escape/avoidance test task (Anisman, 1973; Anisman & Waller, 1973).

One of the experiments performed by Overmier & Seligman (1967) has been cited as evidence against the 'competing motor response' explanation. They had found that dogs which had their skeleto-muscular systems immobilised with curare, and were thereby rendered incapable of performing any motor responses which might somehow lessen the effect of inescapable shock, still exhibited performance deficits in an escapable shock test task. Furthermore, Lawry, Lupo, Overmier, Kochevar, Hollis & Anderson (1978) found that the activity levels of both dogs and rats in a treatment phase involving shock was not directly related to their subsequent performance debilitation in the test task. Finally, Maier & Seligman (1976) asked why would inescapable shock, but not escapable shock, produce freezing in rats. They also stated that these explanations cannot account for the performance deficits found with uncontrollable appetitive stimuli, nor for the effects produced with humans exposed to loud noises or insoluble problems. Regarding the effects of uncontrollable appetitive stimuli administered in the treatment phase, Job (1989) suggested that learned helplessness theory would predict that having an extinction phase after the treatment would not affect the level of performance debilitation evident in the test task, while the competing response theory would predict that the extinction phase would extinguish any competing responses and would thereby reduce the level of performance debilitation in the test task. Subsequently, Job showed that test task performance debilitation was not reduced following the extinction phase. However, as the activity levels of the rats exposed to noncontingent reward were no different to those rats exposed to contingent rewards, he concluded that the results supported only the cognitive deficit predicted by learned helplessness theory, and not the motivational deficit.

As indicated in the preceding section, a number of studies failed to replicate the findings of Maier (1970) using rats instead of dogs (Anderson, Crowell, Cunningham & Lupo, 1979; Crowell & Anderson, 1979; Nation & Matheny, 1980) and claimed support for the competing response explanation over the learned helplessness explanation. However, Balleine & Job (1991) pointed out that the length of time that subjects were required to be inactive for a successful response in the treatment phase in the Maier study was a maximum of 3 seconds, whereas in the other studies this was a maximum of 15 to 20 seconds. Accordingly, Balleine & Job compared the short and long duration response requirements and found that whereas with a short response the NCT group performed significantly worse in a shuttle test task than did the CT and NT groups, with a long response there was no interference effect, with the CT group performing significantly worse than the other two groups. In further analyses of the data it was revealed that test phase performance was a linear function of the level of inactivity of the subjects in the treatment phase, and not a function of response-outcome contingency. Hence, the short duration of inactivity required by the experimental procedure in the Maier study resulted in lower levels of interference in the CT group than in the NCT group, whereas the longer duration of inactivity in the other studies resulted in greater interference in the CT groups.

A more recent development of the competing motor response hypothesis has been the proposal that behaviours associated with fear invoked by the experience of inescapable shock in the treatment phase transfer to the test phase and compete with the acquisition of the appropriate escape response (Minor, 1990; Minor, Dess & Overmier, 1991; Overmier, 1988).

MOTOR ACTIVATION DEFICIT

The motor activation deficit hypothesis (Glazer & Weiss, 1976a, 1976b; Weiss & Glazer, 1975; Weiss, Glazer & Pohorecky, 1976) attempted to explain the effects of intense shock by proposing that the behavioural deficit caused by exposure to such shock was the result of a temporary disturbance in central neurotransmitter activity. It had been noted by Weiss, Krieckhaus & Conte (1968) and Miller & Weiss (1969) that the performance deficit found by Overmier & Seligman (1967) disappeared within 48 hours. Such a rapid dissipation of an escape-avoidance deficit is not characteristic of learning, as learned responses are generally more persistent. However, later work found long-term interference with learning after exposure to low levels of shock (e.g. Seligman, Rosellini & Kozak, 1975). Consequently, Glazer & Weiss (1976a) proposed that in some situations there may indeed be an avoidance-escape deficit based on learning, but this is most likely the learning of competing behaviours in the test task i.e. learned inactivity. They found that rats given high levels of shock in the treatment exhibited performance deficits 30 minutes later, but other rats did not exhibit these deficits 72 hours later. Conversely, rats given low levels of shock exhibited deficits 72 hours later, but not 30 minutes later. The authors claimed that this was evidence for two types of effects, namely, long-term and transitory deficits.

Maier & Seligman (1976) conceded that the motor activation deficit hypothesis was a correct interpretation of the Weiss et al data. In fact, they stressed that they had not proposed that the learned helplessness hypothesis could account for these findings, which portrayed a different phenomenon from that observed in the helplessness studies. They stated that such physiological processes may well exist and influence behaviour in ways similar to that found in learned helplessness. Indeed, experimental evidence of the possibility of there being two independent mechanisms accounting for the performance deficits, one resulting in an activity deficit (e.g. neurotransmitter depletion) and the other resulting in an associative deficit (i.e. learned helplessness) was presented by Maier & Jackson (1979).

LEARNED IRRELEVANCE

Mackintosh (1973) proposed that organisms learn which elements of their environment are irrelevant to the prediction of reinforcement. Consequently, the salience of these elements is diminished. With sufficient exposure, events which are unimportant to reinforcement become ignored. Should they later be made predictive of reinforcement, the learning of the association between the events and reinforcement would be debilitated.

This position differs from that of helplessness in that it specifies that only those events which already have been experienced in a non-predictive situation will be affected. The learning of relationships between new events and reinforcements should be unaffected. On the other hand, learned helplessness theory states that the learning of response-outcome independence may generalise to other situations that are different from those experienced in the initial treatment. The difference between the hypotheses could be regarded as specific versus generalised irrelevance.

Some support for the learned irrelevance hypothesis was provided by Baker (1976). Rats were rewarded with food for bar-pressing on a VI schedule of reinforcement. While responding on their baseline levels of performance, some of these rats were administered unsignalled inescapable shocks. Next all subjects received signalled punishment training in which response-contingent shocks were administered. It was found that those rats which had originally received inescapable shocks took longer to learn to suppress responding to the signal than did rats which had not received inescapable shocks. Furthermore, as inescapably shocked rats pressed the bar longer than did those not exposed to such shock, it was suggested that exposure to inescapable shock does not necessarily lead to an activity deficit. Similar results were found by Jackson, Maier & Rapaport (1978).

Other evidence of learned irrelevance was provided by Lee & Maier (1988) who found that inescapable shock interfered with the acquisition of a positional discrimination response in a water-escape task when an irrelevant cue was present, but not when it was absent. When the same cue was made relevant to the discrimination, performance of the appropriate response was facilitated. The authors suggested that exposure to inescapable shock reduces attention to internal response-related cues.

Finally, not only do animals exposed to uncorrelated presentations of the US and CS show interference with the future learning that the relevant stimuli are indeed correlated, but this proactive interference has been shown to generalise to a novel CS (Dess & Overmier, 1989; Overmier & Wielkiewicz, 1983), while DeCola & Rosellini (1990) claimed that a lack of interference found in rats acquiring a Pavlovian discrimination when offset of inescapable shock was signalled by light onset, even though interference was evident when offset was not signalled, lends further support to the learned irrelevance hypothesis.

CONDITIONED INATTENTION

Lubow & Moore (1959) found that performance in a task requiring a response to a particular stimulus was debilitated following repeated prior exposure to the same stimulus without reinforcement. Lubow, Weiner & Schnur (1981) suggested that conditioning to such a stimulus is retarded because the organism learns <u>not</u> to attend to it. They proposed the 'Conditioned Attention Theory of Latent Inhibition'. This theory regards attention itself as being a response, which increases when it is followed by reinforcement and decreases when it is not. With repeated exposure of a target stimulus the attentional response to it declines. However, the attentional response will increase if it is followed by a second stimulus that itself elicits an attentional response (i.e. conditioned attention). On the other hand, if the target stimulus either is followed by a second stimulus that no longer elicits an attentional response itself, or is not followed by any particular stimulus, attention to that target stimulus decreases.

This decrease in attention is also said to be conditioned to the target stimulus (i.e. conditioned inattention).

Lubow et al. described the typical experimental paradigm employed in learned helplessness experiments as one in which inattention to a target stimulus, such as loud noise or electric shock, is conditioned and consequently reduces its associability with an appropriate escape response in the subsequent test task. Direct comparisons between conditioned attention and learned helplessness explanations have been carried out by using the usual triadic design, but with the inclusion of a fourth group of subjects receiving noncontingent stimuli followed by a light stimulus. Experiments using rats exposed to electric shock (Lubow, Weiner, Rosenblatt, Lindenbaum & Margolit, 1979, cited by Lubow et al, 1981) and humans exposed to loud noise (Barber & Winefield, 1986b; Lubow, Rosenblatt & Weiner, 1981) have confirmed that there is no performance debilitation observed in this fourth group.

One prediction explicitly made by conditioned attention theory is that inattention to a target stimulus will be a positive function of the intensity of the stimulus. Indeed, Barber & Winefield (1986b) found that performance deficits with high intensity noise were greater than with low intensity noise. However, conditioned attention theory also predicts that these performance deficits should be eliminated if a second stimulus is paired with the target stimulus. Support for this notion was found by Barber & Winefield when they presented a light stimulus immediately after a high intensity sound, although performance deficits were <u>not</u> eliminated when the light followed a low intensity sound. Furthermore, it should be noted that these subjects were required to passively listen to the sounds in the treatment task. When the treatment task involved <u>active</u> attempts to escape the sounds, performance deficits were not eliminated by the presence of the light stimulus. This occurred regardless of the intensity of the sound. The authors suggested that the performance deficits found in typical learned helplessness experiments may be attributable to more than one mechanism, and that ". . .

learned helplessness and conditioned inattention are separate phenomena that do not occur in the one experimental procedure" (p.245).

The fact that conditioned inattention theory makes similar predictions for both animals and humans (Lubow, Weiner & Schnur, 1981) makes it an attractive alternative to learned helplessness theory. However, in addition to the conflicting results reported by Barber & Winefield, the findings that conditioned inattention does not readily generalise to new situations (Lubow, 1973; Lubow, Caspy & Schnur, 1982) and that experimental procedures in such experiments produce smaller performance deficits than learned helplessness procedures (Lubow, Caspy & Schnur, 1982) indicate that conditioned inattention may be a separate mechanism to that of learned helplessness.

TEST ANXIETY

Lavelle, Metalsky & Coyne (1979) proposed that an alternative explanation for the effects of experiencing failure in human subjects is 'test anxiety' (i.e. Doris & Sarason, 1955; Mandler & Sarason, 1952; Sarason, 1975). The theory predicts that high test-anxious subjects are affected by the manipulations in helplessness experiments, and particularly by failure instructions, because they are inclined to blame themselves for poor performance. High test-anxious subjects engage in activities that are attentionally demanding and that centre upon themselves. These self-preoccupied activities may take the form of indecision in the face of a number of choices and/or excessive worry about the subjects' own performance and that of others. Test anxiety theory differs from learned helplessness theory in that it postulates that the deficit following failure is attentional in nature, whereas the latter postulates that deficits result from the perception and expectation of noncontingency.

An experiment performed by Lavelle et al (1979) to test the theory found that high test-anxious subjects who experienced noncontingency between their responses on a single button and the offset of a high intensity tone performed significantly worse on an anagrams test task than did high test-anxious subjects who experienced contingency. Furthermore, as the experimenters expected, low test-anxious subjects who had experienced noncontingency in the treatment task performed no differently in the test task from those subjects who had experienced contingency.

In a subsequent study, Coyne, Metalsky & Lavelle (1980) obtained performance deficits in an anagrams test task following a treatment task which involved inescapable noise. However, test task performance was significantly improved when subjects were given an intervening attentional redeployment task which consisted of imagining mountain scenery, although this was only effective when a reason for the exercise was given (e.g. that the task was effective in helping people to cope with stress by quieting physiological activity, and thus permitting greater efficiency in problem-solving). Subjects who were not given a reason, and were simply told to carry out the exercise, did not show any lessening of performance deficits. Similarly, Mikulincer & Nizan (1988) found that when subjects were required to focus on the task at hand, by concentrating on task-relevant cues, performance debilitation was eliminated.

Silver, Wortman & Klos (1982) also took the view that anxiety may be an underlying factor in the occurrence of performance deficits following experiences of uncontrollability or failure, and stated that this anxiety may interfere with a subject's ability to process information relevant to successful task performance or that anxiety may lead the individual to make competing responses that may interfere with one another.

Barber & Winefield (1986a) suggested that to examine adequately the test anxiety theory, an additional group of subjects should be given the perception that they have no control over the outcomes, while at the same time ensuring that do not have a perception of failure. Test anxiety theory predicts that such subjects would show no performance deficits in the test task. On the other hand, learned helplessness theory predicts that such subjects would indeed exhibit performance deficits in the test task, with these deficits being the direct result of the subjects' exposure to the uncontrollable outcomes regardless of whether or not the outcomes have involved failure. Accordingly, Barber & Winefield administered different instructions to each of three insoluble problem groups. The subjects were told either that successful responses in the Levine-type problems of the treatment task would terminate a moderately loud noise for the remainder of the task (expectation of success + expectation of control). A second group was told that the noise would remain regardless of whether or not they were successful in the problems (expectation of success + no expectation of control). The third group was told that the task was a guessing game with no pattern or solution to the problems (no expectation of success + no expectation of control). Test anxiety theory would predict that only the first two groups should exhibit performance deficits in the test task when compared to a no-treatment group, whereas learned helplessness theory would predict that all three groups should show performance deficits. What was subsequently found was that there was no significant difference between the three groups, and that the performance of these groups was significantly worse than that of the no-treatment group. The experimenters concluded that the results were not consistent with test anxiety theory. In addition, attributional measures of performance in terms of controllability and internality for all insoluble problem groups were above the centre point on the rating scales, indicating that the subjects felt in control to some extent. The experimenters concluded that such a result also has serious implications for learned helplessness theory because of this theory's reliance upon the perception of uncontrollability.

Lavelle, Metalsky & Coyne (1979) attempted to resolve the issue of whether performance deficits are due to learned helplessness or to test anxiety by using test tasks differing in attentional demands. Test anxiety theory predicts that, because of the limited information processing capacity of any individual, when that individual's attention is deployed in a task-irrelevant pre-occupation with the self following an uncontrollable treatment task there is less information processing capacity available for use in the test task. Therefore, the amount of performance debilitation, as measured in terms of the difference in test task performance between the contingent and noncontingent treatment groups, will be proportional to increases in the attentional demands of the test task. Any difference between the groups should increase as the complexity of the test task increases. Learned helplessness theory, on the other hand, proposes that performance deficits are the direct result of expectations of future uncontrollability derived from the experience of uncontrollability in the treatment task. The type of test task used should not be a factor in the occurrence of the deficits. Therefore, it predicts that the performance debilitation should not vary with test task complexity. The experiments reported in Chapter 9 of this thesis attempt to resolve this issue.

Mikulincer (1989a) examined the effect of test task complexity. Test anxiety theory predicts that test task performance debilitation should increase as the attentional demands of the task increase, because off-task cognitions would compete with attentional resources. On the other hand, simple test tasks would result in lower performance debilitation as the attentional resources available would be sufficient for adequate performance. Accordingly, Mikulincer administered insoluble Levine-type problems followed by a visual search task where subjects had to search through a matrix of letters for either 2, 4 or 6 target letters. The author grouped subjects into low and high proneness to cognitive interference, and found that high proneness subjects made more errors in the test task than did low proneness subjects even though there was no difference between the groups in the amount of scanning activity. Furthermore, accuracy in the six-letter problem for the high proneness group was worse than in the low proneness group. Finally, off-task cognitions were significantly correlated with performance, with performance being worse the more off-task cognitions that were made. However, a problem with the experiment is that although Mikulincer assumed that these off-task cognitions are associated with poor performance in the test task, it is unknown whether the subjects actually had these off-task cognitions, or else whether they just said they did. They may have been prompted by the questions to adopt the off-task cognitions as an excuse for their poor performance. Yet their poor performance may have been caused by other factors. It maybe better to ask questions concerning off-task cognitions as well as questions dealing with other potential causes. If off-task cognitions are important, they should score higher than the other possible factors.

SCHEDULE-SHIFT EFFECT

McReynolds (1980) suggested that learned helplessness could be explained in terms of a 'schedule-shift effect', in that subjects who have been given noncontingent outcomes fail to detect a change in the contingencies when placed in the test task situation. This failure is brought about by a low rate of responding that is characteristic of the latter part of the treatment task. Consequently, if these subjects are placed in a new situation in which there is now contingency between responses and outcomes, their performance may be retarded because their current low level of responding would not allow them to be exposed to the change in contingency schedules. In fact, they would not even know that the contingencies have changed. Poor test task performance may therefore not be attributable to an inability to learn the new contingency, as is suggested by learned helplessness theory, but may simply be an unawareness of the change.

An additional consideration regarding this explanation is the fact that in most learned helplessness experiments the similarities of the treatment and test phases usually outweigh their differences. Even when different tasks are employed in each of the phases, more often than not they are administered by the same experimenter, in the same room, and as part of the same experiment. Because of this the subjects may not even consider the possibility of a change in contingencies.

McReynolds claimed support for the schedule-shift explanation by referring to studies which had employed distinctly different training and test situations and which did not exhibit test task performance deficits (e.g. Roth & Bootzin, 1974). McReynolds also cited an earlier experiment by Stegman & McReynolds (1978) as supporting evidence. In this study, three groups of subjects were given a treatment task consisting of 50 trials in which they were required to press a single button to offset a loud sound. For one of these groups offset of the sound was contingent on their responses, with correct responses receiving a white 'success' light. The other two groups were yoked to the contingent group for sound offset, with one receiving the same pattern of success feedback and the other receiving no feedback at all. This last group was said to match the noncontingent groups employed by Hiroto & Seligman (1975). A fourth group received no treatment. The test task consisted of 10 additional trials of the same task, and followed immediately after the treatment trials. The contingent group was placed on an extinction procedure, whereas the other three groups were given response-contingent trials in which 4 button-presses succeeded in offsetting the tone. The experimenters found that the two noncontingent groups had very low rates of responding in the last 10 trials of the treatment phase, and that their test task performance was worse than that of the no-treatment group. In addition, 6 of the 10 subjects in the noncontingent feedback group developed 'superstitious' responding, most often expressed in the mistaken belief that the correct response was a certain number of presses e.g. one press. Persistence in such superstitious responding ensured their poor performance in the test task.

A major flaw in the above study was that there was no distinctive break between treatment and test phases. The subjects would have assumed that they were being given only one task and, as a result, it is hardly surprising that they did not perceive the change in contingencies. On the other hand, most experiments on learned helplessness involve a clear separation between treatment and test tasks. This occurs even when the treatment and test phases involved a similar task.

Finally, in commenting on McReynolds' explanation, Maier (1980) stated that he failed to see the force in the argument, as ". . . virtually any experiment that involves the presentation of rewards or punishments and has two or more phases involves, at some level, a schedule-shift" (p.178), and therefore there is nothing to gain by calling the effect a schedule-shift.

MOTIVATIONALLY-INDUCED PERSISTENCE

Levis (1980) argued that motivationally-induced persistence, as proposed by Amsel (1972), can better explain the effects of experiencing noncontingency than learned helplessness theory or McReynolds' (1980) schedule-shift hypothesis. Basically, the theory states that responding in one situation becomes more resistant to change as a result of the new situational stimuli counter-conditioning to the original response. With a relatively small number of response choices, the effects of this counter-conditioning are expected to be manifest through behavioural fixation (or persistence). This fixation is tied to a disruptive emotional event such as frustration, fear or hostility. Levis claimed that frequent findings in the learned helplessness literature of increases in hostility and frustration in subjects lends support to his hypothesis.

Boyd (1982) also argued from the stimulus-response position of Amsel: "Increased frustration, anxiety and hostility are typical responses to frustrative non-reward. Therefore, one might hypothesise that the learned helplessness effect represents performance disruptions caused by the increased motivational effects of frustrative non-reward as opposed to developing cognitive expectations of uncontrollability" (p. 740). Boyd set out to test this S-R interpretation of the learned helplessness data by predicting that, over a prolonged exposure to uncontrollable events, subjects will fixate on stereotyped response patterns. Accordingly, he administered high intensity noise to four groups of human subjects required to offset the noise by naming the relevant one of four light stimulus dimensions. For one group, offset of the noise was contingent on responses, while a second group received uncontrollable noise according to a predetermined randomised schedule consisting of 50% 'success' feedback. The remaining two groups were yoked to either of these groups. Boyd found confirmation of his predictions, in that all three noncontingent groups showed a non-random pattern of responding in the treatment task with just over two-thirds of their responses being fixated on one of the four stimulus dimensions.

Boyd also reasoned that behavioural persistence in the treatment task would expose the 'uncontrollable' group to intermittent schedules of reinforcement, thereby allowing for frustration-produced stimuli to be counter-conditioned to the fixated response. If these subjects are then given an identical subsequent test task in which the correct response is a different stimulus dimension from that in the treatment task (i.e. controllable group) or to the fixated response in the treatment task (i.e. uncontrollable groups), the performance on this task should be directly related to the degree of persistence exhibited in the treatment task. Boyd provided confirmation of this prediction with the finding of a significant negative correlation between treatment task persistence and test task performance.

Finally, the motivationally-induced persistence model would predict that if the range of the 'correct' feedback in the test task is increased to incorporate not only 100% of all responses to the new stimulus dimension but also 50% of the responses to the previously fixated stimulus dimension, the frustration-produced stimuli associated with the fixated stimulus should be reduced. As a consequence, the behavioural persistence, and therefore the subsequent test task performance deficits, would also be reduced. On the other hand, learned helplessness theory would predict that performance deficits in this instance should increase, as the test task would be relatively more difficult to learn than when only responses to the new criterion stimulus are being reinforced. The results of the experiment showed that although test task performance of the controllable group decreased, there was no change in the performance of the uncontrollable groups. Overall, Boyd concluded that the results supported the frustration hypothesis and questioned the generality and applicability of the learned helplessness hypothesis.

REACTANCE

Wortman & Brehm (1975) attempted to integrate learned helplessness theory with the reactance theory of Brehm (1966, 1972). The basic tenet of reactance theory is that when a person's behavioural freedom is threatened, he/she will experience emotional arousal, referred to as reactance, which leads the individual to try to restore his/her freedom. The theory makes specific predictions about how people will evaluate uncontrollable situations. The amount of reactance experienced by an individual will increase with increases in the following: the expectations of freedom; the strength of the threat to the freedom; the importance of the threatened freedom; and the implication that the threat has for the person's other freedoms. The result of a person experiencing reactance is: a) an increase in attractiveness of the uncontrollable outcome; b) an attempt to restore control by engaging in the threatened behaviour or by engaging in behaviours that resemble it; and c) hostility and aggression towards the cause of the uncontrollability.

Moderate amounts of uncontrollability lead to reactance and result in attempts to maintain control. This reactance is greater if the outcome has a high level of importance to the individual. However, as the level exposure to uncontrollability increases the individual's expectation of control will decrease, leading to helplessness. The greater the importance of the outcome to the individual, the greater will be the experience of helplessness.

Wortman & Brehm suggested that poor performance in a test task does not necessarily reflect a condition of helplessness. Indeed, a reinterpretation of the helplessness literature indicates that subjects said to be exhibiting helplessness, in terms of poorer performance in a test task, could in fact be experiencing psychological reactance and are attempting to reassert control over the situation by behaving in a negative or hostile manner. The large number of studies which have reported hostility in the subjects lends support to this (e.g. Dor-Shav & Mikulincer, 1990; Gatchel, Paulus & Maples, 1975; Hiroto & Seligman, 1975; Miller & Seligman, 1975; Oakes & Curtis, 1982; Pittman & Pittman, 1979; Schmeck, 1970).

Albert & Geller (1978) found that following 80% 'success' feedback schedule in a treatment task requiring prediction of the next stimulus in a two-stimulus problem, subjects exhibiting external locus of control performed better in a serial-learning task than did those exhibiting internal locus of control. However, following only 20% 'correct' feedback, 'internals' performed better in the test task than did 'externals'. The authors suggested that this provided support for the reactance hypothesis, in that upon entering the test task situation following the 20% success feedback, 'externals' would have a general expectation of no control, whereas 'internals' would have had an expectation of at least some control.

The reactance theory suggests that the determining factor in whether helplessness or reactance will occur is the amount of exposure to uncontrollable outcomes and the importance of those outcomes. Consequently, evidence in support of the integrative model has centred on experiments which have either included instructions manipulating the importance of the experiment or have varied the number of insoluble problems administered in the treatment task. Many of these experiments have found the opposite to what would be expected from helplessness theory, namely, that subjects exposed to uncontrollable outcomes exhibit less performance debilitation than do those experiencing controllable outcomes. Some of this evidence is presented in the following sections.

Perceived Importance of the Experiment

Although not specifically designed to include importance instructions, two experiments carried out by Thornton & Jacobs (1972) have been cited as evidence for the integrative model. They used a mental ability test containing items on mathematical and verbal reasoning and perceptual organisation as the pre-treatment and test tasks, and found that when subjects in the noncontingent group was told that they could do nothing to avoid shocks in a choice reaction-time treatment task, test performance was enhanced in comparison to performance the pre-treatment task. It has been suggested that this 'intelligence test' nature of the tasks may have been a factor in the resulting performance facilitation, in that the subjects may have perceived that their level of performance in the tasks was an important indicator of their mental abilities.

A number of subsequent studies have also manipulated the subjects' perceptions of the importance of the experiment by issuing instructions that have implicitly stated that performance on the tasks was linked with intelligence or academic potential. Under these conditions, Roth & Kubal (1975) found that performance debilitation occurred in a low-importance condition but not in a high importance condition, while Hanusa & Schulz (1977) found that performance in the test task was facilitated by the high-importance instructions. However, Mikulincer (1989c) argued that the Roth & Kubal study may have confounded task importance with the 'internality' dimension of causal attribution.

Because the high importance instructions involved linking task performance with intelligence, the subjects would have felt that performance reflected their personal characteristics. Accordingly, Mikulincer gave subjects in the high-importance condition instructions that indicated that the experiment was part of an important scientific project concerning performance in educational settings, and that the results would be published and would be used in recommendations for modifying the educational system. The low-importance subjects were told that the experiment was not important and that their performance would not determine anything. Four Levine-type concept formation treatment task problems were followed by ten Ravens-type test problems. Four groups compared contingent and noncontingent outcomes with high and low importance instructions. Following the treatment task, but before the test task was administered, subjects were asked about their success expectations and their level of motivation. It was found that the high-importance groups were more motivated than the low-importance groups, while the contingent subjects had greater success expectations than did the noncontingent subjects. Although performance measures in the test task showed no difference in latencies to solution, an interaction effect between importance and contingency for the number of problems solved was obtained. The noncontingent high-importance subjects performed worst of all, whereas the contingent high-importance subjects performed best. Mikulincer claimed that the results cast doubt on explanations of learned helplessness that employ a concept of a generalised belief in uncontrollability, as both noncontingent groups had lower expectations of success than did the contingent groups, but only the high importance noncontingent group performed worse than the high importance contingent group. Furthermore, the low-importance noncontingent group appeared to perform better than the low-importance contingent group, although this difference was not statistically significant.

Conflicting results, however, were reported by Barber & Winefield (1986a). They found performance debilitation only in the high importance condition and not in the low importance condition. Hence, although their results did not support reactance theory, they also did not support learned helplessness theory.

Number of Insoluble Problems

The integrative model predicts that, as the level of exposure to uncontrollability increases, reactance is replaced by helplessness. Furthermore, with this higher level of exposure the greater the importance of the outcome to the individual, the greater will be the experience of helplessness. It follows, then, that with a small number of treatment tasks or problems, test task performance in the low-importance condition would either be unaffected or would show slight facilitation. In the high-importance condition, performance should be greatly facilitated. However, as the number of treatment tasks or problems is increased both the high-importance subjects and the low-importance subjects will exhibit performance debilitation, with the overall performance of the former being worse than that of the latter.

Roth & Bootzin (1974) provided some evidence supportive of the integrative model in relation to the amount of exposure to noncontingency. In their study the measure of 'helplessness' was the number of times that subjects stood up and/or approached the experimenter in relation to a blurred image on a computer screen that appeared on a fixed number of trials of a concept-formation problem. The authors reasoned that the standing represented controlling behaviour i.e. non-helpless behaviour. A group which was required to complete two insoluble concept-formation problems in the treatment task stood up more often, took less time to stand up, and performed better in the test task than a group required to complete only one insoluble problem. These 'insoluble' groups generally stood up significantly more and took significantly less time to stand than did the no-treatment and 'soluble' groups. This higher incidence of standing was interpreted as indicating a greater level of attempts to assert control. Subjective measures of the test task revealed that the insoluble groups felt significantly more in control of the test task, with the two-problem group feeling more in control than the one-problem group. Overall, the authors suggested that the facilitated test task performance may reflect a possible curvilinear relationship between experiences of no control and learned helplessness. Therefore, the initial reaction to noncontingency is to behave assertively in an attempt to re-establish and exercise control. It is the continued exposure to noncontingency that leads to passive, helpless behaviour. However, some doubt has to be raised about the appropriateness of the authors' interpretation by the fact that there was no significant difference between the groups. Furthermore, examination of the mean measures reveals that the performance of the insoluble groups was at least in the direction predicted by learned helplessness, namely, they performed worse than the other two groups.

Additional evidence in support of the integrative model was provided by Roth & Kubal (1975) who found that, when they administered only one noncontingent problem in the treatment task, performance debilitation occurred in a low-importance condition but not in a high-importance condition. On the other hand, when the number of treatment task problems was increased to three, performance debilitation was observed in the high-importance condition but not in the low-importance condition. Tennen & Eller (1977) suggested that the facilitation effects found by Roth & Kubal may have been due to the subjects making specific attributions for their failure in the treatment task. Hence, they replicated the experiment but added a group in which the subjects were told that the treatment problems were getting progressively harder. Their results supported those of Roth & Kubal in that the one-problem group performed only marginally better than the contingent treatment group, while the three-problem group performed worse. However, the three-problem group given 'harder' attributional cues actually performed better than the control groups, although this difference was not statistically significant. Roth & Kubal concluded that 'helplessness' effects are confounded by exposure to noncontingency and the availability of attributional cues, so that when attributions are situation-specific facilitation rather than debilitation occurs. Further evidence in support of the integrative model was provided by Pittman & Pittman (1979, 1980) who found that increasing the number of insoluble problems administered to the noncontingent treatment group changed its performance from better than the no-treatment group to worse than the same group. Similarly, Mikulincer, Kedem & Zilkha-Segal (1989) found that subjects who were administered only one insoluble concept-formation treatment-task problem exhibited facilitated performance in a memory and visual search test task, while subjects exposed to four insoluble problems exhibited debilitated performance.

Barber (1989) examined the prediction made by the integrative model that there should be a curvilinear relationship between amount of helplessness training and performance. He administered a quiet tone to subjects in both a single-button-pressing treatment task and a two-button test task. Six different conditions were used, each differing in the number of trials in the treatment task (ranging from 5 to 30 trials). Barber found that subjects experiencing the uncontrollable treatment performed significantly worse than the controllable subjects in only the 10 and 30 trial conditions, with performance in all other conditions being similar to that of the no-treatment group. He concluded that this did not support the Wortman and Brehm hypothesis, and suggested that a reaction to uncontrollability incorporates the altered hypothesis pool hypothesis (Levine, Rotkin, Jankovic & Pitchford, 1977; Peterson, 1978), and involves four stages: with few trials there is no effect; with more exposure, helplessness effects are evident when simple solutions are exhausted; with further exposure, there is recovery of motivation and exploration of further hypotheses; finally, with continued exposure, all possible solutions are deemed exhausted by the subjects and, once again, exhibit helplessness. However, it should be noted that Raps, Peterson, Jonas & Seligman (1982) found no performance debilitation using a 10-trial manipulative treatment task, but did so using a 45-trial task.

Additional support for the integrative model was demonstrated by the finding that subjects with low expectations of treatment task success performed worse in a test task than those with high expectations of success (Winefield & Jardine, 1982; Winefield & Norris, 1981). However, this was found to interact with the subjects' level of achievement motivation.

Overall, there is strong support for the notion that subjects' perceptions of the importance of the experiment and the number of response noncontingent problems administered to the subjects influences whether test task performance is either facilitated or debilitated. Hence, the integrated model of the learned helplessness and reactance theories may give a better account of the phenomenon than learned helplessness theory alone.

EGOTISM

It had been proposed by Snyder, Stephan & Rosenfield (1976; 1978) that when people experience failure, their self-esteem is threatened, particularly if the failure is attributable to their own actions and is relevant to their self-esteem. As inability to solve unsolvable problems may be perceived as failure, the performance deficit following such an experience could be the result of an S's motivation to protect self-esteem, and not the result of a lack of motivation due to an expectation of a lack of control. Self-esteem is protected by denying that the failure was attributable to any lack of ability. Rather than attributing failure to luck or task difficulty, subjects may simply not try in the test task and can therefore attribute their failure to a lack of effort. In terms of the subjects' self-esteem, this is a more acceptable reason for their performance.

Indeed, Snyder et al defined the denial of an unpleasant attribution as 'egotism' which is characterised by the tendency to take credit for good outcomes (i.e. success) and to deny blame for bad ones (i.e. failure).

When a task is described as being very difficult it becomes non-threatening to the subjects because failure can be attributed to the task rather than to themselves. If they are chronically worried about their performance, describing the task as difficult improves their performance (Karabenick & Youssef, 1968). Tang & Baumeister (1984) had suggested that task labels, such as difficult or easy, may provide some guidance in the initial interpretation of the task, but the final evaluation incorporates the personal values of the individual, such as self-esteem. Following on from this, Tang, Liu & Vermillion (1987) examined the effects of self-esteem and task instructions on task performance. Subjects who were either high or low in self-esteem were told that an anagrams task was either difficult or easy, even though they were exactly the same in all conditions. Performance on the anagrams showed an interaction with task difficulty labels and self-esteem. High self-esteem subjects performed better on the 'easy' task than on the 'difficult' task, whereas low self esteem subjects performed better on the 'difficult' task than on the 'easy' task.

A study which has been cited as evidence supporting egotism theory is that by Miller (1976) who found that subjects who were made to fail at a task which was said to be an index of social perceptiveness and were then led to believe that the task was a very valid index claimed to have exerted less effort in completing the task than did subjects who were led to believe that the task was not a very valid index.

Further support for the egotism theory was provided by Pyszczynski & Greenberg (1983) who examined the premise that subjects alter how much effort they intend to expend in a task as a defensive strategy against the possibility of having to attribute subsequent failure to their own abilities. The experimenters manipulated the instructions for a task, consisting of the Culture

Fair Test of Intelligence, in such a way that it was perceived either as high in ego-relevance (i.e. a good predictor of academic and career success) or low in ego-relevance (i.e. the scores didn't mean much). The subjects were also led to believe that they had either a high or low probability of success, and just prior to carrying out the task they were asked to rate their "reactions to Psychological tests". It was found that subjects in the high ego-relevance condition rated their intended effort as being higher when their probability of success was high as compared to when their probability of success was low. The subjects in the low ego-relevance condition did not differ, regardless of their probability of success. This ego-defensive strategy was found only when the task was ego-relevant (i.e. measuring an important ability) and success was unlikely (i.e. when the test task was difficult).

An experiment by Miller & Klein (1989) also manipulated perceptions of test task difficulty in an experiment in which an insoluble matching figures treatment task was followed by an anagrams test task. They found that subjects scoring low in ego value gave up more often in the test task when the anagrams were labelled as highly difficult than when they were labelled moderately difficult, while subjects scoring high in ego value gave up more when the anagrams were labelled moderately difficult. On the other hand, there was no interaction effect for the number of anagrams solved, with subjects perceiving high difficulty performing better than subjects perceiving moderate difficulty anagrams.

Liu & Steele (1986) gave subjects six Levine problems. A low-failure group received noncontingent feedback on the last two problems, while a high-failure group received noncontingent feedback on all problems. A third group received no feedback on their responses in all of the 6 problems. It was found that the subjects in the low failure group made more extreme attributions concerning a fictitious author. In a second experiment, this effect only occurred when the value-scale was central to the subjects' self-concept. The experimenters concluded that the attributions of the subjects were motivated by a desire to protect a positive self-image rather than to regain environmental control.

Kernis, Zuckerman, Cohen & Spadafora (1982) gave an insoluble maze treatment task to subjects. They then manipulated expectations for success in the test task by either telling subjects that performance in the test task was highly correlated with performance in the treatment (internal) or by telling them that the test task was difficult by saying that students at another university hadn't done very well. (external). The subjects were then given a figure-tracing test task. The experimenters manipulated self-awareness by placing subjects in front of a mirror while they performed the task. There was no difference between subjects with internal or external expectations in the low self-awareness condition. However, in the high self-awareness condition, subjects with external attributions persisted longer than those with internal attributions. Furthermore, there was a significant interaction between expectations and self-awareness. The authors suggested that egotism effects may be moderated by the person's degree of self-awareness.

A similar viewpoint to the egotism theory is the 'self-handicapping strategy' proposed by Berglas & Jones (1978). When people are worried about the outcomes of a future event they may change their cognitions about the event in order to avoid any negative consequences. Indeed, they may employ self-handicapping strategies as a means of avoiding any negative self attributions that would result from experiencing failure. To test this Berglas & Jones administered either noncontingent feedback or contingent feedback in a series of multiple-choice analogy problems to subjects who were then given the option of taking a drug, which was purported to be either performance-enhancing or performance-inhibiting, just prior to performing a test task which was said to be a test of cognitive abilities. It was found that the subjects who had been given noncontingent feedback in the treatment task had a higher incidence of choosing the performance-inhibiting drug. The experimenters concluded that the subjects did this because it gave them an excuse for any subsequent poor performance. This self handicapping strategy is a means by which individuals can protect their self-esteem when it is threatened by the possibility of future failure.

Pyszczynski (1982) suggested that even when self-esteem is not at stake, people may employ self-handicapping strategies when ". . . affectively significant outcomes are pending" (p.387). Hence, the individual ". . . engages in pre-outcome manoeuvres in order to avoid future negative affect and enhance future positive affect" (p.388). One strategy for altering a person's experience of an outcome is to change the perception of the desirability of that outcome. Hence, if an outcome is perceived as desirable but uncertain, possible future negative affect can be avoided by derogating that outcome. A second strategy is to underestimate the chance of obtaining the desirable outcome. This tends to insulate the person against the disappointment of not obtaining the outcome. Pyszczynski tested these predictions using a lottery in which the probability of winning either a lowly attractive prize (50¢) or a highly attractive prize ($5 pizza voucher) was made either low (20%), moderate (50%) or high (90%). Subjects were required to rate the attractiveness of the prize. It was shown that subjects regarded the highly attractive prize as less valuable and less attractive when their probability of winning was low. No differences were found for the lowly attractive prize. Subjects also perceived themselves as being less likely to win the highly attractive prize than the lowly attractive prize.

The studies mentioned above only provided support for the mechanism of the egotism theory, without directly testing it against learned helplessness theory. Such a direct test was provided in three studies (Frankel & Snyder, 1978; Kofta & Sedek, 1989; Snyder, Smoller, Strenta & Frankel, 1981) described in more detail below.

Frankel & Snyder (1978) gave subjects either soluble or insoluble Levine-type task presented via a computer screen, followed by an anagram test task. Prior to the test task the subjects were told that the anagrams were either moderately difficult or highly difficult. The experimenters predicted from the egotism hypothesis that performance on the anagrams would be improved in the high difficulty condition, but only following unsolvable treatment task problems. The prediction was based on the notion that, firstly, the subjects would not have their self-esteem threatened if they perceived the test task as being difficult, and secondly, they would have a chance of redeeming their treatment task failure by succeeding in this difficult test task. The subjects would therefore try harder in the test task. On the other hand, Frankel & Snyder suggested that learned helplessness theory would predict that test task performance in the high difficulty condition would be worse than that in the moderate difficulty condition because the former would strengthen the expectation that responses are independent of outcomes and the subjects would therefore not be motivated to solve the test task problems. Nevertheless, the results of the experiment supported the egotism hypothesis. In the moderate difficulty condition, the unsolvable group performed significantly worse than the solvable group, whereas in the high difficulty condition, the unsolvable group performed better than the solvable group, although this latter difference was not statistically significant.

The Frankel & Snyder study examined the influence of perceptions of complexity of the test task on the performance of the task itself. But what of experiments which have examined the influence of treatment task complexity on performance of the test task? Douglas & Anisman (1975) found that failure on difficult treatment tasks does not produce test task performance deficits, while Klein, Fencil-Morse, & Seligman (1976) and Tennen & Eller (1977) found that allowing subjects to attribute failure on a treatment task to task difficulty also did not produce test task performance deficits. Helplessness theory predicts that experiences of uncontrollability in complex tasks result in the likelihood that the uncontrollability is attributed to specific and external causes, while in simple tasks uncontrollability is more likely attributed to global and internal causes. This implies that performance deficits will be found following an experience of uncontrollability within a simple task, but not following a complex task. Egotism theory would predict the same results as learned helplessness theory, except that they would be brought about via a different mechanism. Failure in a treatment task perceived as being simple would result in a threat to self-esteem. The subjects would then not try very hard in the test task in order to protect their self-esteem, and this would be reflected in poor test task performance. On the other hand, failure in a treatment task perceived as being difficult would not be a threat to self-esteem. Consequently, there would be no need for adopting an ego-defensive behavioural strategy, with no performance deficits in the test task.

Another comparison of egotism with learned helplessness theories was reported by Snyder, Smoller, Strenta & Frankel (1981). They gave subjects Levine problems that were either soluble or insoluble, followed by a test task of soluble anagrams with or without the accompaniment of distracting music. Subjects were told that the music would inhibit performance. A fifth group was also given the music, except that they were told that it would facilitate performance. Helplessness theory would predict that being told that the music inhibits performance would generate expectations of no control over outcomes and would thus lead to poorer performance. On the other hand, egotism theory would predict that such instructions give subjects an excuse for their poor (noncontingent) performance in the treatment task (i.e. they would not face the possibility of their performance being attributed to ability), and hence their performance in the test task would be facilitated. The experimenters also tested for the possibility of another explanation, namely, a 'negativity' hypothesis, which would suggest that a ". . . lack of effort and poor performance could be construed as manifestations of hostility toward the experimenter." (p.25). This predicts that performance following the facilitating instructions in the 5th group would lead to poorer performance (i.e. the subjects would purposely try to do the opposite of what the experimenter has said). The experimenters found that the performance of the 5th group was enhanced, thus indicating that performance debilitation following noncontingency cannot be accounted for by a negativity hypothesis. They also found that, contrary to helplessness theory, the noncontingent subjects who had distracting music actually performed better in the test task than those noncontingent subjects who did not have the distracting music. The results were interpreted as support for egotism theory.

Three studies have not supported egotism theory. Firstly, Hagen & Medway (1989) replicated the experiment of Frankel & Snyder using female primary and secondary school students. They failed to find any significant differences between subjects who were given insoluble Levine-type problems in a treatment task who were then told that the test task (word opposites) was either moderately or highly difficult. Secondly, Kofta & Sedek (1989) also compared learned helplessness with egotism and found that the latter was not supported. In two experiments they administered Levine-type concept-formation problems to three groups of subjects. Two groups received a random 50% schedule of success feedback for their responses, except that one group ('failure solution') was told that their solutions to each of the problems was wrong. In addition, the subjects were told that the problems measured "some important aspects of intelligence". The second group ('no solution') was not told anything about their solutions, nor were they given instructions relating the problems to intelligence. The third group received contingent feedback for their responses as well as for their solutions to each problem. All three groups were then tested in a button-pressing task requiring escape from an unpleasant noise. Kofta & Sedek reasoned that learned helplessness theory, with its emphasis on the effects of noncontingency between responses and outcomes, would predict performance deficits in both noncontingent groups with no difference between them. On the other hand, egotism theory, with its emphasis on the effects of failure, would predict performance debilitation in the 'failure solution' group only. The experimenters found that the 'no solution' group performed significantly worse than the contingent group. However, there was no difference in performance between the 'failure solution' group and the 'no solution' group. It was concluded that this provided support for helplessness theory rather than egotism theory. However, this support was weakened by the finding that the 'no solution' group did not report lower perceptions of control in the treatment task problems.

Snyder & Frankel (1989) responded to the experiment by Kofta & Sedek by pointing out that the key issue in egotism theory is not failure per se but threat to self-esteem which may, however, be brought about by failure. Consequently, by omitting solution feedback to the 'no solution' subjects may have reduced their perception of failure, but the threat to self-esteem would not have been eliminated. Indeed, the study by Berglas & Jones (1978), described earlier in this section, showed that subjects experiencing noncontingent success feedback without explicit failure do show evidence of threatened self-esteem.

A further test of helplessness versus egotism theories was carried out by Mikulincer (1988a). Whereas egotism theory would predict that manipulations of test task importance would further influence any performance deficits that may arise from an experience of uncontrollability in the treatment task, with a high importance test task being a greater threat to self esteem, and therefore leading to greater performance deficits than would a low importance test task, learned helplessness theory would predict superior performance under high importance conditions, as this would prevent the reduction in motivation that follows exposure to insoluble problems. As outlined in the previous section, an experiment in which test task importance was manipulated was carried out. The results showed that performance debilitation was greater under conditions of high test task importance, lending support to egotism over learned helplessness. However, a second experiment showed that when subjects were prevented from engaging in state-oriented activities, no test task performance debilitation occurred. These results were contrary to what would have been expected from egotism theory, and instead showed support for Kuhl's three factor theory.

In a subsequent study, Mikulincer (1989b) manipulated perceived difficulty of the test task and did find support for egotism theory. It was suggested that egotism theory would predict that a perception of high levels of difficulty in the test task would give subjects an excuse for poor performance, posing no threat to self-esteem and thereby leading to no test task performance deficit. A moderate perception of difficulty would lead to test task debilitation, but only if subjects made an internal attribution for failure in the treatment task. Accordingly, Mikulincer manipulated the attributions for treatment task performance and perceived difficulty of the test task. Following a treatment task of four Levine problems, subjects were given a Ravens test task. The results confirmed the predictions, in that when the subjects were led to believe that failure was attributable to external causes, performance deficits were greater under high perceived test task difficulty, whereas when failure was attributable to internal causes, performance deficits were greater under moderate perceived test task difficulty. In a second experiment, Mikulincer once more manipulated test task importance, and found higher levels of test task debilitation under conditions of external failure attributions with low test task importance, and internal failure attributions with high test task importance. Overall these results were taken as support for the egotism explanation. However, the performance deficits in the subjects given external attributions were puzzling, as egotism theory would predict no performance deficits following externally attributed failure. The author suggested achievement motivation theory may be able to explain the results, in that externally attributed failure under high difficulty or low importance may not only lower the threat to self esteem, but may also lower motivation for success.

A more recent development of egotism theory is 'Excuse' theory (Snyder, Higgins & Stucky, 1983; Snyder & Higgins, 1988). This states that when people fail in a task, their self-esteem is threatened by the possibility that an audience, which can consist of themselves and/or others, will regard them as failures. Hence, they make excuses for their poor performance as alternative explanations for the cause of their failure. These shift the 'blame' away from the self, which reduces the person's personal responsibility for the failure, thereby maintaining a positive self-esteem. Excuse theory would predict that people attribute failure to external, unstable and specific causes as a defence to protect their self-esteem, which was supported in an experiment by Mikulincer & Marshand (1991).

Attributing failure to such causes reduces the likelihood of engaging in off-task cognitions (namely, self-preoccupation) and thereby increases task focus. Attributing failure to global causes increases the relevance of that failure to evaluations of the self, making the person more concerned with his/her negative characteristics and thereby more likely to engage in task-irrelevant self-preoccupation. This draws the subjects' attention away from the task being performed, and in the case of the test task, away from the situational cues that indicate that outcomes are now contingent upon responses. This attentional diversion may then prevent the person from discriminating between different situations, thereby leading to the generalisation of the performance deficits from one situation to another. To test this, Mikulincer & Nizan (1988) administered a treatment task consisting of Levine-type problems to subjects exhibiting global and specific attributional styles, followed by a questionnaire which attempted to get an indication of their task-relevant and task-irrelevant thoughts. The test task consisted of a visual search problem. The results showed that global subjects performed worse in the test task following insoluble treatment task problems. Furthermore, these subjects reported more task-irrelevant thoughts than did specific attribution subjects. There was no difference between attributional styles for subjects given no feedback in the treatment task. In a second experiment, subjects were led to believe that the treatment task was either highly correlated with other psychological tasks (global attribution) or else had very little correlation with other tasks (specific attribution). Once more, subjects encouraged to make global attributions for failure performed worse in the test task than did subjects making specific attributions. Furthermore, the number of off-task thoughts was greater for the global attribution subjects. Finally, when subjects were required to be more task oriented by continually stating their hypotheses regarding the problem configuration of the treatment task, the off-task cognitions of the global-attribution subjects were reduced, and performance debilitation was eliminated.

KUHL'S THREE FACTOR THEORY

Kuhl (1981) argued that the theory of learned helplessness over-emphasises the role that expectation of future uncontrollability plays in the performance deficits following exposure to uncontrollable outcomes. The theory ignores a large body of evidence available in research on achievement motivation. Consequently, he formulated a three factor theory of learned helplessness based upon an expectancy-value theory of achievement motivation.

The first factor in Kuhl's theory is labelled 'expectancy'. The learned helplessness theory assumes that the experience of failure or uncontrollability leads to a perception of a reduced probability of success and thus to a decrease in motivation. Kuhl doubted the plausibility of the assumption in learned helplessness theory that there is a transfer of the belief that events are uncontrollable between the treatment and the test tasks. "Does a person conclude an inability to solve an anagram task from his or her inability to solve a concept formation task? Empirical investigations of the generality of various cognitive variables have shown very limited generalisation of parameters describing expectation of control" (p.157). As humans have high discriminative abilities, ". . . it may be concluded that performance deficits observed in humans may not be mediated by a similar process as the parallel deficits observed in animals. Although animals may generalise experiences of uncontrollability extensively, humans may not do so" (p.157). Contrary to Learned Helplessness theory, Kuhl suggested that experiences of failure can also increase motivation by increasing efforts to overcome the difficulties. This is similar to Wortman & Brehm's reactance theory, where exposure to uncontrollable outcomes leads to increased motivation to regain control and consequently leads to performance facilitation. Helplessness only sets in when these attempts to regain control fail repeatedly.

The second factor in Kuhl's theory is labelled 'value'. The perceived value of success in a task is said to increase as the task continues. This increased value of success arouses motivation to perform well in a subsequent task, particularly if this is related to the same goal as the treatment task but which is perceived as relying on different skills, and substitutes for the decreased motivation associated with performance of the treatment task. If the treatment and test tasks are similar, no such substitutional motivation is aroused. In such cases the original theory of learned helplessness is sufficient to explain the debilitatory effect on test task performance.

Kuhl also pointed out an interesting inconsistency with the helplessness findings regarding the motivational aspects of experiences of uncontrollability: "Miller & Seligman (1975) reported that subjects who showed performance deficits following helplessness training 'looked like trying very hard to solve a difficult problem . . .' (p.236) and gave up later when confronted with their poor performance on the test task. The authors did not emphasise the fact that their observations run counter to what should be expected on the basis of their theory of helplessness. According to this theory, motivation regarding the test task should be reduced right from the beginning as a result of the assumed transfer of perceived uncontrollability developed during training. Consequently, performance deficits should be the result of reduced motivation rather than the cause of motivational deficits. Miller & Seligman's observation suggests the latter causal direction, namely, that reduced motivation regarding the test task develops after experiencing deteriorated performance on the test task itself. Empirical results suggesting high motivation regarding the test task in a control group as well as in noncontingent failure groups were reported in a recent study (Pittman & Pittman, 1979)" (p.158).

The final factor in Kuhl's theory is the distinction between what are called 'action' and 'state' orientations. Action orientation ". . . may be defined by cognitive activities focusing on action alternatives and plans that serve to overcome a discrepancy between the present state and an intended future one. Conversely, state orientation may be defined by cognitive activities that focus on the present, past, or future state of the organism" (p.159). In respect to the performance of an intended action, an excessive state orientation is associated with performance debilitation, while action orientation is associated with performance facilitation. Kuhl suggested that the concept of state orientation is similar to the task-irrelevant cognitions proposed by the 'test anxiety' theory of Lavelle, Metalsky & Coyne (1979). Performance deficits attributable to this final factor are said to represent 'functional helplessness', as distinct from the 'motivational helplessness' described by Learned Helplessness theory.

The three-factor theory predicts that the degree to which performance deficits will generalise depends upon which factors are involved. If the subjects have a belief in uncontrollability (i.e. expectancy factor) then the deficits will be limited to situations in which treatment and test tasks are similar, as these would be perceived as involving similar abilities. If the value factor is involved, the substitutional motivation should extend to any task which serves the same goal as the one blocked in the treatment task. As the goals of both tasks in the typical 'helplessness' experiments are usually the same, namely, achievement-orientated, performance deficits will generalise from one to the other, regardless of any differences in ability requirements of the tasks. Finally, performance deficits will generalise most readily to tasks which are not only dissimilar but which are also not related to an achievement goal when these deficits are associated with excessive state-orientation.

The three-factor theory also postulates that the effects of failure or uncontrollability in the treatment task will be moderated by its perceived importance. Generally the respective debilitation or facilitation effects will be smaller if the treatment task is perceived as having a low level of importance. Furthermore, if subjects have a personal disposition to engage in state-oriented activities the debilitation or facilitation effects will be similar to those found with low levels of perceived importance.

To test the concept of state versus action orientation Kuhl carried out two experiments. In the first of these he subjected subjects to insoluble Levine-type problems. He induced state orientations in some subjects by then asking them to respond to a questionnaire which concentrated on state-related aspects of the experimental situation, such as causal attributions for failure experiences, descriptions of the subjects' emotional state, and evaluations of the experimental situation. In other subjects he induced action orientations by having them participate in an activity which did not have achievement as a goal. This task consisted of reading an essay and then making judgements of its level of interest, level of informativeness and quality of expression. A third group of subjects were given insoluble treatment problems but with no subsequent orientation-intervention. Kuhl predicted that, in comparison to respective no-treatment groups, performance deficits in a test task would be increased in the state-induced subjects and decreased in action-induced subjects. The test task consisted of a series of letters ('d' or 'p') with each having either two, one or no apostrophes above or below. Subjects were required to tick the letter 'd' characters having two apostrophes. The results showed that the state-induced subjects performed significantly worse in this task than did the no-treatment group. However, contrary to predictions the action-induced subjects did not exhibit performance facilitation. In a subsequent experiment, Kuhl asked one group of subjects to explicitly state their hypotheses during an insoluble concept-formation treatment task. A second group was not asked to do this (i.e. implicit hypotheses), while a third was not even required to attempt to solve the task. Once again, half the subjects in each of these groups were given a state- or action-orienting intervention prior to performing the test task. It was predicted that asking subjects to keep stating their hypotheses would stop them from becoming functionally helpless by preventing them from engaging in erratic, non-systematic guessing which would increase the likelihood of engaging in state-oriented thoughts. In accordance with this prediction, it was found that state-oriented subjects in the explicit hypothesis condition exhibited facilitated performance in the test task, while those in the implicit hypothesis condition exhibited performance debilitation.

Mikulincer (1988a) reasoned that if the importance of the test task was manipulated then Kuhl's theory would predict that only under conditions of high importance would performance deficits be observed, with no performance deficits under conditions of low test task importance. The high importance test task would make subjects more preoccupied with their performance, as failure on the test task would confirm any perceptions of their own lack of competence attained in performance of the treatment task and would reduce their self-esteem. The low importance test task would lessen the implications of failure for the subjects' self-esteem, thereby reducing preoccupation with the self with no detriment to performance. On the other hand, learned helplessness theory would predict that performance would be better under high importance condition as this would prevent the reduction in motivation that follows exposure to insoluble problems. Accordingly, Mikulincer manipulated test task importance by telling subjects that it was part of a very important scientific project that would influence recommendations to changes in the educational system. The results supported the predictions made by the three factor theory. However, as the egotism theory of Snyder et al (1976) predicted a similar result, namely, poorer performance under the high importance conditions, Mikulincer carried out a second experiment in which one group of insoluble subjects were required to explicitly state their hypotheses continually throughout the test task, as a means of preventing them from engaging in state-oriented activities. Another group of insoluble subjects was not required to do so. In this case, egotism theory would predict performance debilitation in both failure groups, while Kuhl's theory would predict performance debilitation only in the action-oriented group. The results showed performance deficits in only the latter group, and thus supported Kuhl's theory. Similar results were provided by Mikulincer & Nizan (1988) who found that requiring global- and specific-attribution subjects continually to state their hypotheses regarding the treatment task problem configurations removed the performance debilitation in the test task that was in evidence in subjects not required to state their hypotheses. This was particularly evident in the global-attribution subjects.

Mikulincer, Kedem & Zilkha-Segal (1989) provided further support for Kuhl's theory when they found that subjects who were administered only one insoluble concept-formation treatment-task problem exhibited facilitated performance in a memory and visual search test task, while subjects exposed to four insoluble problems exhibited debilitated performance. In this case, the experimenters also found that when exposed to greater numbers of failures the subjects focused their attention away from the task and onto themselves (i.e. self-consciousness, self-doubt, and self-deprecation). This then interfered with accurate performance of the task.

COGNITIVE TRANSFER / ALTERED HYPOTHESIS POOL

Cognitive sets that have been developed by the subjects in the treatment task, concerning such factors as the types and complexities of solutions, may be carried into the test task (Levine, 1971, 1975; Levine, Rotkin, Jankovic, Pitchford, 1977; Peterson, 1978). If a test task requires complex solutions, subjects already geared towards such solutions may exhibit facilitation of performance, whereas subjects geared towards simple solutions may exhibit decrements in performance.

Levine (1971) proposed that in discrimination or concept-formation tasks, learning takes the form of repeatedly sampling hypotheses from a pool of hypotheses. If an hypothesis is shown to be incorrect, another is drawn from the pool. The process continues until the correct hypothesis is selected. Consequently, if the correct hypothesis is absent from the pool learning will not take place. In experiments on learned helplessness, subjects who have been administered noncontingent feedback use this in determining possible solutions. Accordingly, a subset of hypotheses containing the 'solution' is effectively removed from the potential hypothesis pool.

Douglas & Anisman (1975) carried out an experiment in which subjects were required to press one of three buttons (simple problem) or else a sequence of three buttons (complex problem) to offset a light. Subjects who were given failure feedback in the simple problem performed worse in a maze test task than did those who were either given failure feedback in the complex problem, or who were given success feedback in the simple or complex problems. The authors attributed the results to the congruency of subjects' expectations of success and performance in the treatment task. "Under those conditions where subjects expect to succeed but fail, subsequent performance is disrupted. Conversely, when the task is such that expectation for success is not necessarily present, then failure on this task does not disrupt subsequent performance" (p.416). The test task performance of the 'simple failure' subjects was disrupted because they had originally perceived the treatment task as being simple and therefore expected to perform at a relatively high level. However, the 'complex' groups would have perceived the treatment task as difficult and would therefore not have expected to perform well. Douglas & Anisman suggested that ". . . the critical factors which appear to affect disruption here are the subject's perception of the task, his resulting expectations regarding performance, and finally performance itself. Speculation would lead one to suspect that the further a subject is from expected success, the more disruption would occur. Needless to say, other factors such as duration, intensity, and number of aversive stimulations may well be other factors which might further modify the effects of expectancy on subsequent performance" (p.415).

However, there were a few problems with the study. Firstly, it should be pointed out that the authors based these conclusions on their own assumptions as no subjective perceptions were obtained from the subjects, and secondly, the success and failure groups had received different amounts of success and failure feedback. Nevertheless, the results indicated that treatment and test tasks which have similar levels of complexity should result in performance debilitation in the test task, whereas dissimilar tasks should not. The occurrence of debilitated performance in the dissimilar task would implicate the involvement of more general cognitive abilities in the mediation of the disruption by the insoluble task.

Douglas & Anisman (1975) suggested that ". . . during the course of trying to solve the insoluble problem, subjects reject the correct solution and employ complex hypotheses which are inappropriate for the simple task" (p.413). Similarly, Peterson (1978) suggested that subjects ". . . given insoluble problems learn, not that the problems are insoluble, but that simple solutions do not suffice. Their subsequent attempts to solve problems draw upon complex hypotheses as potential solutions. When subjects are later given problems with simple solutions, their tendency to seek complex answers impairs performance" (p.55). It could be that the performance deficits following insoluble problems are brought about by such an altered hypothesis pool and not by an expectation that responses and outcomes are independent. These performance deficits are therefore a function of the experimental procedure employed. If so, the very basis of learned helplessness theory is questioned.

The altered hypothesis pool theory predicts that when a treatment task has a simple solution, subsequent performance on a test task which also requires a simple solution will be debilitated. If the test task has a complex solution performance will not be debilitated, and may even be facilitated. On the other hand, learned helplessness theory predicts that, with increased complexity in the test task, expectations of noncontingency should be strengthened, leading to a greater level of debilitation. Accordingly, Peterson (1978) gave concept formation problems to six groups of subjects as a treatment task. Each group was given the same problems except that the problems were either simple, complex or unsolvable. In the simple problems were required to determine a relevant target stimulus, while in the complex problems they were required to determine a sequence of stimuli. An additional two groups were given no treatment task at all. All eight groups were then required to solve an additional problem which required either a simple or a complex solution. With regard to the four groups given solvable treatment problems, the predictions made by the altered hypothesis pool theory were supported. It was found that subjects given the complex treatment problems performed worse in the simple test problem than did subjects who were given the simple treatment problems. Hence, it would appear that subjects have difficulty in solving simple problems when these follow complex problems. However, subjects have no difficulty in solving complex problems when these follow simple problems. On the other hand, the performance of the unsolvable treatment problems groups was contrary to expectations. It was predicted that the subjects given the complex test problem should have performed better than the group given the simple test problem as well as the no-treatment control group. In fact, they performed worse. This was interpreted as indicating support for the learned helplessness theory.

To resolve this issue, Peterson performed a second experiment as a partial replication of the first, except that subjects were told that feedback may not be correct. This was meant to add the concept of randomness to the subjects to the subjects' hypothesis pool, as it was reasoned that subjects usually don't expect randomness to be a factor in psychology experiments, and they have difficulty in recognising it. The results indicated that for the unsolvable treatment groups, test problem performance debilitation was directly related to its complexity, in that performance was debilitated when the test problem was complex but was facilitated when the problem was simple. Furthermore, ratings of belief in noncontingency between responses and outcomes were higher with the simple test problem than they were with the complex test problem. This indicated clear support for the learned helplessness theory. Peterson concluded that performance debilitation sometimes ". . . may result from an altered hypothesis pool and sometimes from a belief in response-outcome independence (in which case it is termed learned helplessness)" (p.64-65).

Alloy & Abramson (1979) proposed that the learned helplessness theory should be revised to emphasise the motivational deficit and to down play the cognitive deficit. They found that depressed subjects were more accurate with their perceptions of contingency than were non-depressed subjects. However, they also found that these depressed subjects were less likely to generate complex hypotheses concerning noncontingency. Hence, learned helplessness is characterised by an expectation of noncontingency, and this results in a reduction in the generation of hypotheses but does not interfere with perceptions of response-outcome contingencies. Consequently, generation of complex hypotheses could be regarded as a measure of response initiation (i.e. motivation).

Abramson, Alloy & Rosoff (1981) had found that the judgements of control of depressives may be affected by a reduced likelihood of generating complex hypotheses. They suggested that the Alloy & Abramson results may have been due to the task requiring a simple hypothesis (i.e. press button or don't press button). Subsequently, Abramson et al. showed that depressed subjects were accurate with their estimates of control only when complex hypotheses were generated by the experimenters, but when they were required to generate complex hypotheses themselves they underestimated their degree of control. Their estimate was also significantly lower than that of non-depressed subjects. The authors suggested that these findings, when taken together with the Alloy & Abramson findings, provide strong evidence that depressed subjects do not show an associative deficit. Instead, they exhibit a motivational deficit in response to experience with noncontingency. How do these results compare to the suggestions of Levine et al. (1977) and Peterson (1978) that the effects of experience of noncontingency can be explained in terms of subjects generating more complex hypotheses than are required by the test task? Abramson et al. claimed that these results may be due to the amount of experience with uncontrollable outcomes. With a small amount of such experience, as occurs in most laboratory experiments, subjects may try more complex hypotheses because the simple ones don't work. However, ". . . a prolonged experience with uncontrollability may lead to the belief that no responses can control the outcome and consequently, to a decrease in trying complex hypotheses" (p.43).

Further support for a cognitive transfer explanation of learned helplessness experiments was provided by Tennen, Drum, Gillen & Stanton (1982). They varied the amount of noncontingent success feedback given to subjects in a button-pressing task requiring escape from a loud noise, and followed this with an anagram test task. Suprisingly, the group that received 50% success feedback performed better than all other inescapable groups, and even slightly better than the escapable group, while rating themselves as having less control than the escapable group and the 90% & 100% success groups. A second experiment showed similar results. In both of these experiments subjects in the 50% success group gave more complex solutions for the noncontingent treatment problems than did subjects in the 0%, 10%, 90% and 100% success groups. It was suggested that this group's better performance in the test task may have been a result of transfer of effort from the treatment task (i.e. from formulating more complex solutions). However, a second experiment measured perceptions of interest and effort, and found no differences between the groups. In fact, ratings of effort proved to be positively correlated with amount of success feedback. In explaining these results, the authors referred to Levine's transfer theory. It predicts that hypotheses generated for one task may generalise to a second task, if the second task is perceived as similar to the first. Hence, the transfer of complex hypotheses by the 50% success group may have facilitated later anagram performance. Indeed, Wright (1962) had found that response complexity is a curvilinear function of the probability of noncontingent success. The transfer hypothesis predicts, therefore, that the performance debilitation following exposure to uncontrollable positive outcomes is the result of transfer of overly simplistic strategies. In reference to a personal communication from Levine, Tennen et al suggested that a supplementary prediction of this theory is that the transfer of complex hypotheses to simple tasks may interfere with performance. Hence, the use of a simple test task may remove (or even reverse) performance debilitation resulting from exposure to an insoluble treatment task.

A similar explanation was presented by Sedek & Kofta (1990). They argued that performance deficits following uncontrollability or failure are the result of a temporary disturbance in the cognitive control of human activity. In the typical learned helplessness experiment the treatment task is a problem-like situation in which a goal has been presented by the experimenter (e.g. "turn off the sound"; "find the correct target stimulus") and the subjects then engage in cognitive activity with the aim of developing an effective action program. This cognitive activity takes the form of formulating hypotheses about the solution to the problem, followed by active attempts to confirm them as the experiment progresses. When outcomes are contingent upon responses subjects receive feedback concerning their hypotheses that is consistent, and therefore meaningful. While some hypotheses gain support, the majority are rejected, and the uncertainty regarding the possible outcome is reduced. On the other hand, when outcomes are not contingent upon responses, the subjects receive inconsistent information, which is therefore meaningless. This information does not allow the subjects to adopt any plausible hypotheses, thereby reducing the uncertainty surrounding the outcome to the problem, despite prolonged contact with the problem. The crucial aspect of helplessness training is therefore the situation where there is no reduction of the uncertainty surrounding the outcome, i.e. no information gain, despite continued cognitive effort. After a period of time, the subjects move from a state of meaningless 'cognitive involvement' to a state of 'cognitive exhaustion' in which they refrain from engaging in any hypothesis-testing activity. They also develop an unwillingness to partake in any further problem-solving activity. It is this 'cognitive demobilisation' which leads to the helplessness symptoms observed in the test phase of the experiment. It is also associated with the arousal of negative emotions and depressive feelings. This informational model of helplessness predicts that performance in test tasks should be considerably impaired when the task is complex, as such tasks would require considerable cognitive engagement, while minimal impairment should be evident when the task is simple. Accordingly, Sedek & Kofta administered a Levine-type concept formation treatment task to two NCT groups and a CT group. The first NCT ('behavioural helpless') group was given the standard task. The second NCT ('informational helpless') group received a modified task in which only one figure was presented instead of two. As the task progressed, the experiment indicated whether or not a particular figure contained the target concept. Subjects were not required to make any behavioural responses. All subjects were required to write down their solutions to the problems but were not given any feedback on these solutions as to whether or not they were correct. Furthermore, the test task was a button-pressing problem requiring escape from an aversive noise and consisted of two phases. In the first phase (simple task) subjects had to press one of three buttons to escape the noise. In the second phase (difficult task) the subjects were required to avoid or escape the noise by pressing one of three buttons in the presence of a particular light signal. The results showed that there was no performance debilitation in the simple test task. However, in the more difficult test task the informational helpless group showed performance debilitation whereas the behavioural helpless group did not.

Overall, explanations for the behaviour found in humans following exposure to noncontingency are many. However, although these alternative explanations may give a better explanation of some of the findings relating to experiments with human subjects, more often than not they cannot be used to account for the findings of experiments with animals – unless, of course, there is more than one mechanism operating, and there is no apparent reason why this may not be so!

Rather than trying to specifically find evidence for or against any of the theories presented in this chapter, this thesis was concerned with procedural considerations in observing the 'learned helplessness effect'. The first two experiments examined the effect of the amount of failure feedback in Levine-type treatment tasks. From these it became apparent that factors such as stimulus intensity and task complexity may have influenced performance. This contradicts learned helplessness theory, which proposes that experience of uncontrollability over an outcome should lead to subsequent behavioural debilitation, regardless of the physical properties of stimuli associated with that outcome. The remaining experiments attempted to examine this issue further.

Before reporting the results of these experiments, the following chapter will outline some aspects of the general methodology used.

Chapter Five:

Procedural Notes

As experimenters who have examined the theoretical and experimental implications of Learned Helplessness have used a variety of different terms to describe the conditions and results of their experiments, it is felt that the terms used in this thesis need to be clarified.

Task Types

Up to three distinct phases are used in the experiments. These are as follows:

i) Test task: This is the experimental task used to assess the extent of an effect of the conditions employed in the Treatment and Pre-treatment tasks. Invariably, this involves problems which have a solution, and where outcomes, such as offset of a sound, are contingent upon responses.

ii) Treatment task: This is the experimental task immediately preceding the test task. The problems are either soluble, with the feedback provided to the subjects being related to their responses, or insoluble, with feedback being unrelated to responses. In tasks using buttons and sounds, the offset of the sound is either contingent or not contingent upon responses.

iii) Pre-treatment task: This is the experimental task immediately preceding the treatment task. In the present research, it involves problems which have a solution, and where outcomes, such as offset of a sound, are contingent upon responses.

Treatment Types

Regardless of the type of treatment task used, (i.e. Levine-type or button-pressing problems) the three basic experimental groups are the following:

(i) Contingent Treatment (CT): Treatment task outcomes, either in the form of sound offset or success feedback, are contingent upon the responses of the subjects.

(ii) Noncontingent Treatment (NCT): Treatment task outcomes, either in the form of sound offset or success feedback, are not contingent upon the responses of the subjects. This noncontingency can be generated by either a yoking procedure or by a pre-determined fixed pattern of outcomes. Yoked subjects are linked to the CT group for pattern of outcomes.

(iii) No-Treatment (NT): These subjects are not exposed to any treatment task, either immediately proceeding to the test task. The exception to this is when a pre-treatment task is administered. In this case the subjects spend an equivalent amount of time to the length of the treatment task merely “relaxing”.

Performance Outcomes

Researchers of learned helplessness in humans in laboratory situations have found that the subjects experiencing noncontingency perform worse at a test task than do those subjects experiencing contingent outcomes. These experimenters have often referred to these subjects as being ‘helpless’, even though only a small proportion may have completely failed the task or the mean performance difference from that of the contingent or control groups may have only been just significant. Are such subjects helpless in the true sense of the word, or more importantly, in the sense proposed by the theory? In 1978, Buchwald, Coyne & Cole suggested that the meaning of ‘learned helplessness’ had become confused, and that it was not always clear which of three meanings are intended. Their criticisms are still relevant today. The term ‘learned helplessness’ has been used to refer to: the observed interference (i.e. decreased performance); the postulated deficits (i.e. cognitive and/or motivational deficits); and the hypothetical expectation that events are noncontingent on responses. Many experimenters seem to assume that a demonstration of decreased performance is also a demonstration of the postulated deficits. It seems that labelling a human subject as 'helpless' just because performance of a task may be slower than that of CT subject is a rather dubious practice. For that reason, any retarded levels of responding found in the series of experiments reported here are referred to as 'performance deficits', and not 'helplessness', and the subjects are referred to as being 'debilitated', and not 'helpless'.

Response Measures

Two response measures are used in the experiments, with these being defined as:

i) Latency: The time taken to complete a correct response. Incorrect responses are allocated a latency of 10 seconds, being the length of each trial. In effect, the latency measure reflects the duration of sound per trial.

ii) Errors: The number of trials in which the subject fails to offset the sound before the expiration of the trial.

These two measures are practically standard in most experiments concerning learned helplessness. However, the effect is sometimes gauged by one or both of two other measures, namely, 'trials to criterion' and 'conditional probability'. These measure have not been used here because they were considered to be unsuitable, on methodological grounds. The problems associated with them are briefly described below.

The 'trials to criterion' measure is the number of trials that it takes for subjects to achieve a criterion of three consecutive correct responses. Sometimes the experimenter may impose an additional time constraint, as for example, three consecutive correct responses with a latency of 15 seconds. Miller & Seligman (1975) argued that the trials to criterion measure reflects how long it takes for subjects to find a pattern to a solution. The adequacy of this measure is doubtful, for the following reasons: i) Sometimes subjects have managed to find the underlying pattern without having latencies below 15 seconds, while others have given three or more consecutive solutions without finding the underlying pattern (Price, Tryon & Raps, 1978; Lavelle, Metalsky & Coyne, 1979); ii) It has been suggested that difficulty in finding a pattern is not necessarily the same as difficulty in learning that outcomes are contingent upon responses (Buchwald, Coyne & Cole, 1978); iii) In most experiments employing this measure, when subjects do not reach the criterion before the set number of trials have passed they are given a maximum score of the number of trials in the task, which does not allow for differentiation between those subjects and others who may have solved the problem within the last three trials and limiting response range; iv) The initial experiments in this thesis found that, after attaining criterion, subjects sometimes failed to succeed on subsequent trials. From interviews with the subjects it was ascertained that this was attributable to a number of causes, namely, boredom, misunderstanding instructions, or curiosity; v) Also in the initial experiments, correlations between the 'errors' and 'trials to criterion' measures were found to be very high.

Another measure used by a small number of researchers is that of 'conditional probability' (e.g. Klein, Fencil-Morse & Seligman, 1976; Friedlander & Chartier, 1981; Tiggemann, Barnett & Winefield, 1983). This has been calculated as the number of errors made after the first correct response, recorded as a fraction of the remaining trials. Klein, Fencil-Morse & Seligman (1976) reasoned that whereas mean response latency, trials to criterion and failures to solve attempt to isolate the motivational deficit associated with learned helplessness, this conditional probability measure attempts to isolate the cognitive deficit. However, a problem with this measure is that it precludes any subjects who could not make at least one correct response over the entire task. In effect the subjects who are most affected by the experimental manipulations are not included. Furthermore, the measure is very sensitive to the number of trials remaining after the successful trial. To allow for an unbiased measure, there should be a fixed number of trials after the first successful response. However, this then introduces an additional factor to the experiment, namely, number of trials experienced.

Sounds

The experiments described in this thesis have employed sounds of low and high intensity. To comply with safety standards, the upper limit was set at 85 dB(A). As higher frequency sounds are judged by people to be louder and noisier than lower frequency sounds of equal intensity (Kryter, 1985), the frequency of the high intensity sound was set at 2000 Hz and the low intensity sound was set at 310 Hz. According to the equal-loudness contours of Kryter & Pearsons (1963), subjects' judgements of loudness of broadband white noise are greatest for an intensity level of about 87 dB (SPL) and a frequency of between 2-3000 Hz. Thus, the intensity and frequency used in the current experiments ensured maximal aversiveness of the sounds.

Kryter & Pearsons also found that as the duration of the sound is increased, with sound-pressure level kept constant, judgements of the unacceptability of the sound are also increased. In fact, for every doubling of the duration of the sound, subjects judged a sound equally acceptable when its sound-pressure level was reduced by 4.5 dB. Thus, increasing the duration of a sound has similar effects on the subjective judgements of the sound as does increasing its intensity. Consequently, the duration of each trial in the current series of experiments was extended from 5 seconds (as frequently used by other researchers) to 10 seconds.

Sound Weighting Scales

Examination of the Learned Helplessness literature reveals a marked lack of consistency of reporting measurements of sound intensity.

Various researchers have used measurements with either A-weighted or C-weighted scales. Other have reported intensity as sound pressure level (SPL) relating to a reference pressure, usually 20 $\mu N/m^2$. In many cases it cannot be ascertained as to what scale of measurement was used. Obviously this creates difficulties when reviewing and comparing studies on the basis of sound intensity. In this thesis, the sound intensities have been stated using the original weighting scales reported by the authors, if known. As each of the weighting scales measures the same sound in different ways, a short explanation of the differences between the scales is in order.

Sound pressure level (i.e. SPL) expressed in decibels (i.e. dB) without qualification, implies a pressure measurement with equal contribution from all frequencies, and is approximated by the C-weighted scale. However, this is a purely physical measure and does not correspond to loudness when comparing sounds of different frequencies. On the other hand, the A-weighted scale has the same weighting for high frequencies as does the C-weighted scale, but greatly attenuates low frequencies to which the human ear is relatively insensitive. Thus, the A-weighted scale is said to closely resemble the subjective perception of loudness in humans (Broadbent, 1978; Sulkowski, 1980; Kryter, 1985). A sound measured on the A-weighted scale will show fewer dB than the same sound measured on the C-weighted scale. Thus, a 102 dB(C) sound is equivalent to 82-85 dB(A) (Broadbent, 1978). Both B- and C-weightings are considered obsolete as loudness weighting functions and are currently not used for most noise-assessment purposes (Kryter, 1985). Therefore, the sounds used in this thesis have been measured using the A-weighting scale.

Specific details of the procedures used in each of the twelve experiments performed in this thesis are given in the following chapters.

Chapter Six:

The effect of Failure Feedback

Learned helplessness theory suggests that, in the typical experimental paradigm, test task performance is debilitated because of the motivational and cognitive deficits associated with the perception of uncontrollability in the treatment task. Statements concerning the generality of the effect had claimed that it has been observed in a wide variety of situations (e.g. Abramson, Seligman & Teasdale, 1978; Seligman, 1975). However, closer examination of the literature reveals that the number of situations in which the effect has been observed is rather limited. For instance, animal experiments have predominantly involved administering shock to subjects which have been immobilised in a hammock or tube, or which have been confined to an operant chamber from which there is no escape. This treatment is followed by a test task involving a requirement to escape from shock by successfully performing an escape response (e.g. shuttling; bar-pressing; pole-climbing; swimming). Less frequently, subjects have been exposed to noncontingent food presentation in either the treatment or test tasks, or to inescapable noise, although even in these experiments one of the tasks often involves electric shock. Hence, the factor common to the majority of animal experiments is the presence of electric shock. From this it is reasonable to suppose that the deficits associated with the experience of noncontingent events may be attributable to the properties of this shock stimulus itself. Indeed, evidence supporting the Motor Activation Deficit hypothesis (Weiss & Glazer, 1975), outlined in Chapter Four, suggests that exposure to high intensity shock is the result of a temporary disturbance in central neurotransmitter activity. However, the occurrence of performance deficits following exposure to lower intensities of inescapable shock indicates that behavioural mechanisms may also be operating.

Experiments with humans have also involved only a small number of situational variants in the treatment task. This usually consists of either a manipulative apparatus or some sort of concept-formation problem. As indicated in Chapter Two, a number of experiments have employed other types of tasks, but these have been few. As the experiments using manipulative problems have often required subjects to escape from either high intensity noise or shock, it could be that the intensity of these stimuli plays a role in the subsequent performance deficits. On the other hand, it is important to keep in mind the argument originally put forward by Seligman & Maier (1967) that both the CT and NCT groups receive the same amount of aversive stimulation, and yet the latter performs worse in the test task does than the former. This would indicate that performance deficits are possibly caused by something other than the aversiveness of the stimuli. Further evidence against such an explanation is drawn form studies which have demonstrated test task debilitation following exposure to non-aversive stimuli (e.g. Douglas & Anisman, 1975; Tiggemann, 1981; Tiggemann, Barnett & Winefield, 1983; Tiggemann & Winefield, 1978). Yet it should also be pointed out that these deficits tend to be smaller than those found with aversive stimuli.

As indicated in Chapter Two, a number of studies with human subjects have reported test task performance deficits without the use of either aversive stimuli or manipulative apparatus (e.g. Buys & Winefield, 1982; Glass & Singer, 1972a; Thornton, 1982; Trice, 1984). Indeed, experiments involving concept-formation problems (typically Levine-type problems) usually do not require subjects to escape an aversive stimulus and yet have demonstrated subsequent test task performance deficits. The variety of types of test task problems administered following concept-formation treatment problems has been rather limited, with some experimenters employing a manipulative apparatus such as a shuttle-box (e.g. Hiroto & Seligman, 1975) or button-pressing task (e.g. Maladono, Martos & Ramirez, 1991). More frequently, experimenters have used anagrams in the test task (e.g. Anderson, Anderson, Fleming & Kinghorn, 1984; Barber & Winefield; 1986a; Baucom, 1983; Baucom & Danker-Brown, 1984; Benson & Kennelly, 1976; Breen, Vulcano & Dyck, 1979; Griffith, 1977; Hirt & Genshaft, 1981). These latter studies have involved non-aversive stimuli in both the treatment and test tasks.

Some studies have used non-aversive stimuli in the treatment task followed by aversive stimuli in the test task, and have also demonstrated test task performance deficits (Hiroto & Seligman, 1975; Jones, Nation & Massad, 1977 expt.1; Kofta & Sedek, 1989; Prindaville & Stein, 1978; Sedek & Kofta, 1990; Stein, 1980; Thornton, 1982). These studies are of particular interest in that they tend to conflict with the findings in the animal literature. Chapter Three outlined experiments on the effects of stimulus intensity. Generally, these indicated that test task performance deficits tend to be greater as treatment task stimulus intensity is increased. However, performance deficits tend to be smaller as test task stimulus intensity is increased, with there being limited evidence of performance deficits with high stimulus intensity in the test task. With humans, when a low intensity stimulus is used in the treatment task and this is followed by a high intensity stimulus in the test task, performance deficits are observed. Why is there a difference between the animal and human experiments?

What immediately comes to mind is that there are different psychological mechanisms involved. On the other hand, it may be due to attributes of the types of tasks used in the experiments. Specifically, certain characteristics of concept-formation problems may play a role in the occurrence of the subsequent test task performance deficits. The type of problems used in most concept-formation tasks are derived from the procedure used by Levine (1971), and first used in learned helplessness experiments by Hiroto & Seligman (1975). A description of the general procedure used in experiments employing these types of problems follows.

Typically, Levine-type problems involve the presentation of two figures on a series of cards, although sometimes the figures are presented on computer screens. Each figure consists of four or five stimulus dimensions, with two alternatives per dimension. Examples of these dimensions are: letter 'A' vs. letter 'T'; square vs. circle; solid underline vs. broken underline. Throughout the card sequence the composition of the figures is varied by means of changes in the position of the stimulus alternatives for each dimension. For example, in the first three cards the circle may appear in the left figure with the square in the right figure, while in the fourth card the circle may be found in the right figure with the square in the left figure, and so on. In each trial the subjects are required to nominate the figure which they suspect contains the target stimulus. The experimenter then indicates that figure contains the target stimulus. At the end of each ten-trial problem the experimenter usually asks the subjects to give their solution and then indicates whether or not this is correct. If using a systematic approach to the problem, the subjects should be capable of determining which of the stimuli is the target stimulus within the first four to five trials. With soluble problems, one of the stimuli is chosen by the experimenter as being the target stimulus and feedback is given in relation to this stimulus. With insoluble problems, the subjects are given false feedback for each trial, and their suggested solutions are <u>all</u> said to be 'wrong'. The false feedback consists of a pre-determined schedule in which 50% of the responses in each of the problems are said to be 'correct'.

The fact that the subjects in the insoluble treatment group receive 100% failure for their treatment problem solutions raises the possibility that their debilitated test task performance may be attributable to this failure, and not to any perceptions of uncontrollability. Research has shown that people are likely to attribute personal control to desired outcomes and not to undesired outcomes (Langer & Roth, 1975; Streufert & Streufert, 1969). As it can be assumed that subjects would regard successful solution of the problems as a desired outcome, any experimental procedure which allows the noncontingent group to experience lower levels of success is likely to foster lower perceived levels of control, with a resultant lower expectation of future success, regardless of the objective level of control. In addition, as indicated in Chapter Three, there is evidence to suggest that as the number of insoluble problems increases the likelihood of test task performance deficits also increases (e.g. Pittman & Pittman, 1979, 1980; Roth & Kubal, 1975; Trice, 1984). Such studies have predominantly involved 100% failure in the treatment task problems. However, one experiment reported by Fosco & Geer (1971) involved less than 100% failure. They varied the ratio of insoluble button-pressing problems to soluble problems between four groups, with all groups receiving nine problems in total. The test task consisted of more of the same type of problems, except that they were all soluble. It was found that the greater the proportion of insoluble problems administered in the treatment phase, the more errors were made in the test phase.

If it is assumed that unsuccessful outcomes are most likely to be attributed to a lack of personal control, it is not surprising that increasing the number of insoluble problems leads to higher levels of perceived uncontrollability. However, with Levine-type problems it is uncertain whether subsequent performance deficits are actually caused by this perception of uncontrollability, and an associated expectation of future uncontrollability, or whether they are related somehow to the nature of the task or the amount of failure experienced. The question then arises as to whether test task debilitation will occur following an experience of less than 100% failure in the treatment task.

The purpose of the first experiment reported here was to determine whether test task performance deficits could be observed when subjects are given noncontingent treatment (NCT) of four Levine-type treatment task problems, but instead of 'failing' in all four of the problems, the subjects are told that they have failed only two of them. Helplessness theory stipulates that it is the perception of noncontingency between responses and outcomes, together with the expectation of future noncontingency, which governs subsequent performance deficits. Hence, if the subjects in the NCT group perceive that they have little control over outcomes in the problems, they should perform worse than both the 'contingent treatment' (CT) and a 'no-treatment' (NT) groups, regardless of the fact that they may have been told that they had been successful in half the problems. On the other hand, if failure is an essential component of producing subsequent performance deficits, a reduced level of failure would lead to a reduction in the performance deficits.

Most experiments that have used Levine-type problems in the treatment task have followed these with an anagrams test task. Miller & Seligman (1975) had assumed that the number of trials it takes to reach a criterion of 3 correct anagrams with latencies less than 15 sec can be assumed to be a measure of cognitive deficit. However, Buchwald, Coyne & Cole (1978) disagreed with this assumption, and stated that Miller & Seligman ". . . argue that these measures reflect how long it takes the subject to see that there is a pattern of solutions to the anagrams. Even if we accept these arguments, it does not follow that this difficulty reflects the cognitive deficit postulated by learned helplessness theory. Difficulty in seeing a pattern in anagrams is not equivalent to difficulty in learning that responses produce outcomes. To call them both 'negative cognitive set' (Miller & Seligman, 1975, p.235; Seligman, 1975, p.82) merely leads to confusion. . . . A better case for interpreting interference effects as evidence for motivational and cognitive deficit can be made in the case of escape learning, where the situation that faces the human subject is more closely analogous to that of the dog laboratory. Here, the subject must push buttons or pull knobs to escape, and it is simple to observe whether he or she is trying and whether a successful response is repeated" (Buchwald et al, 1978, p.181). With these arguments in mind it was decided that, instead of an anagrams test task, the present experiment would employ a manipulative test task requiring subjects to make responses on three buttons.

EXPERIMENT ONE

Method

Overview

The experiment consisted of two phases. In the treatment phase the Ss were given Levine-type problems in which feedback and level of success were made either contingent or not contingent upon responses. The noncontingency was achieved by a pre-determined, fixed pattern of feedback. In the test phase all Ss were given a button-pressing problem requiring escape from high intensity sound, the offset of which was contingent upon responses and signalled with lights. The design of the experiment is summarised in Table 6-1.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Thirty Ss were randomly allocated to one of the three groups in the experiment.

Table 6-1: *Design of Experiment One.*

Group		Response-Outcome Contingency		Sound Intensity		Types of Tasks	
		Treat.	Test	Treat.	Test	Treat.	Test
No Treatment	(NT)	—	C	—	High	—	Button sequence
Contingent Treatment	(CT)	C	C	—	High	Levine	Button sequence
Noncontingent Treatment	(NCT)	NC fixed	C	—	High	Levine	Button sequence

Note: Feedback was either contingent (C) or not contingent (NC) on responses.

Apparatus

a. *Treatment Task*

The treatment task employed four concept-formation problems similar to those described by Levine (1971). The problems consisted of a series of 10 cards on which were drawn two figures made up of five dimensions, with each dimension having two alternatives. The first problem had the following dimensions and alternatives:

dimension	alternatives
dots	one vs. two
shape	circle vs. square
borders	single vs. double
letter	T vs. X
letter colour	white vs. black

The first card of this problem is shown in Figure 6-1. The figure on the left side of each card was complementary to the right side with regard to the dimension

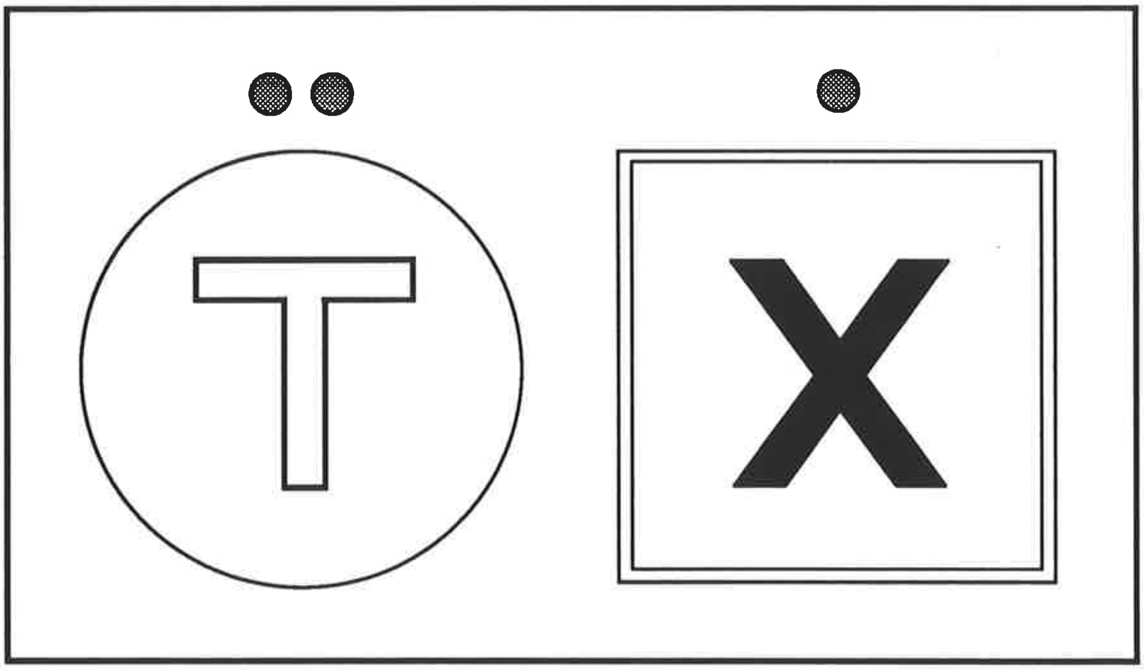

Figure 6-1: *Example of one of 10 cards in the first Levine-type problem in the treatment task of Experiment One.*

alternatives. Each alternative was presented the same number of times on either side of the card. However, no alternative appeared on the same side for more than 3 cards in a row. Each of the four problems used a different set of dimensions.

b. *Test Task*

A set of three buttons (2.5 cm in diameter, 8 cm apart) were mounted in a small table. Each button required a pressure of 210 grams in weight to register a response. In front of this was situated another small table upon which stood a small panel (15 cm x 23 cm) displaying 3 lights, mounted 7 cm apart in a horizontal line. The lights, from left to right, were green, yellow and red. The sound was of high intensity (85 dB(A), 2000 Hz, square wave form) and was administered to the Ss through headphones. The sounds were generated by a Wavetek Sweep Generator (Model 164) via a programmable attenuator controlled by a computer located in a room adjacent to the experimental room, and were presented to the Ss through headphones. Background sound-level with all experimental sounds turned off was 50 dB(A).

c. *Questionnaire*

The post-experimental questionnaire asked the Ss about their perceptions of the pleasantness of the sound, level of effort expended in the tasks, degree of solubility of the tasks, level of frustration, comparative difficulty of test task to the treatment task (Questionnaire A in the Appendix).

Procedure

The Ss allocated to the CT and NCT groups were individually led into the experimental room and were seated at the table with the Levine-type problems. The experiment was described to the Ss as being concerned with learning, and that the problems would involve reasoning, logic and memory. The treatment task was then introduced as a set of four 'simultaneous discrimination' problems. The dimensions and their respective alternatives were described. The instructions continued as follows:

> "Prior to the start of this experiment I have selected one of the 10 stimuli as being the 'target'. Your task is to find this target. You go about this in the following way. Every time that I present you with a new card you have to choose between the left and right sides. Your choice should be governed by whether you think that the target is one of the 5 stimuli of the left figure, or one of the 5 stimuli of the right figure. I will answer with a 'yes' or a 'no', depending on whether the target is or is not on the side that you have picked."

Any questions from the Ss were answered with a repetition of the relevant part of the instructions. The Ss were then asked to make their first choice. The problems were not time-limited. Ss in the CT group were given veridical feedback in relation to their performance in the task. They were also given veridical feedback in relation to their solutions to the problems. The NCT group was given non-veridical feedback according to a predetermined pattern of 'yes' or 'no' answers, with two 'correct' solutions and two 'incorrect' solutions, as follows:

i)	Y-Y-N-Y-N-Y-Y-N-N-N	'Correct'
ii)	N-N-N-Y-N-Y-N-Y-Y-Y	'Incorrect'
iii)	N-N-Y-N-N-Y-Y-N-Y-Y	'Incorrect'
iv)	Y-Y-N-Y-Y-N-Y-N-N-N	'Correct'

Note that any 'correct' problem solution was preceded by three 'no' answers, and any 'incorrect' problem solution was preceded by at least two 'yes' answers. This was to ensure that the Ss would perceive the feedback to be noncontingent upon their responses, even when 'solving' a problem. Ss in the NT group did not participate in the treatment task.

Following the completion of the treatment task, the Ss were seated in front of the test task apparatus. The NT group was introduced to the experiment with this task. All Ss were given the following verbal instructions:

> "In this task I am going to ask you to place these headphones on your head. Through these headphones you will hear a sound that will come on from time to time. Your aim is to try to turn these sounds off using the buttons in front of you. You won't be able to stop the sounds from coming on, but you may be able to shorten the length of time that they are on. Every time the sound comes on you have to make 6 presses on the buttons. These can be distributed among the buttons in whatever ratios you like. The sequence of the presses is not important. All that matters is the number of presses on each button. To help you in your task you have these three lights in front of you. If you get the number of presses on each of the three buttons incorrect the red light will turn on at the end of 10 seconds. If the number of presses on one of the buttons is correct, the yellow light will come on. However, the yellow light doesn't tell you which of the three buttons was correct. It is up to you to work out which one it was, and then how many presses need to be made on the other two buttons. Also note that the solution may require some buttons to have no presses. If you get all three buttons correct, the green light will come on and the sound will turn off immediately."

Any questions were answered by repeating the relevant portion of the instructions. The task was started a few seconds after the experimenter had left the room. All Ss received 30 trials, each lasting 15 seconds. The duration of the sound in each trial was a maximum of 10 seconds. The number of presses required for the solution of this task was 4, 0 and 2 on the left, centre, and right buttons respectively, regardless of sequence. When this solution was pressed the sound was stopped for the remainder of the trial.

At the completion of the test task the Ss were asked to fill out the post-experimental questionnaire. They were then debriefed on the aims of the experiment and the deceptions that had been used in the case of the NCT group.

Results

Performance Measures

The mean number of successful solutions by the CT group in the treatment task was 3.1 out of a total of four problems, with this being greater than the two successful solutions received by the NCT group.

Examination of the performance of individual Ss in the test task revealed that only one from each group failed to offset the noise at least once. The means for the 'latency' and 'errors' performance measures over all 30 trials of the test task are given in Figures 6-2 and 6-3. The number of Ss making 20 or more errors in the test task was 3, 2 and 2 for the NCT, CT and NT groups, respectively. A multivariate analysis of variance was performed using both the 'latency' and 'errors' measures as dependant variables. The criterion for the analysis was the Pillais-Bartlett trace. The analysis confirmed that there was no significant difference between the three groups ($F_{(4,54)} = 0.67$).

Subjective Measures

The means and standard deviations of the responses to the post-experimental questionnaire are given in Table 6-2. Maximum and minimum possible scores are indicated for each question, with a score of 5 representing a high rating of pleasantness, high likelihood of solution, high level of effort, and high level of frustration.

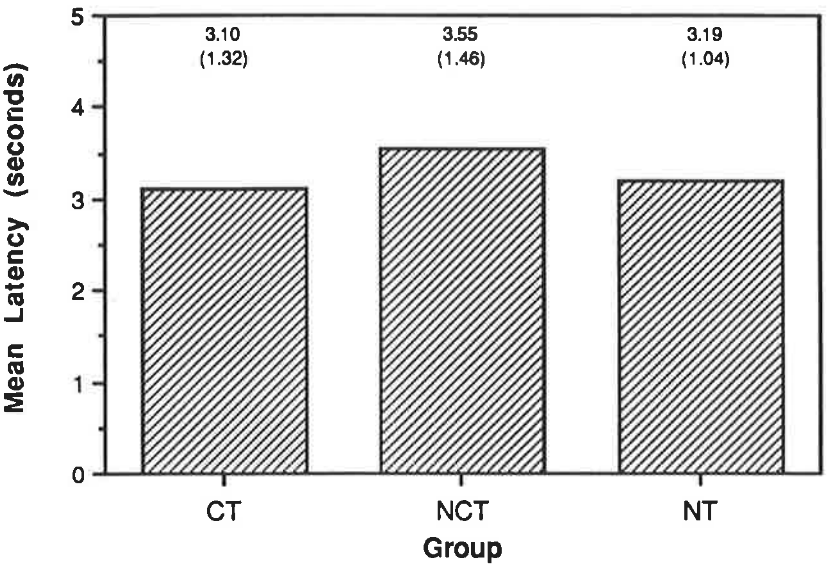

Figure 6-2: *Mean latency of the 6 button-presses per trial over all 30 trials of the test task for the Contingent Treatment (CT), Noncontingent Treatment (NCT) and No-Treatment (NT) groups of Experiment One. Means appear above the columns, with standard deviations in brackets.*

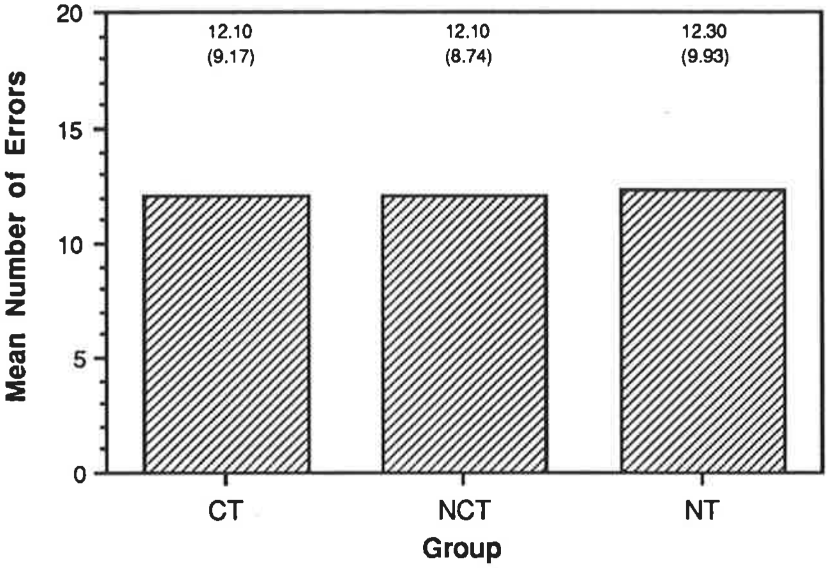

Figure 6-3: *Mean number of errors made over the 30 trials of the test task of Experiment One.*

Perceptions of the Treatment and Test Tasks

Student t-tests with a one-tailed level of probability were used to compare differences between the CT and NCT groups regarding their perception of the treatment task. The CT group rated the task as having a high likelihood of being soluble, and more so than that perceived by the NCT group ($t_{(18)}$ = 2.08, p =.026). The NCT group rated themselves higher on 'effort' than did the CT group ($t_{(18)}$ = 2.01, p = .030), and as having a higher level of frustration with the task ($t_{(18)}$ = 2.72, p = .007). There were no differences between the three groups in their perceptions of the test task.

Comparison Between Treatment and Test Task Perceptions

Related-sample t-tests were carried out between the treatment and test tasks for each of the CT and NCT groups. For the CT group, there were no

Table 6-2: *Means and standard deviations for the subjective measures following the treatment and test tasks of Experiment One.*

Group	Subjective Measures						
	Pleasantness of Sound	Solution		Effort		Frustration	
	Response Range						
	1 ↔ 5	1 ↔ 5		1 ↔ 5		1 ↔ 5	
	Task						
	Test	Treat	Test	Treat	Test	Treat	Test
None (NT)	2.1 (0.6)	none	4.6 (0.8)	none	3.8 (0.6)	none	1.9 (0.7)
Contingent (CT)	2.2 (0.6)	4.9 (0.3)	4.8 (0.6)	3.8 (0.6)	3.5 (0.9)	1.9 (1.0)	1.5 (0.9)
Noncontingent (NCT)	2.3 (0.7)	4.0 (1.3)	4.7 (1.0)	4.4 (0.7)	4.2 (1.1)	3.2 (1.1)	2.1 (1.2)

differences between the two tasks on any of the measures of solubility, frustration or effort. The NCT group exhibited a lower level of frustration in the test task compared to the treatment task ($t_{(9)} = 1.94$, $p = .042$), although there were no differences between the two tasks in ratings of solubility and effort.

Discussion

The experiment failed to find any debilitation of performance in a button-pressing test task following 50% failure in a concept-formation treatment task. In fact there was no difference in test task performance between any of the three groups. However, this conflicts with the subjects' subjective ratings which indicated that the experimental procedure was, to some extent, successful in instilling in the NCT group a perception of noncontingency between responses and outcomes. Indeed, the NCT group gave the treatment task a significantly lower solubility rating than did the CT group – although the NCT group still rated the task as being to some degree soluble. As could be expected from the lower perceptions of problem solubility, the NCT group was also more frustrated by the treatment task. However, it is of interest to note that the subjects in this group felt that they had made a greater effort in the task than did those in the CT group.

According to learned helplessness theory, a perception of response-outcome noncontingency in the treatment task should result in a higher likelihood of expecting future noncontingency, and consequently poorer performance in the test task. As described in Chapter Four, an alternative viewpoint is that test task performance decrements are the result of frustration and hostility elicited by the experience of uncontrollability in the treatment task (Oakes & Curtis, 1982; Schmeck, 1970). Frustration with the treatment task may also result in the persistence of a competing response that directly interferes with performance of the test task (Boyd, 1982; Dor-Shav & Mikulincer, 1990; Levis, 1976, 1980). If so, then a high level of treatment task frustration would be associated with a debilitation in test task performance. Therefore, as both helplessness theory and frustration-based explanations would suggest that a performance deficit in the NCT group should have occurred in the current experiment, why was there none found?

Eisenberger & Leonard (1980) found that the degree of effort required by a preliminary task increased persistence in a subsequent task. In particular, the effort required by either complex anagrams or unsolvable anagrams produced greater persistence in a later perceptual task (involving finding differences in pairs of cartoons) than did simple anagrams or no anagrams. The authors stated that ". . . in human adults initial failure in an assigned task serves as a cue to work harder" (p.296). Therefore, it may be that the experience of 50% failure in the treatment task of the present experiment had motivated the NCT subjects to try harder, as reflected in their higher ratings of effort. This increased effort could then have transferred to the test task, thereby eliminating the effects of the prior experience of noncontingency. However, a finding by Tennen, Drum, Gillen & Stanton (1982) that effort ratings were positively correlated with the amount of success feedback given to subjects, questions the validity of such effort ratings. Yet in the present experiment it is clearly not the case that effort ratings were related to success feedback, as the NCT group had a high mean effort rating (i.e. 4.5 out of a maximum of 5) with this being significantly higher than that of the CT group, even though the latter had received a greater amount of success feedback.

It could also be that the subjects were reluctant to admit that they had not been trying hard, as suggested by Snyder, Stephan & Rosenfield (1978). Indeed, research has indicated that ratings of effort are only weakly related to performance measures (Frankel & Snyder, 1978; Kuhl, 1981). This was confirmed in the current experiment with no correlation being found between effort ratings in the treatment-task and performance in the test-task. Furthermore, as described in detail in Chapter Four, Frankel & Snyder (1978) have proposed that subjects adopt ego-defensive strategies when confronted with failure. One such strategy is for subjects to decrease their efforts in the subsequent test task to avoid having to question their own abilities, and thereby avoiding a lowered self-esteem. Yet in the present experiment the NCT subjects did not decrease their efforts, as there was no test task performance debilitation, nor did they report a lower level of effort. On the contrary, the subjects reported greater levels of effort.

The lack of test task performance deficits in the current experiment is in contrast to the results of other studies which have used similar types of treatment and test tasks, and which have found such deficits (e.g. Hiroto & Seligman, 1975; Kofta & Sedek, 1989; Prindaville & Stein, 1978; Sedek & Kofta, 1990; Stein, 1980). The main difference between those studies and the current experiment is the level of failure experience given to the subjects – with the former involving 100% failure and the latter only 50% failure. Hence, it may be that an experience of 100% failure in concept-formation tasks is a necessary prerequisite for subsequent performance deficits to become evident. However, the force of this explanation is weakened by reported evidence of performance deficits being observed in the NCT group even when the subjects have not been given any feedback regarding their solutions to the problems (Benson & Kennelly, 1976; Griffith, 1977; Kofta & Sedek, 1989; Tiggemann, 1981; Winefield, Barnett & Tiggemann, 1985). If performance deficits are not necessarily dependent upon 'failure' experiences alone, and instead can be obtained through experiences of noncontingent feedback for the trials of each treatment-task problem, once again the question needs to be asked, why was there no performance deficit found in the current experiment?

The studies which have used similar tasks to those in the current experiment have employed a treatment task consisting of Levine-type problems followed by a test task involving a manipulative apparatus requiring subjects to escape from a high intensity noise. In the studies by Kofta & Sedek (1989) and Sedek & Kofta (1990) the test task had consisted of a button-light matching problem where the noise could be escaped by making a single press on one of three buttons, while in the studies by Hiroto & Seligman (1975), Prindaville & Stein (1978) and Stein (1980) the test task was a hand-shuttle problem where the noise could be escaped by moving a lever from one side of the device to the other. The common feature of these studies, then, is the fact that they had used test tasks of low complexity. On the other hand, the test task used in the current experiment was one of considerably greater complexity. It had involved three buttons requiring a particular pattern of six presses. It is possible that the high degree of variability of task performance within all three groups may have been attributable to differences in individual ability. Indeed, comments made by some of the subjects suggest that personal experiences with games and knowledge of the mathematical concepts of probability may have helped them in their performance of the task. Therefore, Experiment Two was carried out with the aim of removing the possible influence of such individual differences.

EXPERIMENT TWO

The problem of between-subject variability in ability to perform the types of tasks commonly used in learned helplessness experiment has been noted by a number of authors (Benson & Kennelly, 1976; Thornton & Jacobs, 1972). It could be that the failure of some studies to find significant performance debilitation following exposure to noncontingency may be attributable to such large within-group differences in ability, where differences in test-task performance have been obscured by the greater variability in individual abilities. Benson & Kennelly suggested that an anagram problem pre-treatment, i.e. giving a test task before any treatment task is administered, would allow for comparisons to be made between groups with regard to their pre-existing anagram-solving abilities.

There is, of course, a confounding factor in such a design. As mentioned in Chapter Two, a large number of studies have reported attempts to determine whether it is possible to immunise subjects against the debilitatory effects of noncontingent experiences by pre-exposing them to contingent experiences. Experimental procedures employed in these studies have invariably used three-phases involving a variety of combinations of task types. For instance, some experimenters have employed different tasks in each phase (Eckelman & Dyck, 1979; Prindaville & Stein, 1978; Stein, 1980), or the same task in all three phases (Douglas & Anisman, 1975; Thornton & Powell, 1974; Williams & Moffat, 1974). Other studies have employed three tasks, two of which are similar, with the differing task being placed in either the pre-treatment phase (Douglas & Anisman, 1975; Klee & Myer, 1979), in the treatment phase, as in the current experiment, (Eckelman & Dyck, 1979; Thornton & Jacobs, 1972) or in the test phase (Dyck & Breen, 1978; Hirt & Genshaft, 1981; Jones, Nation & Massad, 1977).

Prevention of test task performance debilitation had been demonstrated in a large proportion of the studies mentioned above. However, it is difficult to determine whether this prevention had been the result of immunisation attributable to the prior experience of contingency, or to some other factors. For instance, the studies which had used the same task in all three phases, or at least in the pre-treatment and test tasks, had employed insufficient experimental controls. They had not included contingent-treatment or no-treatment groups also pre-exposed to response-outcome contingency. Although two studies (Prindaville & Stein, 1978; Williams & Moffat, 1974) did use a design that included a pre-treatment control group (involving a contingent pre-treatment and test tasks, with no treatment in-between) no statistical tests were carried out to determine whether performance improved between the pre-treatment and test tasks. However, examination of the means from the Williams & Moffat study would suggest that a practice effect had occurred.

The main aim of Experiment Two was to re-examine the effects of a 50% failure schedule in a series of four Levine-type problems. This time the influence of individual differences in problem-solving ability would be controlled by the administration of a pre-treatment task, the performance on which would be used as a covariate in the analysis of the test task performance. A secondary aim was to determine whether there would be a general improvement in test task performance of all groups as a result of pre-exposure to problem similar to that used in the test task. Learned helplessness theory predicts that the NCT group would perform worse than the CT and NT groups, with no difference between the latter two groups.

Method

Overview

The experiment consisted of three phases. In the pre-treatment phase all Ss were given a button-pressing problem requiring escape from high intensity sound, the offset of which was contingent upon responses and signalled with lights. In the treatment phase the Ss were given Levine-type problems in which feedback and level of success were made either contingent or not contingent upon responses. The noncontingency was achieved by a pre-determined, fixed pattern of feedback. In the test phase all Ss were given a button pressing task similar to that used in the pre-treatment, but with a different solution. The design of the experiment is summarised in Table 6-3.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Thirty Ss were randomly allocated to one of three groups.

Apparatus

The apparatus was the same as used in Experiment One, with the pre-treatment and test tasks involving the button-pressing apparatus and the treatment task involving the Levine-type cards.

Procedure

The procedure was similar to that used in Experiment One, except that the Ss were told that the experiment was in three phases. The instructions for the pre-treatment task were identical to those in the test task. The number of presses required for the solution of the pre-treatment task was 2, 3 and 1, on the left, centre, and right buttons respectively, regardless of sequence.

At the completion of the test task, the Ss were asked to fill out a post-experimental questionnaire (Questionnaire B in the Appendix). All Ss were then debriefed by being told of the aims of the experiment and of any deceptions that were used.

Table 6-3: *Design of Experiment Two.*

Group	**Response-Outcome Contingency**			**Sound Intensity**			**Types of Tasks**		
	Pre-Treat.	Treat.	Test	Pre-Treat.	Treat.	Test	Pre-Treatment	Treatment	Test
NT	C	—	C	High	—	High	Button sequence	—	Button sequence
CT	C	C	C	High	—	High	Button sequence	Levine	Button sequence
NCT	C	NC fixed	C	High	—	High	Button sequence	Levine	Button sequence

Note: Feedback was either contingent (C) or not contingent (NC) on responses.

Results

Performance Measures

The means and standard deviations for the performance measures over all 30 trials of the pre-treatment and test tasks are given in Figures 6-4 and 6-5. As in Experiment One, very few errors were made by the Ss following their first correct response in each of these tasks. To test for initial differences between the groups in ability to solve the button-pressing problems, a multivariate analysis of variance of pre-treatment task performance was carried out using 'errors' and 'latency' as the dependant variables. The criterion for the analysis was the Pillais-Bartlett trace. There was no significant difference between the three groups ($F_{(4,54)} = 1.57$, $p = 0.20$).

A multivariate analysis of covariance of test task performance between the three experimental groups was then carried out using 'error' and 'latency' measures in the test task as the dependent variables, with the treatment task 'errors' and 'latency' measures used as covariates. The criterion for the analysis was the Pillais-Bartlett trace. Once again, the analysis indicated that there was no significant difference between the three groups ($F_{(4,50)} = 0.56$, $p = 0.69$).

Comparison with Experiment One

To examine the possibility of there being a practice effect, test-task performance of the current experiment was compared to that of Experiment One. A 3x2 multivariate analysis of variance was carried out using 'latency' and 'errors' as dependent variables, with groups (NT vs. CT vs. NCT) and experiment (1 vs. 2) as independent variables. Although examination of the means indicated a general improvement in test task performance as a result of the pre-treatment in Experiment Two, this increase was not statistically significant (group $F_{(4,108)} = 0.33$; experiment $F_{(2,53)} = 2.00$; group x experiment interaction $F_{(4,108)} = 0.48$).

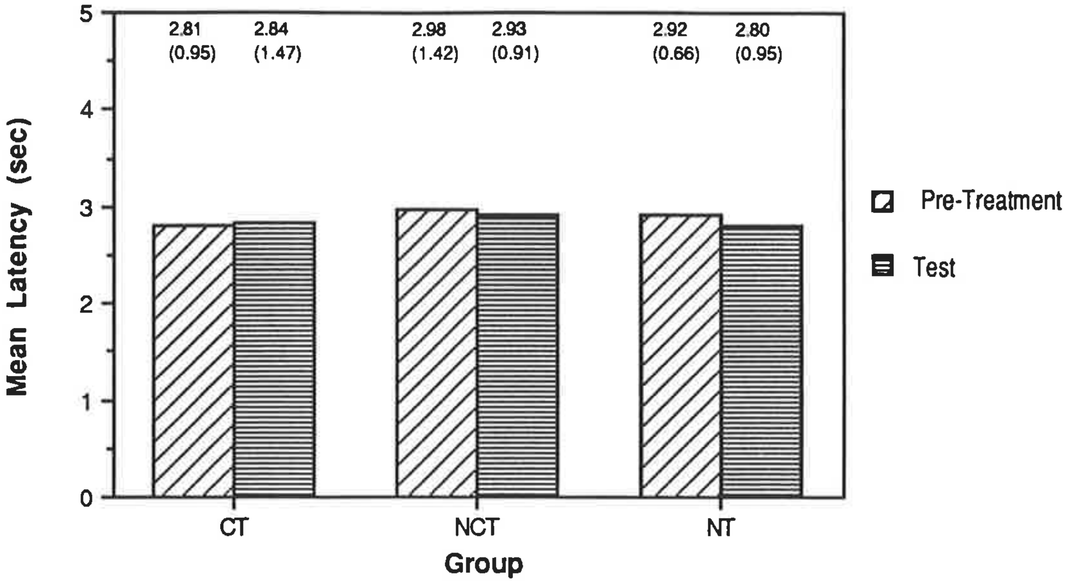

Figure 6-4: *Mean latency of the first 6 button-presses per trial of the pre-treatment and test tasks for the Contingent Treatment (CT), Noncontingent Treatment (NCT) and No Treatment (NT) groups of Experiment Two. Means appear above the columns, with standard deviations in brackets.*

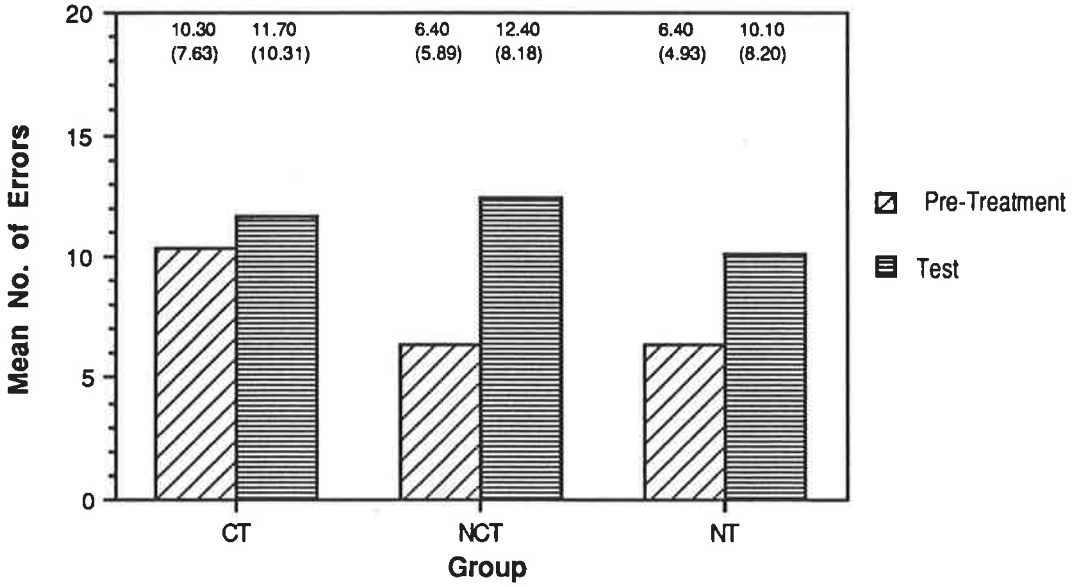

Figure 6-5: *Mean number of errors made in the pre-treatment and test tasks of Experiment Two.*

Subjective Measures

The means and standard deviations of the responses to the post-experimental questionnaire are given in Table 6-6. Maximum and minimum possible scores are indicated for each question, with a score of 5 representing a high rating of pleasantness, high likelihood of solution, high level of effort, and high level of frustration.

Perceptions of the Pre-treatment and Test Tasks

Analyses of variance of the perceptions of the pre-treatment task indicated that there were no significant differences between the three groups on any of the measures. Similarly, there were no differences between the three groups in their ratings of the test task.

Table 6-4: *Means and standard deviations for subjective measures following the pre-treatment, treatment and test tasks of Experiment Two.*

Group	**Subjective Measures**										
	Pleasantness of Sound		**Solubility**			**Effort**			**Frustration**		
	Possible Response Range										
	1 ↔ 5		1 ↔ 5			1 ↔ 5			1 ↔ 5		
	Task										
	T1	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
NT	2.2 (0.8)	2.3 (0.8)	4.7 (0.7)	none	4.6 (0.7)	3.2 (1.2)	none	3.7 (1.0)	1.4 (0.5)	none	2.2 (1.1)
CT	2.6 (0.7)	2.4 (0.7)	5.0 (0.0)	4.9 (0.3)	4.6 (0.8)	3.5 (1.2)	4.1 (0.6)	3.9 (1.0)	1.5 (0.7)	1.6 (0.7)	2.1 (0.9)
NCT	2.4 (0.7)	2.4 (0.7)	4.7 (0.5)	3.7 (1.0)	4.4 (0.8)	3.9 (0.6)	4.2 (0.6)	4.1 (0.3)	2.0 (0.7)	3.2 (0.9)	2.4 (0.8)

Note: T1 = pre-treatment task; T2 = treatment task; T3 = test task.

Perceptions of the Treatment Task

Differences between the CT and NCT groups in their perceptions of the treatment task were analysed using Student t-tests. Because of non-homogeneity of variance for measures of 'solubility', separate variance estimates were used in its analysis, whereas pooled estimates were used for measures of 'effort' and 'frustration'. The CT group rated the treatment task as having a high level of solubility, and significantly more so than the NCT group ($t_{(10.98)} = 3.79$, $p =.003$). There was no difference between the two groups in their ratings of 'effort'. The NCT group rated themselves as having a moderate level of frustration with the task, and this was significantly greater than that of the CT group rating ($t_{(18)} = 4.38$, $p < .001$).

Comparison Between Treatment and Test Task Perceptions

Related-sample two-tailed t-tests were carried out between the treatment and test tasks for each of the CT and NCT groups. For the CT group, there were no differences between the two tasks in relation to perceptions of 'solubility', 'amount of effort' or 'level of frustration'. On the other hand, the NCT group rated the treatment task as having less solubility ($t_{(9)} = 2.69$, $=.025$) and as having caused more frustration ($t_{(9)} = 2.75$, $=.022$) than did the test task. There was no difference in ratings of effort in the two tasks.

Correlations of Treatment Task Perceptions with Test Task Performance

The results from both Experiments One and Two were combined to examine possible associations between performance measures and subjective ratings. Pearson's r correlations between the perceptions of the treatment task and performance in treatment task and performance in the test task are give in Table 6-5. For the CT group, there were no significant correlations. However, the NCT group exhibited one significant correlation in the measure of effort, with lower ratings of effort in the treatment task being associated with more errors in the test task.

Table 6-5: *Correlations between treatment task subjective measures and test task performance measures for the CT & NCT groups of Experiments One & Two.*

			Treatment Task Subjective Measures		
			Solution	Effort	Frustration
Test Task Performance Measures	Contingent	Latency	-.04	.02	.06
		Errors	-.22	.07	.11
	Noncontingent	Latency	-.33	-.34	.09
		Errors	-.01	-.57 **	-.08

Note: All significance levels are two-tailed, with *** p < .001, ** p < .01, * p < .05, and n=20.

Table 6-6: *Correlations between test task subjective measures and test task performance measures for the NT, CT & NCT groups of Experiments One & Two.*

			Test Task Subjective Measures			
			Pleasantness	Solution	Effort	Frustration
Test Task Performance Measures	No Treatment	Latency	-.12	-.15	-.18	.58 **
		Errors	-.21	-.51 *	-.20	.73 ***
	Contingent	Latency	.09	-.66 ***	.32	.51 *
		Errors	.07	-.75 ***	.30	.70 ***
	Noncontingent	Latency	.00	-.60 **	-.30	.37
		Errors	.19	-.74 ***	-.12	.69 ***

Correlations of test task perceptions with test task performance

Correlations between subjective and performance measures in the test task are shown in Table 6-6. There was no correlation between task performance with perceptions of pleasantness of the sound nor with amount of effort expended. All three groups exhibited significant correlations between performance and perceptions of solubility, with the higher ratings being associated with shorter latencies and fewer errors. Conversely, the level of frustration was higher when response latency and number of errors were high.

Discussion

In Experiment One it was suggested that the lack of differentiation in the performance of the three groups may have been due to different levels of ability in performing the button-pressing test task. To examine this possibility, the current experiment included a pre-treatment problem which was similar to that administered in the test-task, with the performance on this pre-treatment problem then used as a covariate in the analysis of test task performance. Although there were noticeable differences between subjects in their performance of the pre-treatment task, these were not statistically significant. More importantly, there were no differences found between the three groups in their performance on the test task when the pre-treatment task performance was used as a covariate. Such a result refutes the earlier suggestion that the lack of differentiation between the groups may have been due to individual differences in abilities.

As expected, the performance of all three groups improved between the pre-treatment and test tasks. Although this improvement was not statistically significant, it nevertheless indicates that experiments which have purportedly demonstrated immunisation against learned helplessness may have only demonstrated a practice effect. It could be that this practice effect is sufficient to negate any after-effects of an experience of response-outcome noncontingency or problem insolubility. Hence, studies which claim to demonstrate immunisation, without employing adequate controls for a practice effect, must be questioned.

There was no differentiation in test task performance between the groups even though the perceptions of problem solubility and frustration levels were similar to those found in Experiment One, namely, the NCT group perceived the treatment task as being less soluble and more frustrating than did the CT group. Furthermore, test task ratings of solubility and frustration were correlated with test task performance in all three groups. This indicates that the subjects were capable of making accurate judgements of their level of performance in the test task. On the other hand, treatment task ratings of solubility and frustration were not correlated with test task performance. If the NCT group had a significantly lower perception of treatment task solubility than the CT group, and were more frustrated by the experience, why then did they not exhibit test task performance debilitation?

Although there was no significant difference between the CT and NCT groups in their ratings of treatment task effort (a result at odds with the findings in Experiment One), the combined groups from both experiments showed that the NCT group's rating of treatment task effort was significantly correlated with test task performance (i.e. lower ratings of effort were associated with higher numbers of errors). As suggested earlier in this chapter, the experience of partial failure by the NCT subjects may have caused them to increase their efforts in the treatment task, and as a consequence, raise their persistence in the test task, thereby countering any debilitatory effects produced by the treatment.

On the other hand, it is possible that the lack of differentiation in test task performance was attributable to the type of feedback procedure employed. In both experiments the CT group received veridical feedback for their treatment task performance, while the NCT group received non-veridical feedback which consisted of a predetermined schedule of a mixture of 50% 'correct' and 50% 'incorrect' indicators. This procedure was first used by Hiroto & Seligman (1975), and has been followed by subsequent studies that have succeeded in demonstrating performance debilitation in NCT groups (e.g. Jones, Nation & Massad, 1977; Klein, Fencil-Morse & Seligman, 1976; Stein, 1980). A number of other experimenters have also found performance debilitation using similar 50% 'correct' feedback procedures but with different types of tasks (e.g. Hanusa & Schultz, 1977; Roth & Kubal, 1975; Willis & Blaney, 1978; Wilson, Seybert & Craft, 1980). As first noted by Cohen, Rothbart & Phillips (1978), using such feedback schedules for the two experimental groups means that because the subjects in the contingent group eventually solve the problems, they receive a higher percentage of 'correct' indicators. As such, noncontingency is confounded with feedback schedule.

Research has shown that people are not very good judges of contingency schedules in that they do not always respond to random events as though they are truly random (Bruner & Revusky, 1961; Hake & Hyman, 1953; Naylor & Clark, 1968). Furthermore, their subjective probability estimates of contingency relationships do not accurately reflect the objective probabilities (e.g. Kahneman & Tversky, 1972). In fact, perceptions of response-outcome contingency are directly related to the relative percentage of success feedback given to the subjects (Alloy & Abramson, 1979, 1982; Jenkins & Ward, 1965; Sergent & Lambert, 1979; Tennen, Drum, Gillen & Stanton, 1982). Hence, a lower percentage of 'correct' indicators given to NCT subjects would no doubt influence their perception of the contingency between their responses and outcomes.

Pasahow (1980) suggested that one way to remove the confounding of noncontingency with feedback schedule is to limit analyses to comparisons between the NCT and NT groups. Yet this solution itself confounds noncontingency with level of task experience, particularly when the treatment and test tasks are similar. Another solution, suggested by Winefield (1982), is to ensure that experimenters adopt a strict yoking procedure. However, it is felt that this method is more appropriate for tasks in which outcomes are not easily identified with a particular response, such as unsignalled manipulative tasks, and is not appropriate for concept-formation problems. Levine (1966) had shown that, when participating in such problems, subjects quickly formulate hypotheses concerning the nature of the solution and then use subsequent trials to confirm these hypotheses. Hence, CT subjects who choose the appropriate hypothesis would receive 'correct' feedback for every trial thereafter, while NCT subjects, who have formed their own hypotheses about the solution, would receive the same pattern of 'correct' feedback. In this way both the CT and NCT subjects would have their hypotheses 'confirmed', and effectively their experiences would be identical. To prevent this from occurring it is necessary to employ a procedure where the NCT group receives the same number of 'correct' indicators as the CT group, except that these are randomly distributed. Cohen, Rothbart & Phillips (1976) did carry out just such an experiment. The NCT group was yoked to the contingent group for the total number of 'right' and 'wrong' responses made, except that this feedback was distributed randomly over the total number of trials (i.e. not in the same sequence pattern as that of the CT group). The treatment consisted of a concept-formation task (i.e. finding the principle underlying a series of figures), and the test task consisted of a Stroop Colour-Word test followed by a set of figure tracing problems. The NCT group was significantly slower at the Stroop task than was the CT group. However, this applied only to those subjects with external locus of control. For internals, there was no difference between the two groups. Furthermore, the NCT group showed less tolerance for frustration than did the CT group, and this applied to both internals and externals. Overall, it would seem that researchers wishing to use Levine-type problems could remove the confounding of noncontingency with feedback schedule by adopting a similar procedure.

Without being able to directly compare the results of Experiments One and Two with those of other studies in which subjects were given 100% failure, one cannot conclude that the inability to demonstrate performance deficits in these experiments was specifically attributable to the reduction in failure feedback to 50%. In addition to the possible effects of differences in exerted effort and feedback schedules, other factors need to be considered. Firstly, it may be that the treatment and test task were too different for any expectations of future noncontingency to generalise from one to the other. Secondly, earlier in this chapter it was noted that the three-button test task used in the current experiments was considerably more complex than the test tasks employed in other studies that have used similar tasks. Although studies with animals have shown that test task performance debilitation is more likely to be observed with increases in the complexity of the task, it could be that the three-button test task may have been too complex, making it insufficiently sensitive to any differences in performance attributable to the treatment task experiences. Thirdly, it could be argued that the two "success" problems may have been more salient to subjects because they appeared first and last in the series of four problems. A test of this would be to repeat the experiment with the "success" problems appearing in the reverse order.

A fourth factor which may have affected test task performance was the use of lights to signal sound offset. In tasks in which no light signals are used subjects may be uncertain whether they themselves have offset the sound or whether the time limit for that trial had been reached. It could be that the use of light signals removes such uncertainty, thereby making the contingency between responses and sound offset easier to distinguish. Any perceptions of uncontrollability that may have arisen as a result of the experience of noncontingency in the treatment task would therefore not easily generalise to the test task. The signalling of success, partial success, and failure may also make it easier for subjects to see or remember the significance of particular button configurations. Indeed, Bihm, McWhirter & Kidda (1982) found that performance deficits do not occur when a test task is made easier to conceptualise through the use of written responses. How, then, does one explain the results from Kofta & Sedek (1989) and Sedek & Kofta (1990), who had employed a light-signalled button-pressing test task requiring escape from a high intensity sound and had found performance deficits? Closer scrutiny of their experimental procedure offers a clue – they had made the sound inescapable in the first three trials of the test task. This effectively increased the difficulty of the task. Pasahow (1980) had found that when the first anagram in a test task was made relatively difficult the task became sensitive enough to detect performance differences between CT and NCT groups, but not when the first anagram was made relatively easy. However, differences between groups were not obtained when the first anagram was relatively easy. Therefore, the effect of the light feedback in the Kofta and Sedek studies may have been counteracted by the increased initial difficulty of the task. After considering this evidence it was concluded that removing the light signal from the test task would increase the likelihood of finding a performance deficit.

In view of the possible influences of the factors described above it was concluded that the current experimental design should be altered so that i) the treatment and test tasks would be more similar, ii) the offset of sounds would be unsignalled, and iii) the NCT group would receive response feedback identical to that of the CT group. It was felt that these procedural changes would maximise the possibility of observing test task performance deficits. The results of using such a modified procedure are reported in the following experiments.

Chapter Seven:

Similar Treatment and Test Tasks, and the Effect of Sound Intensity

The experiments reported in the preceding chapter had employed treatment and test tasks which were dissimilar in both concept and method of responding, and showed no performance debilitation in the NCT group. It was suggested that the lack of performance deficits may be attributable to the dissimilarity of tasks. When the literature on learned helplessness is examined it is evident that there is conflicting evidence regarding how similar the treatment and test tasks need to be in order to exhibit performance deficits. On one hand some studies have found that performance deficits can only be obtained if the treatment and test tasks are very similar, and carried out as part of the same experiment (e.g. Tiggemann & Winefield, 1978), while others have found that the treatment and test tasks can be different (e.g. Hiroto & Seligman, 1975), and can even be presented as different experiments (e.g. Lamb, Davis, Tramill & Kleinhammer-Tramill, 1987). Generally, however, it appears that the treatment and test tasks need to be reasonably similar for an increased likelihood of performance deficits to occur. In Experiments One and Two, any expectations of future noncontingency arising from the treatment task experiences of the subjects may not have generalised to the test task because the tasks were not sufficiently similar. Therefore, if both the treatment and test tasks were to involve a manipulative apparatus, such as that used in button-pressing problems, there would be a greater likelihood of observing test task performance deficits.

Experiments One and Two had also involved high intensity sounds in the test task, with no sounds in the treatment task. Most studies which have used a manipulative apparatus have involved either high or low intensity sounds in both tasks. Only one study, that of Adams & Dewson (1982), used manipulative problems involving low intensity sounds in the treatment task, followed by high intensity sounds in the test task. The treatment task required subjects to find a simple sequence of two lever-pulls on a two lever apparatus, and the test task required subjects to determine a sequence of two presses on a considerably more complex ten-button apparatus. The noncontingent treatment group performed significantly worse in the test task than did the contingent treatment and the no-treatment groups. The fact that performance deficits were found using a manipulative apparatus in both treatment and test tasks, suggested that similar results could be obtained if the concept-formation problem in the treatment task was replaced with a manipulative task similar to the test task.

As mentioned in Chapter Three, some authors have suggested that the 'learned helplessness effect' may be attributable to 'failure instructions' given by the experimenter (Buchwald, Coyne & Cole, 1978; Harris & Tryon, 1983; Wortman & Brehm, 1975). Hence, performance debilitation in the test task may result from a general disbelief in the experimenter's instructions, brought about by a lack of confirmation of the experimenter's statement that a solution to the problem exists, and not to the experience of response-outcome noncontingency. Recall that Harris & Tryon (1983) found test task performance debilitation only when there was an incongruency between instructions and what actually happened in the task. Debilitation was observed when subjects were led to believe that the treatment task was soluble (when in fact it wasn't), while no debilitation was observed when subjects were led to believe that the treatment task was not soluble (when in fact it was). From this it is reasonable to assume that failure instructions would play a role in procedures which employ Levine-type problems involving 100% failure, where the complete lack of success is likely to arouse suspicion. However, in procedures involving only 50% failure, the subjects are less likely to doubt the instructions. Therefore, the lack of test task performance debilitation in Experiments One and Two may have been due to a <u>lack</u> of incongruence between instructions and the task experienced.

On the other hand, it is possible that the subjects did not even entertain the possibility of there not being a connection between their responses and the problem outcomes. Peterson (1980) found that subjects were more aware of noncontingency only when they received instructions indicating that randomness was a possibility or when they had experienced an initial random sequence of events. Otherwise, subjects did not readily recognise noncontingency. If the 'learned helplessness effect' depends upon the recognition of response-outcome noncontingency, then any procedure which raises the subjects' awareness of the possibility of this should be more likely to produce debilitation. In order to make the perception of contingency less definite, and to remove the possibility that any performance deficits could be attributable to experimenter induced failure, the instructions for the following experiments were altered to include the notion that the treatment task problem either may or may not have a solution.

In summary, to counter the possibility that the lack of observed performance debilitation may have been attributable to either 1) the dissimilarity between treatment and test, 2) the feedback pattern in the treatment task, or 3) the signalled offset in the test task, Experiment Three used similar treatment and test tasks with no signalled sound offset. Because the light feedback in the button-pressing task used in Experiments One and Two was integral to solving the problems, the removal of this feedback necessitated a modification to the solution requirements. This was done while at the same time maintaining a comparable level of task complexity. Finally, to remove the influence of the 'failure instructions', the experiment included instructions that raised subjects' awareness of the possibility of there being no solution to the problem.

The aims of the experiment were: firstly, to determine whether the experience of response-outcome noncontingency in relation to offset of high intensity sounds would produce a later debilitating effect on performance of response-contingent offset of high intensity sounds; secondly, to determine the test task performance characteristics over trials for each of three groups (contingent treatment, noncontingent treatment, no-treatment); and finally, to determine whether subjective perceptions of performance are correlated to actual performance in the treatment and test tasks.

EXPERIMENT THREE

Method

Overview

The experiment consisted of two phases: a treatment phase, in which Ss were given either no sounds or low intensity sounds, the offset of which was either contingent or noncontingent upon responses on a two-button apparatus; and a test phase, in which all Ss were given high intensity sounds, the offset of which was contingent upon responses on a three-button apparatus. The design of the experiment is summarised in Table 7-1.

Table 7-1: *Design of Experiment Three.*

Group		Sound Contingency		Sound Intensity		Number of Buttons	
		Treat.	Test	Treat.	Test	Treat.	Test
No Treatment	(NT)	—	C	—	High	—	3
Contingent Treatment	(CT)	C	C	Low	High	2	3
Noncontingent Treatment	(NCT)	NC yoked	C	Low	High	2	3

Note: Sound was either contingent (C) or not contingent (NC) on responses.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Thirty Ss were randomly allocated to one of the three groups.

Apparatus

a. *Sounds*

As for Experiments One and Two, the sounds were generated by a Wavetek Sweep Generator via a programmable attenuator, and controlled by a computer located in a room adjacent to the experimental room, and presented through headphones. Two levels of sound were employed: Low intensity 56 dB(A), 310 Hz, triangular wave form; High Intensity 85 dB(A), 2000 Hz, square wave form.

b. *Treatment Task*

A set of two buttons (2.5 cm in diameter, 20 cm apart) were mounted in a pad that could be inserted and removed from a small table (450 mm by 760 mm). Each button required a pressure of 210 grams in weight to register a response.

c. *Test Task*

A set of three buttons (2.5 cm in diameter, 15 cm apart) were mounted in a pad that, once again, could be inserted and removed from the same table used in the treatment task.

d. *Questionnaires*

Two questionnaires were administered. The first of these (Questionnaire C in the Appendix) was concerned with the treatment task, regarding: perceptions of the pleasantness of the sounds; level of motivation following the task; and level of confidence in being able to solve the next task. The second questionnaire (Questionnaire D in the Appendix) contained the same questions, but directed at the test task, as well as questions concerning: perceptions of contingency between responses and sound offset in both tasks; thoughts about performance in the treatment task; level of perceived success of this performance; and causal attributions regarding this performance.

Procedure

a. *Treatment Task*

All Ss were run through the experimental procedure individually. Those allocated to either the CT or NCT groups were seated in front of the button-pad and were then given the following printed instructions for the treatment task:

> "In front of you is a set of headphones and a set of two buttons. Just prior to the start of the experiment you will be asked to place the headphones on your head. Task One of the experiment consists of the following problem:
> 'From time to time you will hear a sound through the headphones. This sound will, after a short period of time, turn off. However, it may be possible for you to turn off the sounds much sooner. You are to try to find a way to turn off these sounds by doing something with the buttons.'
> Note that the problem <u>may or may not</u> have a solution. Dismantling the equipment or taking the headphones off is not part of any solution. You are required to listen to all of the sounds until told otherwise."

After reading the instructions, the Ss were given a sample of the sound that they were going to hear in the task. They were then given the option of withdrawing from the experiment. The experimenter answered questions from the Ss by merely repeating the relevant parts of the written instructions. All questions concerned with possible aims of the task, length of sound onset, and controllability of the sounds were not answered. Instead, the Ss were told that no other information could be given, but that all questions would be answered at the end of the experiment. The experimenter left the room, and the first trial began a few moments later.

The CT and NCT groups were given 30 trials of unsignalled, low intensity sounds. Each trial was of 15 seconds duration, with the sound being on for a maximum of 10 seconds, followed by a fixed 5 second interval of no sound. The CT group could turn off the sounds by making a particular sequence of three presses on the two buttons within 10 seconds of the sound onset. The correct sequence was, in strict order, 'Left, Right, Left'. Completion of the correct sequence turned the sound off for the remainder of the trial, regardless of what presses had been made beforehand. Each of the Ss of the NCT group were yoked to a particular S in the CT group, and hence received sounds of equal duration and pattern to those experienced by the CT group. By this process, the offset of sound for the NCT Ss was unrelated to their responses.

When the treatment task was completed the Experimenter returned to the room and administered Questionnaire C.

b. *Test Task*

The test task followed immediately after completion of the post-treatment questionnaire. The experimenter removed the two-button pad from the table and inserted the three-button pad. A new set of instructions was given to each of the Ss. These read as follows:

> "In front of you is a set of headphones and a new button-pad with three buttons. Just prior to the start of Task Two of the experiment you will be asked to place the headphones on your head. Task Two consists of the following problem:"

The remainder of the written instructions were identical to those given in the treatment task. After asking if the S had any questions, the experimenter once more left the room and the problem was started a few moments later.

The NT group was introduced to the experiment in this second task. All three groups were given the same test task. This consisted of 30 trials of unsignalled, high intensity sound. Each trial was of 15 seconds duration, with the sound being on for a maximum of 10 seconds, followed by a fixed 5 second interval of no sound. The sound could be turned off by making a minimum of three presses in the strict sequence of 'Right - Centre - Centre' within 10 seconds of initial onset for any trial.

At the completion of the test task the Experimenter returned and administered Questionnaire D. Each S was fully debriefed with regard to the aims of the experiment, the theory upon which it was based, and the type of response-outcome contingencies to which he/she had been exposed.

Results

Performance Measures

The means and standard deviations for the performance measures over all 30 trials of the experiment are given in Table 7-2. The 30 trials were divided into 6 blocks of 5 trials, with the means of the 'latency' and 'errors' measures being obtained for each trial-block. These means are plotted in Figures 7-1 and 7-2, respectively.

In the analyses of the performance measures over time, the between-groups variance was partitioned into two planned contrasts in place of an omnibus F-test. The contrasts were: NT vs CT (Contrast 1); $\frac{1}{2}$[NT+CT] vs NCT (Contrast 2). A multivariate analysis of variance with repeated measures over the 6 trial-blocks was carried out on each of the two dependent variables of 'errors' and 'latency'. Using the Pillai-Bartlett trace criterion, the first contrast proved significant for both variables with ($F_{(1,27)} = 6.89$, $p = .014$) and ($F_{(1,27)} = 7.53$, $p = .011$), respectively. As an adequate test of the learned helplessness theory requires this contrast to be non-significant, the second contrast was not performed. Instead, the data was reanalysed with no partitioning of the variance. This analysis indicated a significant difference between the groups for errors ($F_{(2,27)} = 5.43$, $p = .010$) and latency ($F_{(2,27)} = 4.92$, $p = .015$). The group x blocks interaction was non-significant for both variables, with ($F_{(10,48)} = 0.80$, $p = .627$) and ($F_{(10,48)} = 1.01$, $p = .450$), respectively. While the groups showed a distinct improvement in performance over trials for errors ($F_{(5,23)} = 8.80$, $p < .001$) and latency ($F_{(5,23)} = 7.78$, $p < .001$). Post-hoc tests on group means using the Newman-Keuls procedure indicated that the NT group performed significantly worse in the measures of latency and errors, at the 5% level of probability, than did either of the CT and NCT groups. There was no difference between these latter groups.

Table 7-2: *Mean latency and mean number of errors over all 30 trials of the test task of Experiment Three.*

Type of Treatment	**Latency (sec)**		**Errors**	
	Mean	sd	Mean	sd
None (NT)	7.64	2.57	18.80	9.43
Contingent (CT)	4.51	2.91	8.60	9.41
Noncontingent (NCT)	4.57	2.13	7.00	7.01

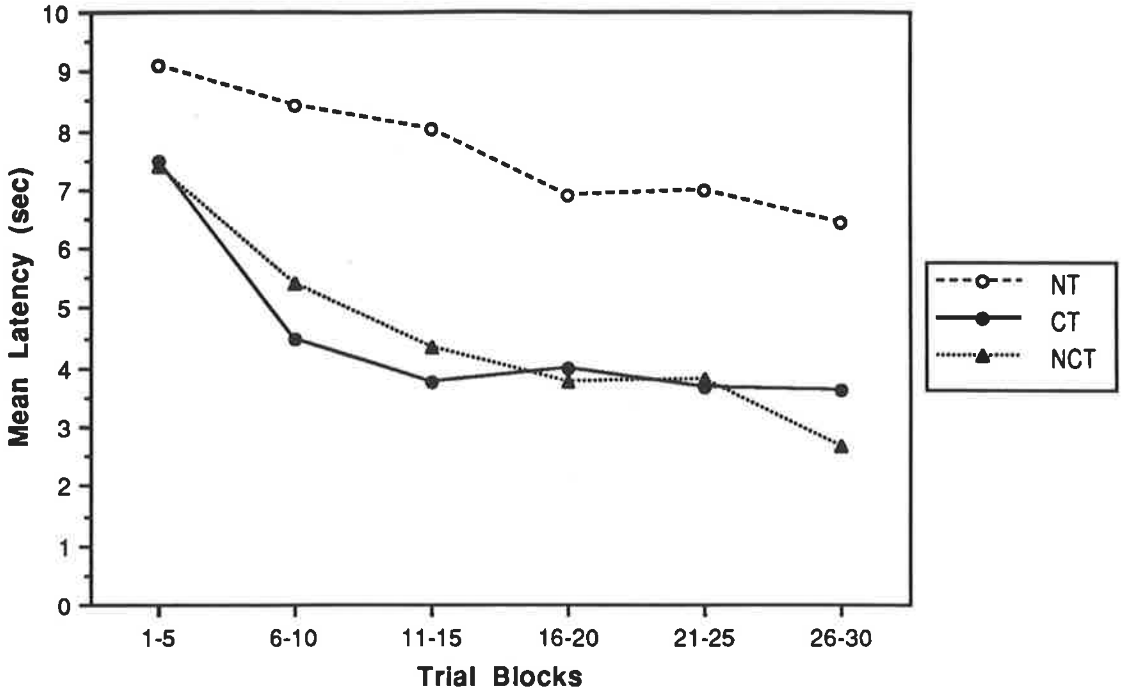

Figure 7-1: *Mean latency of responses over six 5-trial blocks in the test task for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Three.*

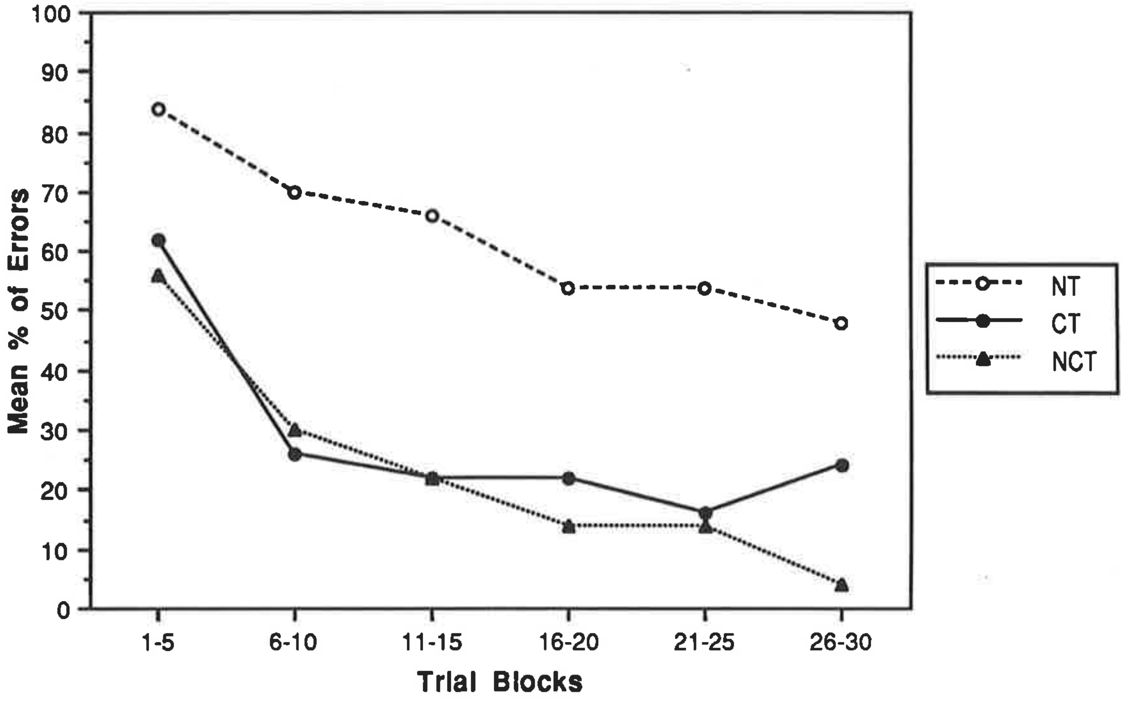

Figure 7-2: *Mean percentage of errors over six 5-trial blocks in the test task for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Three.*

Subjective Measures

The means and standard deviations of the subjective measures obtained in the post-treatment and post-test questionnaires are shown in Table 7-3. Ratings of the Ss' perceptions of response-outcome contingency and success in solving the treatment task are given in Table 7-4.

Perceptions of the Treatment Task

There were no differences between the CT and NCT groups in their ratings of the pleasantness of the sound in the treatment task, and their levels of motivation confidence following the task (Table 7-3). The frequency counts of Table 7-4 show that whereas 5 of the 10 Ss in the NCT group stated that they <u>did not</u> perceive a connection between their responses and the offset of the sound, only 1 of the CT Ss did so, with 2 others being unsure. However, as 5 of the NCT group stated that there was some connection between their responses and the offset of the sound, it would have to be said that the experimental procedure was only partially successful in fostering a perception of response-outcome noncontingency. To test whether this perception was in any way related to test task performance, results of the CT and NCT groups were combined and then reallocated into one of two new categories (perceived contingency vs. no perceived contingency). Learned helplessness theory predicts that those Ss who did not perceive a connection between responses and outcomes in the treatment task would subsequently perform worse in the test task. Although the "perceived contingency" group appeared to perform better in the test task (Mean latency 4.01, s.d. 2.36; Mean errors 6.67, s.d. 7.66) than did the "no perceived contingency" Ss (Mean latency 5.33, s.d. 2.61; Mean errors 9.50, s.d. 9.01), these differences were not significant using one-tailed tests (latency $t_{(18)}=1.18$, $p=0.127$; errors $t_{(18)}=0.76$, $p=0.230$).

The Ss were also asked if, following their experience of the treatment task, they had thought about their performance. The number of Ss who

Table 7-3: *Means and standard deviations for subjective measures following the treatment and test tasks of Experiment Three.*

Type of Treatment	Subjective Measures					
	Pleasantness		Motivation		Confidence	
	Response Range					
	1 ↔ 7		1 ↔ 5		1 ↔ 5	
	Task					
	Treat	Test	Treat	Test	Treat	Test
None (NT)	none	3.3 (1.3)	none	3.3 (0.7)	none	3.1 (1.0)
Contingent (CT)	3.9 (0.7)	2.1 (1.0)	3.4 (0.5)	3.0 (0.9)	3.2 (0.4)	3.4 (0.8)
Noncontingent (NCT)	4.3 (1.3)	2.5 (1.0)	3.3 (0.7)	3.0 (0.8)	3.0 (0.8)	3.5 (0.9)

Table 7-4: *Frequency of responses to questions regarding perceptions of response-outcome contingency and success in the treatment task of Experiment Three.*

Group	Perceived Contingency			Thought about performance		Rating of Success		
	Yes	Unsure	No	Yes	No	Successful	Moderately Successful	Un-successful
CT	7	2	1	8	2	2	5	1
NCT	5	0	5	7	3	1	1	5

stated that they did do so was 8 of the CT group and 7 of the NCT group. Of these, 7 in the CT group rated their performance as being either successful or moderately successful, while only 2 did so in the NCT group. When asked if they had any idea as to what might have caused them to perform in the way that they did, 4 Ss from each of the two groups said that they did. When probed further, three of the CT group simply described their strategy whereas the fourth stated "I like a challenge". Similarly, only one of the NCT group indicated anything other than a strategy, by saying "I like problem solving". It would seem, then, that very few causal attributions for performance were made.

Perceptions of the Test Task

A univariate analysis of variance on the measure of pleasantness of the sound showed a difference between the three groups which approached significance ($F_{(2,27)} = 3.20$, $p = .057$). Post-hoc Newman-Keuls tests showed that the NT group rated the task as being more unpleasant than did the CT group. There were no differences between the groups on measures of motivation and confidence. When asked if they perceived any connection between their responses and the offset of the test task sounds, 80% of the Ss in each of the CT and NCT groups either replied that they did or else stated the solution to the problem.

Comparison Between Treatment and Test Task Perceptions

One-tailed Related-sample t-tests showed that test task sounds was rated significantly lower on the measure of pleasantness pleasant than was the treatment task sounds (CT group, $t_{(9)} = 6.19$, $p < .001$; NCT group, $t_{(9)} = 4.32$, $p < .001$). The only other differences were shown by the NCT group, with Ss reporting a higher level of motivation following the treatment task ($t_{(9)} = 1.96$, $p = .041$), and a lower perception of response-outcome contingency in the treatment task ($t_{(9)} = -1.96$, $p = .041$).

Table 7-5: *Pearson's r correlations between post-treatment task subjective measures and test task performance measures for the Contingent (CT) and Noncontingent (NCT) groups of Experiment Three .*

			Treatment Task Subjective Measures		
			Pleasantness	Motivation	Confidence
Test Task Performance Measures	Contingent	Latency	-.17	-.23	-.09
		Errors	-.10	-.31	-.12
	Noncontingent	Latency	-.51	.06	-.05
		Errors	-.30	.07	-.06

Note: No correlations were significant.

Table 7-6: *Pearson's correlations between test task performance measures and post-test task subjective measures for all three groups of Experiment Three.*

			Test Task Subjective Measures		
			Pleasantness	Motivation	Confidence
Test Task Performance Measures	No Treatment	Latency	-.14	-.63 *	-.73 *
		Errors	-.20	-.62 #	-.61 #
	Contingent	Latency	-.61 #	-.74 *	-.69 *
		Errors	-.48	-.71 *	-.79 *
	Noncontingent	Latency	-.33	-.14	-.47
		Errors	-.20	-.06	-.26

Note: All significance levels are two-tailed, with * $p < .05$, # $.05 < p < .10$

Correlations of Treatment Task Perceptions with Test Task Performance

Measures of correlation between perceptions of the treatment task and performance in the test task were made for the CT and NCT groups. The correlations are given in Table 7-5. There were no significant correlations for either of the two groups.

Correlations of Test Task Perceptions with Test Task Performance

Measures of association between perceptions of the test task and performance in the test task were made for all groups. The resulting Pearson's correlations are given in Table 7-6. There was no significant correlation between ratings of the unpleasantness of the sound in the test task and test task performance in any of the three groups. However, for the NT and CT groups there was a significant correlation between ratings of motivation and confidence and test task performance, with ratings being higher following better performance. No such relationships were found in the NCT group.

Discussion

No performance deficits were found in the current experiment despite procedural changes aimed at increasing the likelihood of observing such deficits. These results are in contrast with those of Adams & Dewson (1982) who did find test task performance deficits using manipulative tasks and similar intensities of sound. Contrary to what would be expected from learned helplessness theory, the CT and NCT groups performed significantly better than the NT group. The fact that CT and NCT groups had experienced a similar problem in both the treatment and test tasks, whereas the NT group only experienced the test task, would suggest that this 'facilitation' of performance was a practice effect. Such a finding is not unique. Benson & Kennelly (1976) found similar facilitation using a Levine-type treatment task followed by an anagrams test task, with no aversive stimuli involved.

A second point of interest concerns the perceptions of contingency in the treatment task. Half of the NCT group reported contingency between their responses and offset of the sound. On the other hand, not all of the CT group perceived this connection. Therefore, one reason for the lack of differentiation in the test task performance of these two groups could be that the subjects had difficulty perceiving the contingency between responses and outcomes.

There is also the possibility that aversive stimuli are required in the treatment task for test task performance deficits to be observed. To check this, the next experiment employed a high intensity sound in both treatment and test tasks.

EXPERIMENT FOUR

A number of researchers have used high intensity sounds and a manipulative (or otherwise known as 'instrumental') apparatus in both treatment and test tasks, and have found test task performance debilitation (Barber & Winefield, 1986b, 1987; Gregory, Chartier & Wright, 1979; Hiroto, 1974; Hiroto & Seligman, 1975; Klein & Seligman, 1976; Koller & Kaplan, 1978; Krantz, Glass & Snyder, 1974; Lubow, Rosenblatt & Weiner, 1981; Miller & Tarpy, 1991; Raps, Peterson, Jonas & Seligman, 1982; Wilson, Seybert & Craft, 1980). In view of these demonstrations of test task performance deficits, it could reasonably be expected that if a high intensity sounds were used in both treatment and test tasks, using the same procedure as in Experiment Three, performance deficits should be observed.

At this point mention should be made of an experiment reported by Barber & Winefield (1987) in which it was found that when a high intensity sound was used in both treatment and test tasks, performance deficits were exhibited by subjects who scored either high or low on motivation as measured by the Personal Interests Inventory (PIQ), whereas when low intensity sound was used in both tasks only those subjects who scored high on motivation exhibited test task performance debilitation. The authors speculated that the high intensity sound may have increased the urgency of the low motivation subjects to control the sound, stimulating them to higher levels of activity. In having a higher level of activity, these subjects would have been more likely to perceive the noncontingency between responses and outcomes in the treatment task.

An extension of the proposal by Barber & Winefield is that if high intensity sounds do indeed stimulate subjects to greater levels of activity, and if this sound is used in both the treatment and the test tasks, then it follows that the subjects will also exhibit higher activity levels in the test task. As a result of this activity, would not these subjects be likely to accidentally ‘hit’ on the solution to the problem in only a few trials and be more likely to perceive a connection between responses and outcomes? Consequently, any differences that may have arisen from any prior experiences of noncontingency would be removed. Just as in experiments that are concerned with the possibility of removing the effects of “helplessness” training by forcible exposure to response-outcome contingency, a higher level of activity brought about by high intensity sound may forcibly expose the NCT subjects to the contingency between responses and outcomes. This may account for the lack of performance deficits found in the three experiments reported thus far, where a high intensity sound had been used in each of the test tasks.

Such a position is supported by Krantz, Glass & Snyder (1974) who used very high intensity sounds of 107 dB(A) and moderate intensity sounds of 78 dB(A). They administered a rotating-knobs treatment task followed by a hand-shuttle test task and found a significant difference between a CT and a yoked NCT group for each of the two sound intensities. However, this difference was larger under the moderate intensity sound than under the high intensity sound, with the overall performance of the high intensity groups being somewhat better than that of the moderate intensity groups. The high intensity groups also showed higher levels of skin conductance, and reported that they regarded the study as having a higher level of importance, than did the moderate intensity groups. The authors suggested that the high intensity sounds was sufficiently aversive to overcome the effects of the noncontingent treatment and that these subjects may have been more motivated to escape the sounds. If this is so, then it could be expected that, once more, no test task debilitation would be found if a high intensity sound was used in both the treatment and test tasks.

Method

Overview

The procedure was the same as that in the preceding experiment. It consisted of two phases: a treatment phase, in which Ss were given either no sounds or high intensity sounds, the offset of which was either contingent or not contingent upon responses on a two-button apparatus; and a test phase, in which all Ss were given a high intensity sound, the offset of which was contingent upon responses on a three-button apparatus. The design of the experiment is shown in Table 7-7.

Table 7-7: *Design of Experiment Four.*

Group		Sound Contingency		Sound Intensity		Number of Buttons	
		Treat.	Test	Treat.	Test	Treat.	Test
No Treatment	(NT)	—	C	—	High	—	3
Contingent Treatment	(CT)	C	C	High	High	2	3
Noncontingent Treatment	(NCT)	NC yoked	C	High	High	2	3

Note: Sound is either contingent (C) or not contingent (NC) on responses.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Thirty Ss were allocated to one of three groups: contingent treatment; noncontingent treatment; no-treatment. One S from the Contingent Treatment group failed to learn to solve the task (i.e. failed all of the last 10 trials) and was discarded and subsequently replaced.

Apparatus

The apparatus and questionnaires were exactly the same as used in Experiment Three. Only one level of sound was employed for both tasks. This was a high intensity tone of 85 dB(A), 2000 Hz, square wave form.

Procedure

The procedure employed was exactly the same as that used in Experiment Three. The only difference was that Ss in the CT and NCT groups were administered high intensity sounds in the treatment task. All three groups were given a test task requiring escape from the same high intensity sound.

Results

Performance Measures

The means and standard deviations for the performance measures over all 30 trials of the experiment are given in Table 7-8. The 30 trials were divided into 6 blocks of 5 trials, with the means of the 'latency' and 'errors' measures being obtained for each trial-block. These means are plotted in Figures 7-3 and 7-4, respectively.

As the NT group performed worse than the CT and NCT groups, contrary to that predicted by learned helplessness theory, the data was analysed using an omnibus F-test in place of planned contrasts. A multivariate analysis of variance was carried out on each of 'latency' and 'errors' as the dependent variables, with repeated measures over the 6 trial-blocks. No significant difference was found between the groups on either of the two variables (errors $F_{(2,27)} = 2.33$, $p = .117$; latency $F_{(2,27)} = 2.40$, $p = .110$). Using the Pillai-Bartlett trace criterion, the type x blocks interaction was not significant (errors $F_{(10,48)} = 0.47$, $p = .904$; latency $F_{(10,48)} = 0.86$, $p = .579$), while the groups showed a distinct improvement in performance over trials (errors $F_{(5,23)} = 8.08$, $p < .001$; errors $F_{(5,23)} = 13.97$, $p < .001$).

Subjective Measures

The means and standard deviations of scores on the subjective measures obtained in the post-treatment and post-test questionnaires are shown in Table 7-9. Ratings of the Ss' perceptions of response-outcome contingency and whether they were successful in solving the treatment task are given in Table 7-10.

Table 7-8: *Mean latency and mean number of errors over all 30 trials of the test task of Experiment Four.*

Type of Treatment		**Latency (sec)**		**Errors**	
		Mean	sd	Mean	sd
None	**(NT)**	7.25	2.49	16.90	9.71
Contingent	**(CT)**	4.71	2.52	8.90	8.21
Noncontingent	**(NCT)**	5.37	3.03	9.50	9.69

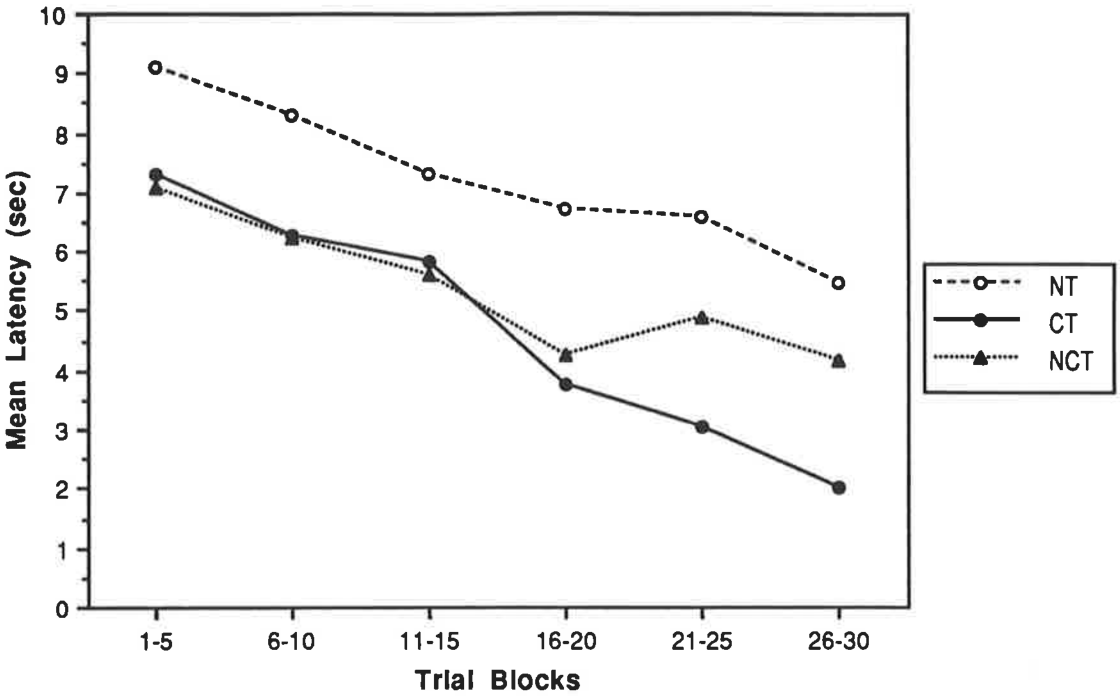

Figure 7-3: *Mean latency of responses over six 5-trial blocks in the test task for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Four.*

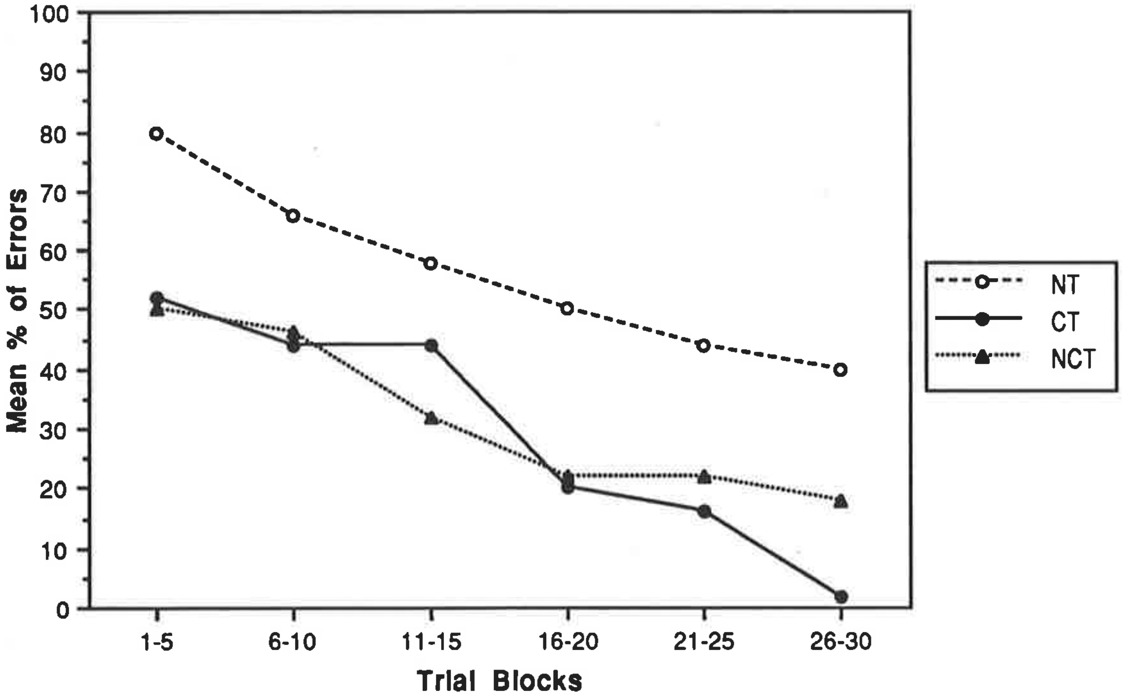

Figure 7-4: *Mean percentage of errors over six 5-trial blocks in the test task for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Four.*

Table 7-9: *Means and standard deviations for subjective measures following the treatment and test tasks of Experiment Four.*

Type of Treatment	Subjective Measures					
	Pleasantness		Motivation		Confidence	
	Response Range					
	1 ↔ 7		1 ↔ 5		1 ↔ 5	
	Task					
	Treat	Test	Treat	Test	Treat	Test
None (NT)	none	2.5 (0.7)	none	3.0 (0.9)	none	3.1 (0.9)
Contingent (CT)	3.2 (1.3)	3.1 (1.2)	3.4 (0.5)	3.2 (0.2)	3.5 (0.5)	3.6 (0.7)
Noncontingent (NCT)	2.7 (0.7)	2.4 (1.0)	3.4 (0.7)	3.2 (1.0)	3.0 (0.9)	3.4 (1.2)

Table 7-10: *Frequency of responses to questions regarding perceptions of response-outcome contingency and success in the treatment task of Experiment Four.*

Group	Perceived Contingency			Thought about performance		Rating of Success		
	Yes	Unsure	No	Yes	No	Successful	Moderately Successful	Un-successful
CT	8	0	2	8	2	4	4	0
NCT	5	3	2	9	1	4	3	2

Perceptions of the Treatment Task

There were no differences between the CT and NCT groups in their ratings of the treatment task in relation to perceptions of pleasantness of the sound, and levels of motivation and confidence following the task. Only 2 of the 10 Ss in the NCT group stated that they did not perceive a connection between their responses and the offset of the sound, with 3 other Ss being unsure, while 2 of the CT group also did not perceive a connection. As in Experiment Three, a test was carried out to determine whether this perception was in any way related to test task performance by separating the Ss of both CT and NCT groups into two new groups according to whether or not they perceived any contingency between responses and sound offset. There was no difference between the "perceived contingency" and the "no perceived contingency" groups (latency t=0.33; and errors t=-0.19), although the former group exhibited shorter latencies (means of 4.89 vs. 5.32), but made more errors (means of 9.46 vs. 8.71).

The Ss were asked if they had thought about their performance in the treatment task. The number of Ss who stated that they did was 8 and 9 for the CT and NCT groups, respectively. Of those, all 8 in the CT group rated their performance as being successful, while 7 of the 9 did so in the NCT group. When then asked if they had any idea as to what might have caused them to perform in the way that they did, 5 of the CT group, and 7 of the NCT group, said that they did. Of the CT group, except for one S who attributed performance to the use of computer games at home and to the increasing irritation of the sounds, the Ss described their strategy in solving the problem. Similarly, only one S in the NCT group indicated anything other than a strategy, by saying "Nervousness and trying to get the sound off as soon as possible". In general, and as in Experiment Three, very few causal attributions for performance were made.

Perceptions of the Test Task

Univariate analyses of variance showed no significant difference between the three groups on measures of pleasantness of the sound, level of

Table 7-11: *Pearson's r correlations between post-treatment task subjective measures and test task performance measures for the Contingent and Noncontingent Treatment groups of Experiment Four .*

			Treatment Task Subjective Measures		
			Pleasantness	Motivation	Confidence
Test Task Performance Measures	Contingent	Latency	-.11	.71 *	.68 *
		Errors	-.11	.74 *	.60 #
	Noncontingent	Latency	-.30	-.61 #	-.47
		Errors	-.33	-.53	-.38

Note: All significance levels are two-tailed, with * p < .05, # .05 < p < .10

Table 7-12: *Pearson's correlations between test task performance measures and post-test task subjective measures for all three groups of Experiment Four.*

			Test Task Subjective Measures		
			Pleasantness	Motivation	Confidence
Test Task Performance Measures	No Treatment	Latency	-.43	-.82 **	-.74 *
		Errors	-.35	-.76 **	-.65 *
	Contingent	Latency	-.30	.22	-.61 #
		Errors	-.25	.30	-.63 #
	Noncontingent	Latency	-.64 *	-.68 *	-.65 *
		Errors	-.66 *	-.64 *	-.58 #

Note: All significance levels are two-tailed, with ** p < .01, * p < .05, # .05 < p < .10

motivation and level of confidence. In response to the question of whether the Ss perceived any connection between responses and sound offset in the test task, 8 of the CT group and 7 of the NCT group said that they did.

Correlations of Treatment Task Perceptions with Test Task Performance

Measures of correlation between perceptions of the treatment task and performance in the test task were made for the CT and NCT groups. The correlations are given in Table 7-11. The CT group showed a surprising result in that performance measures on the test task were positively correlated with post-treatment task perceptions of motivation and confidence levels, with high levels of treatment task motivation and confidence being associated with longer latencies and more errors in the test task.

Correlations of Test Task Perceptions with Test Task Performance

Measures of association between perceptions of the test task and performance in the test task were made for all groups. The resulting Pearson's correlations are given in Table 7-12. All three groups reported higher levels of confidence the better they performed in the test task. However, only the NT and NCT groups reported similar correlations for the measure of motivation level. Surprisingly, the NCT group showed a significant correlation of test task performance with their rating of the pleasantness of the sounds, with longer latencies and more errors being associated with higher ratings of unpleasantness.

Discussion

Once again, no test task performance debilitation was observed. However, although the NCT and CT groups both exhibited improved performance when compared to that of the NT group, this difference was shown not to be statistically significant. In terms of learned helplessness theory, the lack of differentiation between the CT and NCT groups is not surprising considering their reported perceptions of response-outcome contingency. Although the offset of the sounds in the treatment task of the NCT group was unrelated to responses, 5 of the 10 subjects stated that there was a connection, while only 2 stated that there was no connection. This inability to perceive the relationship between responses and outcomes cannot be attributable to the instructions given to the subjects. After all, they were told that the problem 'may or may not' have a solution – there was no implication, as is usually the case in helplessness experiments, that the problem was definitely soluble. However, the reported inability of the subjects to perceive the lack of connection between responses and outcomes could be due to the phrasing of the question. The subjects were asked: "Did you perceive any connection between your responses and the offset of the sound . . . ?". It may be that the term "any connection" was innappropriate, as it is likely that subjects would have perceived at least <u>some</u> connection.

Nevertheless, the failure to demonstrate test task performance debilitation, using manipulative tasks together with high intensity sound, is in direct contrast to the results reported in other studies. The finding that in both Experiments Three and Four there was no difference between the CT and NCT groups (while the NT group performed worse than either of them) raises doubts about an activity explanation of the effects of experiencing high intensity sound as proposed by Barber & Winefield (1987). If high intensity sound does indeed stimulate subjects to a higher level of activity, thereby ensuring that NCT subjects are exposed to the <u>noncontingency</u> between responses and outcomes, there should have been a difference in performance between the CT and NCT groups in Experiment Four but not in Experiment Three. In fact, no differences was found at all. However, it could be argued that the high intensity sound in the test task may have also increased activity levels and thereby exposed the NCT group to the <u>contingency</u> between responses and outcomes. Consequently any differences in performance that could have been attributable to the treatment task experiences may have been removed. Unfortunately, such an explanation cannot account for the performance of the NT group, which performed worse than either the CT and NCT groups in both Experiments Three and Four. If high intensity sound does indeed stimulate activity levels then this group's performance should have been no different from that of the CT and NCT groups. Instead, as suggested earlier in this chapter, there may be some sort of practice effect operating, with the CT and NCT groups performing better in the test task because of their prior experience of a similar problem. Alternatively, this may operate in association with an activity-stimulating effect. Therefore, if the test task sound intensity was to be kept low, and the treatment task sound intensity was varied, it could be expected that performance deficits would be observed in a high intensity condition but not in a low intensity condition.

The finding that causal attributions for performance in the treatment task were not readily elicited by either CT or NCT subjects in either of Experiments Three or Four raises some doubt regarding the operation of the mechanism described by the reformulated learned helplessness theory. If people do not readily make causal attributions, having such attributions as an integral part of any performance deficit phenomenon is questionable. More importantly, however, the lack of observed performance deficits in each of the four experiments reported thus far raises some doubt about the robustness of the 'learned helplessness effect'. It may be that mere exposure to an experience of response-outcome noncontingency is not sufficient for performance deficits to be observed, and that stimulus intensity may play a greater role in the effect than has been assumed in the literature to date. This possibility is examined in the next chapter.

Chapter Eight:

Effect of Treatment Task Stimulus Intensity

It is unclear as to why the experiments reported to this point have found results in agreement with studies using animal subjects but not with studies using human subjects. This may be due to the procedural variations used. However, the literature indicates that other studies have found performance deficits with both animal and human subjects when the stimulus intensity is high in the treatment task and low in the test task.

In studying learned helplessness in humans a large number of researchers have employed an aversive stimulus in the treatment task. This stimulus has usually been loud noise, although electric shock has also been used. In most of these studies the treatment task has involved a 'manipulative' apparatus requiring reaction to the stimulus itself (e.g. pressing a button; pushing a lever from one side to another). Exposure to noncontingent aversive stimulation in such tasks has been repeatedly shown to lead to debilitation of performance in the subsequent test task, regardless of whether the subsequent test task has consisted of manipulative problems with aversive stimuli (e.g. Alloy, Peterson, Abramson, & Seligman, 1984; Barber & Winefield, 1987; Fosco & Geer, 1971; Hiroto, 1974; Hiroto & Seligman, 1975; Krantz, Glass & Snyder, 1974; Raps, Peterson, Jonas & Seligman, 1982; Thornton & Jacobs, 1971), or non-manipulative problems with no stimuli (e.g. Alloy, Peterson, Abramson, & Seligman, 1984; Cole & Coyne, 1977; Coyne, Metalsky & Lavelle, 1980; Eckelman & Dyck, 1979; Gatchel, Paulus & Maples, 1975; Hiroto & Seligman, 1975; Miller & Seligman, 1975; Miller & Tarpy, 1991; Price, Tryon & Raps, 1978; Raps, Peterson, Jonas & Seligman, 1982; Tennen, Drum, Gillen & Stanton, 1982; Tennen, Gillen & Drum, 1982; Thornton & Jacobs, 1972). No study could be found in the literature which had used human subjects and a high intensity treatment stimulus followed by a low intensity test stimulus, with both tasks consisting of manipulative problems.

Animal experiments have shown that following a treatment task involving inescapable high intensity shocks, performance is debilitated in a test task requiring escape from low intensity shocks (e.g. Alloy & Bersh, 1979; Anisman, DeCatanzaro & Remington, 1978; Dinsmoor & Campbell, 1956b; Jackson, Maier & Rapaport, 1978; Rosellini & Seligman, 1978).

To be sure that the lack of test task debilitation in the current experiments was not the result of some procedural variation, it was necessary to demonstrate performance deficits using a configuration of stimulus intensities which have successfully resulted in test task performance debilitation in both animal and human studies. Hence, Experiment Five examined the effect of experiencing uncontrollable high intensity sounds on subsequent test task performance involving low intensity sounds.

The aims of this experiment were: firstly, to determine whether an experience of response-outcome noncontingency with high intensity sounds would produce a subsequent debilitating effect on performance of response-contingent offset of low intensity sounds; secondly, to determine the test task performance characteristics over trials for each of the three groups (contingent treatment, noncontingent treatment, no treatment); thirdly, to determine whether subjective perceptions of performance are correlated to actual performance in the treatment and test tasks. It was predicted that there would be no difference between the no-treatment and contingent groups in the performance of the test task, while the noncontingent group would perform worse in the test task when compared to both these group combined.

EXPERIMENT FIVE

Method

Overview

The experiment consisted of two phases: a treatment phase, in which Ss were given either no sounds or high intensity sounds, the offset of which was either contingent or not contingent upon responses; and a test phase, in which all Ss were given low intensity sounds, the offset of which was contingent upon responses. Ss attempted to control the sounds by making some response on either two buttons (treatment task) or three buttons (test task). The design of the experiment is summarised in Table 8-1.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Thirty Ss were allocated to one of three groups: contingent treatment (CT); noncontingent treatment (NCT); and no treatment (NT). One S from the CT group failed to learn to solve the treatment task problem (i.e. failed all of the last 10 trials) and was replaced.

Table 8-1: *Design of Experiment Five.*

Group		Sound Contingency		Sound Intensity		Number of Buttons	
		Treat.	Test	Treat.	Test	Treat.	Test
No Treatment	(NT)	—	C	—	Low	—	3
Contingent Treatment	(CT)	C	C	High	Low	2	3
Noncontingent Treatment	(NCT)	NC yoked	C	High	Low	2	3

Note: Sound was either contingent (C) or not contingent (NC) on responses.

Apparatus

The apparatus and sound intensities were the same as used in Experiment Three. Measures of the Ss' perceptions were obtained at the end of each task (Questionnaires E and F in the Appendix). Six questions were asked concerning: perceptions of the pleasantness of the sounds; the awareness of a solution for the tasks; the Ss' perception of success in solving the tasks; the level of motivation of the Ss following the tasks; the degree to which the tasks were perceived as being under internal vs. external control. The aim of the latter two questions was to obtain a measure of the extent to which subjects felt that the offset of the sounds was under personal control. The question was asked in two parts, rather than requiring subjects to rate their perceptions on a single scale, because it avoided problems associated with labelling the scale points e.g. having a mid-point labelled as "partly under my control, partly beyond my control".

Procedure

The experimental procedure was exactly the same as that employed in Experiment Three, except that the treatment task used high intensity sound, while the test task used low intensity sound.

Results

Performance Measures

The means and standard deviations for the performance measures over all 30 trials of the test task are given in Table 8-2. The 30 trials were also divided into 6 blocks of 5 trials, with the mean measures for 'latency' and 'errors' being obtained for each block. These are plotted in Figures 8-1 and 8-2, respectively.

In the analyses of test task performance, the between-groups variance was partitioned into two planned contrasts in place of an omnibus F-test: NT vs CT (Contrast 1); $\frac{1}{2}$ [NT+CT] vs NCT (Contrast 2). A repeated measures multivariate analysis of variance was carried out separately on each of the 'latency' and 'errors' dependent variables, with repeated measures over the 6 trial-blocks. Using the Pillai-Bartlett trace criterion, no difference was found between the CT and NT groups in terms of latency ($F_{(1,27)} = 0.08$, $p = .778$) or errors ($F_{(1,27)} = 0.02$, $p = .896$). Furthermore, the combined CT and NT groups had significantly shorter latencies ($F_{(1,27)} = 6.57$, $p = .016$), and made fewer errors ($F_{(1,27)} = 6.98$, $p = .014$), than the NCT group. As would be expected, there was a significant improvement in performance over trial-blocks in both latency ($F_{(5,23)} = 19.45$, $p < .001$) and errors ($F_{(5,23)} = 16.57$, $p < .001$). Finally, for Contrast 2 there was a significant 'group x trials' interaction for number of errors made ($F_{(5,23)} = 2.69$, $p = .047$), but not for latency ($F_{(5,23)} = 2.11$, $p = .101$).

Table 8-2: *Mean latency and mean number of errors over all 30 trials of the test task of Experiment Five.*

Type of Treatment		**Latency**		**Errors**	
		Mean	sd	Mean	sd
None	**(NT)**	4.65	(2.71)	8.60	(8.88)
Contingent	**(CT)**	4.96	(2.33)	9.10	(7.85)
Noncontingent	**(NCT)**	7.21	(2.19)	17.50	(8.59)

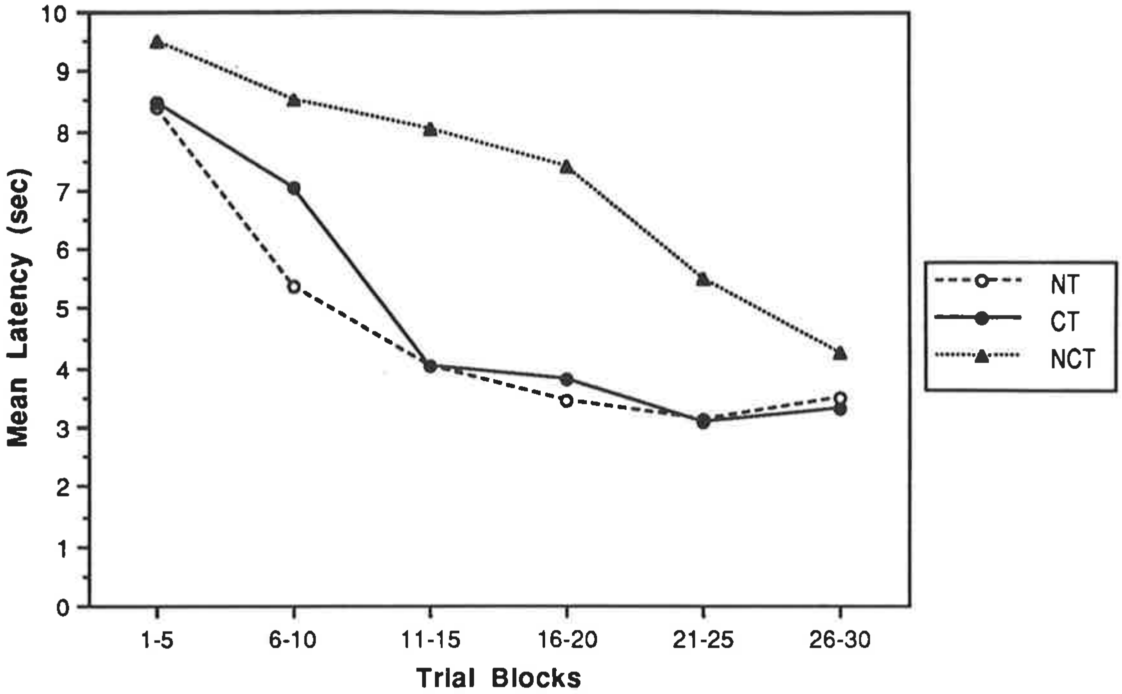

Figure 8-1: *Mean latency of responses over six 5-trial blocks in the test task for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Five.*

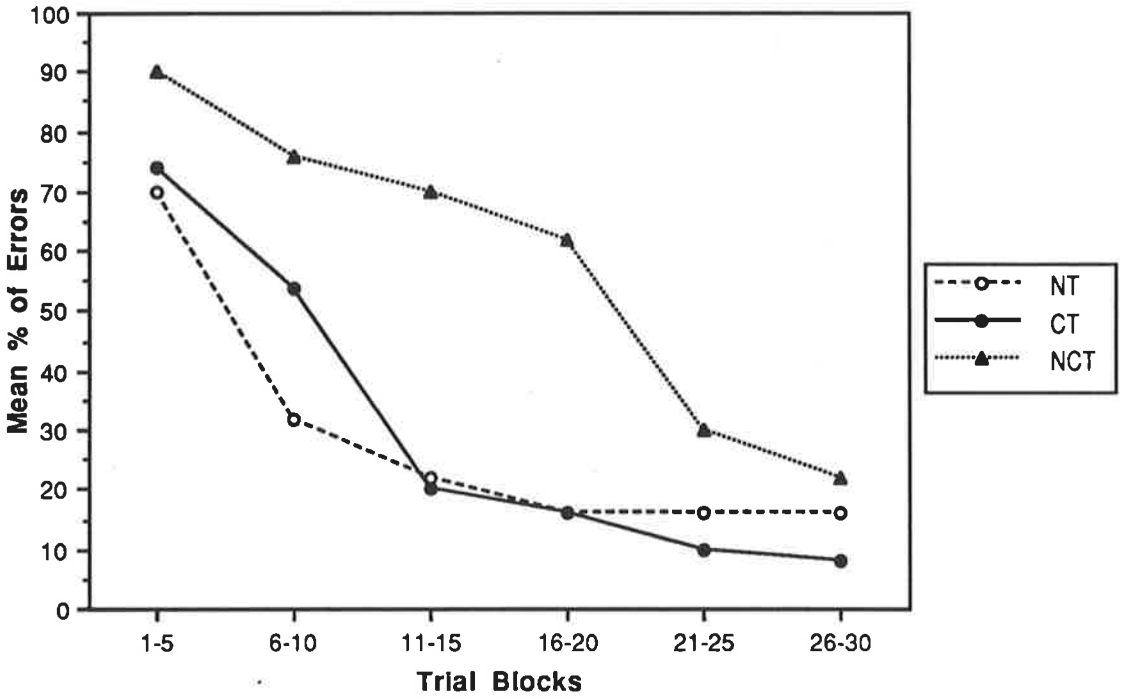

Figure 8-2: *Mean percentage of errors over six 5-trial blocks in the test task for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Five.*

Subjective Measures

The means and standard deviations for the subjective measures obtained in the post-treatment and post-test questionnaires are shown in Table 8-3. The maximum rating that was possible for 'pleasantness' was 7 (i.e. very pleasant) and the minimum was 1 (i.e. very unpleasant). For the 'solution', 'success', and 'motivation' questions, the maximum response was 5 (indicating a definite solution, a high perception of success, and a high level of motivation, respectively) while the minimum was 1 (indicating no solution, no success, and a low level of motivation, respectively). Regarding perceptions of control, a total score was obtained by subtracting the 'external control' score from the 'internal control' score. The resulting 'control' score had a maximum of +4 (i.e. completely under internal control) and a minimum of -4 (i.e. completely under external control).

Table 8-3: *Means and standard deviations for subjective measures following the treatment and test tasks of Experiment Five.*

Type of Treatment	Subjective Measures									
	Pleasantness		Solution		Success		Motivation		Control	
	Response Range									
	1 ↔ 7		1 ↔ 5		1 ↔ 5		1 ↔ 5		-4 ↔ +4	
	Task									
	Treat	Test	Treat	Test	Treat	Test	Treat	Test	Treat	Test
None (NT)	none	3.9 (0.6)	none	4.5 (0.9)	none	4.4 (1.0)	none	3.8 (0.8)	none	+2.5 (2.1)
Contingent (CT)	2.7 (0.7)	3.9 (0.6)	4.0 (0.8)	4.1 (1.0)	4.2 (0.6)	4.1 (1.3)	3.1 (0.6)	3.3 (0.5)	+1.2 (1.9)	+1.3 (2.3)
Noncontingent (NCT)	2.8 (0.9)	4.3 (1.3)	3.4 (0.8)	3.6 (1.4)	3.6 (1.1)	3.5 (1.4)	3.5 (0.9)	3.7 (0.8)	+0.4 (2.3)	+1.3 (2.8)

Perceptions of the Treatment Task

The CT and NCT groups were compared in relation to their perceptions of the treatment task. Although it appeared that the NCT group generally perceived themselves as being less successful, and perceived the task as less likely to have a solution and less likely to be under internal control, these differences were not statistically significant. Interestingly, the NCT group reported a higher level of motivation after completion of the task than did the CT group, although once again this difference was not significant.

Perceptions of the Test Task

The three groups were compared using univariate analysis of variance on each of the subjective measures following the test task. There were no significant differences between the groups on any of the measures.

Comparison Between Treatment and Test Task Perceptions

Related-sample t-tests were used to compare the perceptions of the treatment task with the perceptions of the test task for the CT and NCT groups separately. The only measure which displayed significant differences between the two tasks was 'pleasantness', with the sound in the treatment task being perceived as significantly less pleasant than that in the treatment task in both groups (CT group, $t_{(9)} = -9.00$, $p < .001$; NCT group, $t_{(9)} = -2.76$, $p = .022$).

Correlations of treatment task perceptions with performance

The performance measures of the CT group in the treatment task were correlated with the subjective measures on that task. Pearson's correlation coefficients ranged from -0.26 to 0.02, none of which was significant at the 5% level of probability. Next, measures of association between perceptions of the treatment task and performance in the test task were made for the CT and NCT groups. The resulting correlation coefficients are given in Table 8-4. It should be

Table 8-4: *Pearson's r correlations between post-treatment task subjective measures and test task performance measures for the Contingent and Noncontingent groups of Experiment Five .*

			Treatment Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	Contingent	Latency	-.29	-.06	-.29	-.28	-.25
		Errors	-.29	.03	-.18	-.20	-.20
	Noncontingent	Latency	-.03	-.39	-.61 #	-.09	-.01
		Errors	-.03	-.32	-.55 #	.01	.02

Note: Correlations marked with # are have a significance level .05 < p < .10 (two-tailed).

Table 8-5: *Pearson's correlations between test task performance measures and post-test task subjective measures for the No Treatment, Contingent and Noncontingent groups of Experiment Five.*

			Test Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	No Treatment	Latency	-.28	-.89 ***	-.83 ***	-.04	-.77 **
		Errors	-.34	-.90 ***	-.86 ***	.02	-.76 *
	Contingent	Latency	.01	-.88 ***	-.87 ***	-.58 #	-.86 ***
		Errors	.03	-.90 ***	-.92 ***	-.48	-.90 ***
	Noncontingent	Latency	-.39	-.44	-.61 #	-.22	-.30
		Errors	-.35	-.44	-.58 #	-.16	-.33

Note: All significance levels are two-tailed, with *** p ≤ .001, ** p ≤ .01, * p ≤ .05, # .05 < p ≤ .10

made clear that because the performance measures were negative in nature (e.g. long latencies indicated poor performance) a negative coefficient actually reflects a positive association between subjective measures and performance. No correlations were statistically significant, although the correlation between the NCT group perceptions of success in the treatment task and both measures of performance in the test task was just short of significance.

Correlations of Test Task Perceptions with Performance

Measures of association between perceptions of the test task and performance in the test task were made for all groups. The resulting correlation coefficients are given in Table 8-5. Examination of the correlations for the NT group show that the Ss appeared aware of there being a solution to the task, their level of success in solving the task, and, to a lesser extent, their control over the situation. Similar results were obtained for the CT group, except that the Ss appeared more aware of their actual control of the situation. These results were not reflected in the NCT group. Perceptions of solubility and of control over the situation were uncorrelated with performance. However, there appeared to be some degree of awareness of the Ss' success in performing the task, although these correlations were just short of significance at the 5% level of probability.

Discussion

The analysis of the performance measures clearly indicates that experiencing response-outcome noncontingency in a task requiring subjects to offset high intensity sounds debilitates later performance in a similar task using low intensity sounds. This is particularly borne out in the examination of performance over time. The NCT group consistently performed worse than both the NT and CT groups over the six trial-blocks of the test task. Whereas the NT and CT groups quickly learned to turn off the sound, the NCT group did not show any clear indications of learning to solve the problems until after the 4th trial-block. It would thus appear that not only does the experience of noncontingency between response and outcome result in a later performance deficit overall, this performance deficit is characterised by a retarded learning process.

The possibility that the performance debilitation is solely attributable to the experience of high intensity sound (and not response-outcome noncontingency) is ruled out by the fact that both the CT group and the NCT experienced this sound intensity, yet only the NCT group exhibited later performance deficits.

Examination of the subjective measures indicated that there are a number of problems with interpreting the performance results strictly in terms of learned helplessness theory. Firstly, there were no statistically significant differences between the CT and the NCT groups in their perceptions of the existence of a solution, no differences in their perceptions of the degree of success that they had in turning off the sounds, and no differences in their attributions of control over the offset of the sounds. A requirement of the theory is that the experience of noncontingency has to be perceived and subsequently expected in future situations. If there was no overwhelming perception of noncontingency which may have affected later performance, the question arises as to what <u>was</u> the contributing factor to the poor test task performance of the NCT group? Secondly, learned helplessness theory suggests that after experiencing noncontingency, a person's general level of motivation is lowered. No such differences were found between the NCT and CT groups following the treatment task, nor after the test task. In fact, the motivation level of the NCT group was slightly higher than that of the CT group (albeit nonsignificantly) after both tasks. Hence, it would appear that although the NCT group perceived themselves as being less successful than the CT group in the treatment task, they reported a slightly higher level of motivation following this task. This points to the possibility that the performance differences may be attributable to a mechanism other than learned helplessness. However, as these effects were weak it is not possible to say this with any degree of confidence. Alternatively, it may be that the subjective measures were not sufficiently reliable.

Another problem with a learned helplessness interpretation of the results is that there were strong correlations between test task performance and test task perceptions for both the NT and CT groups, indicating that subjects' were capable of reporting subjective perceptions which closely reflected their actual performance. It could be reasoned, therefore, that if any performance deficits in the test task are directly related to the subjects' perceptions and attributions in the treatment task, as is proposed by learned helplessness theory, then test task performance should show a significant correlation with treatment task subjective measures. While no such correlations were found for the CT group, a very weak correlation was found between test task performance and treatment task perceptions of success in the NCT group. The more successful that a subject perceived herself/himself in the treatment task, the better was that person likely to perform in the test task. However, as this question was asked after both tasks had been completed, there may have been some contamination of the treatment task perceptions with those of the subsequent test task.

Indeed, some authors have criticised the procedure of obtaining subjective measures and attributions only after the test task because the perceptions would be influenced by self-serving biases (Kuiper, 1978) or test task performance or the passage of time (Alloy, 1982). Some support for this had been provided by Pasahow (1980), who reported an effect for the time of administration of subjective measures in that there was no difference in global-specific attributions for failure in a treatment task between subjects when these attributions were obtained prior to the test task. However, when the attributions were obtained after the test task, there was a difference. On the other hand, a number of experimenters have found no difference between subjective measures of the treatment task taken after the treatment task and taken after the test task

(Mikulincer, 1989a; Mikulincer & Nizan, 1988; Tennen, Drum, Gillen & Stanton, 1982; Tiggemann & Winefield, 1987).

Finally, in Experiment Four the subjects were exposed to high intensity sounds in the treatment task, and yet did not show any test task performance deficits. It may be that the intensity of the test task affects the carry-over of any performance deficits which may arise from experiences within the treatment task. Hence, the demonstration of performance deficits with a procedure employing high intensity sounds in the treatment task followed by low intensity sounds in the test task raises the possibility that similar performance deficits would be found when both the treatment and test task sound intensities are low. Similar performance differences between the groups with lower treatment task sound intensities would confirm that it is the intensity of the test task, and not the intensity of the treatment task, which may differentially affect performance debilitation resulting from experiences of noncontingency in the treatment task. This is examined in the next experiment.

EXPERIMENT SIX

One way of determining whether the aversiveness of stimuli used in the treatment task plays a major role in subsequent test task performance deficits is by examining the effect of noncontingency in tasks which do not involve aversive stimuli. A large number of such experiments have been carried out using non-manipulative tasks, which have included concept-formation problems, anagrams, numerical sequences, figure-tracing, uses of objects, mazes, word-searches and colour-word problems (Buys & Winefield, 1982; Cohen, Rothbart & Phillips, 1976; Dor-Shav & Mikulincer, 1990; Eisenberger & Leonard, 1980; Hanusa & Schulz, 1977; Hiroto & Seligman, 1975; Mikulincer & Caspy, 1986; Mikulincer & Nizan, 1988; Roth & Bootzin, 1974; Roth & Kubal, 1975; Trice, 1984; Trice & Woods, 1979). Although some of these studies either failed to demonstrate test task performance debilitation or found facilitation (i.e. Hanusa & Schulz; Roth & Bootzin; Roth & Kubal), the remainder reported test task performance debilitation. However, as these studies used non-manipulative tasks whereas Experiment Five used button-pressing problems, it is more relevant to examine studies using similar tasks. A number of such experiments have been carried out, and have demonstrated test task performance deficits (Barber & Winefield, 1986b; DeVellis, DeVellis & McCauley, 1978; Douglas & Anisman, 1975; Tiggemann, 1981; Tiggemann, Barnett & Winefield, 1983; Tiggemann & Winefield, 1978). These studies used simple treatment and test tasks, such as button-pressing problems using one or two buttons, except for DeVellis et al who used a four-button task.

However, there have been other studies which have used manipulative tasks and which have reported difficulties in finding performance deficits. For instance, Douglas & Anisman (1975) found deficits using simple tasks, but not when the complexity of the treatment task was increased. Barber & Winefield (1987) did not find performance deficits in subjects scoring low on motivation (as measured by the Personal Interests Inventory), but did so with subjects scoring high on motivation. Finally, Barber (1989) varied the number of trials of exposure to a non-aversive sound between 5 and 30 trials (in 5 trial intervals) and found performance deficits only when the task was either 10 or 30 trials in length.

The use of a low intensity stimulus in the treatment task is an important test of the theory of learned helplessness. Seligman (1975), and Maier & Seligman (1976), had proposed that learned helplessness should occur not only when aversive events are experienced as uncontrollable, but also when non-aversive events are experienced as uncontrollable. If support for this premise could be found, then it would strengthen the view that it is the uncontrollability of an outcome, rather than its aversiveness, that is responsible for the performance deficits following experience of uncontrollable outcomes.

The aims of this experiment were: firstly, to determine whether the experience of response-outcome noncontingency in relation to offset of a low intensity sound would produce a later debilitating effect on performance of response-contingent offset of the same low intensity sound; secondly, to determine whether the lower intensity of the treatment sound results in any different performance characteristics compared to those found in Experiment Five in which high intensity sound was employed; and thirdly, to determine whether subjective perceptions of performance are correlated to actual performance in the treatment and test tasks. From learned helplessness theory it was predicted that there should be no difference between the No-Treatment and the Contingent Treatment groups in the performance of the test task, while the Noncontingent Treatment group would perform worse in the test task in comparison to the other two groups combined.

Method

Overview

The experiment consisted of two phases: a treatment task, in which Ss were given either no sound or low intensity sound, the offset of which was either contingent or noncontingent upon responses on a two-button apparatus; and a test task, in which all Ss were given a low intensity sound, the offset of which was contingent upon responses on a three-button apparatus. The design of the experiment is summarised in Table 8-6. The experiment differed from Experiment Five only in the intensity of the sound employed in the treatment task.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Thirty Ss were allocated to one of three groups (Contingent Treatment, Noncontingent Treatment, or No Treatment). Two Ss in the Contingent Treatment group failed to successfully complete the treatment task and were removed from the experiment with replacement.

Apparatus and Procedure

The apparatus, written instructions and post-task questionnaires were identical to those used in Experiment Five, with the only difference in the procedure being that a low intensity sound was used in both the treatment and test tasks.

Table 8-6: *Design of Experiment Six.*

Group		Sound Contingency		Sound Intensity		Number of Buttons	
		Treat.	Test	Treat.	Test	Treat.	Test
No Treatment	(NT)	—	C	—	Low	—	3
Contingent Treatment	(CT)	C	C	Low	Low	2	3
Noncontingent Treatment	(NCT)	NC yoked	C	Low	Low	2	3

Note: Sound was either contingent (C) or not contingent (NC) upon responses.

Results

Performance Measures

The means and standard deviations of the three response measures, taken over all thirty trials of the test task, are given in Table 8-7. Examination of this table reveals that the NCT group performed marginally worse than did the NT and CT groups in all measures.

The 30 trials were divided into 6 blocks of 5 trials, with the means of the 'latency' and 'errors' measures being obtained for each trial-block. The plots of the mean latency (Figure 8-3) and the mean number of errors (Figure 8-4) over the six 5-trial blocks of the test task show that, although performance was almost identical for the three groups in the first trial-block, the groups gradually diverged as the experimental session progressed. Interestingly, there was no apparent difference between the CT and the NCT groups for the first three trial-blocks. However, over the latter half of the test session the NCT group exhibited longer latencies and made more errors than the CT group.

The between-groups variance was partitioned such that two planned contrasts were incorporated into the analyses in place of an omnibus F-test. The contrasts were as follows: NT vs CT (Contrast 1); $\frac{1}{2}$ [NT+CT] vs NCT (Contrast 2). A repeated measure multivariate analysis of variance was carried out separately on each of the 'latency' and 'errors' dependent variables, with repeated measures over the 6 trial-blocks. Using the Pillai-Bartlett trace criterion, Contrast 1 proved not significant (errors $F_{(1,27)} = 0.09$, $p = .773$; latency $F_{(1,27)} = 0.17$, $p = .681$) as did Contrast 2 (errors $F_{(1,27)} = 0.14$, $p = .710$; latency $F_{(1,27)} = 0.50$, $p = .487$). Although there was a significant improvement in performance over trial-blocks in both errors ($F_{(5,23)} = 6.57$, $p = .001$) and latency ($F_{(5,23)} = 9.99$, $p < .001$), there were no significant interactions between the contrasts and trial-blocks.

Table 8-7: *Mean latency and mean number of errors over all 30 trials of the test task of Experiment Six.*

Type of Treatment		**Latency**		**Errors**	
		Mean	sd	Mean	sd
None	**(NT)**	5.22	(2.60)	11.00	(8.73)
Contingent	**(CT)**	5.75	(2.96)	12.30	(10.83)
Noncontingent	**(NCT)**	6.26	(2.98)	13.10	(10.21)

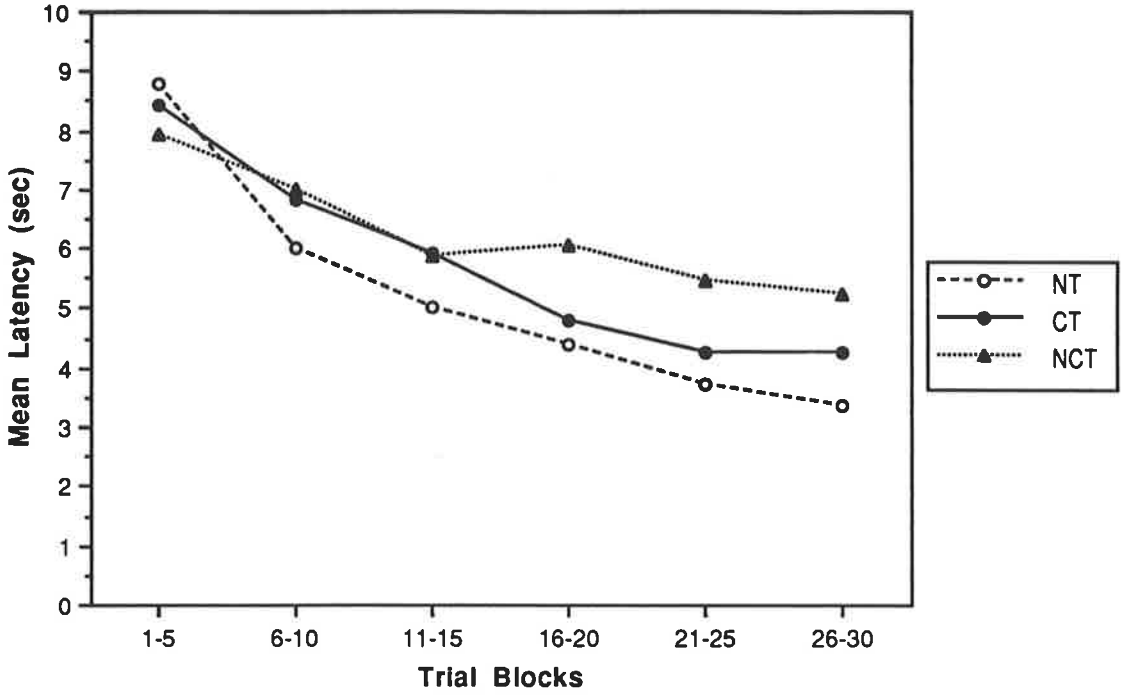

Figure 8-3: *Mean latency of responses over six 5-trial blocks in the test tasks for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Six.*

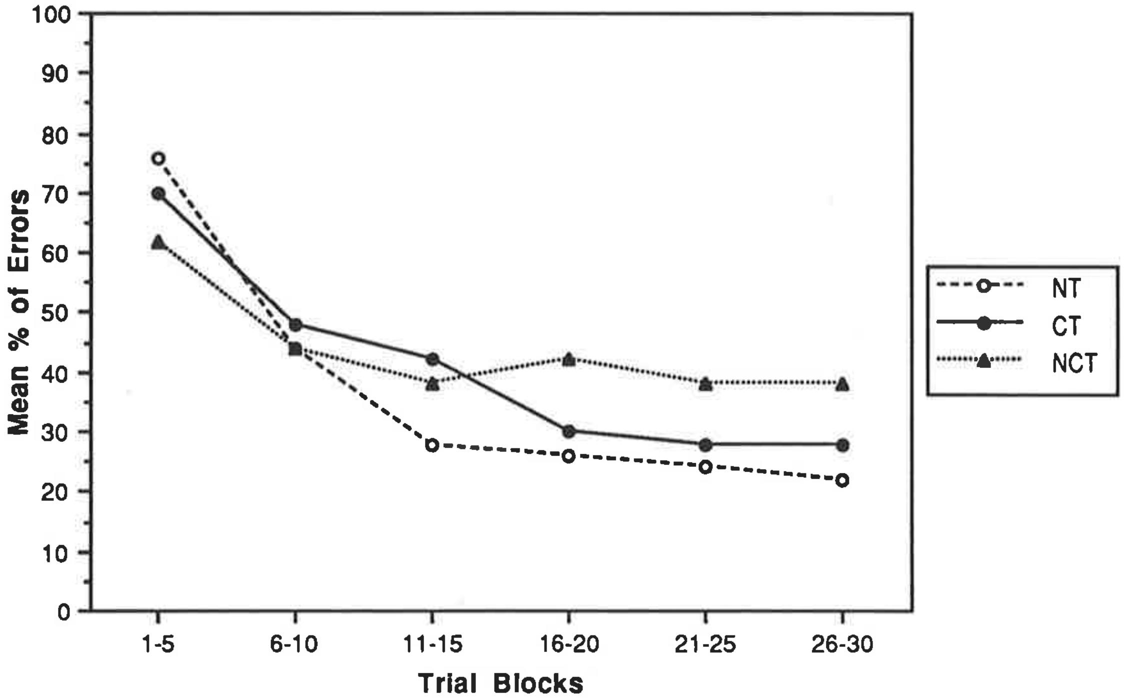

Figure 8-4: *Mean percentage of errors over six 5-trial blocks in the test task for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Six.*

Subjective Measures

The means and standard deviations of scores on the subjective measures are shown in Table 8-8. Minimum and maximum ratings that could possibly be obtained for each of the questions are indicated in the table, with a score of 5 representing a high rating of pleasantness, high likelihood of solution, high level of effort, and high level of frustration.

Perceptions of the Treatment Task

One-tailed t-tests showed that the CT and NCT groups did not differ in their ratings of the pleasantness of the treatment task sound nor in their motivation level following the task. On the other hand, the NCT group perceived the task as significantly less likely to have a solution than did the CT group ($t_{(18)}$ = 4.20, p < .001). The NCT group also rated themselves as significantly less successful ($t_{(18)}$ = 3.77, p = .001) and the task as being less under internal control ($t_{(18)}$ = 3.40, p = .002).

Perceptions of the Test Task

The three groups were compared using univariate analyses of variance on each of the subjective measures taken after the test task. There were no significant differences between the groups on any of the measures.

Comparison Between Treatment and Test Task Perceptions

Differences in perceptions between the two tasks were examined for the CT and NCT groups separately. As no predictions were made regarding these measures, two-tailed t-tests were used. The CT Ss perceived themselves as being less successful in the test task than in the treatment task, although this was short of significance ($t_{(9)}$ = 1.88, p = .093). They also perceived themselves as having less control in the test task than in the treatment task ($t_{(9)}$ = 2.24, p = .052). For the NCT group, there was a difference in the perceptions of the pleasantness of the sounds, with the test task sound being perceived as less pleasant than the treatment task sound (t (9) = 2.24, p = .052). This last result was surprising in view of the fact that the sound was exactly the same in both tasks.

Correlations of Treatment Task Perceptions with Performance

Pearson's *r* correlations between the performance measures recorded in the treatment task and the subjective perceptions of the same task by the CT group were calculated. There were no significant correlations.

Correlations between perceptions of the treatment task and performance in the test task were calculated for the CT and NCT groups, and are given in Table 8-9. Significant negative correlations between perceptions of success in the treatment task and both measures of test task performance were found for the NCT group. The correlation coefficients for the 'solution', 'success' and 'control' ratings of the CT group were surprising in that they were positive, albeit not significant.

Table 8-8: *Means and standard deviations for subjective measures following the treatment and test tasks of Experiment Six.*

Type of Treatment	Subjective Measures									
	Pleasantness		Solution		Success		Motivation		Control	
	Response Range									
	1 ↔ 7		1 ↔ 5		1 ↔ 5		1 ↔ 5		-4 ↔ +4	
	Task									
	Treat	Test	Treat	Test	Treat	Test	Treat	Test	Treat	Test
None (NT)	none	4.1 (1.0)	none	4.3 (0.9)	none	4.3 (0.7)	none	3.3 (0.7)	none	+1.9 (1.7)
Contingent (CT)	4.3 (1.3)	4.2 (1.3)	4.6 (0.5)	4.2 (0.8)	4.5 (1.0)	3.4 (1.6)	3.0 (0.0)	3.1 (0.6)	+2.6 (1.7)	+0.6 (2.2)
Noncontingent (NCT)	3.9 (0.6)	3.4 (0.8)	3.2 (0.9)	3.6 (1.5)	2.6 (1.3)	3.2 (1.8)	3.0 (0.5)	3.1 (0.9)	-0.5 (2.3)	+0.5 (3.0)

Table 8-9: *Pearson's r correlations between post-treatment task subjective measures and test task performance measures for the Contingent and Noncontingent Treatment groups of Experiment Six.*

			Treatment Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	Contingent	Latency	-.10	.49	.35	-.16	.53
		Errors	-.12	.52	.35	-.17	.55 #
	Noncontingent	Latency	-.31	-.24	-.65 *	-.37	-.31
		Errors	-.38	-.26	-.63 *	-.46	-.38

<u>Note</u>: All significance levels are two-tailed, with * p < .05, and # .05 < p < .10

Table 8-10: *Pearson's correlations between test task performance measures and post-test task subjective measures for the No Treatment, Contingent and Noncontingent Treatment groups of Experiment Six.*

			Test Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	No Treatment	Latency	.20	-.67 *	-.55 #	.00	-.23
		Errors	.29	-.51	-.41	.00	-.08
	Contingent	Latency	-.01	-.64 *	-.80 **	-.13	-.72 **
		Errors	-.04	-.65 *	-.84 **	-.13	-.74 **
	Noncontingent	Latency	-.50	-.92 ***	-.92 ***	-.47	-.79 **
		Errors	-.41	-.89 ***	-.94 ***	-.51	-.80 **

<u>Note</u>: All significance levels are two-tailed, with *** p < .001, ** p < .01, * p < .05, # .05 < p < .10

Correlations of Test Task Perceptions with Performance

Measures of association between perceptions of the test task and performance in that same task were made for all groups. The resulting Pearson's correlations are given in Table 8-10. The CT and NCT groups both had significant correlations between response measures and the subjective measures of 'solution', 'success', and 'control', with the latter group having somewhat higher correlations. Furthermore, the ratings of the NT group showed poorer correlations with task performance. It is interesting that the NCT group should show such high correlations when compared to those found in Experiment Five. The measures of 'pleasantness' and 'motivation' showed no correlation with performance measures at all for any of the three groups..

Discussion

The aim of this experiment was to establish whether performance deficits could be obtained in the NCT group following exposure to a treatment of response-noncontingent sounds of low intensity using the same procedure as in Experiment Five. No such deficits were observed. Furthermore, the subjective measures indicated that the NCT group perceived the treatment task problem as <u>not</u> having a solution and rated the offset of the sound as being under external control. Furthermore, there was a significant correlation between perception of success in the treatment task problem and performance in the test task problem.

The results of this experiment present two problems for learned helplessness theory. Firstly, the theory suggests that it is the uncontrollability of a stimulus, and not its aversiveness, which is the cause of poor performance in a subsequent test task. Thus, it should make no difference whether the treatment task stimulus has a high or a low intensity, as long as it is perceived by the subjects as being uncontrollable. The fact that in Experiment Five performance deficits were found following exposure to uncontrollable aversive sound while in the current experiment no such deficits were found following exposure to uncontrollable non-aversive sound indicates that the aversiveness of the stimulus employed does influence subsequent performance.

Secondly, according to learned helplessness theory, a person must perceive the noncontingency between responses and outcomes and have an expectation of future noncontingency. The fact that the NCT group reported a significantly lower perception of success in the treatment task problem and attributed control of the offset of the stimulus to external agents would suggest that, at least, the first condition was adequately met. Although no question was asked regarding specific expectations of future noncontingency, the correlation between the perception of solubility of the treatment task problem and performance in the test task problem suggests that these perceptions may have indeed influenced later performance.

The lack of a performance deficits in the NCT group does not conform to the findings of other studies, mentioned earlier, which had employed human subjects with manipulative tasks and nonaversive sounds. However, the results of the current experiment, when taken together with the results of Experiment Five, support findings reported in other studies which have varied treatment task shock intensity using animals as subjects. For instance, Anisman, DeCatanzaro & Remington (1978) found that mice given a moderate intensity inescapable shock treatment exhibited performance deficits in a subsequent test task incorporating low intensity shock. On the other hand, when the treatment and test shock intensities were both low, no such performance deficits were obtained.

As the main difference between the current experiment and the human studies is the number of buttons used in the tasks it may be that increasing the complexity of the treatment and test tasks influences whether subjects are affected by experiences of noncontingency, although even this does not seem clear, as DeVellis, DeVellis & McCauley (1978) had used a complex treatment task and had found performance deficits, while on the other hand Douglas & Anisman (1975) found performance deficits following a simple task, but not following a more complex task. The effect of treatment task complexity on subsequent performance deficits is further explored in the next chapter. However, before any experiments on treatment task complexity were carried out it was considered essential to replicate the findings of Experiment Five. After all, of the six experiments carried out to this point, this was the only one to show any performance effects.

EXPERIMENT SEVEN

In the present series of experiments evidence has been obtained that indicates that the performance deficits following exposure to uncontrollable low intensity sound are not as pronounced as the deficits following high intensity sound. It was concluded that this difference was attributable to the intensity itself, rather than to any other influences of the experimental situation, such as amount of exposure to the sound stimulus. If a high intensity sound is regarded as aversive by the subjects, and it is this aversiveness which differentially affects the amount of performance deficit following an experience of uncontrollability, then it follows that this performance deficit may be increased if the aversiveness of the sound is increased. One obvious way of increasing the aversiveness of the sound is by increasing its level of intensity. Although studies have been reported which have used sound intensities as high as 108 dB(A) (e.g. Glass, Reim & Singer, 1971), current safety considerations preclude the use of intensities greater than 85 dB(A). However, it may be possible to increase the aversiveness of a sound by varying certain of its properties, such as frequency, waveform and sweep time.

There is a possibility that even when the intensity is kept constant, variations in other properties of the sound may lead to differences in performance deficits. As mentioned in Chapter Three, Lawry et al (1978) found that performance deficits in dogs following experiences of uncontrollable shock were affected by varying such properties as type of current (i.e. alternating vs. direct) or type of phase (i.e. pulsating vs. continuous). This occurred even though the shocks were kept at a constant level of intensity. With human subjects, Percival & Loeb (1980) found that after-effects of exposure to very loud sounds were influenced by the type of sounds being administered (i.e. aircraft noise vs white noise vs garbled noise). Once again, these differences were found even though the sound level in all conditions was kept at an overall intensity level of 95 dB(A). If changes in the properties of sound lead to differential changes in the amount of performance deficit, the generality of the detrimental effect of an experience of uncontrollability would need to be questioned.

The aims of this experiment were: firstly, to demonstrate test task performance debilitation using sounds of the same intensity as in Experiment Five, but differing in frequency and 'sound effect' (with the latter being defined by sweep time and wave form); secondly, to determine whether subjective perceptions of performance are correlated to actual performance in the treatment and test tasks. In accordance to learned helplessness theory, it was predicted that there should be no difference between the No-Treatment and the Contingent Treatment groups in their performance of the test task, while the Noncontingent Treatment group perform worse in the test task when compared to the other two groups combined.

Method

Overview

A pilot experiment was run to determine the most unpleasant form of sound that could be generated within the confines of a maximum intensity of 85 dB(A). The sound rated as most unpleasant was used in the main experiment.

The main experiment consisted of two phases: a treatment phase, in which subjects were given either no sounds or high intensity sounds, the offset of which was either contingent or noncontingent upon responses on a two-button apparatus; and a test phase, in which all subjects were given low intensity sounds, the offset of which was contingent upon responses on a three-button apparatus. The design of the experiment is summarised in Table 8-11. Essentially, the experiment differed from Experiment Five only in the properties of the sounds employed in the treatment task, with these being frequency, wave form and sweep time.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Ten Ss were used in the pilot experiment. In the main experiment, a further twenty Ss were allocated to one of two groups (Contingent or Noncontingent Treatments). Two Ss in the Contingent Treatment group failed to successfully complete the treatment task and were eliminated from the experiment with replacement.

Table 8-11: *Design of Experiment Seven.*

Group		Sound Contingency		Sound Intensity		Number of Buttons	
		Treat.	Test	Treat.	Test	Treat.	Test
No Treatment *	(NT *)	—	C	—	Low	—	3
Contingent Treatment	(CT)	C	C	HighB	Low	2	3
Noncontingent Treatment	(NCT)	NC yoked	C	HighB	Low	2	3

Note: Sound was either contingent (C) or not contingent (NC) upon responses. The NT* group was the NT group from Experiment Five.

Apparatus and Procedure

<u>Pilot Experiment</u>

Sounds were administered to the Ss with the same sound-generating equipment as that used in all of the experiments to this point, with the exception that the Ss were not required to perform any tasks. The sounds were varied in frequency (1000, 2000, 3000 Hz) and sweep time (0, 0.1, 1.0, 10.0 sec), giving a total of 12 different sounds, which were presented four times to the Ss. The order of the sounds was varied with each presentation. The Ss were asked to rate the sounds on a 9-point scale ranging from extremely unpleasant (1) to extremely pleasant (9), with a neutral mid-point (5). The means of these scores were calculated, and the sound with the lowest score was selected for the main experiment. This sound had a frequency of 3000 Hz and a sweep time of 0.1 seconds, and could be likened to the sound of a helicopter.

<u>Main Experiment</u>

The apparatus was identical to that used in Experiment Five. The sounds used were: Low intensity 56 dB(A), 310 Hz, triangular wave form; High intensity 85 dB(A), 3000 Hz, square wave form, continuous sweep of 0.1 sec.

Results

Performance Measures

The means and standard deviations of the response measures, taken over all thirty trials of the test task, are given in Table 8-12. The NT group results were taken from Experiment Five. It is evident from this table that the NCT group performed worse than the CT group in both measures

Figure 8-5 shows the plot of the mean latency over the six 5-trial blocks of the test task, and Figure 8-6 shows the plot of the mean number of errors. The results of the NT group from experiment 5 are also presented in these graphs. The performance of the three groups did not appear to differ greatly in the first trial-block, while the groups gradually diverged over the course of the experimental session. The CT group performed better than either the NCT or the NT groups, particularly over the latter half of the session, with all Ss in the CT group making no errors in the last trial-block.

Once again the between-groups variance was partitioned into two planned contrasts, these being: NT vs CT (Contrast 1); $\frac{1}{2}$ [NT+CT] vs NCT (Contrast 2). A repeated measures multivariate analysis of variance was carried out separately on each of the 'latency' and 'errors' dependent variables over the 6 trial-blocks. Using the Pillai-Bartlett trace criterion, no difference was found between the CT and NT groups in terms of latency ($F_{(1,27)} = 0.31$, $p = .581$) or errors ($F_{(1,27)} = 0.05$, $p = .832$). Contrast 2 showed that the performance of the NCT group was significantly worse than that of the combined CT and NT groups in terms of the latency of responses ($F_{(1,27)} = 4.22$, $p = .050$), but proved to be just short of significance in terms of the number of errors made ($F_{(1,27)} = 3.44$, $p = .074$). As would be expected, there was a significant improvement in

Table 8-12: *Mean latency and mean number of errors over all 30 trials of the test task of Experiment Seven. The No Treatment group is taken from Experiment Five.*

Type of Treatment		**Latency (sec)**		**Errors**	
		Mean	sd	Mean	sd
None *	**(NT)**	4.65	(2.71)	8.60	(8.88)
Contingent	**(CT)**	3.99	(2.00)	7.70	(6.75)
Noncontingent	**(NCT)**	6.43	(3.13)	14.90	(11.83)

Note: * From Experiment Five.

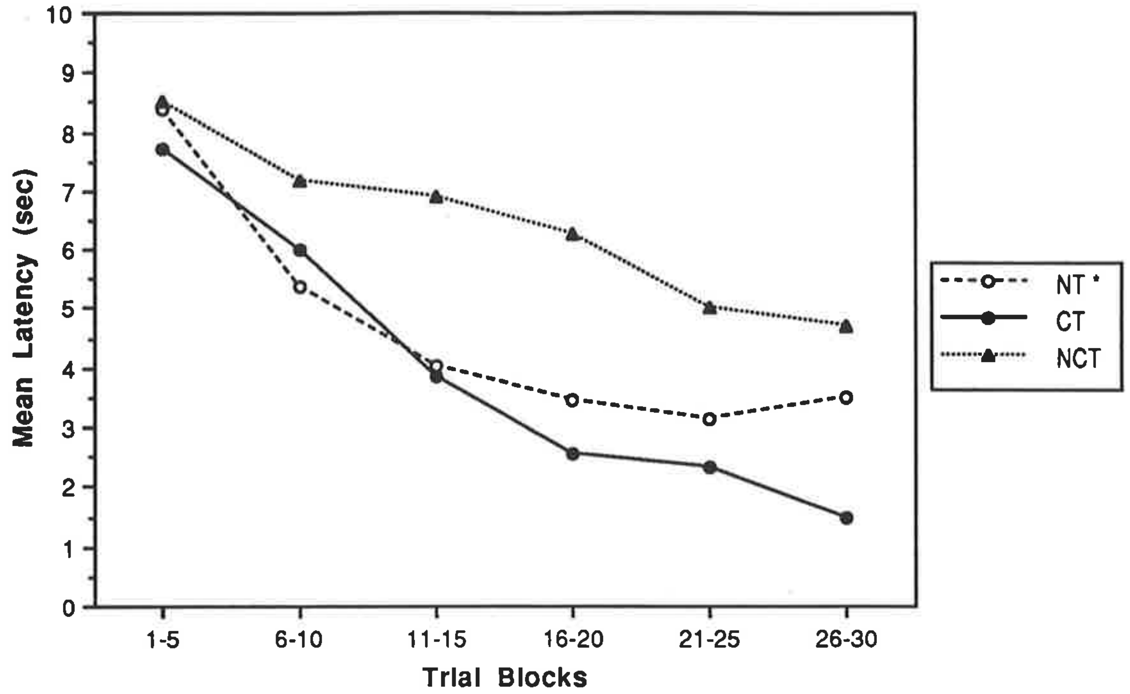

Figure 8-5: *Mean latency of responding over six 5-trial blocks of the test task for the Contingent Treatment (CT) and the Noncontingent Treatment (NCT) groups of Experiment Seven, compared to the No Treatment group (NT *) of Experiment Five.*

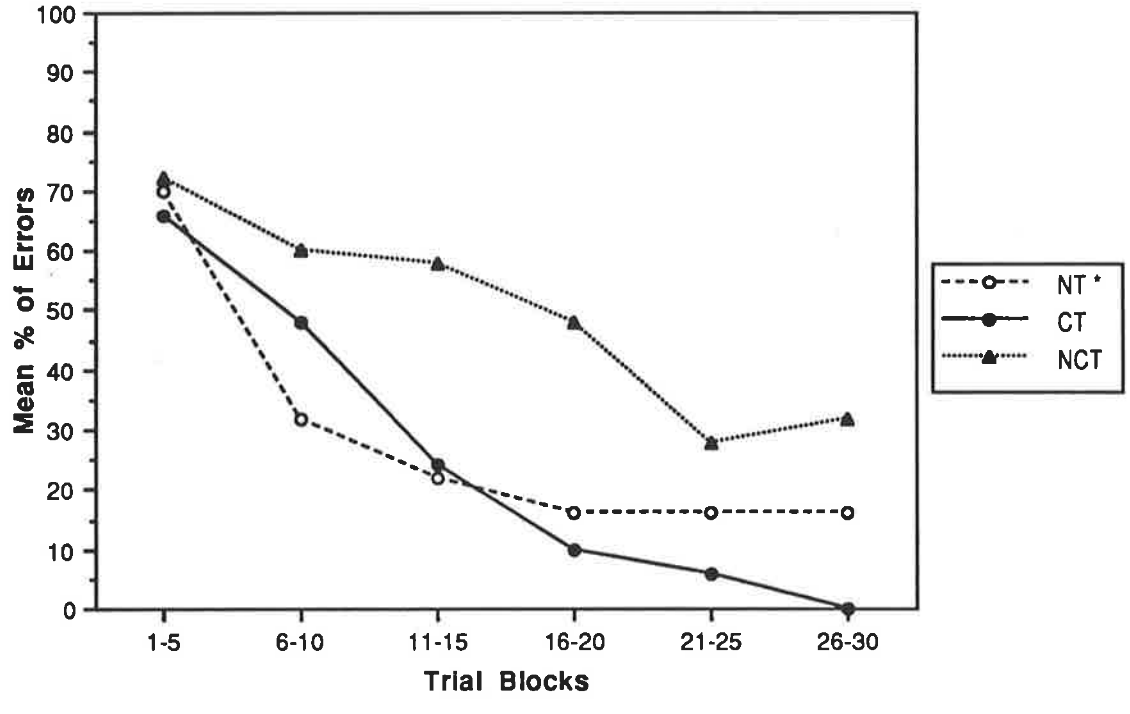

Figure 8-6: *Mean percentage of errors over six 5-trial blocks of the test task for the Contingent Treatment (CT) and the Noncontingent Treatment (NCT) groups of Experiment Seven, compared to the No Treatment group (NT *) of Experiment Five.*

performance over trial-blocks in both latency ($F_{(5,23)} = 14.87, p < .001$) and errors ($F_{(5,23)} = 10.45, p < .001$). There was no interaction effects for either of the two contrasts by trial blocks.

The difference in performance between the CT and NCT groups was similar to that found in Experiment Five. In the current experiment, the differences between the two groups were 2.44 seconds and 7.2 errors for mean latency and mean numbers of errors, respectively. Effect size in terms of partial eta-squared for Contrast 2 was 0.250 for latency, and 0.240 for errors. This can be compared to Experiment Five, in which the performance difference between the groups was 2.25 seconds and 8.4 errors, with effect sizes for Contrast 2 being 0.196 for latency and 0.205 for errors.

Subjective Measures

Perceptions of the Treatment Task

The means and standard deviations of the subjective measures are shown in Table 8-13. The differences in ratings of the treatment task between the CT and NCT groups found in Experiment Five were mirrored in the present experiment. In particular, the CT and NCT groups did not differ in their ratings of the pleasantness of the treatment task sound, nor in their ratings of their motivation level following the task. However, the NCT group perceived the task as significantly less likely to have a solution than did the CT group ($t_{(18)} = 3.90$, $p < .001$). The NCT group also rated themselves as significantly less successful ($t_{(18)} = 2.66$, $p = .008$) and the task as being more likely to have been under external control ($t_{(18)} = 4.60$, $p < .001$).

Perceptions of the Test Task

The three groups were compared using univariate analysis of variance on each of the subjective measures following the test task. There were no significant differences between the groups on any of the measures.

Comparison Between Treatment and Test Task Perceptions

Differences in perceptions between the two tasks were examined for the CT and NCT groups using two-tailed t-tests. The only significant differences found in the CT group was in the rating of the pleasantness of the sound. The high intensity sound in the treatment task was perceived as being more unpleasant than the low intensity sound of the test task ($t_{(9)}$ = 3.75, p = .005). For the NCT group, all ratings except that for level of motivation were significantly different between the two tasks. In particular, it was found that the treatment task sound was more unpleasant then the test task sound ($t_{(9)}$ = 7.22, p < .001), the treatment task was rated as less likely to have had a solution ($t_{(9)}$ = 2.74, p = .023), the Ss perceived themselves as being less successful in the treatment task ($t_{(9)}$ = 2.71, p = .024), and the treatment task was considered to be much less under internal control ($t_{(9)}$ = 3.64, p = .005).

Table 8-13: *Means and standard deviations for subjective measures of the treatment and test tasks for the CT and NCT groups of Experiment Seven, with comparison with the NT group from Experiment Five.*

Type of Treatment	Subjective Measures									
	Pleasantness		Solution		Success		Motivation		Control	
	Response Range									
	1 ↔ 7		1 ↔ 5		1 ↔ 5		1 ↔ 5		-4 ↔ +4	
	Task									
	Treat	Test	Treat	Test	Treat	Test	Treat	Test	Treat	Test
None * (NT*)	none	3.9 (0.6)	none	4.5 (0.8)	none	4.4 (1.3)	none	3.8 (0.8)	none	+2.5 (2.1)
Contingent (CT)	2.7 (0.5)	4.3 (1.1)	4.4 (0.7)	4.8 (0.4)	4.1 (1.3)	4.8 (0.4)	3.5 (0.7)	3.8 (0.8)	+2.3 (2.0)	+3.4 (1.0)
Noncontingent (NCT)	2.9 (0.7)	4.7 (0.8)	2.9 (1.0)	3.9 (1.4)	2.7 (1.1)	3.9 (1.4)	3.3 (0.5)	3.4 (0.5)	-1.7 (1.9)	+1.6 (2.9)

Note: * NT results taken from Experiment Five

Correlations of Treatment Task Perceptions with Performance

Pearson's product-moment correlations were calculated between the CT group's performance measures recorded in the treatment task and the subjective perceptions of the same task. It was found that better performance (faster latencies and fewer errors) was positively correlated with higher ratings of success (r=-0.63, p=.050 and r=-.79, p=.006, respectively) and with higher ratings of internal control (r=-0.83, p=.003 and r=-.68, p=.029, respectively).

Correlations between perceptions of the treatment task and performance in the test task were calculated for the CT and NCT groups, and are given in Table 8-14. None were significant, although the negative correlation between the 'solution' perception and test task responding for the NCT group was just short of significance.

Correlations of Test Task Perceptions with Performance

Table 8-15 shows the Pearson's r correlation measures between perceptions of the test task and performance in the test task for the CT and NCT groups. The NCT group exhibited significant correlations between response measures and the subjective measures of 'solution', 'success', and 'control'. (Note: It should be remembered that longer latency and greater number of errors are indicative of poorer performance). The CT group on the other hand only showed significant correlations between response measures and the 'success' measure, while the correlation with 'pleasantness' was just short of significance. Interestingly, the relative sizes of the correlation coefficients for the two groups are the reverse of those found in Experiment Five, where the correlations between response measures and subjective measures were higher for the CT group than they were for the NCT group.

Table 8-14: *Pearson's r correlations between post-treatment task subjective measures and test task performance measures for the Contingent and Noncontingent groups of Experiment Seven.*

			Treatment Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	Contingent	Latency	-.17	.17	-.05	.27	.08
		Errors	-.13	.24	-.03	.24	.19
	Noncontingent	Latency	-.25	-.59 #	-.33	.10	-.35
		Errors	-.20	-.61 #	-.36	.10	-.38

Note: All significance levels are two-tailed, with # .05 < p < .10

Table 8-15: *Pearson's correlations between test task performance measures and post-test task subjective measures for the Contingent and Noncontingent groups of Experiment Seven.*

			Test Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	Contingent	Latency	-.52	-.22	-.63 #	.23	-.39
		Errors	-.59 #	-.26	-.65 *	.18	-.37
	Noncontingent	Latency	.08	-.81 **	-.81 **	.34	-.84 **
		Errors	.09	-.84 **	-.84 **	.37	-.88 ***

Note: All significance levels are two-tailed, with *** p < .001, ** p < .01, * p < .05, # .05 < p < .10

Discussion

The high intensity sound used in the current experiment was rated, in the pilot study, as being more aversive than the high intensity sound used in Experiment Five. Earlier it had been predicted that if performance deficits are indeed attributable to the level of aversiveness of a stimulus, the more aversive sound would result in greater performance deficits. What was found was that the magnitude of the difference between the CT and NCT groups was similar to that in Experiment Five, while the overall performance levels of the Ss in both the CT and NCT groups were generally lower than that in Experiment Five.

Although there were no differences between the CT and NCT groups in relation to their perceptions of the pleasantness of the treatment sound nor in their level of motivation following the completion of the task, perceptions of solubility, level of success and locus of control in the treatment task were significantly lower for the NCT group compared to the CT group. This should be contrasted against the lack of any significant differences between the CT and NCT groups on any of the subjective measures relating to the treatment task of Experiment Five. It is particularly noteworthy that the differences in the rating of control between the CT and NCT groups of Experiment Five was 0.8 points, whereas the difference in the current experiment was 4.0 points. This marked dissimilarity in perceptions of control between the two experiments was not reflected in their test task performances.

Once more, the results raise some doubt concerning the postulate that learned helplessness is influenced by perceptions of control. The much greater perception of external control exhibited by the NCT group of the current experiment, when compared to that of Experiment Five, did not lead to a greater magnitude of performance deficit. In fact, there were no significant correlations between treatment task perceptions of control and test task performance.

Finally, either of the sounds used in Experiments Five and Seven were considered suitable for use in subsequent experiments, as the level of performance debilitation attributable to them was similar. The next experiment attempted to increase aversiveness by varying intensity within each trial.

EXPERIMENT EIGHT

As mentioned in Chapter Three, there is evidence to suggest that when an aversive stimulus is made unpredictable, either by being unsignalled, by appearing at variable intervals, or by having a variable duration, its debilitative after-effects are increased. Glass & Singer (1972a) claimed that such unpredictability increases anxiety, which in turn affects performance. When an aversive stimulus is made predictable there is a reduction in the anxiety associated with the event and consequently a reduction in its debilitatory effects. Learned helplessness theory also proposes that an experience of uncontrollable outcomes leads to an increase in fear or anxiety, which is reduced if the individual learns that the situation can be controlled. Indeed, studies which have examined control over shock and its effect upon anxiety and physiological arousal have found that anxiety and arousal are increased by the threat of shock, and decreased when subjects anticipate control over the shock (Houston, 1972; Solomon, Holmes & McCaul, 1980).

Recall that, in attempting to account for the differential effects of high and low intensity sounds upon performance, Barber & Winefield (1987) had suggested that high intensity sound may increase the urgency of subjects to control the sound, stimulating them to higher levels of activity and thereby increasing the likelihood that the noncontingency between responses and outcomes is perceived. It could be that this sense of urgency may be associated with anxiety concerning the aversiveness of the sound.

It follows, then, that if a treatment task is used which raises the level of anxiety over a sound, and therefore the sense of urgency in offsetting it, the overall level of performance in the test task should be made worse. One way of raising the subjects' level of anxiety could be by varying the intensity of the stimulus, so that it rises from a low level to a high level in a crescendo effect. The question asked is whether such a sound would be similar to a high intensity sound in its effectiveness of bringing about subsequent performance deficits.

The aim of this experiment was to explore the effect of response-outcome noncontingency in a task in which the sound increases in intensity over the length of each exposure trial, and to determine whether subjective perceptions of performance are correlated to actual performance in the treatment and test tasks. It was predicted that the Noncontingent group would be affected by the response-outcome noncontingency in the treatment task and would perform worse in the test task when compared to the Contingent group.

Method

Overview

The experiment consisted of two phases: a treatment phase, in which Ss were given either no sounds or 'crescendo' sounds, the offset of which was either contingent or noncontingent upon responses on a two-button apparatus; and a test phase, in which all Ss were given low intensity sounds, the offset of which was contingent upon responses on a three-button apparatus. The design of the experiment is summarised in Table 8-16. The experiment differed from all previous experiments only in the type of noise used in the treatment task.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Sixteen Ss were allocated to one of two groups (Contingent or Noncontingent Treatments).

Table 8-16: *Design of Experiment Eight.*

Group	Sound Contingency		Sound Intensity		Number of Buttons	
	Treat.	Test	Treat.	Test	Treat.	Test
Contingent Treatment (CT)	C	C	Crescendo	Low	2	3
Noncontingent Treatment (NCT)	NC yoked	C	Crescendo	Low	2	3

Note: Sound was either contingent (C) or not contingent (NC) upon responses.

Apparatus and Procedure

The apparatus and procedure was identical to that used in Experiment Five, except for the intensity of the sound used in the treatment task. The sounds used in the two tasks were: crescendo intensity increasing from 56 dB(A) to 85 dB(A), 3000 Hz, square wave form, with increments of 6 dB(A) every 2 seconds; low intensity 56 dB(A), 310 Hz, triangular wave form.

Results

Performance Measures

The means and standard deviations of the two response measures, taken over all thirty trials of the test task, are given in Table 8-17.

Figures 8-7 and 8-8 show the plots of the mean latency, and the mean number of errors, respectively, over the six 5-trial blocks of the test task. As found in the previous experiments, there were no apparent performance differences between the two groups in the first trial-block. However, the groups did diverge over the course of the experimental session in their performance of the test task, although this was not to any great extent.

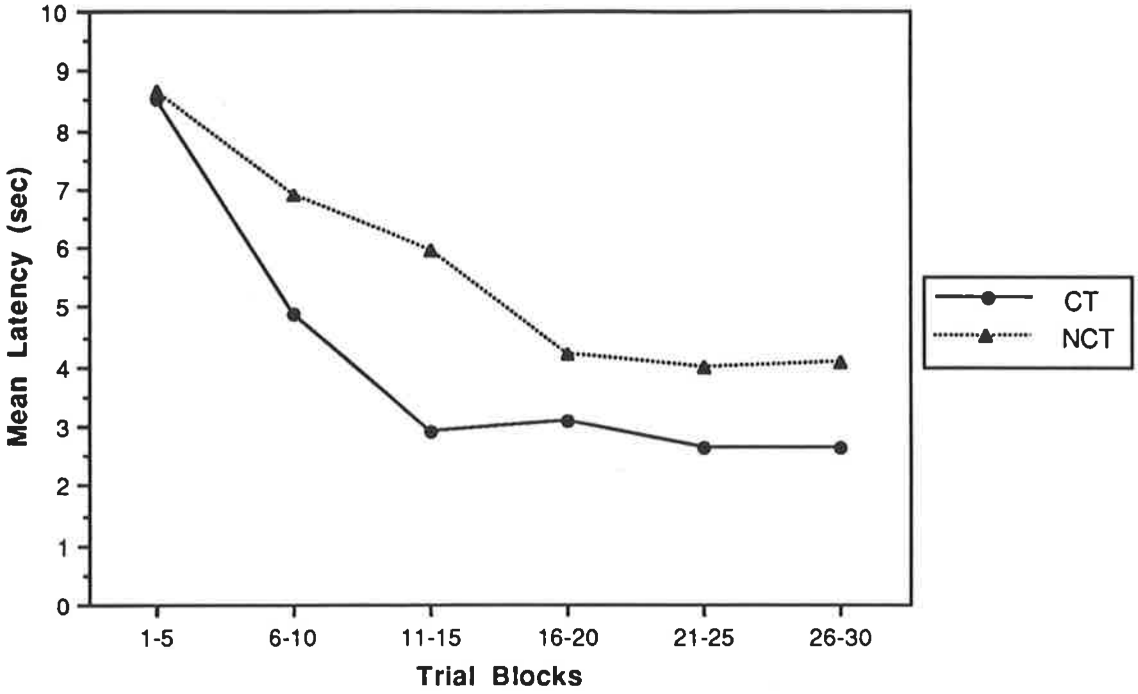

Figure 8-7: *Mean latency of responding over six 5-trial blocks of the test task for the Contingent Treatment (CT) and Noncontingent Treatment (NCT) groups of Experiment Eight.*

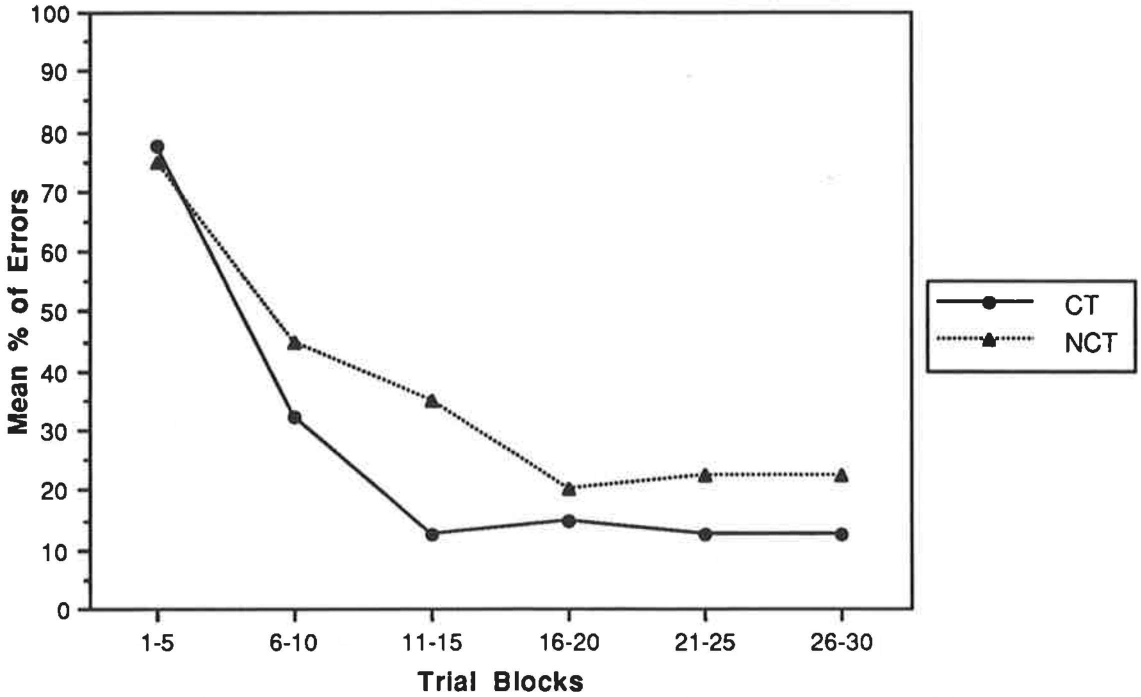

Figure 8-8: *Mean percentage of errors over six 5-trial blocks of the test task for the Contingent Treatment (CT) and Noncontingent Treatment (NCT) groups of Experiment Eight*

Table 8-17: *Mean latency and mean number of errors over all 30 trials of the test task of Experiment Eight.*

Type of Treatment	Latency (sec)		Errors	
	Mean	sd	Mean	sd
Contingent (CT)	4.12	(2.49)	8.13	(9.16)
Noncontingent (NCT)	5.64	(2.50)	11.00	(9.26)

The analysis of the performance measures did not include any results from a NT group. An analysis of variance (MANOVA using the Pillai-Bartlett trace criterion) was carried out separately on each of the 'latency' and 'errors' dependent variables with repeated measures over the 6 trial-blocks. No difference was found between the CT and NCT groups in terms of latency ($F_{(1,14)} = 1.48$, $p = .244$) and errors ($F_{(1,14)} = 0.22$, $p = .542$), nor for the interaction of groups by trial blocks, with latency ($F_{(5,10)} = 2.35$, $p = .117$) and errors ($F_{(5,10)} = 0.95$, $p = .489$). The improvement in performance over trial-blocks was statistically significant for both latency ($F_{(5,10)} = 10.03$, $p < .001$) and errors ($F_{(5,10)} = 7.11$, $p = .004$).

Subjective Measures

Perceptions of the Treatment Task

The means and standard deviations of scores on the subjective measures are shown in Table 8-18. The CT and NCT groups showed differences similar to those found in the previous experiments. In particular, the NCT group perceived the treatment task as significantly less likely to have a solution than did the CT group ($t_{(14)} = 2.95$, $p = .010$), they rated themselves as significantly less successful ($t_{(14)}$ = 3.15, p = .007), and they rated the task as being more likely to have been under external control ($t_{(14)}$ = 3.20, p = .006). There were no differences between the two groups in their ratings of the pleasantness of the treatment task sound, nor in their ratings of their motivation level following the task.

Perceptions of the Test Task

There were no significant differences between the CT and NCT groups in their perceptions of the test task.

Comparison Between Treatment and Test Task Perceptions

When the perceptions of the treatment and test tasks were examined for the CT and NCT groups individually, the only significant differences between the tasks were in the rating of the pleasantness of the sounds. TThe crescendo sound in the treatment task was perceived as being more unpleasant than the low intensity sound in the test task, both for the CT group ($t_{(7)}$ = 3.97, p = .003) and for the NCT group ($t_{(7)}$ = 4.33, p = .002)

Table 8-18: *Means and standard deviations for subjective measures following the treatment and test tasks of Experiment Eight.*

Type of Treatment	**Subjective Measures**									
	Pleasantness		**Solution**		**Success**		**Motivation**		**Control**	
	Response Range									
	1 ↔ 7		1 ↔ 5		1 ↔ 5		1 ↔ 5		-4 ↔ +4	
	Task									
	Treat	Test	Treat	Test	Treat	Test	Treat	Test	Treat	Test
Contingent (CT)	2.6 (1.1)	4.1 (0.4)	4.9 (0.4)	4.4 (1.1)	4.5 (0.5)	4.0 (1.5)	3.3 (0.5)	3.3 (0.5)	+2.6 (1.2)	+1.9 (2.7)
Noncontingent (NCT)	2.5 (0.5)	4.1 (1.0)	3.1 (1.6)	3.9 (1.5)	2.6 (0.6)	3.8 (1.3)	3.1 (0.4)	3.3 (0.5)	-1.0 (3.0)	+1.3 (2.1)

Correlations of Treatment Task Perceptions with Test Task Performance

Correlations between the Ss' perceptions of the treatment task and their performance in the test task were calculated and are shown in Table 8-19. There were no significant correlations.

Correlations of Test Task Perceptions with Test Task Performance

The correlations between Ss' perceptions of the test task and their performance in the same task are given in Table 8-20. The CT group showed significant correlations between response measures and the 'solution', 'success' and 'control' measures. The NCT group exhibited significant correlations between response measures and the subjective measures of 'solution' and 'success'. No other correlations attained statistical significance.

Table 8-19: *Pearson's r correlations between post-treatment task subjective measures and test task performance measures for the Contingent and Noncontingent groups of Experiment Eight*

			Treatment Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	Contingent	Latency	.55	.31	-.44	-.44	-.26
		Errors	.56	.31	-.42	-.41	-.21
	Noncontingent	Latency	.14	.37	.41	.20	.57
		Errors	.12	.45	.49	.22	.65 #

Note: All significance levels are two-tailed, with # .05 < p < .10

Table 8-20: *Pearson's correlations between test task performance measures and post-test task subjective measures for the Contingent and Noncontingent groups of Experiment Eight.*

			Test Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	Contingent	Latency	-.31	-.96 ***	-.90 **	-.29	-.92 ***
		Errors	-.31	-.96 ***	-.90 **	-.35	-.90 **
	Noncontingent	Latency	.14	-.85 **	-.77 *	-.11	-.47
		Errors	.02	-.86 **	-.84 **	-.17	-.38

Note: All significance levels are two-tailed, with *** p < .001, ** p < .01, * p < .05

Comparison of Low, Crescendo and High Sound Intensities

The treatment task performance of the CT groups in each of Experiments Five, Six and Eight was examined, allowing for a comparison of the differential effects of low, crescendo and high intensity sounds. It was considered that such a comparison could legitimately be made because all the experiments were carried out under identical methodological conditions i.e. same experimenter, apparatus and procedure. The performance means are shown in Table 8-21. Ss experiencing the crescendo sound appeared to perform better in the task than did the other two groups. However, univariate analyses of variance showed that the differences in performance were not significant for latency ($F_{(2,25)} = 2.00$, $p = .157$), and just short of significance for the number of errors made ($F_{(2,25)} = 2.84$, $p = .077$). However, as the variance for this latter measure proved to be non-homogenous, with variance correlated to size of the mean, a square-root transformation of the data was carried out and the analysis was repeated, with the difference being not significant ($F_{(2,25)} = 1.88$, $p = .173$).

As the mean latency of sound offset for the Crescendo group was 2.86 seconds, it is apparent that in the majority of treatment task trials the sound did not increase markedly. In fact, Table 8-22 shows that in almost two-thirds of the trials the intensity of the sound stayed at the base level of 56 dB(A), with it rising to the maximum of 85 dB(A) in just over 10% of trials.

A comparison between the three sound intensities was also carried out in relation to the test task performance of the CT and NCT groups. The mean latency and number of errors are shown graphically in Figures 8-9 and 8-10, respectively. In terms of latency of responses, there was a significant main effect for type of group i.e. CT vs NCT ($F_{(1,50)} = 4.18$, $p = .046$), but not for sound intensity ($F_{(2,50)} = 1.16$, $p = .321$), with no significant interaction ($F_{(2,50)} = 0.56$). In terms of errors, there were no significant main effects (Type $F_{(1,50)} = 2.68$, $p = .108$; Intensity $F_{(2,50)} = 0.79$), nor interaction effects ($F_{(2,50)} = 0.87$).

Table 8-21: *Mean latency and mean number of errors over all 30 trials of the treatment task for the contingent treatment (CT) group of each of Experiments Five, Six & Eight.*

Intensity of Sound	**Latency (sec)**		**Errors**	
	Mean	sd	Mean	sd
Low (Expt 6)	3.60	(1.09)	2.70	(2.45)
Crescendo (Expt 8)	2.86	(1.48)	2.13	(2.36)
High (Expt 5)	4.44	(2.23)	6.90	(7.26)

Table 8-22: *Maximum intensity of crescendo sound reached in the treatment task of Experiment Eight.*

Sound Intensity (dBA)	56	63	71	78	85
% of Trials	61.7	17.5	7.9	2.1	10.8

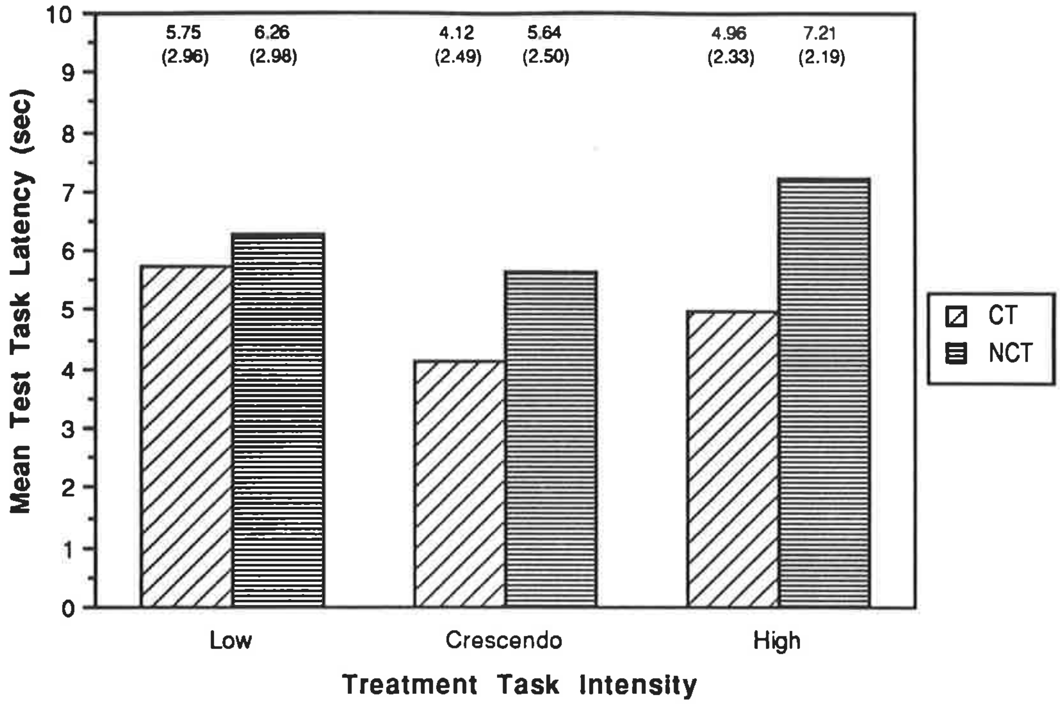

Figure 8-9: *Mean latency to correct solution over all 30 trials of the test tasks for the CT and NCT groups of Experiments Five, Six & Eight, with the intensity of the sound in the treatment task being either low, crescendo or high, and the test task intensity being low.*

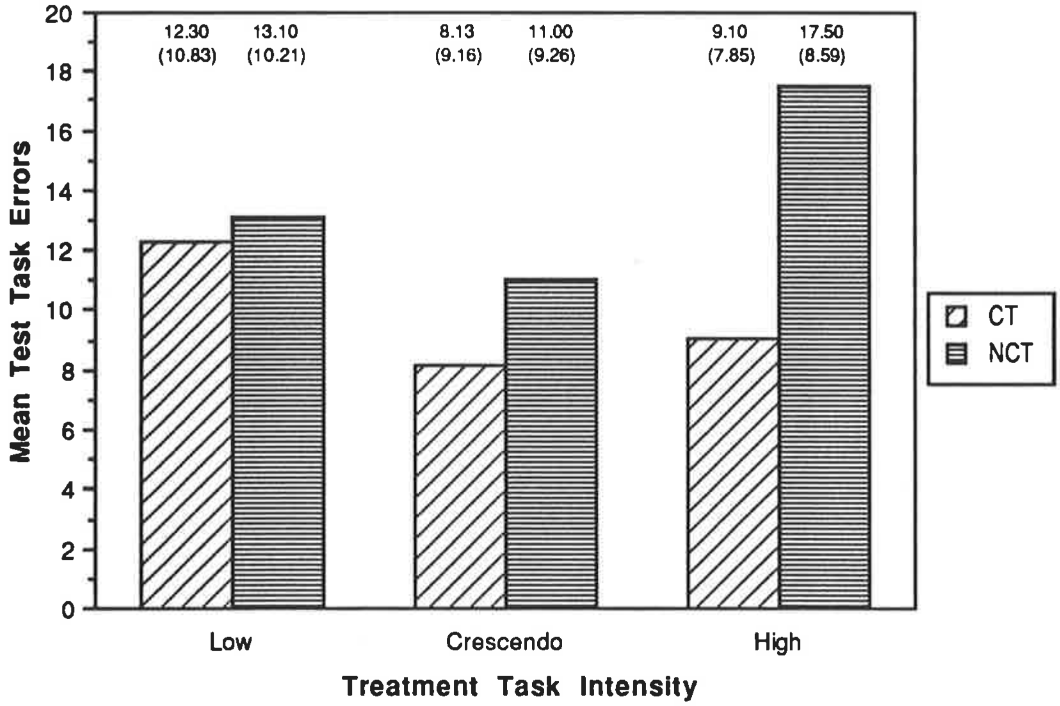

Figure 8-10: *Mean number of errors made over all 30 trials of the test tasks for the CT and NCT groups of Experiments Five, Six & Eight, with the intensity of the sound in the treatment task being either low, crescendo or high, and the test task intensity being low.*

To establish whether the perceptions of the pleasantness of the crescendo sound differed from the other sounds, the ratings were compared from the CT groups experiencing low, crescendo and high intensity treatment task sounds. The mean ratings for pleasantness of these sounds were low intensity (4.30), crescendo (2.63), and high intensity (2.70). Analysis of variance revealed that there was a significant difference between the ratings of the sounds ($F_{(2,25)} = 8.23$, $p = .002$), with post-hoc Newman-Keuls tests indicating that while there was no difference between the crescendo and high intensity sounds, both of these were rated as significantly more unpleasant than the low intensity sound.

Discussion

It was expected that the effects of uncontrollable crescendo sound on subsequent performance would be similar to that of uncontrollable high intensity sound, with the NCT group performing significantly worse than the CT group. However, no such difference between the groups was found. This is particularly puzzling as the subjective measures indicated that, when compared to the CT group, the NCT group rated themselves as being unsuccessful in solving the treatment task, perceived the task as having a lower likelihood of solution and perceived the offset of the sounds as being under external control.

Furthermore, there was no correlation between treatment task subjective measures and test task performance. It cannot be easily argued that the subjective measures were such that they did not allow sufficient variation, or that the subjects were not accurate in their perceptions, because there was a high correlation between subjective measures of the test task and performance measures in that same task. Clearly then, the lack of performance differentiation in the test task is problematic for learned helplessness theory, which predicts that such perceptions are likely to be associated with performance deficits in a subsequent task.

The crescendo sound was rated as being similar to the high intensity sound in terms of pleasantness, even though in the majority of treatment task trials the subjects offset the sound within two seconds and so its intensity did not increase at all from its base level. It is probable that the subjects were rating the pleasantness of the maximum intensity level. However, as there was no correlation between the level of exposure to the sound and ratings of pleasantness of the sound, it is also possible that the sound was being rated as unpleasant because of its potential to attain a high intensity, rather than in relation to the actual level of intensity experienced.

Measure of the anxiety levels of the subjects were not included in the post task questionnaires as it was felt that any anxiety-producing properties of the crescendo sound would affect both CT and NCT groups similarly, thereby not providing any information regarding the issue at hand. In addition, because anxiety measure was not taken in the earlier experiments, it still would not have been known whether the crescendo sound increases anxiety. It is suggested that a possible future experiment would make a direct comparison of continuous low and high intensity sounds with that of crescendo sounds, and would provide for a measure of anxiety.

The question of whether high intensity sound may increase the urgency of subjects to control the sound, stimulating them to higher levels of activity and thereby increase the likelihood that the noncontingency between responses and outcomes is perceived, as suggested by Barber & Winefield (1987), cannot yet be answered from the evidence available in the current series of experiments. However, this issue is examined in Experiment Eleven.

Overall, the inability to produce test task performance debilitation following a treatment task experience of uncontrollable outcomes in six of the eight experiments reported so far, with one of the 'successful' demonstrations of performance deficits being essentially a replication, presents problems for learned helplessness theory. This is highlighted by the incongruence between the subjects' reported perceptions of the experimental situations and their actual performance.

There is also an inconsistency with other research which has employed human subjects. This is particularly so for experiments which have used non-aversive stimuli (e.g. Tiggemann & Winefield,1978). However, the failure to find performance deficits may be attributable to a factor to which attention had been drawn earlier, namely, the complexity of the tasks employed. This issue is examined in the next chapter.

Chapter Nine:

Effect of Task Complexity

In the current series of experiments, performance deficits have only been found by employing a treatment task involving high intensity sound followed by a test task involving low intensity sound. Contrasting with this, other studies have reported test task debilitation using sounds of both high and low intensities. However, closer examination of the experimental procedures of those studies reveals a common factor – most of them have involved simple tasks. The type of apparatus used was either: i) a single button treatment task requiring four presses, followed by a hand-shuttle test task requiring a lever to be moved from one side of the apparatus to the other (e.g. Alloy, Peterson, Abramson & Seligman, 1984; Gregory, Chartier & Wright, 1979; Hiroto, 1974; Hiroto & Seligman, 1975; Klein & Seligman, 1976; Lubow, Rosenblatt & Weiner, 1981); or ii) a two button treatment task requiring only a single press on any button, followed by a hand-shuttle test task (Seybert & Craft, 1980); or iii) a treatment task requiring subjects to rotate two knobs to offset sound, followed by a hand-shuttle test task (Krantz, Glass & Snyder, 1974); or iv) a single-button treatment task requiring four presses, followed by a two-button test task requiring three presses, with two presses on one button and one on the other, regardless of sequence (e.g. Barber & Winefield, 1986b, 1987; Tiggemann, 1981; Tiggemann, Barnett & Winefield, 1983; Tiggemann & Winefield, 1978). All of these studies reported performance deficits, although some were only partially successful at doing so, with variations being attributed to factors such as locus of control (Gregory et al, 1979) or gender (Wilson et al, 1980).

It is apparent that the experiments described above used tasks with a low level of complexity, while the current series of experiments employed tasks with higher levels of complexity. From this it is tempting to conclude that raising overall task complexity results in a decreased likelihood of test task performance deficits. Is such a conclusion supported by the research literature? Unfortunately, only a small number of studies have used tasks similar in complexity to those reported here. These are described briefly below.

Koller & Kaplan (1978) found test task performance deficits in a noncontingent treatment group using a four-button treatment task followed by an eight-button test task, with subjects having to press two particular buttons in any order and with any number of intervening presses to offset high intensity sounds. This result contrasts with the failure to find performance deficits in Experiment Four of this thesis. There were, however, a number of procedural differences which might account for this, as follows: the number of buttons (four for the treatment, eight for the test); the solution itself; shorter sound durations; a greater number of trials in the treatment task (i.e. forty); and success/failure on the tasks being signalled with lights. The latter three differences in procedure were also common to the following two studies.

DeVellis, DeVellis & McCauley (1978) employed a four-button treatment task, requiring subjects to find a strict four-press sequence, followed by a simple hand-shuttle test task. No sounds were involved in either of the tasks. Significant performance debilitation in the noncontingent treatment group were found. However, there were two procedural differences, in addition to those mentioned above, which may have influenced this result. Firstly, nine of the contingent subjects who solved the treatment task problem with a <u>small</u> number of overall errors were excluded from the experiment and replaced. This was done to eliminate the illusion of control in noncontingent subjects. In effect, it ensured that the noncontingent treatment group was exposed to failure feedback and to longer durations of sounds. Secondly, a complex treatment task was followed by a very simple test task. In the current series of experiments, moderate to high complexity treatment tasks have been followed by high complexity test tasks . The reverse ordering of task complexity may be crucial to the conflicting findings, as the literature indicates that performance on other types of problems is affected by their order of difficulty. For instance, when mathematical problems are presented in a descending order of difficulty, performance is worse than when they are presented in ascending or random orders of difficulty (Spies-Wood, 1980; Towle & Merrill, 1972). Similarly, the performance on a series of anagrams has been found to be worse when the subjects experience initial failure (Williams & Teasdale, 1982). Finally, Pasahow (1980) found that, following a treatment of Levine-type problems, an anagrams test task is sensitive enough to detect performance differences between CT and NCT groups when the first anagram is relatively difficult, but not when it is easy.

Another study which used tasks of higher complexity was that by Miller & Tarpy (1991) in which subjects were required to find a specific four button sequence on four buttons to offset high intensity sound. The procedure employed two test tasks – anagrams with no sounds, followed by a second instrumental problem using the same apparatus and high intensity sounds as in the treatment task but with a new solution. Both test tasks showed significant performance deficits in the noncontingent treatment group. However, because the anagrams test task had no associated sounds, the subjects were, in effect, participating in a treatment task involving high intensity sounds followed by a test task involving no sounds. Finding performance deficits under these conditions agrees with the results of the current series of experiments where this had been the only combination of sounds associated with test task performance deficits. It could be that the poorer performance of the NCT group in this first test task may have then influenced the performance in the subsequent instrumental test task which had employed high intensity sounds. As research has shown that performance deficits are increased with increased exposure to failure (e.g. Pittman & Pittman, 1980; Trice, 1984) it is questionable whether the performance of the NCT group in the instrumental test task would have been debilitated if the experimental design had not included the intervening anagrams test task.

Although the studies described above did not support the notion that increases in overall task complexity lead to lower levels of performance deficit, the high number of procedural variations indicate that any comparisons with the current series of experiments should only be made with caution. After all, the opening chapters of this thesis have presented sufficient evidence to suggest that the occurrence of performance deficits in 'learned helplessness' experiments is susceptible to the influence of even minor procedural differences. This being said, it was considered that no firm conclusions could be made regarding the influence of task complexity on the occurrence of performance deficits without comparing performance under identical procedural conditions.

EXPERIMENT NINE

The aim of Experiment Nine was to determine whether the size of the performance deficit demonstrated in Experiment Five would be in any way affected by decreasing the complexity of both the treatment and the test tasks. It was predicted that the relative magnitude of these deficits should be greater than that found with complex tasks. Furthermore, the NCT group would perform worse than the CT and NT groups, regardless of changes in magnitude of the deficits. Hence, performance deficits were expected not only with high intensity treatment sound, but with low intensity sound as well.

Method

Overview

The experiment consisted of two phases: a treatment in which involving high intensity sound, the offset of which was either contingent or not contingent upon responses on a one-button apparatus; and a test involving low intensity sound, the offset of which was contingent upon responses on a two-button apparatus. The design of the experiment is summarised in Table 9-1.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Thirty subjects were randomly allocated to one of three groups.

Apparatus

a. *Sounds*

The sounds were identical to those used in Experiment Five, namely: low intensity 56 dB(A), 310 Hz, triangular wave form; high intensity 85 dB(A), 2000 Hz, square wave form.

b. *Treatment Task*

A cylindrical case (10 cm long by 2.5 cm in diameter) housed a single microswitch button on the top end, with the electrical cord protruding from the bottom end. The device could be held in the hand and operated with the thumb. A pressure of 450 grams in weight was required to register a response.

Table 9-1: *Design of Experiment Nine.*

Group		Sound Contingency		Sound Intensity		Number of Buttons	
		Treat.	Test	Treat.	Test	Treat.	Test
No Treatment	(NT)	—	C	—	Low	—	2
Contingent Treatment	(CT)	C	C	High	Low	1	2
Noncontingent Treatment	(NCT)	NC yoked	C	High	Low	1	2

Note: Sound was either contingent (C) or not contingent (NC) on responses.

c. *Test Task*

A set of two buttons (2.5 cm in diameter, 20 cm apart) were mounted in a small table (450 mm by 760 mm). Each button required a pressure of 210 grams in weight to register a response.

Procedure

The procedure was the same as used in Experiment Five, except that the instructions referred to the single button apparatus in the treatment task and to the two button apparatus in the test task. Subjective measures were taken at the end of each task (Questionnaires E and F in the Appendix).

Results

Performance Measures

The means and standard deviations for the performance measures over all 30 trials of the experiment are given in Table 9-2. The 30 trials were divided into 6 blocks of 5 trials, with the means of the 'latency' and 'errors' measures being obtained for each trial-block. These means are plotted in Figures 9-1 and 9-2, respectively.

Table 9-2: *Mean latency and mean number of errors for each of the three groups performing the test task of Experiment Nine*

Type of Treatment		Latency (sec)		Errors	
		Mean	sd	Mean	sd
None	**(NT)**	2.93	(2.38)	3.50	(7.78)
Contingent	**(CT)**	2.44	(2.20)	2.50	(6.22)
Noncontingent	**(NCT)**	4.87	(2.95)	8.10	(10.25)

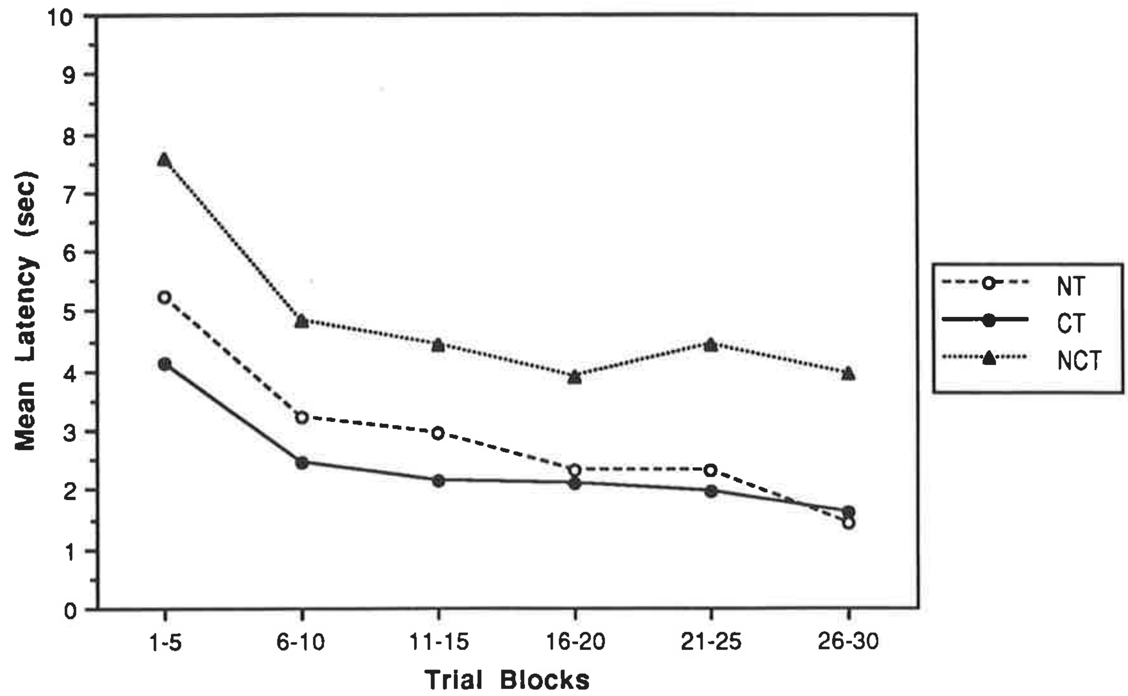

Figure 9-1: *Mean latency of test task responses over six 5-trial blocks for the No Treatment (NT), Contingent Treatment (CT), and the Noncontingent Treatment (NCT) groups of Experiment Nine.*

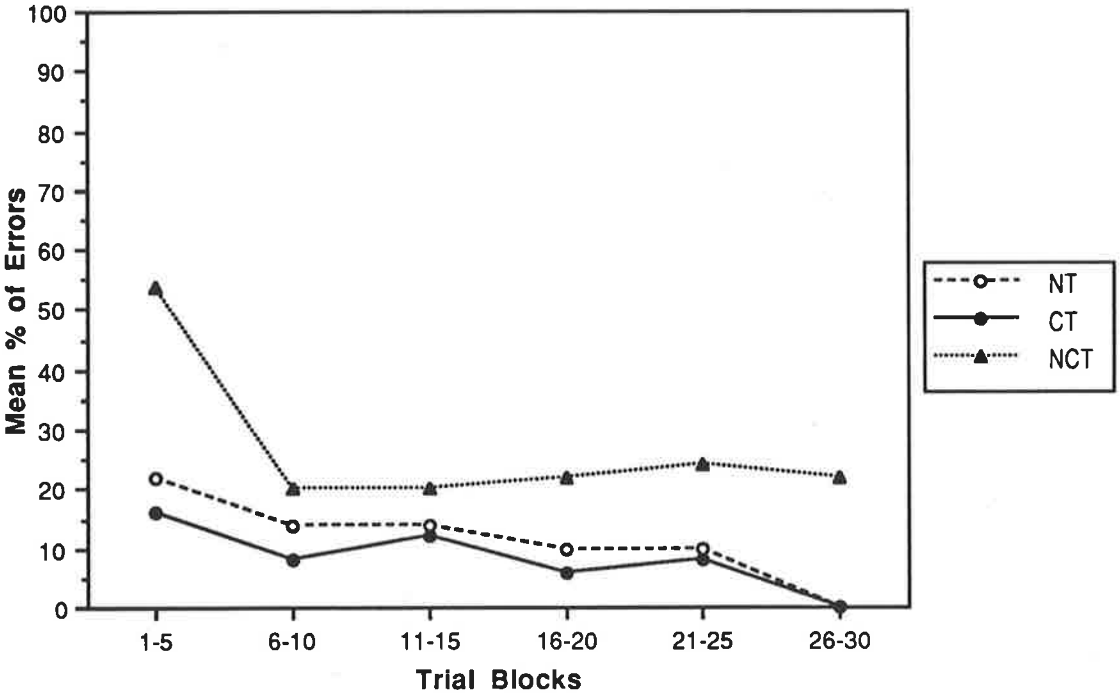

Figure 9-2: *Mean percentage of errors in test task responses over six 5-trial blocks for the No Treatment (NT), Contingent Treatment (CT), and Noncontingent Treatment (NCT) groups of Experiment Nine.*

Examination of the variance-covariance matrices indicated that the NT and CT groups were singular. To counter this, the six 5-trial blocks were collapsed to three 10-trial blocks. A multivariate analysis of variance was then carried out on each of the dependent variables separately, with repeated measures taken over the 3 trial-blocks. The criterion for the analyses was the Pillais-Bartlett trace.

The between-groups variance was partitioned into two planned contrasts in place of an omnibus F-test, these being: NT vs CT (Contrast-1); $\frac{1}{2}$[NT+CT] vs NCT (Contrast-2). For the 'latency' measure, Contrast-1 showed no difference between the NT and CT groups. Contrast-2 showed that the combined NT and CT groups performed significantly better than did the NCT group ($F_{(1,27)} = 5.03$, $p = .033$). As expected, there was a significant decrease in latencies for all groups over trial blocks ($F_{(2, 26)} = 15.47$, $p < .001$). There were no interactions between the contrasts and trial blocks. For the 'errors' measure, there were no main effects. However, the 'Contrast-2 x Trial Blocks' interaction fell just short of significance ($F_{(2,26)} = 3.06$, $p = .064$).

Subjective Measures

The means and standard deviations of scores on the subjective measures obtained in the post-treatment and post-test questionnaires are shown in Table 9-3. Possible ranges for maximum and minimum scores are indicated in the table for each variable.

Perceptions of the Treatment Task

Significant differences between the CT and NCT groups were found in three of the five measures. The NCT subjects had lower perceptions of there being a solution to the problem ($t_{(18)} = 5.63$, $p < .001$) and perceived themselves as being less successful ($t_{(18)} = 6.74$, $p < .001$). The CT group rated the sounds as being under internal control, whereas the NCT group rated them as being under external control. This difference was significant ($t_{(18)} = 4.94$, $p < .001$).

Perceptions of the Test Task

Although the NCT group appeared to rate the test task lower on the measures of 'solution', 'success' and 'internal-external control', these differences were not significant.

Comparison Between Treatment and Test Task Perceptions

Comparisons were carried out between the treatment and test tasks for each of the CT and NCT groups. As no predictions were made, two-tailed tests were employed. For both groups, the test task sound was perceived as more pleasant than the treatment task sound ($t_{(9)} = 6.33$, $p < .001$ and $t_{(9)} = 3.55$, $p = .006$ for the CT and NCT groups, respectively). Although the CT group perceived less likelihood of a solution, saw themselves as less successful, and rated the sounds as being under less internal control in the test task than in the

Table 9-3: *Means and standard deviations for subjective measures following the treatment and test tasks of Experiment Nine.*

Type of Treatment	**Subjective Measures**									
	Pleasantness		**Solution**		**Success**		**Motivation**		**Control**	
	Response Range									
	1 ↔ 7		1 ↔ 5		1 ↔ 5		1 ↔ 5		-4 ↔ +4	
	Task									
	Treat	Test	Treat	Test	Treat	Test	Treat	Test	Treat	Test
None (NT)	none	4.6 (1.1)	none	4.7 (0.5)	none	4.2 (1.0)	none	3.5 (0.9)	none	2.7 (1.8)
Contingent (CT)	2.6 (0.5)	4.0 (0.9)	4.9 (0.3)	4.5 (1.3)	4.9 (0.3)	4.5 (1.3)	3.2 (0.4)	3.0 (0.7)	2.9 (1.5)	2.1 (2.7)
Noncontingent (NCT)	2.8 (0.8)	4.1 (1.0)	2.8 (1.1)	3.7 (1.4)	2.5 (1.1)	3.5 (1.6)	3.3 (0.5)	3.2 (0.4)	-1.3 (2.2)	0.3 (2.9)

treatment task, these differences were not significant. The change in perceptions between the two tasks for the NCT group was opposite in direction to that found in the CT group. Namely, they scored higher in the test task for 'solution' and 'success' than they did in the treatment task. They also changed their locus of control rating from and external one to a slightly internal one. However, none of these changes was statistically significant.

Correlations of Treatment Task perceptions with Test Task performance

Pearson's *r* correlations between the subjective measures taken in the treatment task and the performance measures of the test task are given in Table 9-4. There were no significant correlations between the ratings and test task performance. However, the NCT group did exhibit a weak association between 'solution' perception and test task performance, namely, the stronger was the perception of solubility, the lower was the latency and the fewer the errors in the test task.

Correlations of Test Task perceptions with Test Task performance

Correlations between perceptions of the test task and performance in the test task were calculated for each of the three groups. The results are given in Table 9-5. Ratings on the measures of 'solution', 'success' and 'control' showed significant correlations with performance in all groups, with the CT group having the highest correlations. The lower correlations of the NCT group reflected their poorer performance in the test task. Interestingly, there was a significant correlation of pleasantness ratings and performance for the NT group, with higher ratings of pleasantness of the test task sound being associated with higher numbers of errors.

Comparison with Experiment Five

The performance measures were compared to those from Experiment Five and are presented graphically in Figures 9-3 and 9-4. The

Table 9-4: *Pearson's r correlations between the treatment task subjective measures and test task performance measures for the CT and NCT groups of Experiment Nine.*

			Treatment Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	Contingent	Latency	-.43	.18	.01	-.15	.18
		Errors	-.45	.14	.14	-.13	.30
	Noncontingent	Latency	.00	-.43	.08	.03	.23
		Errors	.17	-.41	-.07	.22	.06

Table 9-5: *Pearson's correlations between test task performance measures and post-test task subjective measures for the NT, CT, and NCT groups of Experiment Nine.*

			Test Task Subjective Measures				
			Pleasantness	Solution	Success	Motivation	Control
Test Task Performance Measures	No Treatment	Latency	.52	-.70 *	-.75 *	-.15	-.79 **
		Errors	.72 *	-.67 *	-.80 **	-.29	-.79 **
	Contingent	Latency	-.46	-.93 ***	-.97 ***	-.04	-.82 **
		Errors	-.44	-.95 ***	-.95 ***	-.05	-.76 *
	Noncontingent	Latency	.35	-.81 **	-.74 *	-.04	-.75 *
		Errors	.36	-.76 **	-.62 #	-.16	-.62 #

<u>Note</u>: All significance levels are two-tailed, with *** p < .001, ** p < .01, * p < .05, # .05 < p < .10

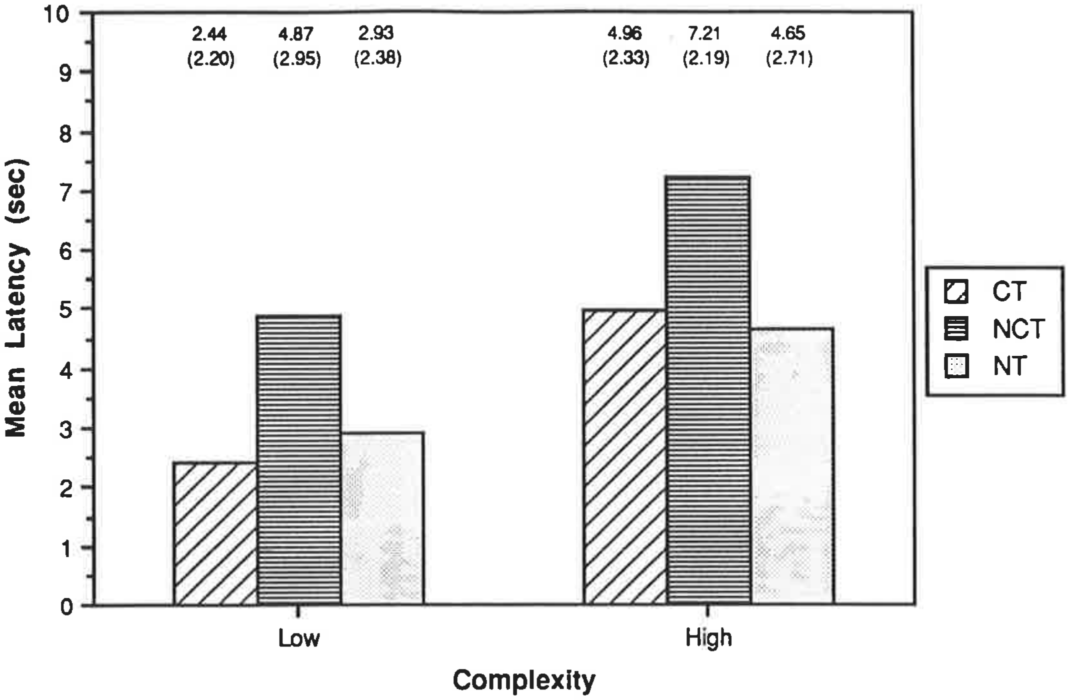

Figure 9-3: *Mean latency of responses by the CT, NCT and NT groups of Experiments Five (low complexity treatment and test tasks) and Nine (high complexity treatment and test tasks).*

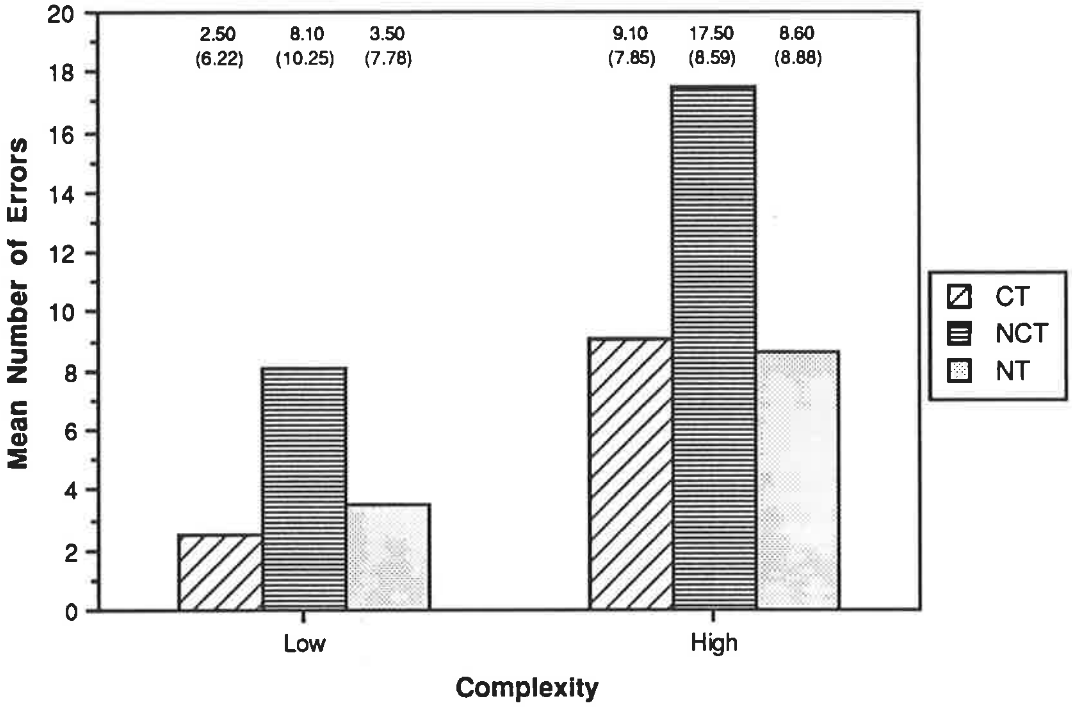

Figure 9-4: *Mean number of test task errors made by the CT, NCT and NT groups of Experiments Five (low complexity treatment and test tasks) and Nine (high complexity treatment and test tasks).*

results were analysed via a 3 x 2 (treatment type by task complexity) analysis of variance. As would be expected, performance in high complexity tasks (i.e. Experiment Five) was significantly worse than performance in low complexity tasks (i.e. Experiment Nine) with latency $F_{(1,54)} = 11.82$, $p = .001$ and errors $F_{(1,54)} = 10.64$, $p = .002$. However, the main point of interest was whether there the magnitude of the performance deficit would be relatively greater in the current experiment. This was not the case, as there was no interaction between treatment type and complexity (Latency $F_{(1,54)} = 0.03$; Errors $F_{(1,54)} = 0.60$). Furthermore, effect size in terms of partial eta-squared for Contrast 2 of Experiment Five was 0.196 for latency, and 0.205 for errors, while for the current experiment it was 0.155 for latency and 0.086 for errors.

There was, however, another point of interest in that the difference between the CT and NCT groups in their treatment task perceptions was considerable greater in the current experiment than in Experiment Five. This was reflected in significant interaction effects in perceptions of solubility ($F_{(1,36)} = 8.13$, $p = .007$), success ($F_{(1,36)} = 11.48$, $p = .002$) and control ($F_{(1,36)} = 7.18$, $p = .011$).

Discussion

This experiment used a high intensity sound in the treatment phase and a low intensity sound in the test phase. In this respect it was similar to Experiment Five. However, it differed by using simpler tasks in both phases. Nevertheless, performance debilitation in the NCT group was demonstrated. In terms of the performance curve over the length of the entire test task, the NCT group began the task with considerably poorer performance than that of the CT and NT groups, but this difference rapidly disappeared by the next trial-block. On the other hand, in Experiment Five the NCT group began the test task with a level of performance similar to that of the CT and NT groups, but whereas the performance of these latter groups began improving within the next trial-block, the NCT group did not markedly improve in its performance until the 5th trial-block. It would seem that decreasing the complexity of tasks increases the rate at which the problem is solved in comparison to the CT and NT groups.

Compared to the CT group, the NCT group perceived the treatment task as having a significantly lower likelihood of solution, lower level of success, and lower likelihood of being under internal control. However, as has been found repeatedly throughout this thesis, these perceptions did not show any strong relationship with test task performance.

It had been suggested that tasks of lower complexity may make the contingencies between responses and outcomes more easily observed by the NCT group, thereby increasing the magnitude of performance deficits. In a comparison of performance in Experiment Five, it was shown that there was no increase in the magnitude of performance deficit. In fact, the size of the effect was smaller. However, it should be pointed out that a major problem with comparing the results of the current experiment with those of Experiment Five is that the two experiments differed in terms of the complexity of <u>both</u> of their tasks. As a result it is unclear whether the lack of differences found between the two experiments were attributable to the complexity of one or other of the tasks, or even to an interaction between them. Therefore it was considered necessary to examine the influence of treatment task complexity alone. This was done in the next experiment.

EXPERIMENT TEN

Only two studies have reported a direct comparison of the subsequent effects of exposure to uncontrollability in treatment tasks differing in complexity. In the first of these, Douglas & Anisman (1975) used a button-light matching treatment task followed by a maze test task, with <u>no sound</u> stimuli being involved in either of the tasks. The treatment task apparatus consisted of three buttons and three lights. In the simple treatment task the subjects had to offset each of the three lights by pressing only one button, with each light requiring a different button. In the complex treatment task, the subjects had to determine a sequence of three buttons to offset any one light. The experimenters found that in the simple treatment condition the NCT group performed worse in a test task consisting of 10 maze problems than did either the CT or NT groups. However, in the complex treatment condition there were no differences in performance of the test task. There is, of course, some difficulty in interpreting the results of this experiment as it is unclear as to how the complexity of the maze problem compared with that of treatment problems.

Results contradictory to those above were reported by Peterson (1978) who also varied the complexity of the concept-formation treatment problems He found that in comparison to relevant no-treatment control groups, the NCT subjects who were given the complex treatment (i.e. finding a sequence of target stimuli) performed worse in the test task than did NCT subjects who were given a simple treatment task (i.e. finding a single target stimulus). However, this only occurred when the test task was simple. When the test task was complex, there was no difference between the two treatment complexities.

From the studies described above, it is unclear how variations in treatment task complexity affect test task performance. Unfortunately no additional information can be derived from studies which have used animal subjects, as these have only varied test task complexity. However, evidence of a less direct nature can be derived from two other human studies in which the perceptions of complexity, rather than actual complexity, of the treatment task were manipulated (Klein, Fencil-Morse, & Seligman, 1976; Tennen & Eller, 1977). These found that failure on perceived-difficult treatment tasks did not produce performance deficits, whereas failure on perceived-simple treatment tasks did.

An additional consideration of the effects of the complexity of the treatment task is its possible interaction with sound intensity. To examine this relationship comparisons of performance were made between groups drawn from Experiments Three to Six, using only those tasks which were not preceded by any other task, namely, the treatment task of CT groups and the test task of NT groups. The treatment task performance data from the CT groups were used to examine the effect of moderate complexity (i.e. two buttons), while test task performance data from the NT groups were used to examine the effects of high complexity (ie. three buttons). Altogether there were eight groups which could be drawn from these experiments. These are shown in Table 9-6. As there were two groups for every combination of sound intensity and task complexity, tests were carried out to determine whether there were any statistical differences between them. None was found, and so these groups were combined to form four larger samples of n=20.

The mean performance of each of the four combined groups is presented in figures 9-5 and 9-6. As the 'errors' measure showed non-homogeneity of variance, with the size of variance being proportional to the size of the mean, a square root transformation was performed on the data. A 2x2

Table 9-6: *Data from experiments used in an analysis of the interactive effects of sound intensity and task complexity. Treatment task performance of the CT groups were used for examining low complexity (*) with the test task performance of the NT groups used for examining high complexity (#).*

	2 Buttons	**3 Buttons**
Low Intensity Sound	Experiment 3 * Experiment 6 *	Experiment 5 # Experiment 6 #
High Intensity Sound	Experiment 4 * Experiment 5 *	Experiment 3 # Experiment 4 #

(task complexity by sound intensity) univariate analysis of variance indicated a significant interaction effect for 'latency' ($F_{(1,76)} = 4.42$, $p = .039$), but not for 'errors' ($F_{(1,76)} = 0.98$). There were, however, main effects for both sound intensity (Latency $F_{(1,76)} = 10.09$, $p = .002$; Errors $F_{(1,76)} = 9.23$, $p = .003$) and task complexity (Latency $F_{(1,76)} = 25.14$, $p < .001$; Errors $F_{(1,76)} = 29.74$, $p < .001$). Examination of the means showed that the interactions were ordinal for both variables, with performance in high intensity sound being consistently worse than performance in low intensity sound, and performance in three button tasks being consistently worse than that in two button tasks. The main effects could therefore be interpreted independently of the interactions. Post-hoc comparisons of 'latency' showed that performance of the three button task in high intensity sound was significantly worse than in low intensity sound, but there was no difference in performance of the two button tasks in the two sound intensities. Comparisons of 'errors' showed that performance under high intensity sound was significantly worse than under low intensity sound for both the two and three button tasks.

These results conformed to other research on noise which had shown that task performance in the presence of high intensity noise did not differ from that of low intensity noise – but only when the task has a low level of complexity. With high levels of task complexity, performance in the presence of high intensity noise was worse than that in low intensity noise (Broadbent, 1979; Glass & Singer, 1972a; Nagar & Pandey, 1987; Percival & Loeb, 1980). On the other hand, results reported by Gawron (1982) showed the opposite interaction, namely, with a high complexity task there was no difference in performance between low and high intensity noise conditions, while with a low complexity task subjects performed worse in low intensity noise than they did in high intensity noise. No explanation can be suggested for this contradiction.

Regardless of the conflicting evidence from other research, the data available from the experiments reported here have indicated that performance may be affected by the interaction of sound intensity and test task complexity. It

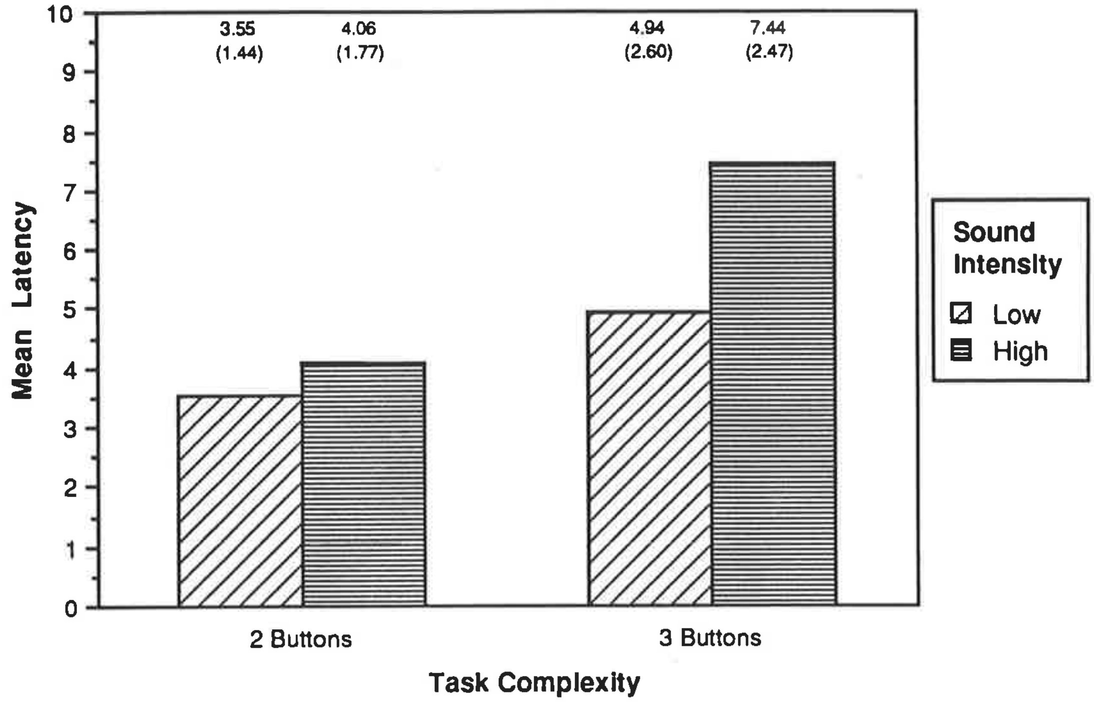

Figure 9-5: *The interactive effects of task complexity and sound intensity on mean latency in tasks where offset of the sound was contingent upon responses.*

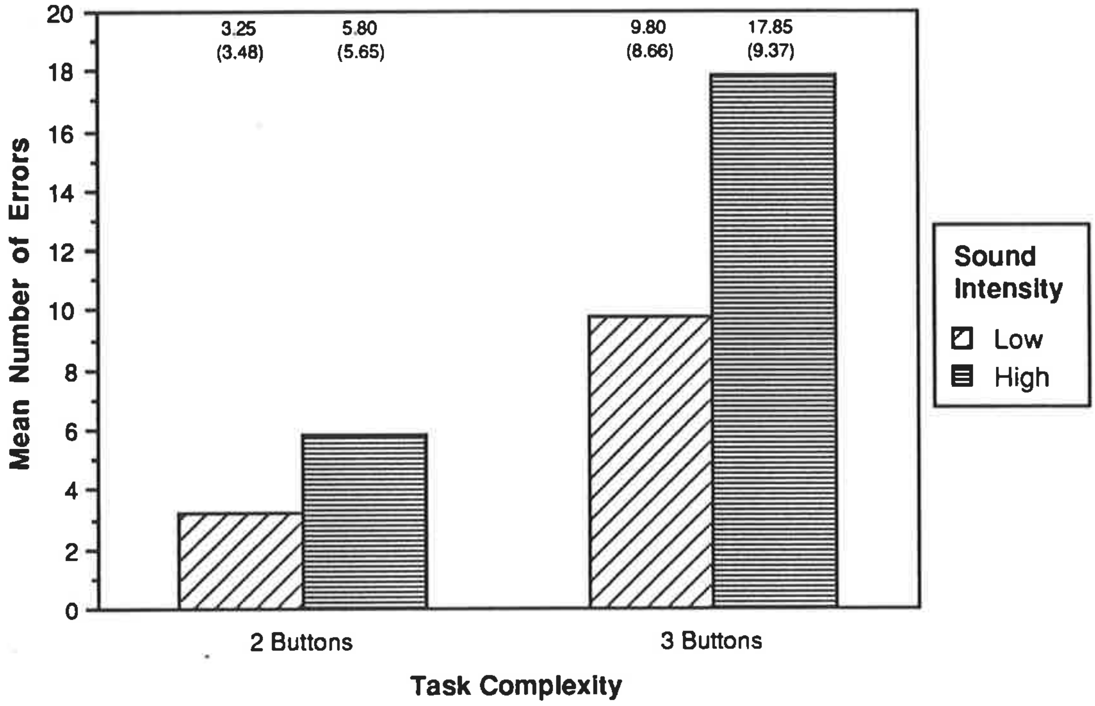

Figure 9-6: *The interactive effects of task complexity and sound intensity on mean number of errors in tasks where offset of the sound was contingent upon responses.*

seems that with a low complexity task the intensity of sound used does not affect performance. With a high complexity task, on the other hand, high intensity sounds debilitate performance whereas low intensity sounds do not. This interaction occurs even without any prior experience of noncontingency. How, then, is this interaction affected by the response-outcome noncontingency employed in typical learned helplessness experiments? It may be that with low complexity tasks performance deficits following an experience of uncontrollability are readily demonstrated using either high or low intensity sounds, while with more complex tasks the intensity of the sound plays a greater role in how subsequent performance is affected. Indeed, in Chapter Three's literature review of the effects of task complexity it had been suggested that the likelihood of obtaining test task performance deficits is increased if the treatment task is simple rather than complex, or if the test task is complex rather than simple. Learned helplessness theory states that failure on complex tasks results in the likelihood that the failure is attributed to specific and external causes, while failure on simple tasks is more likely attributed to global and internal causes (Abramson, Seligman & Teasdale, 1978). Therefore, it is possible that, in the experiments performed to this point, performance deficits were found only in the high intensity treatment condition because of the aversive properties of the stimulus itself. By reducing the complexity of the treatment task, there may be a greater likelihood of observing performance deficits regardless of the treatment intensity.

The aims of this experiment were as follows: firstly, to determine whether the experience of noncontingency between offset of either a low or high intensity sound in a low complexity treatment task would produce a later debilitating effect on a test task requiring escape from low intensity noise; secondly, to determine whether this debilitation would be similar in magnitude to that found with the more complex treatment task used in earlier experiments; and finally, to determine whether subjective perceptions of performance are correlated to actual performance in the treatment and test tasks. It was predicted that the test task performance of the NCT groups would be worse than that of the CT groups, regardless of the intensity of the treatment sounds.

Method

Overview

The experiment consisted of two phases: a treatment involving high intensity sounds, the offset of which was either contingent or noncontingent upon responses on a one-button apparatus; and a test involving low intensity sounds, the offset of which was contingent upon responses on a three-button apparatus. The design of the experiment is summarised in Table 9-7.

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Forty Ss were allocated to one of four groups: either contingent treatment or noncontingent treatment, with either high or low intensity sounds.

Table 9-7: *Design of Experiment Ten.*

Group		Sound Contingency		Sound Intensity		Number of Buttons	
		Treat.	Test	Treat.	Test	Treat.	Test
High-Contingent	(H-CT)	C	C	High	Low	1	3
High-Noncontingent	(H-NCT)	NC yoked	C	High	Low	1	3
Low-Contingent	(L-CT)	C	C	Low	Low	1	3
Low-Noncontingent	(L-NCT)	NC yoked	C	Low	Low	1	3

Apparatus

a. *Sounds*

The sounds were identical to those used in Experiment Five, namely: low intensity 56 dB(A), 310 Hz, triangular wave form; high intensity 85 dB(A), 2000 Hz, square wave form.

b. *Tasks*

The treatment task employed the same one-button apparatus as used in Experiment Nine. The test task employed the same three-button apparatus as used in Experiment Five.

Procedure

The procedure was exactly the same as that used in Experiments Five and Six, with the exception that the treatment task consisted of a single-button problem instead of a two-button problem. Subjective measures were obtained after each task (Questionnaires C and D in the Appendix).

Results

Performance Measures

The treatment task performance of the CT groups were compared to determine whether there were any differential effects between the high and low intensity treatment conditions. The means and standard deviations for the performance measures over all 30 trials of the treatment task are shown in Table 9-8. The group given the high intensity sound (H-CT) appeared to perform worse than the group given the low intensity sound (L-CT). However, there were no significant differences between them on either the 'latency' or 'errors' measures.

The means and standard deviations for the performance measures over all 30 trials of the test task are given in Table 9-9. Although the magnitude of the standard deviations appeared proportional to the performance means, Cochran's C and Barlett-Box F tests indicated no heterogeneity of variance. The 30 trials were then divided into 6 blocks of 5 trials, with the mean 'latency' and 'errors' measures being obtained for each trial-block. These means are plotted in Figures 9-7 and 9-8, respectively.

A repeated measures multivariate analysis of variance was carried out separately on each of the 'latency' and 'errors' dependent variables in a 2 x 2 design (type of treatment by intensity of sound) with repeated measures on trial-blocks. Using the Pillai-Bartlett trace criterion, there was a significant effect for type of treatment, with the performance of the NCT groups being significantly worse than that of the CT groups in terms of latency ($F_{(1,36)} = 11.62$, $p = .002$) and errors ($F_{(1,36)} = 8.49$, $p = .006$). Furthermore, there were no significant effects for intensity of sound nor was there a significant interaction between type of treatment and intensity of sound. Finally, there were no significant interactions with trial blocks, although the intensity by trial blocks interaction was just short of significance for both latency ($F_{(5,32)} = 2.20$, $p = .079$) and errors ($F_{(5,32)} = 2.09$, $p = .093$).

Table 9-8: *Mean latency and mean number of errors, in the treatment task of Experiment Ten, for the two Contingent Treatment groups under conditions of either high or low intensity sound.*

Group		**Latency (sec)**		**Errors**	
		Mean	sd	Mean	sd
High-Contingent	(H-CT)	2.51	(1.64)	3.10	(5.53)
Low-Contingent	(L-CT)	2.17	(1.43)	1.60	(3.78)

Table 9-9: *Mean latency and mean number of errors for each of the four groups performing the test task of Experiment Ten.*

Group		**Latency (sec)**		**Errors**	
		Mean	sd	Mean	sd
High-Contingent	(H-CT)	3.22	(2.00)	4.40	(5.80)
High-Noncontingent	(H-NCT)	5.12	(3.17)	10.10	(11.42)
Low-Contingent	(L-CT)	2.59	(1.21)	2.80	(3.32)
Low-Noncontingent	(L-NCT)	5.75	(2.55)	12.00	(9.30)

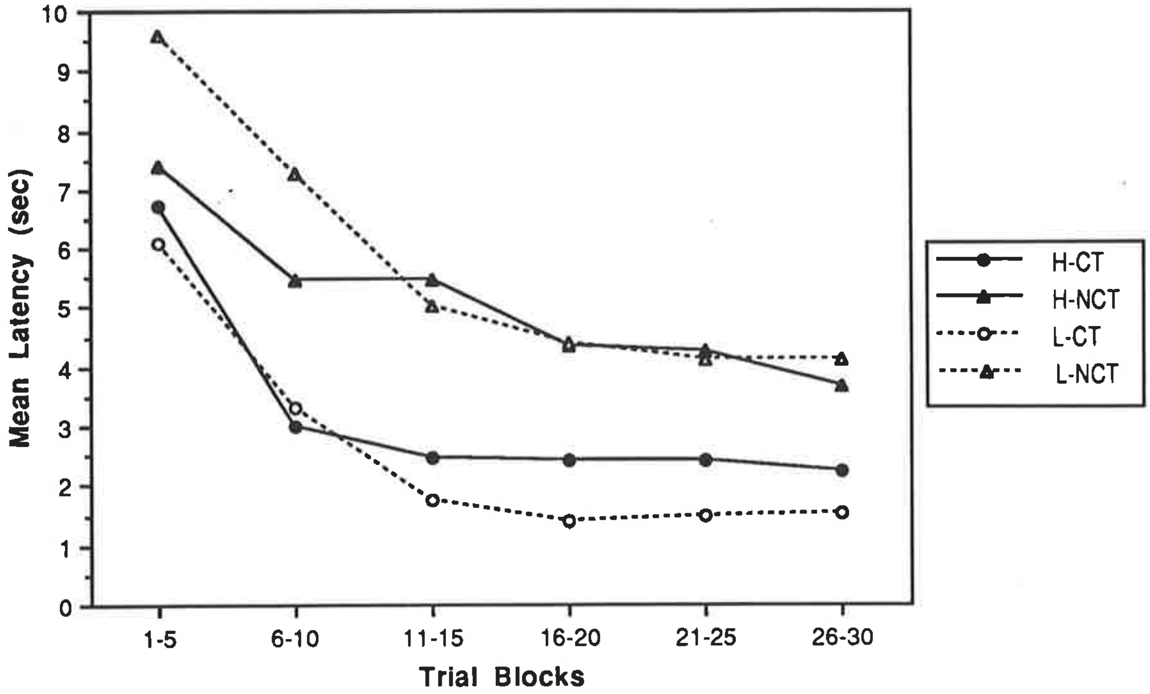

Figure 9-7: *Mean latency of responses over six 5-trial blocks in the test task of Experiment Ten for the Contingent Treatment (CT) and Noncontingent Treatment (NCT) groups under high (H) or low (L) sound intensity conditions.*

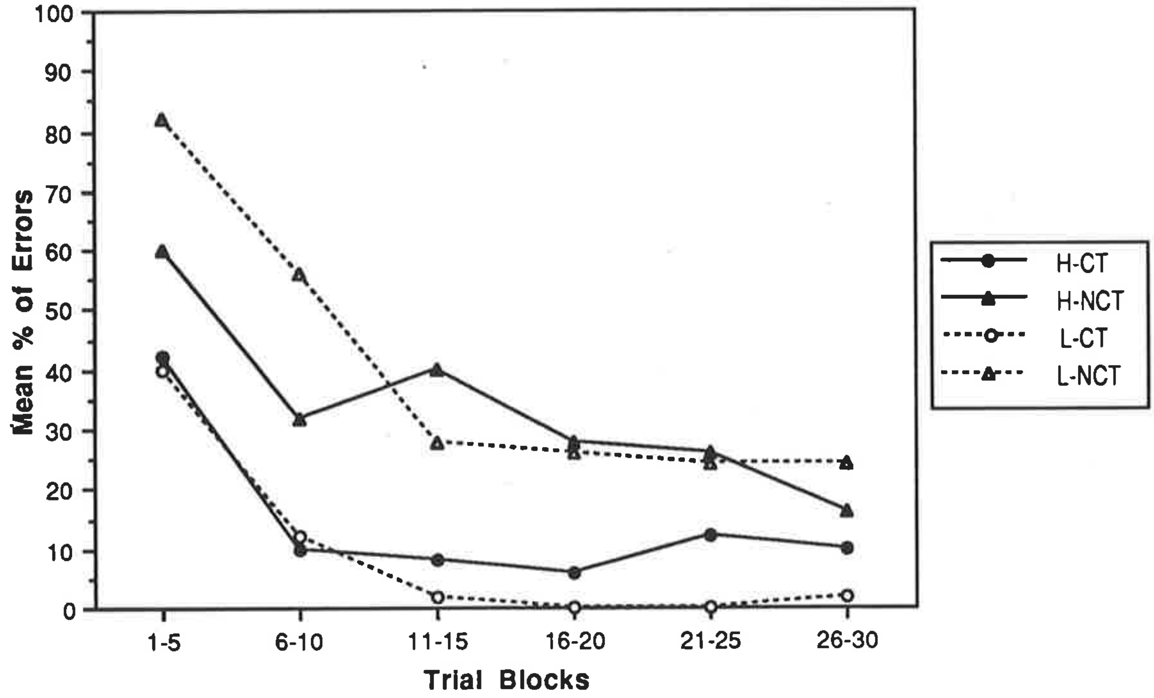

Figure 9-8: *Mean percentage of errors over six 5-trial blocks in the test task of Experiment Ten for the Contingent Treatment (CT) and Noncontingent Treatment (NCT) groups under high (H) or low (L) sound intensity conditions.*

Subjective Measures

The means and standard deviations of scores on the subjective measures obtained in the post-treatment and post-test questionnaires are shown in Table 9-10. Possible ranges for maximum and minimum scores are indicated in the table for each variable.

Perceptions of treatment task

Analysis of variance in a 2 x 2 design (type of treatment by intensity of sound) showed a significant difference between the groups in their perception of the pleasantness of the treatment task, with the high intensity sound being rated as more unpleasant than the low intensity sound ($F_{(1,28)}$ = 12.63, p = .001). There was no significant effect for type of treatment. However, the interaction between type of treatment and intensity of sound was just short of significance ($F_{(1,28)}$ = 3.46, p = .074). Ss given low intensity sound were also more confident that they would be successful in the test task than were Ss given high intensity sound ($F_{(1,28)}$ = 5.06, p = .033). There were no other significant effects.

Table 9-11 shows the frequency of responses to questions regarding perceptions of response-outcome contingency and degree of success. As many as 8 of the 20 NCT Ss responded that offset of the sound was contingent upon their responses, with 9 stating that offset was not contingent and the remaining 3 being unsure. This can be contrasted against the subjective measures of Experiments 3 and 4 combined (where the same questions were asked) where 10 Ss reported that offset of the sound was contingent upon their responses, with 7 Ss being definite that it was not, and 3 being unsure. Hence, the decrease in complexity of the treatment task did not have a marked effect on the NCT group's perceptions of response-outcome contingency.

To test whether the contingency perceptions were in any way related to test task performance, the Ss in the NCT groups were combined and then reallocated into one of two new groups according to their response on this measure. Learned helplessness theory would predict that those Ss who did not perceive a connection between treatment task responses and outcomes would perform worse in the test task. Although the 'perceived contingency' group appeared to perform better in the test task (Mean latency 4.54, s.d. 2.21; Mean errors 7.28, s.d. 7.71) than did the 'no perceived contingency' Ss (mean latency 5.74, s.d. 2.95; mean errors 10.59, s.d. 10.17), although these differences were short of significance ($t_{(38)}=1.43$, p=0.081; $t_{(38)}=1.48$, p=0.073).

From Table 9-11 it is also clear that the NCT groups were aware of the noncontingency between their responses and offset of the sounds in the treatment task. The difference in perception of contingency between the CT and NCT groups proved to be significant ($\chi^2_{(1)} = 17.14$, $p < .001$). Similarly, the NCT groups perceived themselves as being less successful than the CT groups ($\chi^2_{(1)} = 9.61$, $p = .002$).

When asked if they had any idea as to what might have caused them to perform in the way that they did, none of the NCT Ss offered explanations that suggested an awareness of lack of control over sound offset. Otherwise, the Ss made comments that implied that the problem had a solution, only that it was difficult to find or that they weren't trying enough different strategies.

Perceptions of the Test Task

There were no significant differences between the groups in terms of their perceptions of the pleasantness of the sounds in the test task, their level of motivation, nor their level of confidence in solving similar problems.

Comparison Between Treatment and Test Task Perceptions

Related-sample t-tests were used to compare the perceptions of motivation and confidence following the treatment task with those of the test task for the combined CT groups and combined NCT groups. The level of confidence increased significantly for the CT groups between the two tasks ($t_{(19)} = -4.1$, $p = .001$). No other differences were significant.

Table 9-10: *Means and standard deviations for subjective measures following the treatment task and the test task of Experiment Ten.*

Group		Subjective Measures					
		Pleasantness		Motivation		Confidence	
		Response Range					
		1 ↔ 7		1 ↔ 5		1 ↔ 5	
		Task					
		Treat	Test	Treat	Test	Treat	Test
High-Contingent	(H-CT)	2.9 (0.7)	4.3 (0.8)	3.2 (0.6)	3.4 (0.5)	3.1 (0.6)	3.5 (0.7)
High-Noncontingent	(H-NCT)	3.1 (1.1)	4.2 (0.8)	3.4 (0.5)	3.2 (0.8)	3.1 (0.7)	3.2 (1.3)
Low-Contingent	(L-CT)	4.5 (0.5)	4.1 (0.4)	3.6 (0.2)	3.7 (0.2)	3.4 (0.2)	4.1 (0.1)
Low-Noncontingent	(L-NCT)	3.9 (0.3)	3.5 (0.4)	3.1 (0.1)	3.3 (0.3)	3.6 (0.3)	3.4 (0.2)

Table 9-11: *Frequency of responses to questions regarding perceptions of response-outcome contingency and success in the treatment task of Experiment Ten.*

Group	Perceived Contingency			Thought about performance		Rating of Success		
	Yes	Unsure	No	Yes	No	Successful	Moderately Successful	Un-successful
H-CT	10	0	0	9	1	5	4	0
H-NCT	3	3	4	7	3	1	3	3
L-CT	10	0	0	8	2	5	3	0
L-NCT	5	0	5	8	2	0	5	3

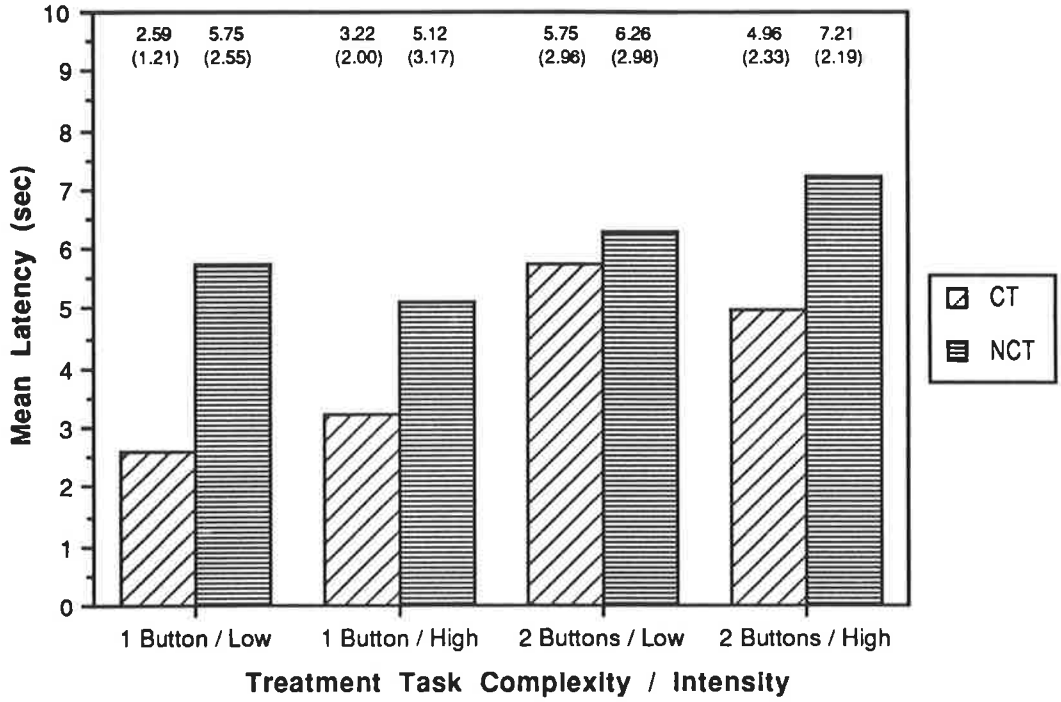

Figure 9-9: *Mean latency of responses made in the test task by the CT and NCT groups of Experiments Five, Six and Ten, following a treatment task involving either one or two buttons and either low or high intensity sound.*

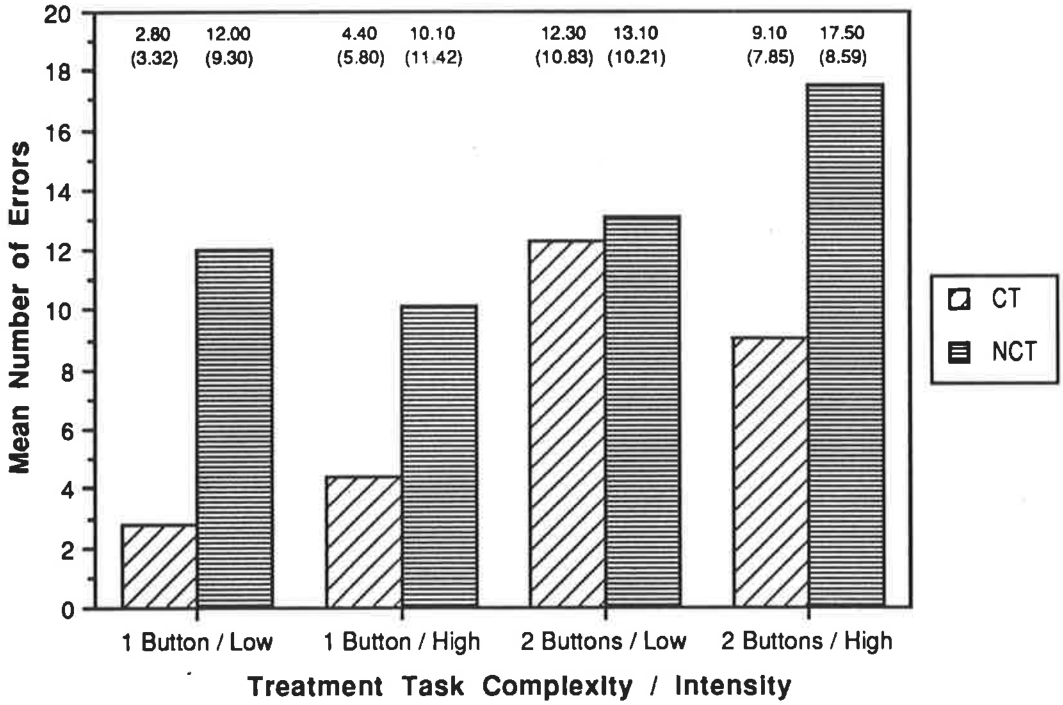

Figure 9-10: *Mean number of errors made in the test task by the CT and NCT groups of Experiments Five, Six and Ten, following a treatment task involving either one or two buttons and either low or high intensity sound.*

Comparison with Experiments Five and Six

The test task performance in this experiment was compared to that in Experiments 5 and 6, which had used two-button treatment task instead of the one-button task employed here. The mean latency of responses and number of errors made are presented in Figures 9-9 and 9-10, respectively. A 2x2x2 (complexity by intensity by type) analysis of variance showed a significant effect for treatment type (latency $F_{(1,72)} = 12.27$, $p = .001$; errors $F_{(1,72)} = 9.39$, $p = .003$) and treatment complexity (latency $F_{(1,72)} = 11.28$, $p = .001$; errors $F_{(1,72)} = 8.33$, $p = .005$). There were no significant interaction effects.

Discussion

It was predicted that if the complexity of the treatment task was reduced there would be a greater likelihood of observing performance deficits in NCT subjects, regardless of the intensity of the treatment sound. This prediction was supported, and occurred in spite of the finding that a number of the subjects in each of the NCT groups perceived a contingency between their responses and offset of the sounds.

The experiment also presented limited support for the assertion that performance in the presence of high intensity sound is worse than in low intensity sound. The high intensity CT group (i.e. H-CT) performed worse in the treatment task than did the low intensity CT group (i.e. L-CT), although this was not statistically significant. This difference between the two groups was magnified slightly in the test task, but once again it proved not to be statistically significant. The marginally poorer performance of the H-CT group meant that their yoked H-NCT partners experienced longer durations of sound than did the L-NCT group. Despite this longer exposure, the H-NCT group tended to perform better in the test task than did the L-NCT group. This may have been attributable to the higher level of treatment task motivation reported by the H-NCT group.

The results of this experiment were compared to those of Experiments Five and Six. It was evident that the lower complexity of the treatment task resulted in better performance in the test task, particularly for the CT groups. Lower treatment task complexity also led to test task performance debilitation in the NCT group, regardless of treatment task sound intensity, whereas with a higher complexity treatment task, subsequent performance debilitation was only evident when the treatment task had a high intensity sound, but not a low intensity sound.

THE EFFECT OF TEST TASK COMPLEXITY

Results from the current experiment could also be used to examine the effect of test task complexity, thus giving an opportunity to test predictions made by a number of theories. Learned helplessness theory predicts that, with increased complexity in the test task, expectations of noncontingency should be strengthened, leading to a greater level of debilitation. Test anxiety theory predicts that, following an uncontrollable treatment task, an individual's attention is diverted to a self pre-occupation that is irrelevant to the test task. Because every individual has a limited information processing capacity, the self pre-occupation means that there is less information processing capacity available for use in the test task. Therefore, the amount of performance debilitation, as measured in terms of the difference in test task performance between the contingent and noncontingent treatment groups, will be proportional to increases in the attentional demands of the test task. Any difference between the groups should increase as the complexity of the test task increases. On the other hand, Egotism theory predicts that a high level of test task difficulty should lead to a reduced level of performance debilitation because the difficulty of the task provides an excuse for failure, thereby eliminating the threat to ego. Finally, the Cognitive Transfer theory states that the performance deficits following exposure to uncontrollable outcomes is the result of a transfer of solution strategies adopted by the subjects in the treatment task. Hence, cognitive sets developed in the treatment task concerning the types and complexities of solutions of the problem may be carried into the test task by the subjects. If the test task requires simple solutions, a tendency to formulate complex solutions may result in performance decrements. However, if the test task requires complex solutions, subjects already geared towards such solutions may exhibit facilitation of performance. As NCT subjects are likely to formulate complex solutions, the theory predicts that performance debilitation should be reduced as test task complexity is increased.

As already described in Chapter Three, a number of studies have manipulated either 'actual' or 'perceived' test task complexity. The results present a rather confusing picture. Mikulincer (1989a) and Sedek & Kofta (1990) found performance debilitation with 'actual' high complexity, but not with 'actual' low complexity, while Peterson (1978) also found performance debilitation with high complexity but facilitation with low complexity. On the other hand, Frankel & Snyder (1978) found performance facilitation with 'perceived' high complexity and debilitation with 'perceived' low complexity.

Recall that in Chapter Three it was also indicated that research involving animal subjects has generally found that raising the complexity of the test task increases the amount of performance debilitation. However, these performance deficits are only evident within a particular range of complexity. Performance is <u>not</u> debilitated when the test task has either a low or a very high level of complexity, but it <u>is</u> debilitated when the test task has a moderate level of complexity. It may be that, because the animals initially react to the aversive stimulus with a high response rate, a low complexity test task ensures that they are exposed to response-outcome contingency, and consequently performance is not debilitated. On the other hand, when the test task is too complex, neither the CT nor the NCT animals can readily learn its response requirements, with the result that once again performance is not debilitated.

Comparison with Experiment Nine

In order to further examine the effect of test task complexity, the CT and NCT groups which had experienced high intensity sound in the treatment task of Experiment Ten were compared with the CT and NCT groups of Experiment Nine. All these groups had been exposed to high intensity sound in the treatment task and to low intensity sound in the test task, with the treatment task involving only one button. The two experiments differed in the complexity of the test task, with Experiment Nine involving two buttons and Experiment Ten involving three buttons. The mean latency of responses and number of errors made in the test tasks are shown in Figures 9-11 and 9-12, respectively. A 2x2 (treatment type by test task complexity) analysis of variance showed a significant effect for type of group (latency $F_{(1,36)} = 6.79$, $p = .013$; errors $F_{(1,36)} = 4.15$, $p = .049$), but with no significant difference between test task complexities and with no significant interaction.

From the comparison between the two experiments, it is evident that increasing the test task complexity from a moderate level to a high level had no differential effect on test task performance debilitation in the NCT group. In fact, the magnitude of the debilitation was similar for both levels of complexity. Consequently, the results did not provide support for any of the four theories examined.

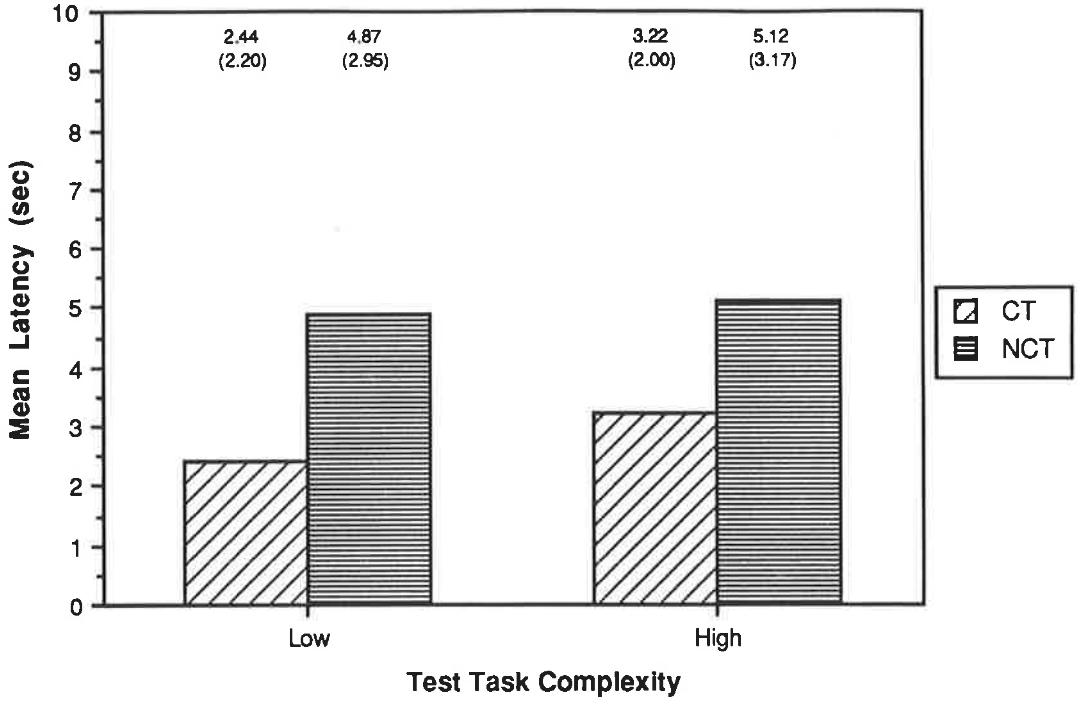

Figure 9-11: *Comparison of the mean latency of responses made in test tasks of different complexity (two vs. three buttons) following a treatment task involving one button. The groups have been drawn from Experiments Nine and Ten, with high intensity sound in the treatment task and low intensity sound in the test task.*

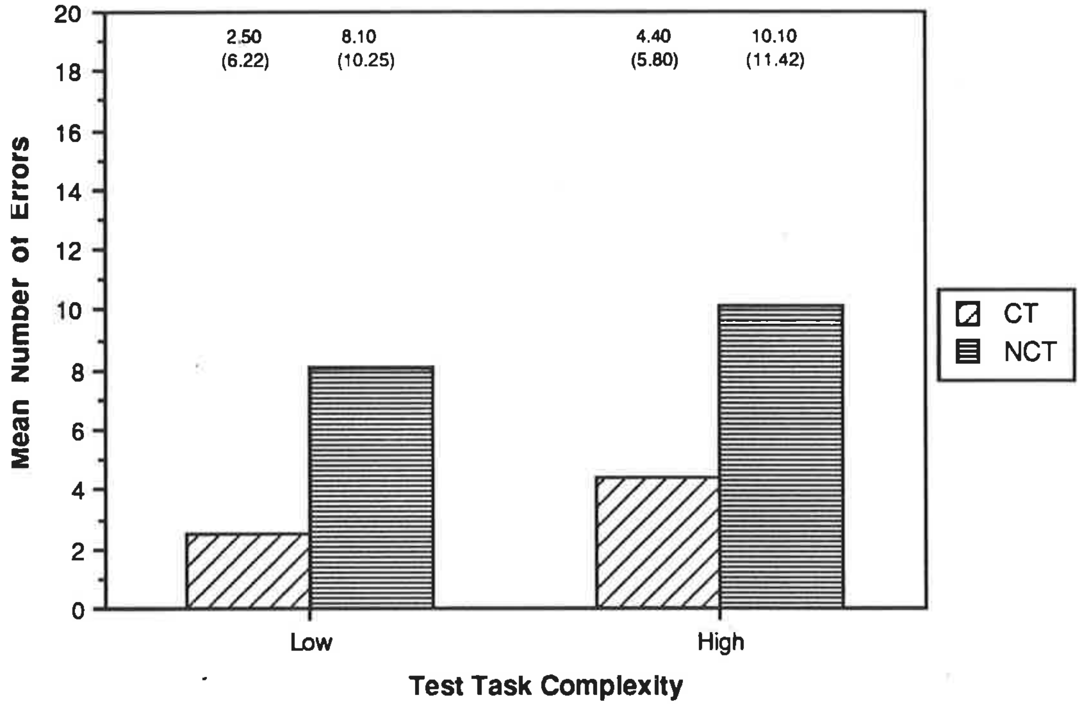

Figure 9-12: *Comparison of the mean numbers of errors made in test tasks of different complexity (two vs. three buttons) following a treatment task involving one button. The groups have been drawn from Experiments Nine and Ten, with high intensity sound in the treatment task and low intensity sound in the test task.*

Chapter Ten:

Other Treatment Task Factors

The first two experiments presented in this thesis had used a fixed pattern of success/failure feedback for the NCT groups. The remainder of the experiments, as indeed the majority of studies examining learned helplessness, used a yoking procedure in which individuals within the NCT group were linked to individuals within the CT group so as to match them in exposure to stimuli. The purpose of a yoking procedure is to ensure that any differences between the two groups are attributable to the type of response-outcome contingencies experienced, and not to differences in pattern and duration of the stimuli which may themselves have some behaviour-influencing properties.

There are, however, a number of problems with the use of a yoking procedure. Firstly, although the procedure controls for the amount of exposure to stimuli by the two groups, some authors argue that the actual experience of the subjects are not identical and that individual differences in the general effect of an event, for example, sensitivity to high intensity sounds, can lead to a systematic bias in favour of the experimental group over its yoked control group (Church, 1964; Levis, 1976). Thus, if 'sound-sensitive' subjects are yoked to 'sound-insensitive' subjects (who are not highly motivated to escape the sounds), they will exhibit a greater degree of impairment following the experience. In a typical learned helplessness experiment, where the treatment task may involve high intensity sounds together with a yoking procedure, the overall test task performance deficits shown by the NCT group would be magnified by the individuals' sensitivity to the sounds (Costello, 1978).

A second problem with the yoking procedure is that, as observed in most of the experiments in this thesis, a high proportion of the NCT subjects appear to have a mistaken perception of response-outcome contingency or, to use the phrase coined by Langer & Roth (1975), an "illusion of control". This is perhaps brought about by the fact that their yoked partners eventually find the solution to the problem and thereafter consistently offset the sounds. Research has shown that as the number of 'successes' increases, so does the perception of control (e.g. Alloy & Abramson, 1979, 1982; Sergent & Lambert, 1979). It has also been shown that when subjects perceive themselves as having control over the offset of aversive stimuli they report the stimuli as being less aversive, and appear to be able to tolerate higher levels of stimulus intensity (Glass, Singer, Leonard, Krantz, Cohen & Cummings, 1973; Lepanto, Morney & Zeahausern, 1965; Staub, Tursky & Schwartz, 1971). It can be deduced from this that any illusion of control that is brought about by the yoking procedure would reduce the NCT group's perception of stimulus aversiveness, and would minimise perceptions of noncontingency between responses and outcomes. The overall result would be decreased level of test task performance deficit.

A third problem with yoking procedures relates to difficulties in comparing results between experiments. By the very nature of the procedure, any pair of yoked groups (i.e. an NCT group yoked to a particular CT group) will have had similar treatment experiences. At the same time, any pair of yoked groups will have been exposed to patterns and durations of sounds different from any other pair of yoked groups. Consequently, it is not possible to separate the effects of uncontrollability from the effects of differential reactions to the stimuli themselves. A number of such comparisons had been reported in the preceding chapters. Because of the differences in treatment experienced, the those results have to be interpreted with caution. Hence, Experiment Eleven attempted to make an 'unbiased' comparison of the effects of different intensities of sounds.

EXPERIMENT ELEVEN

The Differential Effects of Fixed Pattern and Yoking Procedures

Because of the problems associated with the yoking procedure, it was reasoned that a better way of comparing differences in NCT groups, resulting from exposure to various intensities of sounds, would be to employ exactly the same patterns and durations of sounds for each group. Effectively, this meant using an experimenter-determined, fixed pattern of feedback. Therefore, the first aim of Experiment Eleven was to determine whether test task performance would be differentially affected by sound intensity when the confounding effect of differences in exposure to the stimuli, brought about by the yoking procedure, were removed by the use of a fixed pattern procedure.

A second aim of the experiment was to compare the effects of fixed pattern treatment procedures with yoking procedures. As the two types of noncontingency schedules have been used interchangeably in the literature, it would be interesting to know whether this disregard for the differences between the schedules is justified. In other words, is there a differential effect on test task performance debilitation when the treatment task involves a yoking procedure as opposed to a predetermined pattern of outcomes?

Using an experimental design in which the NCT groups were exposed to the same pattern and duration of stimuli allowed for the testing of the 'increased activity' hypothesis proposed by Barber & Winefield (1987), which had been described in the discussion of the influence of stimulus intensity in Chapter Three. Recall that they had found that, when both treatment and test tasks involved low intensity sounds, high-motivation subjects exhibited performance deficits but low-motivation subjects did not. On the other hand, when the tasks involved high intensity sounds, performance deficits were observed in both high- and low-motivation subjects. In attempting to account for this finding the experimenters suggested that high intensity sound is arousing and that it motivates subjects to a higher level of activity. This higher level of activity results in an increased likelihood that those subjects with low motivation will perceive the noncontingency between their responses and the offset of the sounds, leading to performance deficits on the test task. The third aim of Experiment Eleven was to determine whether or not high intensity sound does indeed increase activity levels in the performance of a button-pressing task above that which is found in the same task with low intensity sound.

Method

Overview

The experiment consisted of two phases: a treatment phase in which Ss were given either low intensity or high intensity sounds, the offset of which was not contingent upon responses on a one-button apparatus; and a test phase, in which the Ss were given either low intensity or high intensity sounds, the offset of which was contingent upon responses a three-button apparatus. The design of the experiment is summarised in Table 10-1.

Table 10-1: *Design of Experiment Eleven.*

Group	Sound Contingency		Sound Intensity		Number of Buttons	
	Treat.	Test	Treat.	Test	Treat.	Test
LL	NC fixed	C	Low	Low	1	3
LH	NC fixed	C	Low	High	1	3
HL	NC fixed	C	High	Low	1	3
HH	NC fixed	C	High	High	1	3

Subjects and Apparatus

Forty subjects were drawn from students at the University of Adelaide enrolled in their first year of Psychology. The apparatus and sound intensities were identical to those used in Experiment Ten.

Procedure

Initially, two noncontingent treatment (NCT) groups were run, each with 20 Ss. The schedule of sound offset in the treatment task was a fixed pattern pre-determined by the experimenter, having a mean sound duration of 4.12 seconds with a range between 0.46 and 10.00 seconds, and an inter-trial interval of 5 seconds. A random pattern of sound durations was deliberately chosen to eliminate the "illusion of control" created by yoking procedures. One of the groups was administered low intensity sounds, and the other high intensity sounds. The number of presses made on the one-button apparatus by each of the Ss was recorded for each trial. The instructions for the task were the same as those used in Experiment Three, except that reference was made to the one-button apparatus. Subjective measures were taken at the completion of the task (Questionnaire C in the Appendix). For the test task, the groups were split into two subgroups of 10 Ss, with one subgroup experiencing low intensity sounds and the other high intensity sounds, making four groups overall. In the task, offset of the sounds was contingent on responses on the three-button apparatus. This consisted of 30 trials, in which the sound could be turned off by making a minimum of three presses in the strict sequence of 'Right - Centre - Centre' within 10 seconds of initial onset. Instructions for the task were the same as those used in Experiment Three. A second questionnaire was administered following the test task (Questionnaire D in the Appendix). All Ss were fully debriefed with regard to the aims of the experiment, the theory upon which it was based, and the type of response-outcome contingencies to which he/she had been exposed.

Results

Performance Measures

Level of activity in the treatment task was measured in terms of the mean number of presses made on the buttons. However, as the duration of sound in each trial was not constant, the number of presses in any one trial were divided by the respective length of the trial. As the LL and LH groups both experienced the same level of sound intensity in the treatment task, their results were combined. Similarly, the results of the HL and HH groups were combined. Table 10-2 shows the mean and standard deviation for the overall level of activity of the groups in the treatment task. Although the activity level of the combined high intensity groups tended to be lower than that of the combined low intensity groups, t-tests showed that these differences were not significant.

Closer examination of the raw data indicated that activity levels changed over the progress of the task, and Figure 10-1 depicts these changes.

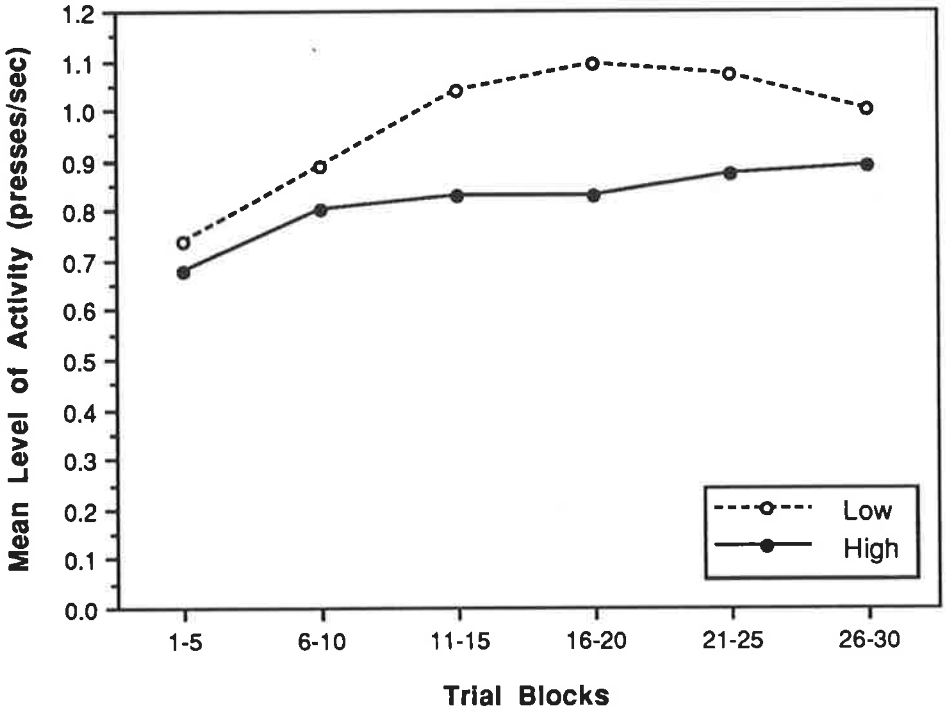

Figure 10-1: *Comparison of the effects of either low or high intensity sounds on activity levels, measured in terms of the number of presses per second, in the treatment task of Experiment Eleven.*

The first block of five trials was compared to the last block by means of a repeated measures analysis of variance. Once more, there were no significant effect for treatment intensity nor for trial blocks, and the interaction evident in the figure proved to be not significant.

Table 10-2 also shows the means for the 'latency' and 'errors' measures of test task performance of each of the four groups. The 30 trials of the test task were divided into 6 blocks of 5 trials, with the mean 'latency' and percentage of 'errors' being obtained for each trial-block. These have been plotted in Figures 10-2 and 10-3, respectively. A 2x2 (treatment sound intensity by test sound intensity) multivariate analysis of variance, with repeated measures taken over trial-blocks, was carried out on each of the dependent variables, using the Pillais-Bartlett trace criterion. There were no significant interactions nor significant main effects found.

Table 10-2: *Mean activity level in the treatment task of Experiment Eleven in terms of button-presses per second under conditions of either low or high intensity sound, and the mean latency and mean number of errors made by each of the four groups in the test task.*

Group	Treatment Task		Test Task			
	Activity Level (presses/sec)		Latency (sec)		Errors	
	Mean	sd	Mean	sd	Mean	sd
LL	0.97	(0.56)	6.13	(2.82)	12.90	(10.85)
LH			6.52	(2.78)	14.50	(10.69)
HL	0.82	(0.81)	4.16	(2.21)	7.00	(6.52)
HH			6.27	(2.85)	14.40	(10.69)

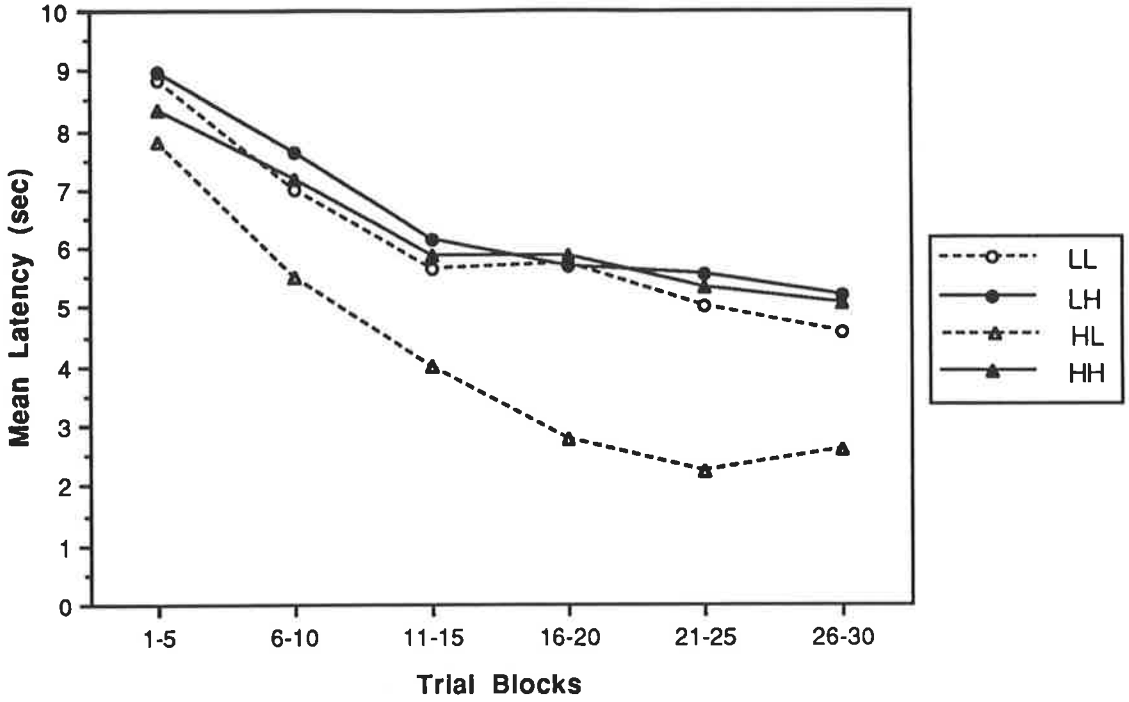

Figure 10-2: *Mean latency of test task responses over six 5-trial blocks for the four noncontingent treatment groups of Experiment Eleven.*

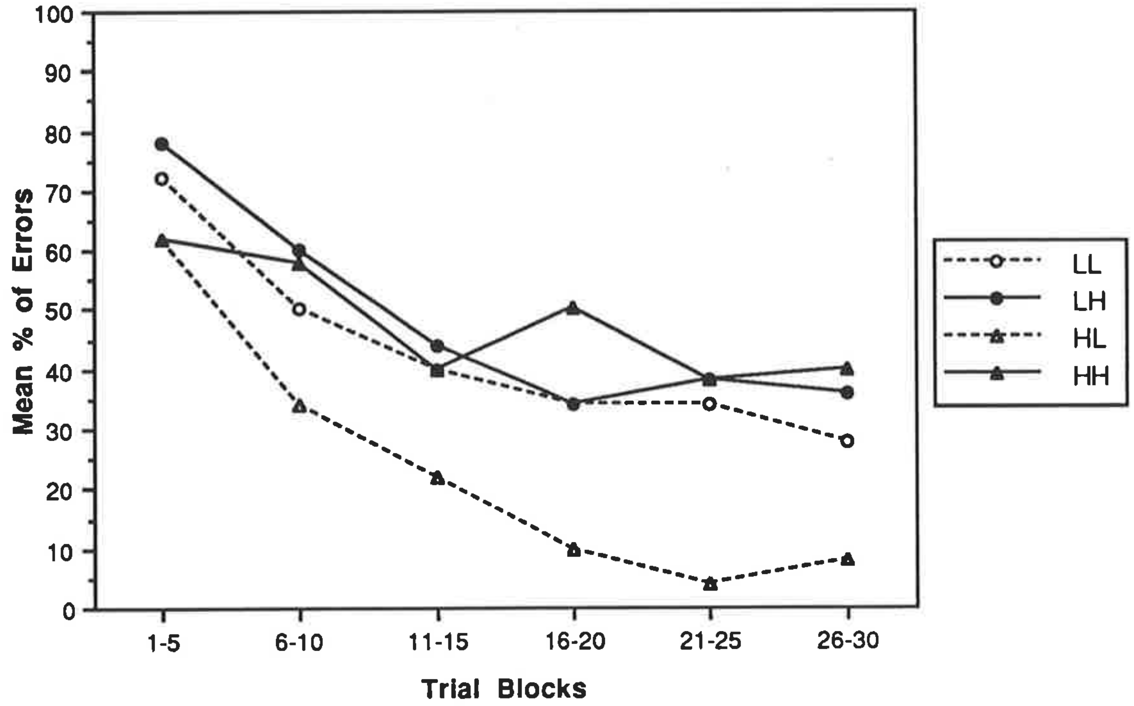

Figure 10-3: *Mean percentage of errors in test task responses over six 5-trial blocks for the four noncontingent treatment groups of Experiment Eleven.*

Subjective Measures

The means and standard deviations of the subjective measures are shown in Table 10-3. Possible maximum and minimum scores are indicated for each variable. Table 10-4 shows the results of questions which asked whether Ss had thought about their performance, and if so, what were their thoughts, and to rate their success in the treatment task and whether they perceived a contingency between responses and sound offset.

Perceptions of the Treatment Task

In examining the differences in perceptions of the treatment task, the scores of the groups experiencing similar sound intensities were pooled. Comparisons between the two pooled groups revealed only one significant difference, namely, that the high intensity sound was rated as more unpleasant than the low intensity sound ($t_{(38)}$ = 3.38, p < .001).

Table 10-3: *Means and standard deviations for subjective measures taken following the treatment task and the test task of Experiment Eleven.*

Group	Subjective Measures					
	Pleasantness		Motivation		Confidence	
	Response Range					
	1 ↔ 7		1 ↔ 5		1 ↔ 5	
	Task					
	Treat	Test	Treat	Test	Treat	Test
LL	4.0 (0.9)	4.0 (0.8)	3.3 (0.7)	3.3 (0.7)	2.6 (0.7)	2.9 (1.0)
LH	3.2 (1.0)	2.5 (1.7)	3.1 (0.6)	2.9 (0.9)	2.5 (1.1)	3.1 (1.3)
HL	2.9 (0.6)	4.2 (0.6)	3.0 (0.7)	3.3 (0.5)	2.5 (0.5)	3.5 (0.7)
HH	2.5 (0.5)	2.4 (0.5)	3.5 (0.7)	3.6 (0.7)	2.7 (0.9)	3.3 (0.9)

Perceptions of Test Task

As for the analysis of the treatment task, the only significant difference between the four groups was in relation to the pleasantness of the sound. A 2x2 (treatment intensity by test intensity) analysis of variance showed that the high intensity sound was perceived as being more unpleasant than the low intensity groups ($F_{(1,36)} = 25.46$, $p < .001$). There were no interaction effects. There were no significant effects in any of the other subjective measures.

Comparison with Experiment Ten

The performance of the HL and LL groups were compared to the NCT groups of Experiment Ten, which were exposed to similar sound intensities and task complexities but which had sound offset determined by a yoking procedure instead of a fixed format procedure. The means are plotted in Figures 10-4 and 10-5. In a 2x3 (treatment sound intensity by type of group) analysis of variance, the between-groups variance was partitioned into two planned contrasts in place of an omnibus F-test, with these being: NCT(fixed) vs NCT(yoked) (Contrast 1); $\frac{1}{2}$ [NCT(fixed)+NCT(yoked)] vs CT (Contrast 2). The differences in Contrast 1 proved to be not significant. Hence, the two groups were then combined in Contrast 2. This comparison was significant for both measures (latency $F_{(1,54)} = 13.04$, $p = .001$; errors $F_{(1,54)} = 9.04$, $p = .004$). None of the interactions between the contrasts and treatment intensity were significant.

Table 10-4: *Frequency of responses to questions on perceptions of response-outcome contingency and success in the treatment task of Experiment Eleven.*

Treatment Sound Intensity	Perceived Contingency			Thought about performance		Rating of Success		
	Yes	Unsure	No	Yes	No	Successful	Moderately Successful	Un-successful
Low	5	2	13	20	0	0	9	11
High	1	5	14	19	1	0	6	13

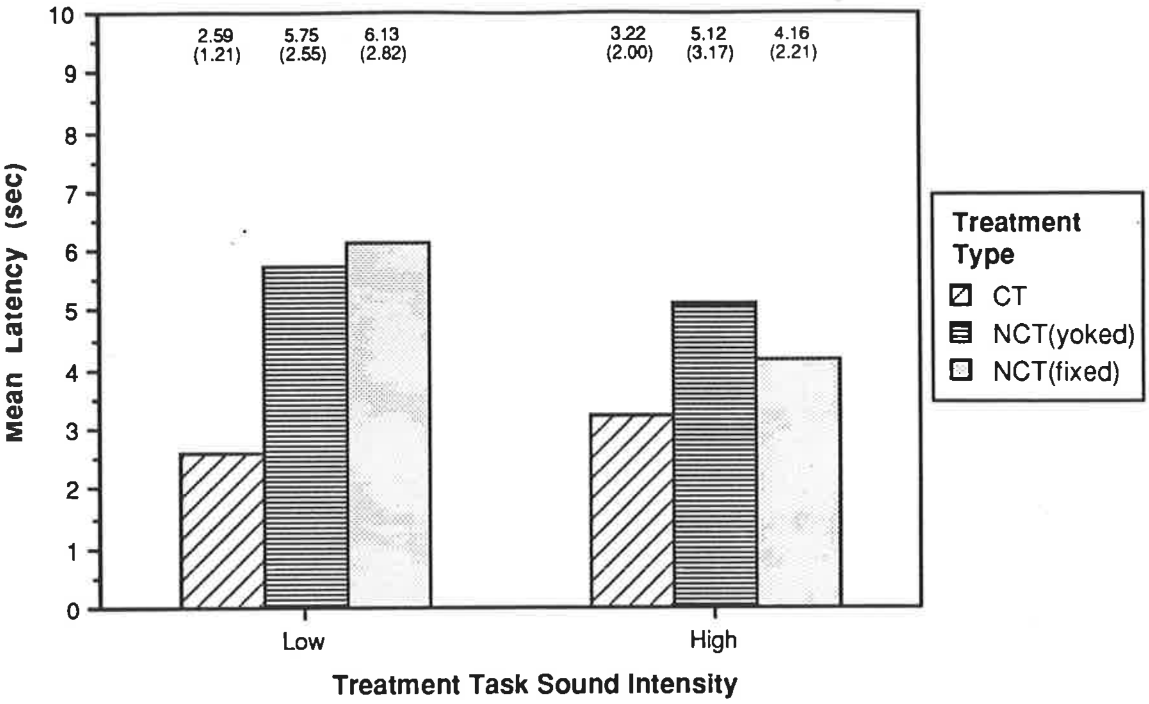

Figure 10-4: *Comparison of mean latency of test task responses for the CT and NCT(yoked) groups from Experiment Ten, and the NCT(fixed) groups from Experiment Eleven, which had experienced either low or high intensity sounds in the treatment task, and a low intensity sound in the test task.*

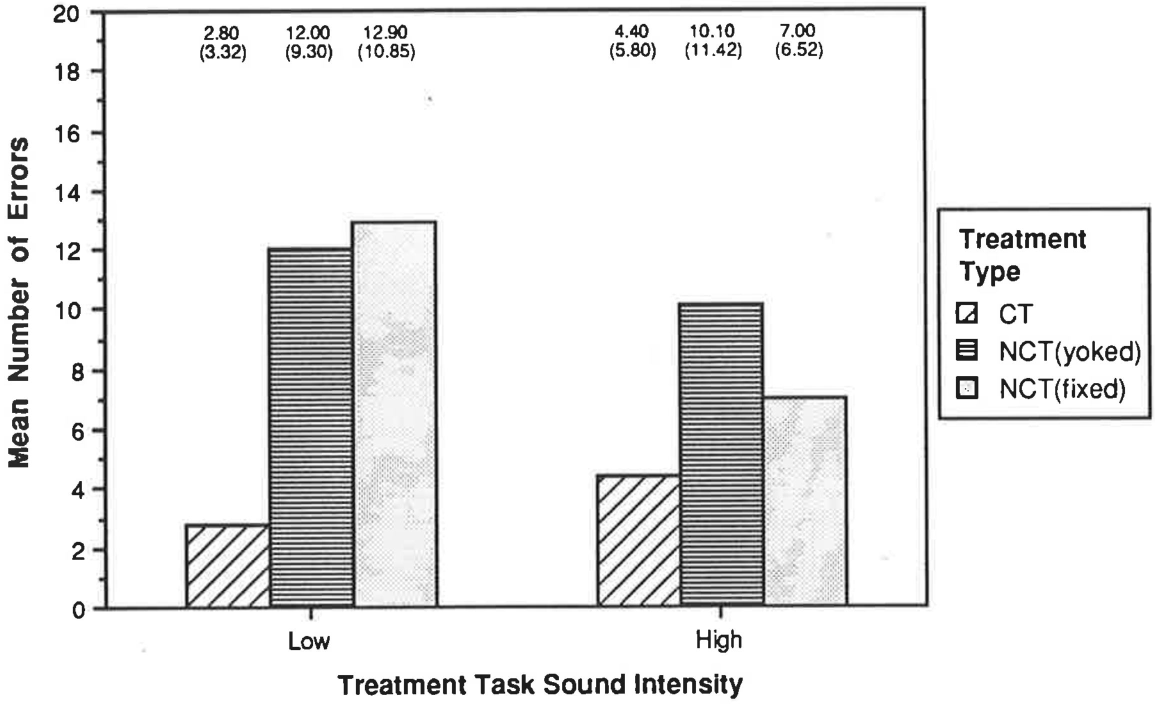

Figure 10-5: *Comparison of the mean number of test task errors made by the CT and NCT(yoked) groups from Experiment Ten, and the NCT(fixed) groups from Experiment Eleven, which had experienced either low or high intensity sounds in the treatment task, and a low intensity sound in the test task.*

Discussion

The first aim of this experiment was to examine further the effects of stimulus intensity on test task performance debilitation. In particular, it was considered necessary to determine whether differences in performance would still be evident when the potential bias of the yoking procedure was removed. This was done by comparing groups given an identical pattern of sound offset in the treatment task, with each experiencing a particular combination of either low or high intensity sound in the treatment and test tasks. Although the HL group appeared to perform better than the other three groups, there were no statistical differences between the groups.

The second aim of this experiment was to compare NCT group test task performance following a fixed pattern treatment procedure against that of the yoking procedure used in Experiment Ten. Although the high intensity fixed pattern group appeared to perform better in the test task than the high intensity yoked group, these differences were not statistically significant. Nevertheless, the marginally better performance of this high intensity group accentuated the difference found between the two NCT groups of Experiment Ten.

The results also indicate that the findings of Experiments Five and Six, in which high intensity treatment NCT subjects performed worse in the test task than did low intensity treatment subjects, may only be applicable to high complexity tasks. With simple tasks the effects of treatment sound intensity appears to be reversed.

It is noteworthy that the fixed format procedure tended to reduce the "illusions of control" brought about by the yoking procedure. More specifically, while in Experiment Ten exactly half of the subjects in the NCT group experiencing low intensity sounds in the treatment task had perceived a contingency between their responses and the offset of the sound, this proportion was reduced to 25% in the current experiment. Better still, the proportion of subjects in the NCT group who were given high intensity sounds in the treatment task and who perceived a contingency between their responses and sound offset was reduced from 30% in Experiment Ten to 5% in the current experiment.

The third aim of this experiment was to test the suggestion by Barber & Winefield (1987) that high intensity sounds stimulate subjects to higher levels of activity. Using a simple treatment task, which was exactly the same as that used by Barber & Winefield, there was no evidence of differentiation in the activity levels of subjects given either low or high intensity sounds.

EXPERIMENT TWELVE

The Effect of Sound Irrelevant to the Task

Most experiments on learned helplessness using animals have involved a treatment phase in which NCT subjects are passively exposed to an uncontrollable stimulus, often while being restrained in some way, while the CT group have an escape mechanism present. The NCT subjects are yoked to this group for pattern and duration of stimulus presentations. On the other hand, this procedure is not used in experiments with humans. Here the CT and NCT groups are required to perform a task in the treatment phase and which may or may not be associated with some sort of stimulus. Whereas with animals the aspect of uncontrollability in the treatment phase is the uncontrollability over stimulus onset/offset, with humans the uncontrollability is essentially the lack of contingency between responses and outcomes. Furthermore, whereas animal subjects are naive to both apparatus and stimuli, the same cannot be said for human subjects. It makes no difference if, for example, a response-bar is present in the treatment phase if the animal has never experienced such an apparatus and therefore has never learned that stimuli can be offset by pressing it. There are no "instructions" given to animals similar to those given to humans. In the latter case the instructions may be effectively meaningless, but nevertheless, the subjects become actively involved in the task. This appears to be an essential difference between the animal and human experiments. It also raises the possibility that with humans the active participation in the treatment task is another factor affecting the results. The question that comes to mind is: What is the effect of using a treatment phase that does not involve active participation? For instance, what happens when subjects are required to passively listen to an aversive sound rather than actively attempt to control it?

Very few experiments with humans have involved subjects being passively exposed to uncontrollable stimuli. Some authors have argued that there should be no performance deficits exhibited by subjects so exposed because there is no observable demonstration that outcomes are independent of responses and no verbalised requirement for them to terminate the noise (Barber & Winefield, 1986b; Buchwald, Coyne & Cole, 1978). As a result, the subjects will not perceive outcomes to be independent of responses, and therefore will not hold any expectations of future independence. Indeed, in a number of experiments the performance of this group has been found to be no different from the CT group, or at least better than the NCT group (Adams & Dewson, 1982; Gatchel & Proctor 1976; Hiroto & Seligman, 1975; Miller & Tarpy, 1991; Tennen, Gillen & Drum, 1982). Yet it is difficult to reconcile these findings with the extensive animal literature demonstrating performance deficits using such 'passive' procedures. Furthermore, at least two studies have found passive treatment groups to perform no differently from the NCT group (Barber & Winefield, 1986b; Thornton & Jacobs, 1971). The latter authors suggested that it was possible that the procedure had impaired performance for reasons other than an induced cognitive expectation of uncontrollability, such as lowering motivation in the test task because of exposure to the monotonous repetition of an unstimulating event.

Seligman and his associates propose that if a person perceives a noncontingency between responses and outcomes and forms the expectation that this relationship will persist in the future, learned helplessness will result. This is said to occur regardless of how the noncontingency is perceived – whether by personal experience or by vicarious means. Indeed, a number of experimenters have reported that subjects who have observed others experiencing noncontingency in a treatment task have themselves performed worse in a test task (e.g. Breen, Vulcano & Dyck, 1979; Brown & Inouye, 1978; DeVellis, DeVellis & McCauley, 1978). A variety of treatment tasks have been employed in studies of learned helplessness. Irrespective of the type of treatment task employed, nearly all of these studies have involved tasks where performance was portrayed as being linked to an outcome, such as, for example, successful completion of a problem or offset of a stimulus, regardless of whether the outcome was actually contingent or not contingent upon the subjects' responses. In these situations the outcome can be labelled as a 'task-relevant' event, as its occurrence is linked to performance of the task.

There is another category of experimental situation in which subjects perform a task attempting to achieve a particular outcome while being exposed to some other 'task-irrelevant' event. As its label suggests, the occurrence of the task-irrelevant event is not linked to task performance. An example of this is when subjects are required to solve problems in the presence of a noise, without there being any procedural requirement for them to offset that noise. As the perception of response-outcome noncontingency is an essential component of learned helplessness theory, then, in accordance with the interpretation by Buchwald et al (1978), it is reasonable to suggest that if an event is irrelevant to the task being performed then there should be no evidence of performance deficits in a subsequent test task, even if the same event is now task-relevant.

Only one study could be found which had compared the effects of experiencing task-irrelevant events with task-relevant events. Gregory, Chartier & Wright (1979) exposed a group of subjects to the same pattern of sound offset as that experienced by a contingent treatment (CT) group, but was required to complete a personality questionnaire while listening to the sounds. The CT group was given a treatment task requiring offset of a high intensity sound using a single button apparatus. Because the task-irrelevant subjects were not told that they were required to terminate the noise, they should not have perceived any response-outcome independence. The experimenters found that there was no difference in performance of a hand-shuttle test task between this group and the CT group, but only for subjects having internal locus of control. For subjects having external locus of control the task-irrelevant group performed worse than the CT group, and similarly to the NCT group.

The first aim of this experiment was to determine whether the effects of experiencing noncontingent sounds that are irrelevant to the task are any different from that of experiencing noncontingent sounds that are task-relevant. For this purpose a comparison was made with the results of Experiment Eleven. The second aim was to once more examine the effect of different levels of sound intensity on test task performance.

Method

Overview

The experiment consisted of two phases: a treatment phase in which Ss were given either low intensity or high intensity sounds, the offset of which was <u>irrelevant</u> to the task at hand; and a test phase in which the Ss were given either low intensity or high intensity sounds, the offset of which was <u>contingent</u> upon responses. The treatment consisted of a number-checking task, while the test was an instrumental task using three buttons. The design of the experiment is summarised in Table 10-5.

Table 10-5: *Design of Experiment Twelve.*

Group	Sound Contingency		Sound Intensity		Number of Buttons	
	Treat.	Test	Treat.	Test	Treat.	Test
LL	NC fixed irrelevant	C	Low	Low	—	3
LH	NC fixed irrelevant	C	Low	High	—	3
HL	NC fixed irrelevant	C	High	Low	—	3
HH	NC fixed irrelevant	C	High	High	—	3

Subjects

The subject pool was drawn from students at the University of Adelaide enrolled in their first year of Psychology. Forty Ss were allocated to one of four noncontingent treatment groups.

Apparatus

a. *Sounds*

The sounds were the same as those used in Experiment Eleven, namely: low intensity 56 dB(A), 310 Hz, triangular wave form; and high intensity 85 dB(A), 2000 Hz, square wave form.

b. *Treatment and Test Tasks*

The treatment task involved the number-checking component of the "Speed and Accuracy Test" (Form B) produced by the Australian Council for

Educational Research. The task involved checking whether a series of numbers were the same or different to a paired series of numbers. The materials consisted of a two-page question booklet and a single answer sheet. Each page of the question booklet was divided into two columns. Each column consisted of a set of two series of numbers. In all, there were 160 sets of numbers, each with from 3 to 12 numerals. The test task employed the same three-button apparatus as that used in Experiment Eleven.

Procedure

Ss were led into the experimental room and seated at a table facing the sound-generating apparatus. The experimenter introduced the experiment as one concerned with the effects of sound on clerical and problem-solving tasks. He then handed the Ss a sheet containing the following instructions:

> "In front of you is a set of headphones and a number-checking task. During this first part of the experiment you will listen to short bursts of sound coming through the headphones, while working through the number-checking task. The task consists of pairs of numbers. If the two numbers are exactly the same, make a cross through the letter '**S**' for that item on the answer sheet; if they are different, make a cross through the letter '**D**'. There are five practice pairs of numbers given below. The first two have already been done. Look at the first two pairs of numbers below and look at the part of your answer sheet marked '**PRACTICE**'.

1.	6539 6539	*These two numbers are the **same** , so a cross has been made through the letter* **S** *on your answer sheet.*
2.	235 253	*These two numbers are **different** , so a cross has been made through the letter* **D** *on your answer sheet.*

> Now do the following three practice pairs yourself, marking your answers in the **PRACTICE** column of your answer sheet.
>
> 3. 8918 892
> 4. 347 374
> 5. 24859 . . . 24859
>
> There are 160 pairs of numbers to work through. You will have a fixed amount of time to do as many of them as you can. You probably won't finish all of them. Try to be quick and accurate. Now, stop and wait for further instructions.

After reading the instructions, the Ss were given a sample of the sound and the option of discontinuing with the experiment. There were no withdrawals. The Ss were then told that they were to turn the page of their test booklet when they heard the first sound. the Experimenter left the room and the first trial began five seconds later. The Ss received 30 unsignalled sound bursts, the intensity of which was determined by their group allocation. The pattern of the durations was the same as that used in the treatment task of Experiment Eleven. In total, the Ss were given 7.5 minutes to do the task, which was insufficient for its completion.

At the end of the time limit for the number-checking task the experimenter entered the room and seated the Ss in front of the button-pressing test task apparatus. They were given instructions which were exactly the same as those used in Experiment Three. All four groups were given 30 trials of unsignalled sounds. The task began five seconds after the Experimenter left the room. Each trial was of 15 seconds duration, with the sound being on for a maximum of 10 seconds, followed by a fixed 5 second interval of no sound. The sound could be offset by making a minimum of three presses in the strict sequence of 'Right - Centre - Centre' within 10 seconds of onset. The intensity of the sounds was either high or low, depending on the individual S's group allocation. At the completion of the test task the Experimenter returned and fully debriefed the Ss with regard to the aims of the experiment, the theory upon which it was based, and the type of response-outcome contingencies to which he/she had been exposed.

Results

Performance Measures

The means and standard deviations for the number of numerical sets checked and the number marked incorrectly in the treatment task are shown in Table 10-6. The results from the L-L and L-H groups were combined, as were results of the H-L and H-H groups. Between-group comparisons showed that there was no differences between the combined groups on any of the performance measures.

Table 10-6: *Mean treatment task performance of the groups of Experiment Twelve combined in relation to treatment sound intensity, and the mean test task performance of each separate group.*

Group	Treatment Task				Test Task			
	Checked Pairs		Incorrect Pairs		Latency (sec)		Errors	
	Mean	sd	Mean	sd	Mean	sd	Mean	sd
LL	96.8	(16.79)	1.90	(1.68)	6.55	(2.79)	15.50	(9.88)
LH					7.58	(2.60)	18.20	(9.58)
HL	95.7	(19.75)	1.75	(1.97)	6.38	(3.16)	14.70	(10.81)
HH					6.48	(2.85)	14.40	(9.43)

Table 10-6 also gives the overall means and standard deviations for the 'latency' and 'errors' measures in the test task. The 30 trials were divided into 6 blocks of 5 trials, with the mean performance measures being obtained for each trial-block and plotted in Figures 10-6 and 10-7, respectively. A 2x2 multivariate analysis of variance was carried out on each of the dependent variables separately, with repeated measures taken over the 6 trial-blocks. The criterion for the analyses was the Pillais-Bartlett trace. There were no significant interactions nor significant main effects.

Comparison with Experiment Eleven

The test task performance of all four groups was compared to that of the four groups in Experiment Eleven. The mean latency and errors from the two experiments are plotted in Figures 10-8 and 10-9, respectively. Although it appeared that the task-irrelevant groups performed worse than the task-relevant groups, a 2x2x2 (treatment sound intensity by test sound intensity by task relevance of treatment task) analysis of variance carried out on each of the performance measures separately showed no significant differences between the groups.

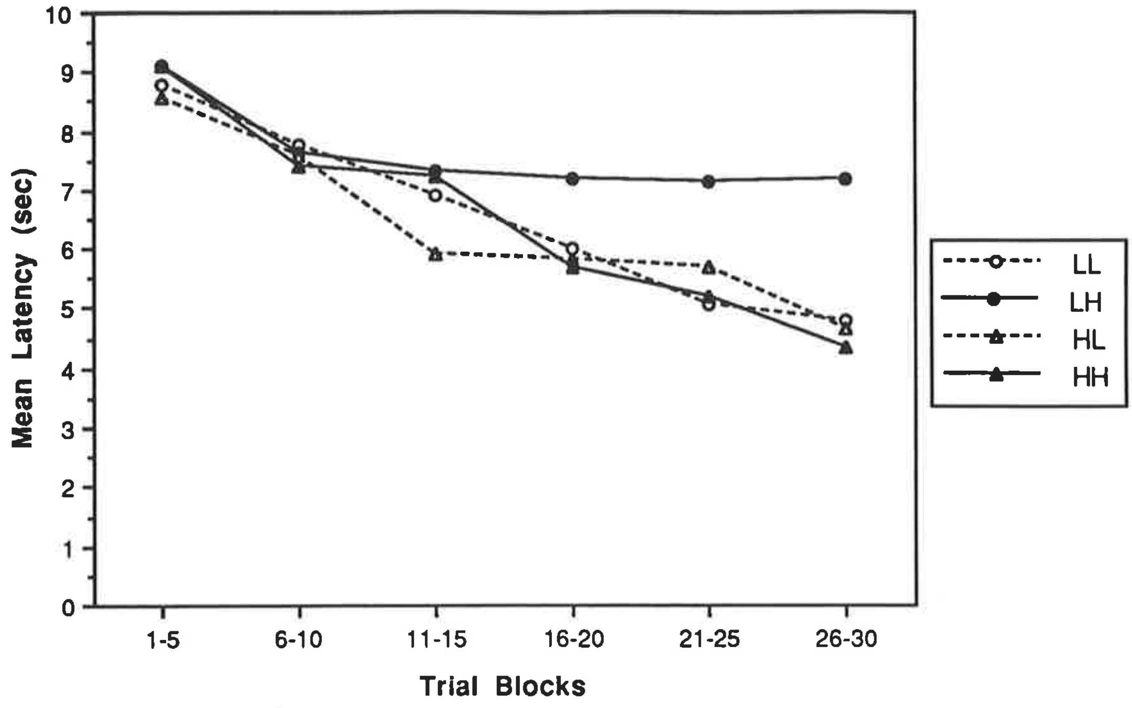

Figure 10-6: *Mean latency of test task responses over six 5-trial blocks for the four noncontingent treatment groups of Experiment Twelve.*

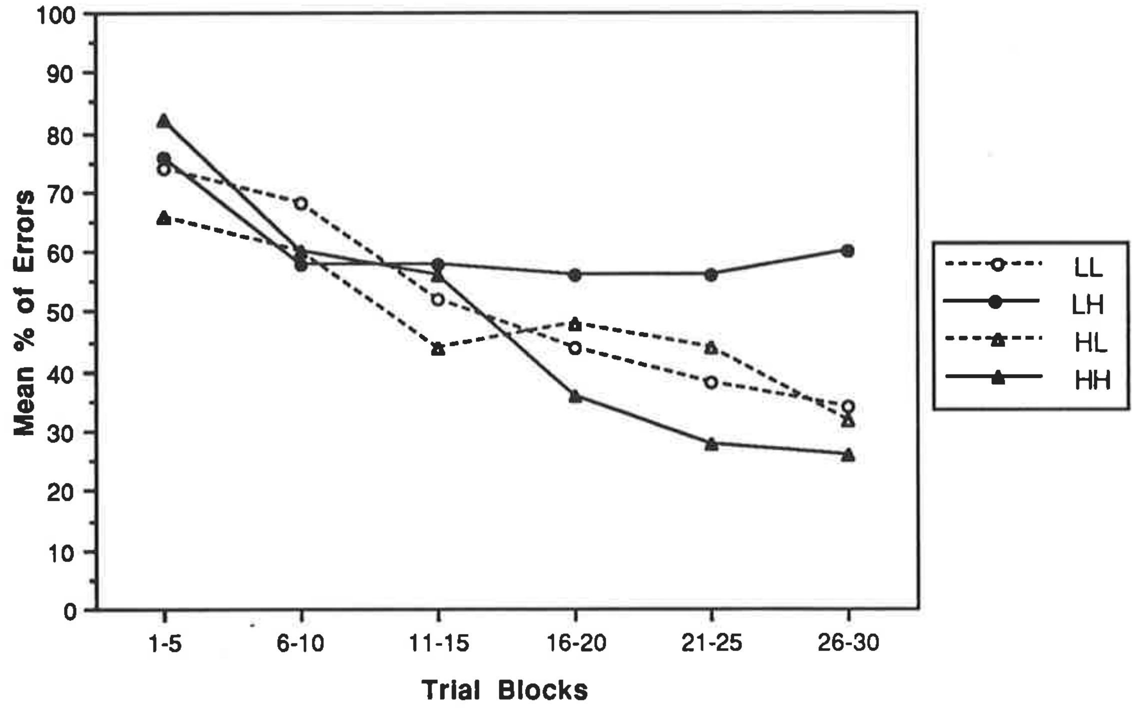

Figure 10-7: *Mean percentage of errors in test task responses over six 5-trial blocks for the four noncontingent treatment groups of Experiment Twelve.*

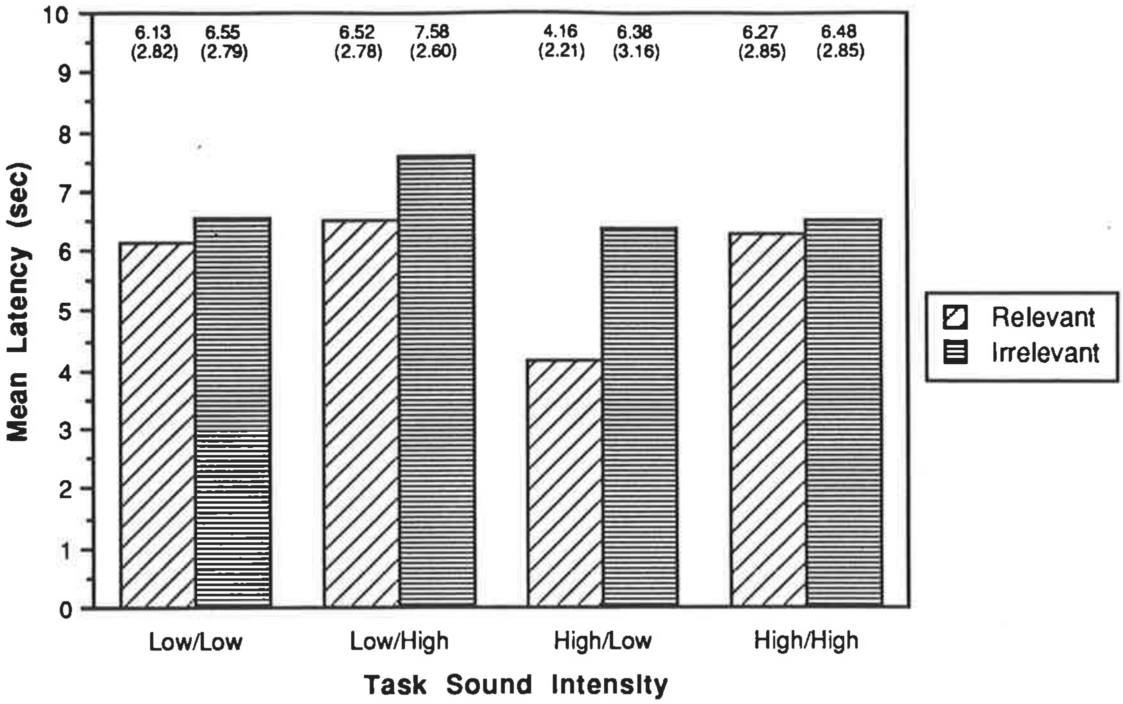

Figure 10-8: *Mean latency of responses made in the test task by NCT groups after performing a treatment task where sound offset was either relevant or irrelevant to the task performed, while under four possible combinations of treatment and test sound intensity.*

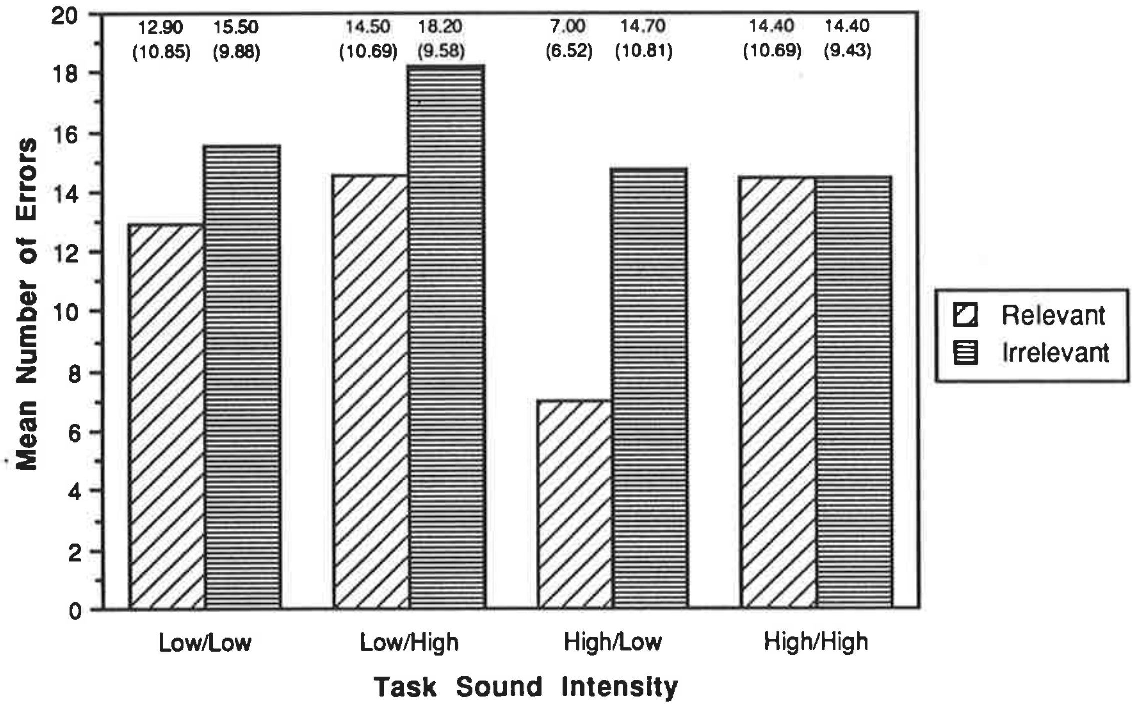

Figure 10-9: *Mean number of errors made in the test task by NCT groups after performing a treatment task where sound offset was either relevant or irrelevant to the task performed, while under four possible combinations of treatment and test sound intensity.*

Discussion

The first aim of this experiment was to determine whether there are any differences in performance resulting from experiencing sounds which are either relevant or irrelevant to the task being performed. To achieve this, the NCT groups were given task-irrelevant sounds and were compared to the task-relevant NCT groups from Experiment Eleven. Although test task performance following the task-irrelevant sounds appeared worse than that following the task-relevant sounds, these differences were not statistically significant. It is tempting to conclude that an experience of task-irrelevant sounds is capable of debilitating subsequent test task performance in a similar fashion to task-relevant sounds. Hence, a person does not need to be actively attempting to exert control over sounds to be affected by those sounds.

These results are at odds with other studies which have employed passive exposure to sounds, where subjects required to listen to sounds without having to participate in any task at all have performed better than NCT subjects actually trying to control those same sounds. As learned helplessness theory suggests that without the perception of response-outcome noncontingency there can be no subsequent performance deficits attributable to expectations of uncontrollability, there should be no performance deficits exhibited by subjects exposed to noise which is irrelevant to their task responses. On the other hand, it could be argued that one does not need to actually attempt to control an aversive event to appreciate that nothing can be done to stop it, with the issue not being the task-relevance of the events but their uncontrollability *per se,* as is suggested by Seligman and his associates. Yet if this is so, why is it that passive exposure procedures do not result in subsequent test task performance deficits?

At this point a cautionary note must be added to the discussion, as the methodology can be criticised on two points. Firstly, in a divergence from the traditional tests of learned helplessness theory, there were no CT or NT groups employed in this experiment, with comparisons being made across experiments. Secondly, the use of a number-checking treatment task confounds the comparison of task-relevance with task type. To avoid this, future experiments should involve a similar treatment task in both task-relevant and task-irrelevant groups.

The second aim of this experiment was to examine further the effects of sound intensity on task performance. As in Experiment Eleven, no differences in treatment task performance were found between subjects given either low or high intensity treatment sounds. This lack of differentiation between sound intensities may be attributable to the low complexity level of the treatment task in both experiments. However, the picture is still not complete. It remains to be seen whether differences in performance would be observed with a more complex treatment task. A future study could repeat the two experiments presented in this chapter, with the inclusion of a 'treatment task complexity' factor (i.e. comparing one- vs. two-button treatment tasks). Only then could a more definite conclusion be reached concerning the debilitatory effects of the intensity and task-relevance of treatment task sounds, and their interaction with treatment task complexity.

Chapter Eleven:

Final Discussion

This chapter presents a summary of the experiments performed in this thesis, followed by a discussion of a number of issues raised by the findings and suggestions for future research.

SUMMARY OF THE EXPERIMENTS

Experiment One

The first experiment presented in this thesis was concerned with determining whether test task performance deficits could be produced if the preceding treatment task involved only 50% failure, while still maintaining complete noncontingency between all responses and outcomes. If the procedure demonstrated test task performance debilitation, it could be assumed that this was due to a perception of noncontingency between responses and outcomes and not to some properties of the failure feedback itself. The experiment consisted of four Levine-type problems in the treatment task followed by a three-button problem in the test task, with offset of high intensity sounds in the test task being signalled by coloured lights. No performance deficits were found, with there being no difference between the contingent treatment (CT), noncontingent treatment (NCT) and no treatment (NT) groups.

Experiment Two

Experiment Two was carried out to determine whether differentiation between the groups could be observed by controlling for individual differences in problem-solving ability. This was achieved by pre-treating the three groups with a button-pressing problem similar to that used in the test task.

Once again, no performance deficits were found in the NCT group. As a large number of studies have found test task performance debilitation in the NCT group using 100% failure in Levine-type treatment task problems, the results of Experiments One and Two provided some evidence that these performance deficits may be attributable to the experience of failure rather than to an expectation of response-outcome noncontingency. Experiment Two also showed that the supposed immunisation effects demonstrated by other experimenters may be merely a practice effect.

However, it was considered possible that the lack of performance deficits may have been brought about by procedural factors in the experimental design. The test task in the experiments required subjects to offset a high intensity sound. As other studies which have used a Levine-type treatment problems have predominantly followed these with a test task involving no sounds (e.g. anagrams), it seemed possible that the presence of high intensity sounds in the test tasks of Experiments One and Two may have influenced performance. Alternatively, it was also possible that the treatment and test tasks were too different for perceptions of uncontrollability to generalise from one to the other, or that the button-pressing test task was too difficult, or that the light signalled offset of sounds in the test task made response-outcome contingency clearly apparent. Hence, the next experiment attempted to determine whether the intensity of the sound was indeed a significant influence on test task performance, while controlling for the possible effects of the other factors.

Experiment Three

Experiment Three used button-pressing problems in both tasks. The treatment task used a two-button apparatus, and the test task used the same three-button apparatus as in Experiments One and Two, except that sound offset was not signalled with lights . To retain a similar sound configuration to those used in the preceding experiments, the subjects were required to escape a low intensity sound in the treatment task and a high intensity sound in the test task. Once again no performance deficits were found in the NCT group. In fact, the NCT and CT groups performed significantly better than the NT group.

Experiment Four

As no effect was observed even with the modified procedure, it was suggested that having high intensity sounds in the treatment <u>and</u> test tasks could increase the likelihood of observing test task performance deficits. Thus Experiment Four used exactly the same procedure as the preceding experiment, except that both tasks involved high intensity sounds. Once again there was no difference between the NCT and CT groups. Although these groups appeared to perform better than the NT group, this difference was not statistically significant. The poorer performance of the NT group in both Experiments Three and Four suggested that there may have been some sort of practice effect operating. The CT and NCT groups may have performed better in the test task because of their prior experience with a similar problem in the treatment task.

Experiment Five

Failure to produce performance deficits in NCT subjects in the four experiments performed to this point, using two distinctly different treatment tasks, suggested that noncontingency alone is not sufficient to produce the effect. It was considered possible that other factors, in an interaction with the contingency factor, may play a role in determining performance deficits. A re-examination of the experimental procedures of the experiments identified two common elements. These were, firstly, that each had involved a high intensity sound in the test task, and secondly, that the tasks were more complex than those used in other studies which had succeeded in demonstrating performance deficits.

In relation to the intensity factor, not finding performance deficits conformed to the results of animal experiments. These have found that test task performance deficits are either reduced or removed altogether if the task involves high intensity stimuli (e.g. Anisman, DeCatanzaro & Remington, 1978). On the other hand, the results were in disagreement with a number of human studies which had reported performance deficits in test tasks employing high intensity test-task stimuli (e.g. Adams & Dewson, 1982).

As the literature also indicates that performance deficits have been demonstrated with both animal and human subjects using a low intensity test task stimulus (e.g. Jackson, Maier & Rapaport, 1978), Experiment Five required subjects to escape from high intensity sounds in a two-button treatment task and then from low intensity sounds in a three-button test task. This was the first experiments in which performance deficits in the NCT group were found.

Experiment Six

To complete the comparison of the four possible configurations of high and low sound intensities, Experiment Six involved the same treatment and test tasks as the previous three experiments, only this time subjects were required to escape from low intensity sound in both tasks. No performance deficits were found.

Experiment Seven

The results of Experiments Three through to Six suggested that test task performance may be differentially affected by an interaction between the sound intensities used in the treatment and test tasks. When the test sound intensity was high, performance was not debilitated. On the contrary, it was facilitated. This occurred following both high and low treatment sound intensities. The finding that the NT group performed worse in these experiments suggested that this facilitation was attributable to a practice effect. On the other hand, when the test sound intensity was low, performance was debilitated, but only with a high intensity treatment sound.

As it was possible that the performance deficits found with high intensity treatment sound were attributable to the aversive properties of the sound itself, it was reasoned that the deficits might be increased if the aversiveness of the sound was increased. In Experiment Seven this was achieved by varying the frequency and sweep time of the sound, using a sound which was identified in a pilot study as being more aversive than the one used to this point. As with Experiment Five, performance deficits were found. However, the greater aversiveness of the sounds did not increase the magnitude of the performance deficits.

Experiment Eight

It was proposed that another way of increasing the aversiveness of the sound would be by raising the level of anxiety generated by its occurrence, and that a sound which increased in intensity, in a crescendo effect over the duration of each trial, might be able to achieve this. Experiment Eight used such a crescendo sound in the treatment task, but did not show any test task performance deficits in the NCT group.

The fact that only two experiments out of the eight performed to this point had demonstrated test task performance debilitation was considered to cast some doubt on the generality of "learned helplessness". From the results it was concluded that, firstly, noncontingency alone is insufficient to bring about subsequent performance deficits, and secondly, performance deficits could only be produced with a particular configuration of treatment and test sound intensities. However, the knowledge that other studies had found performance deficits by using simpler tasks indicated that they may be affected by task complexity. The aim of the next two experiments was to explore this possibility.

Experiment Nine

It was suggested that low complexity tasks may make the relationship between responses and sound offset easier to perceive. Therefore, a decrease in the overall complexity of the treatment task would result in a higher likelihood of subsequent test task performance deficits. Experiment Nine used a one-button treatment task requiring escape from high intensity sounds, followed by a two-button test task requiring escape from low intensity sounds. Although performance deficits were found in the NCT group, these were of no greater magnitude than those in Experiment Five, which had used the same combination of sounds but with two and three-button treatment and test tasks, respectively. However, as the treatment and test tasks of the current experiment were <u>both</u> lower in complexity than those of Experiment Five, it was suggested that the lack of performance differences between the two experiments may have been attributable to the complexity of one or other of the tasks, or even to an interaction between them. Consequently it was considered necessary to examine the effects of treatment task complexity alone.

Experiment Ten

In Experiment Ten the treatment task involved a simple one-button apparatus and either high or low intensity sounds, followed by a complex test task, involving a three-button apparatus with low intensity sounds. Apart from the comparisons between the effects of treatment task intensity, the design also allowed for comparisons to be made with other experiments on the basis of treatment task complexity. In particular, comparisons could be made with Experiments Five and Six, which had used a higher complexity treatment task. Once more it was predicted that a lower level of treatment task complexity would lead to an increased likelihood of finding performance deficits. This was supported, as performance deficits were found using both high and low treatment task intensities. There was no difference in the magnitude of the performance deficits between the high and low intensity treatments.

The effect of test task complexity was further examined in a comparison between the two-button test task of Experiment Nine and the three-button test task of Experiment Ten. There was no significant differences in the magnitude of test task performance deficits between the two levels of test task complexity.

Experiment Eleven

Although it was apparent that sound intensity differentially affected the immediate performance of tasks involving response-outcome contingency, it was still uncertain how intensity affected performance of a subsequent task. Two major problems in making comparisons of test task performance are, firstly, the variations in the pattern of sounds experienced in the treatment task by each individual, and secondly, the possibility of a systematic bias in favour of the CT group over the NCT group attributable to individual differences in sensitivity to sounds. Experiment Eleven attempted to directly examine the effect of treatment sound intensity on subsequent test task performance by using a predetermined, fixed pattern of treatment sounds that was identical for all groups. The four possible configurations of low and high intensity sounds in the treatment and test tasks were compared, with no differences in test task performance being found.

Experiment Twelve

The final experiment was concerned with the effect of experiencing sounds irrelevant to the task being performed, and how these sounds affected subsequent performance. The treatment involved a simple number-checking task, followed by a three-button test task. Once again the four possible configurations of low and high intensity sounds in the treatment and test tasks were compared. There were no differences in test task performance. Furthermore, the test task performance following these task-irrelevant sounds was no different to that of the groups which had been given task-relevant sounds in Experiment Eleven.

Overall, the line of inquiry pursued in this thesis had concentrated on the effects that sound intensity and task complexity have on the occurrence of test task performance deficits. Experiments One to Ten made comparisons between contingent and noncontingent treatments. The findings from these experiments are summarised in Table 11-1.

It is evident from the table that, with moderate levels of treatment complexity, the most effective combination of sound intensities for demonstrating performance debilitation was high treatment and low test. With low levels of treatment complexity, performance debilitation was found with both high and low treatment sound intensities.

Table 11-1: *Summary of the effects of sound intensity and task complexity on test task performance in Experiments One to Ten.*

Experiment	**Intensity**		**Complexity**		**Outcome**
	Treatment	**Test**	**Treatment**	**Test**	
1 & 2	None	High	Moderate	High	No effect
3	Low	High	Moderate	High	Facilitation
4	High	High	Moderate	High	No effect
5	High	Low	Moderate	High	Debilitation
6	Low	Low	Moderate	High	No effect
7	High	Low	Moderate	High	Debilitation
8	Crescendo	Low	Moderate	High	No effect
9	High	Low	Low	Moderate	Debilitation
10	Low	Low	Low	High	Debilitation
	High	Low	Low	High	Debilitation

Note: low complexity = 1 button; moderate complexity = 2 buttons (or Levine-type problems in Experiments One & Two); high complexity = 3 buttons.

EFFECTS OF SOUND INTENSITY

The theory of learned helplessness suggests that the intensity of sound should not influence performance deficits as it is the experience of noncontingency, and the expectation of future noncontingency, which should result in subsequent performance deficits. Indeed, in Chapter Three it had been indicated that a number of authors have claimed that the behavioural effects following an experience of uncontrollable stimuli were not dependent upon the intensity of the stimuli (e.g. Maier & Seligman, 1976). The fact that performance deficits have been observed with either low intensity stimuli (e.g. Tiggemann & Winefield, 1978) or high intensity stimuli (e.g. Hiroto, 1974) was regarded as evidence supporting this notion. Furthermore, Hiroto & Seligman (1975) argued that the performance deficit in their experiments could not be attributable to a differential aversion to the sound because both the CT and NCT groups reported similar levels of aversiveness. This is not disputed, as all through this thesis a similar lack of differentiation between CT and NCT groups in their perceptions of the aversiveness of sounds had been found. On the other hand, the experiments presented here have shown that performance deficits <u>are</u> influenced by stimulus intensity. Furthermore, these effects have been shown to interact with treatment task complexity. Using low complexity treatment tasks, performance deficits in test tasks involving low intensity sounds were found regardless of the intensity of the treatment sound, whereas with higher complexity treatment tasks, performance deficits in test tasks involving low intensity sounds were only found if the treatment sound had a high intensity.

Studies using animal subjects have also found stimulus intensity to influence the extent of test task performance deficits (e.g. Anisman, DeCatanzaro & Remington, 1978; Dinsmoor & Campbell, 1956b; Mullin & Mogenson, 1963). Seligman (1975) himself had suggested that one factor which may limit the transfer of helplessness from one situation to another may be the relative significance of the two situations, in that ". . . helplessness may generalise readily from more traumatic or important events to less traumatic or important ones, but not vice versa" (p.61). He noted that at the time he knew of no laboratory evidence which showed that being helpless in a trivial situation readily generalises to more important ones, while being helpless in important situations does indeed readily generalise to trivial situations.

Furthermore, claims that sound intensity has no effect on subsequent performance deficits are at odds with the findings by researchers examining the effects of noise on human behaviour. For instance, exposure to random schedule intermittent noise has been found to decrease tolerance for frustration in insoluble figure-tracing problems (Glass & Singer, 1972a; Glass, Singer & Friedman, 1969; Percival & Loeb, 1980; Wohlwill, Nasar, DeJoy & Foruzani, 1976) and in reaction-time tasks (Hartley, 1973). Percival & Loeb suggested that rather than the after-effect of exposure to uncontrollable noise being mediated by psychological factors, such as feelings of lack of control over the environment or learned helplessness, ". . . it is possible that unpredictable, uncontrollable noise is simply more traumatic and that the trauma induces effects which persist for some time after noise exposure" (p.342).

The problem for learned helplessness theory is that if test task performance deficits are indeed attributable to the uncontrollability of a situation regardless of stimulus intensity, it should make no difference whether a high intensity stimulus is administered in the treatment or test task – performance deficits should be observed in all combinations of stimuli. Yet it has been shown in this thesis that different combinations of sound intensity do have differential effects on test task performance. With higher complexity tasks, performance deficits were only found with a high/low configuration of treatment and test task sounds. There was no difference between the NCT and CT groups in the low/low, low/high and high/high sound configurations.

It is tempting to explain these results in terms of the suggestion by Barber & Winefield (1987) that high intensity sounds stimulate subjects to a higher level of activity, thereby ensuring that they are exposed to the noncontingency between responses and outcomes. After all, research has shown that reaction times to high intensity sounds are shorter than they are to low intensity sounds (Corso & Moomaw, 1982; Fisher, 1983; Kemp, 1984; Keuss & Van dèr Molen, 1982; Kohfeld & Goedecke 1978; Kohfeld, Santee & Wallace, 1981; Murray, 1970; Nissen, 1977; Santee & Kohfeld, 1977; Van der Molen & Keuss, 1979). This would account for the finding of performance deficits in the high/low configuration of Experiment Five and the lack of such deficits in the low/low configuration of Experiment Six. It could also account for the lack of any performance deficit in the low/high and high/high sound configurations of Experiments Three and Four by attributing it to a renewed high level of activity when NCT subjects were given the high intensity sound in the test task. This level of activity ensured that the subjects were exposed to the change in contingency schedule.

However, two of the current series of experiments had results contradictory to the 'higher activity level' explanation. Firstly, Experiment Eleven found that the activity levels of subjects engaged in a fixed pattern noncontingency schedule in high intensity sound were lower (although not significantly so) than in low intensity sound. Secondly, with the use of a low complexity treatment task, Experiment Ten demonstrated subsequent test task performance deficits in groups given either high or low intensity treatment sound. Clearly the 'higher activity level' explanation is not supported.

It is possible that the differences in performance found with different combinations of sound intensities could be attributable to what Poulton & Freeman (1966) had labelled a 'transfer effect'. They noted that the order in which two tasks are done may affect performance in the second task. Namely, performance on task B following task A is not always the same as performance of B alone. Poulton (1975) reviewed a large number of experiments dealing with performance of individuals subjected to different and successive experimental conditions and concluded that doing task A followed by task B is not counterbalanced by doing task B followed by task A, particularly if task B has a higher level of difficulty or has stimuli of a higher intensity. An example of this is an experiment by Aldridge (1978) where performance of an initial word-recall task was worse in high intensity sound than in low intensity sound, yet this difference disappeared when the sounds were interchanged.

Support for a 'transfer effect' explanation of the results of Experiments Three to Six can be drawn from three separate studies which, although not concerned with examining 'learned helplessness', nevertheless showed a similar pattern of results to those found in the current series of experiments. Firstly, Murray (1970) showed that reaction times were generally slower for low intensity sounds than they were for high intensity sounds when subjects were required to react to a single intensity sound. However, when sounds of different intensities were used, he found that reaction to the sound Low_2 in the configuration of $High_1/Low_2$ was slower than reaction to Low_2 in Low_1/Low_2, while reaction to $High_2$ in $High_1/High_2$ was similar to reaction to $High_2$ in $Low_1/High_2$. He also found that reaction time was generally faster with high intensity in the second task than with low intensity. The other two studies that support a transfer effect explanation were by Teichner, Arees & Reilly (1963) and Shoenberger & Harris (1965), who found that performance of a task was impaired by a single change in the intensity of a continuous sound, regardless of whether the change was an increase or decrease, and more so for larger changes. More importantly, a decrease in sound intensity was even more detrimental to performance than was an increase.

However, a problem for the transfer effect explanation is that there were no performance differences found between high and low treatment intensities in a comparison of the four sound configurations using a fixed-pattern series of sounds (Experiment Eleven). It may be that there is an interaction with task complexity, but this cannot be confirmed without further exploring all of the possible combinations of complexity, sound intensity and contingency schedule. In particular, it is suggested that a future experiment should involve at least three factors: treatment sound intensity; test sound intensity; and treatment task complexity.

EFFECTS OF TASK COMPLEXITY

This thesis has shown that sound intensity interacts with task complexity in two ways. Firstly, performance of tasks under conditions of response-outcome contingency, with no prior experience of noncontingency, was found to be worse in the presence of high intensity sounds than low intensity sounds. Furthermore, this difference in task performance in the two sound intensities increased as the complexity of the task increased. Secondly, performance of tasks following an experience of response-outcome noncontingency showed an interaction effect between sound intensity and treatment task complexity. Specifically, following low complexity treatment tasks, test task performance deficits were found regardless of the intensity of the treatment sound, whereas following higher complexity treatment tasks, test task performance deficits were found only with prior exposure to high intensity treatment sounds. However, it should be pointed out that the above interaction was only examined with low intensity sounds in the test tasks. It remains to be seen what are the relative effects with high intensity sounds in the test task.

The effect of varying test task complexity was examined, although this was restricted to a high/low (i.e. high treatment / low test) sound configuration and a simple treatment task. It was found that increasing test task complexity did not affect the magnitude of the performance deficit. This failed to support any of the predictions concerning the effect of test task complexity on performance made by the theories of 'learned helplessness', 'test anxiety', 'egotism' and 'cognitive transfer'.

It was evident from subjective reports that the contingency between responses and outcomes was easier to perceive in treatment tasks of low complexity than in tasks of high complexity. It may be that the NCT subjects given the simple treatment task could easily see that there was no connection between their responses and the offset of the sound because of the small number of different response strategies that can be tested with a single button. On the other hand, the number of response strategies possible with the more complex two-button treatment task was considerably greater. Consequently, subjects given this task would not have been able to see as easily the connection, or lack thereof, between their responses and the offset of the sounds. However, this does not explain why performance deficits were found with high/low and low/low sound configurations following the simple one-button treatment task, but only with a high/low configuration following the more complex two-button treatment task. A possible explanation is that, because the CT subjects given the high complexity treatment exhibited longer latencies and made more errors in offsetting the sounds than did the CT group given the low complexity treatment, the NCT subjects who were yoked to them were exposed to longer durations of sounds. Because of individual differences in sensitivity to high intensity sounds, these subjects may have been more affected by these sounds (as argued by Costello, 1978). Furthermore, it had been shown earlier that even in a response-contingent situation, task performance was poorer with high intensity sounds than with low intensity sounds. Therefore, it could be that the combination of these two factors, when added to the uncertainty associated with the complexity of the task, may have led to the subsequent test task performance deficits.

An alternative explanation for the lack of performance deficits following the high complexity, low intensity treatment task is that these subjects tried harder and were more persistent in their attempts to offset the sounds, and this persistence carried over to the test task. Indeed, research of the transfer of effort across behaviour in rats has shown that the amount of effort, in terms of the number of responses required to perform a particular behaviour, affects the level of performance of a subsequent behaviour (Eisenberger, Carlson & Frank, 1979; Eisenberger, Carlson, Guile & Shapiro, 1979). Similarly, research with humans has shown that increasing either task complexity or the number of failure trials results in an increased persistence in a subsequent task (Chapin & Dyck, 1976; Dyck, Vallentyne & Breen, 1979; Trope & Brickman, 1975). Applying the notion of increased persistence to humans, Eisenberger & Leonard (1980) proposed that increases in complexity of a task lead to increases in the amount of effort generated, which in turn increases persistence in a subsequent task. Thus, initial failure in an assigned task may serve as a cue to work harder. Supporting this, it was shown that an experience of either complex or unsolvable anagrams produced greater persistence in a later perceptual identification task than did an experience of simple anagrams or no anagrams at all (Eisenberger & Leonard, 1980; Eisenberger & Masterson, 1983). Additional evidence was provided by a study by Ford, Wright & Haythornthwaite (1985) in which subjects were asked to rate a task for difficulty prior to actually doing it. The experimenters found that those subjects who rated it as having a moderate level of difficulty performed better in the task than did subjects who rated it as having a low level of difficulty.

However, there is evidence to suggest that persistence is reduced if the difficulty of the task is increased to a very high level. In the experiments described above, Eisenberger & Leonard found that continued failure tended to diminish the persistence effect, while Ford, Wright & Haythornthwaite found that subjects who rated the task as having a very high level of difficulty performed similarly to those who had rated it as low difficulty, with both groups performing worse than subjects who had rated the task as having a moderate level of difficulty. In the current experiments, it may be that the combined effects of the yoking procedure and the high intensity sound had increased the NCT group's perceptions of treatment task difficulty. Consequently, this would have lowered the persistence of these subjects in the subsequent test task. Unfortunately, as subjective measures of task difficulty were not taken in any of the relevant experiments, this explanation cannot be tested. It needs to be left to a future study.

PERCEPTIONS OF NONCONTINGENCY

There are a number of problems in trying to explain the results of the experiments presented in this thesis in terms of learned helplessness theory. The first of these is that the theory postulates that a perception of uncontrollability, when linked to an expectation of similar uncontrollability in the future, will lead to test task performance deficits. Therefore, if subjects are said to be exhibiting 'learned helplessness', there should be a strong correlation between their perceptions of treatment task control and their subsequent level of performance in the test task. The present findings, that correlations between test task performance and test task subjective measures were consistently significant, while correlations between treatment task perceptions and test task performance were not (in spite of performance deficits being observed), suggest that the deficits may not have been mediated by perceptions of response-outcome noncontingency and expectations of future noncontingency. These findings are not specific to the current study, as other experimenters also have demonstrated differences between the treatment task perceptions of the CT and NCT groups without there being any direct relationship between those perceptions and test task performance (Danker-Brown & Baucom, 1982; Fox & Oakes, 1984; Griffith, 1977; Oakes & Curtis, 1982; Pasahow, 1980; Rosenbaum & Jaffe, 1983; Tennen, Drum, Gillen & Stanton, 1982), nor between attributional styles and test task performance (Miller & Tarpy, 1991).

The second problem is that when subjects were asked if they had perceived contingency between responses and outcomes, a considerable proportion of the NCT groups said that they had. It was suggested that this may be linked to the use of a yoking procedure, which gave subjects an 'illusion of control'. Indeed, when sound offset was determined by a fixed random pattern instead of a yoking procedure the perception of response-outcome contingency was markedly decreased, and particularly so for the groups experiencing high intensity treatment sounds.

It is not surprising that subjective measures were not correlated with test task performance in view of the literature which indicates that humans have difficulty in recognising noncontingency. For instance, people do not always respond to random events as though they are random (Bruner & Revusky, 1961; Hake & Hyman, 1953), nor do their estimates of probabilities reflect the objective probabilities with any accuracy (Kahneman & Tversky, 1972; Ward & Jenkins, 1965). Jenkins & Ward (1965) stated that "The general impression which is conveyed by the results of learning experiments with noncontingent outcomes is that the subjects are surprisingly insensitive to the distinction between contingent and noncontingent arrangements. They tend to behave as though outcomes depend on responses . . . when the events are in fact independent. Further, it is possible to read into some of these experiments the notion that higher frequencies of reward . . . encourage a belief in contingency" (p.4). Indeed, other studies have found that perceptions of contingency are related to the percentage of success feedback given to subjects, or to the frequency of obtaining a desired outcome, and do not reflect true response-outcome relationships (Alloy & Abramson, 1979, 1982; Griffith, 1977; Jenkins & Ward, 1965; Langer & Roth, 1975; Sergent & Lambert, 1979; Tennen, Drum, Gillen & Stanton, 1982). Furthermore, Peterson (1980) found that subjects were aware of noncontingency only when they had received instructions indicating that randomness was a possibility, or when they had experienced an initial random sequence of events. Otherwise, they did not readily recognise noncontingency. Yet Jones (1971) found that subjects were still inclined to believe that there were patterns in outcomes even when the randomness of the outcomes was made explicit. These findings pose a problem for learned helplessness theory. If people do not have an abstract concept of contingency they cannot develop expectations about future contingencies, yet why are performance deficits still found?

The reformulated learned helplessness theory relies heavily on attributions being made for poor treatment task performance, with these attributions mediating the effect of the experience of uncontrollability. Some support for this attributional mechanism has been provided by studies which have found that failure, or non-attainment of a goal, prompts spontaneous causal thinking, and more so than that initiated by expected events or attainment of a goal (Dalal & Agarwal, 1987; Pyszczynski & Greenberg, 1981; Weiner, 1985; Wong & Weiner, 1981). Contrary to this, whenever open-ended question formats were used in the current series of experiments there was a distinct lack of causal attribution for failure or success. If anything, subjects merely described what they thought was the solution to the task. Such findings are in agreement with Hanusa & Schulz (1977) who found that "Typically, subjects responded to the attribution questions by repeating the outcome. Even with further probing subjects did not give specific attributions, making any analysis of these data meaningless" (p.608). Nisbett & Wilson (1977) stated that there may be little or no direct introspective access to higher order cognitive processes, and suggested that when people are asked to explain their behaviours they do not do so by introspection of their thoughts preceding the behaviour. Instead, they find plausible explanations from hypotheses that they formulate concerning those behaviours. It may be that although people are not able to observe their cognitive processes, they can describe them reasonably accurately on the basis of these hypotheses. Indeed, there is experimental evidence that indicates that subjects do not make spontaneous causal attributions for <u>either</u> success or failure (Follette & Jacobson, 1987; Hanusa & Schulz, 1977; Jung, 1987; Wilson, Hull & Johnson, 1981).

Some authors have suggested that the experimental situations in learned helplessness experiments are rather trivial, and that subjects may not be concerned enough to think about the reasons for failure until reasons are suggested by the experimenter (Buchwald, Coyne & Cole, 1978), and even then they need to be induced to think about particular types of reasons (Wilson, Hull & Johnson, 1981). Furthermore, it may also be that the outcomes in question must reach a certain level of intensity or importance before subjects begin to think of reasons for their failure (Silver, Wortman & Klos, 1982; Wortman & Dintzer, 1978). Finally, the finding that attributions for treatment-task failure are not related to their test task performance, regardless of whether these attributional measures are taken before or after the test task, suggests that task performance mediates attributions, and not the reverse (Pasahow, 1980).

Quite apart from arguments centred on subjects' introspective abilities, there is also the possibility that they may be unwilling to report their perceptions accurately to the experimenter because of demand characteristics of the experimental situation (Alloy, 1982; Buchwald, Coyne & Cole, 1978; Silver, Wortman & Klos, 1982). The subjects may wish to ensure that the experimenter's opinion of them is not in any way diminished. Hence, they may not want to admit that they haven't tried, that the task was boring, that the experimenter's instructions were not correct, or that they feel anger toward the experimenter. Indeed, Golding & Lichtenstein (1970) found that subjects who are made aware of deception used in an experimental procedure were not likely to report it.

A final explanation for the lack of correlation between treatment task perceptions and subsequent test task performance may lie in the subjective measures themselves. Firstly, the fact that predominantly only single questions are used to determine perceptions about a variety of cognitive processes raises concern about statistical reliability (Alloy, 1982). Secondly, the questions may simply be too crude in their formulation or in their ability to discern real differences. Nevertheless, the problems associated with measures of perceptions and attributions cast doubt on the validity of such measures. Perhaps this calls for a re-examination of the basic concepts of learned helplessness theory, and possibly a reiteration of the question posed by Oakes & Curtis (1982) that if animals can be 'helpless' without, presumably, the mediation of cognitive phenomena, why not humans?

UNRESOLVED ISSUES

In addition to questioning the relationship between perceptions of contingency and subsequent performance, the results of the experiments reported here have raised a number of unresolved issues of concern regarding the definition of 'response-outcome noncontingency'. The first of these issues relates to the use of failure feedback.

Failure Feedback

A large proportion of the studies which have examined the theory of learned helplessness have used Levine-type discrimination problems in their treatment tasks, and have operationally defined uncontrollability as 'failure to solve the problems'. It has been argued that any performance deficits following Levine-type problems could be attributable to the use of the 100% failure feedback, as opposed to any expectations of response-outcome noncontingency. The purpose of the first experiment described in this thesis was to determine whether performance deficits could be found using Levine-type problems in the treatment task with only 50% failure instead of the usual 100% failure employed in other studies. No deficits were found using such a procedure. However, it cannot be concluded that 100% failure is a requirement for subsequent performance debilitation as it was not established that deficits could be produced using 100% failure feedback with the same tasks and procedures. This was not done because the ensuing line of inquiry focussed primarily on the possible influence of sound intensity and task complexity. Indeed, the subsequent experiments indicated that lack of performance deficits in Experiments One and Two was attributable to the use of high intensity sounds in the test task.

Another issue relating to feedback is that of the use of lights to signal success and/or failure. It was suggested that one reason for the failure to demonstrate test task performance deficits in Experiments One and Two was the possibility that signalled outcomes make it easier for subjects to observe the connection between their responses and the outcomes. However, as it was not feasible to examine this suggestion in the present investigation, it remains to be taken up in future research. Questions concerning feedback signals which are unanswered include: How does such feedback influence the perception of uncontrollability of sound offset? How does it compare with unsignalled sound offset? And does it make any difference if light signals are used in the treatment task as opposed to the test task?

The Yoking Procedure

A second issue raised by the present series of experiments pertains to the use of a yoking procedure in studies of learned helplessness. It was shown that, without pre-exposure to noncontingency, performance of button-pressing tasks involving high intensity sounds was worse than performance involving low intensity sounds. This meant that the CT groups which had experienced high intensity sounds in the treatment task took longer to offset the sounds than did CT groups which had experienced low intensity sounds. Consequently, the NCT groups yoked to the high intensity CT groups not only experienced uncontrollable sounds which were more aversive, they also experienced longer durations of these sounds. Recall that Church (1964) and Levis (1976) argued that a yoking procedure may contribute to the differentiating effects of an experience of aversive stimuli. Hence, differences in exposure to, and tolerance of, high intensity sounds may have contributed to the finding of performance deficits in the NCT groups given high intensity treatment sounds, and not those given low intensity sounds.

This is not to say that the yoking procedure can account for all differences in performance following exposure to either high or low sound intensities. For instance, it cannot explain why performance deficits are found regardless of treatment intensity when the treatment task has a low level of complexity. All that can be said is that the yoking procedure may contribute to the subsequent performance deficits by magnifying the aversive experience, particularly when the treatment task has a higher level of complexity. To test this, it would be necessary to make use of the procedure employed in Experiment Eleven, where subjects were exposed to a 'fixed-pattern noncontingency' treatment procedure with the duration and offset of sound being identical for all individuals and groups, and extend the two-factor design (i.e. treatment intensity by test intensity) to four factors. The third factor would compare a pattern of sounds that mimics the performance of a subject in a CT group (by showing an improvement in performance over the length of the task) with the same duration of sounds distributed randomly over the length of the task. The fourth factor would examine the influence of low versus high complexity in the treatment task. Finding no difference between the four sound configurations, regardless of the treatment task's contingency pattern or complexity, would support the notion that the use of a yoking procedure had contributed to the differences in performance deficits found in the experiments reported in this thesis.

Task-Irrelevant Events

A third unresolved issue raised in this thesis is that of the effect of task-irrelevant random events on subsequent performance. The perception of noncontingency between responses and outcomes, and the expectation of future noncontingency, is the cornerstone of learned helplessness theory. It follows from this that if subjects are in a situation where there is no observable demonstration that particular outcomes are not contingent upon responses (and where there is no requirement for them to achieve these outcomes), they are unlikely to form the expectation of future noncontingency, and therefore will not demonstrate subsequent debilitated behaviour (Barber & Winefield, 1986b; Buchwald, Coyne & Cole, 1978). This is applicable to situations where subjects passively listen to sounds without being required to offset them.

It has been argued in this thesis that this also applies to situations where task-irrelevant events occur in the treatment task. If subjects are required to perform some task (e.g. number-matching), which has its own set of outcomes and which is irrelevant to the occurrence of some other events (e.g. onset and offset of sounds) then it is unlikely that performance deficits will be found in a subsequent test task in which those very same events are now task-relevant. Experimental evidence presented here showed that this is not the case. There was no difference in test task performance between subjects exposed to uncontrollable task-relevant sounds and task-irrelevant sounds. When viewed together with the findings reported by other experimenters that passive exposure to sounds also results in subsequent test task performance deficits (e.g. Barber & Winefield, 1986b; Thornton & Jacobs, 1971), and in light of the considerable body of similar evidence from the animal literature, there is strong indication that the perception of response-outcome noncontingency is not a necessary requirement for the occurrence of subsequent performance deficits. However, this is not conclusive evidence against one of the central hypotheses of the reformulated learned helplessness theory, namely, that of the role of expectation of future noncontingency, for the simple fact that measures of the subjects' expectations of future noncontingency were not taken. Unfortunately, the very act of attempting to 'measure' these expectations may influence the outcome by prompting subjects to draw connections between the relevant elements in the tasks in ways that otherwise they would not have done.

CONCLUSION

In Chapter One it was noted that, according to Maier & Seligman (1976), the boundary conditions of the learned helplessness effect were not clearly specified and lacked empirical evidence. Although various intensities of sounds, and to a lesser extent shock, have been employed in learned helplessness research with humans, up to now there had been no systematic study of the effects of stimulus intensity on the attainment of performance deficits. A step has been taken towards this with the experiments presented in this thesis. Test task performance debilitation was shown to be differentially influenced by the intensity of sounds, with these influences being modified by treatment task complexity and the type of contingency schedule employed.

The theory of Learned helplessness proposes that an experience of uncontrollability over an outcome should lead to subsequent behavioural debilitation, regardless of the physical properties of stimuli associated with that outcome. Evidence contrary to this has been presented here. Treatment tasks involving high intensity sounds and low complexity problems were shown to increase the likelihood of subsequent test task performance debilitation. As a disproportionate number of studies in the research literature which have reported performance debilitation have used this combination of sounds and task complexity, doubts must be raised over the claimed generality of 'learned helplessness' effects and the assertion that they are solely attributable to the experience of uncontrollability of an event, regardless of any associated stimulus properties.

Appendix

QUESTIONNAIRE A

This questionnaire was administered at the end of Experiment One.

1. Rate the sound of the tones in the first task:

	very unpleasant	unpleasant	neutral	pleasant	very pleasant
Task 1:	1	2	3	4	5

2. How hard did you try to solve the problems?

	did not try at all		tried moderately hard		tried extremely hard
Task 1:	1	2	3	4	5
Task 2:	1	2	3	4	5

3. Rate the extent to which you think the task problems were soluble.

	definitely not soluble		not sure		definitely soluble
Task 1:	1	2	3	4	5
Task 2:	1	2	3	4	5

4. Were you frustrated by any of the problems?

	did not feel frustrated at all		felt moderately frustrated		felt extremely frustrated
Task 1:	1	2	3	4	5
Task 2:	1	2	3	4	5

QUESTIONNAIRE B

This questionnaire was administered at the end of Experiment Two.

1. Rate the sound of the tones:

	very unpleasant	unpleasant	neutral	pleasant	very pleasant
Task 1:	1	2	3	4	5
Task 3:	1	2	3	4	5

2. How hard did you try to solve the problems?

	did not try at all		tried moderately hard		tried extremely hard
Task 1:	1	2	3	4	5
Task 2:	1	2	3	4	5
Task 3:	1	2	3	4	5

3. Rate the extent to which you think the task problems were soluble.

	definitely not soluble		not sure		definitely soluble
Task 1:	1	2	3	4	5
Task 2:	1	2	3	4	5
Task 3:	1	2	3	4	5

4. Were you frustrated by any of the problems?

	did not feel frustrated at all		felt moderately frustrated		felt extremely frustrated
Task 1:	1	2	3	4	5
Task 2:	1	2	3	4	5
Task 3:	1	2	3	4	5

QUESTIONNAIRE C

This questionnaire was administered at the end of the treatment task of Experiments Three, Four, Ten, and Eleven.

1. Rate the sound of the tone by circling a number on the scale below:

Very Unpleasant	Moderately Unpleasant	Slightly Unpleasant	Neutral	Slightly Pleasant	Moderately Pleasant	Very Pleasant
1	2	3	4	5	6	7

2. You will shortly be given a problem similar to the one that you just had.

(a) How do you feel about this ?

☐ Very eager to try it
☐ Eager to try it
☐ Don't mind doing it
☐ Would prefer not to do it
☐ Would very much prefer not to do it

(b) How confident are you that you will be able to solve it ?

☐ Extremely confident
☐ Quite confident
☐ Unsure
☐ Not very confident
☐ Not at all confident

QUESTIONNAIRE D

This questionnaire was administered at the end of the test task of Experiments Three, Four, Ten, and Eleven.

1. Rate the sound of the tone by circling a number on the scale below:

Very Unpleasant	Moderately Unpleasant	Slightly Unpleasant	Neutral	Slightly Pleasant	Moderately Pleasant	Very Pleasant
1	2	3	4	5	6	7

2. If you were to be given a problem similar to the one that you just had:

(a) How would you feel about doing it ?

☐ Very eager to try it
☐ Eager to try it
☐ Wouldn't mind doing it
☐ Would prefer not to do it
☐ Would very much prefer not to do it

(b) How confident are you that you would be able to solve it ?

☐ Extremely confident
☐ Quite confident
☐ Unsure
☐ Not very confident
☐ Not at all confident

3. Did you perceive any connection at all between your responses and the offset of the sound for:

Task 1 ?

Task 2?

Please turn the page

QUESTIONNAIRE D (continued)

4. After you had completed the first task, did you think about your performance at all ?

☐ Yes
☐ No

If 'yes', how did you rate your performance ?

☐ Successful
☐ Moderately successful
☐ Unsuccessful

5. Regardless of what you think now, did you, at the time of completing the first task, have any ideas as to what might have caused you to perform in the way that you did ?

☐ Yes
☐ No

If 'yes', what were these ideas ?

QUESTIONNAIRE E

This questionnaire was administered at the end of the treatment task of Experiments Five to Nine.

1. Rate the sound of the tone by circling a number on the scale below:

Very Unpleasant	Moderately Unpleasant	Slightly Unpleasant	Neutral	Slightly Pleasant	Moderately Pleasant	Very Pleasant
1	2	3	4	5	6	7

2. Was there a solution to the problem? Please tick the appropriate box below:

☐ Definitely yes
☐ Probably yes
☐ Unsure
☐ Probably not
☐ Definitely not

3. You will shortly be given a problem similar to the one that you just had, how do you feel about this? Please tick the appropriate box below:

☐ Very eager to try it
☐ Eager to try it
☐ Don't mind doing it
☐ Would prefer not to do it
☐ Would very much prefer not to do it

QUESTIONNAIRE F

This questionnaire was administered at the end of the test task of Experiments Five to Nine.

1. Rate the sound of the tone by circling a number on the scale below:

Very Unpleasant	Moderately Unpleasant	Slightly Unpleasant	Neutral	Slightly Pleasant	Moderately Pleasant	Very Pleasant
1	2	3	4	5	6	7

2. Was there a solution to the problem? Please tick the appropriate box below:

☐ Definitely yes
☐ Probably yes
☐ Unsure
☐ Probably not
☐ Definitely not

3. If you were to be given a problem similar to the one that you just had, how would you feel about doing it? Please tick the appropriate box below:

☐ Very eager to try it
☐ Eager to try it
☐ Wouldn't mind doing it
☐ Would prefer not to do it
☐ Would very much prefer not to do it

4. Do you think that you succeeded in turning off the tones? Please circle the appropriate number on the scale below:

	Definitely Not	Probably Not	Unsure	Probably Yes	Definitely Yes
Task 1:	1	2	3	4	5

	Definitely Not	Probably Not	Unsure	Probably Yes	Definitely Yes
Task 2:	1	2	3	4	5

Please turn the page

QUESTIONNAIRE F (continued)

5. To what extent do you think that, by the end of the problem, the turning-off of the tone was influenced by the following:

The presses that you made on the buttons?

Task 1:

Not at all	Very little	Moderately	A lot	Completely
1	2	3	4	5

Task 2:

Not at all	Very little	Moderately	A lot	Completely
1	2	3	4	5

Something beyond your control? (e.g. some random process, the experimenter, etc.)

Task 1:

Not at all	Very little	Moderately	A lot	Completely
1	2	3	4	5

Task 2:

Not at all	Very little	Moderately	A lot	Completely
1	2	3	4	5

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