EMOTION AND BEHAVIOUR

By

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Abstract

A method of examining how emotions might affect learned behaviour was developed and three hypotheses concerning the possible effects of emotions were investigated. The first was that emotions may have state-dependent properties by which they affect the display of learned behaviour. A behaviour learned in the context of a particular emotion may be more likely to occur when that same emotion is experienced subsequently. This hypothesis was supported by the finding that four-year-old children responded non-aggressively when frustrated if this behaviour had previously been learned in the context of frustration. They did not respond aggressively when frustrated if aggression had been learned in the context of non-frustration. The second hypothesis was that behaviour learned during emotional arousal is more likely to occur subsequently, perhaps because it is better remembered, than is behaviour learned in a less emotional situation. This hypothesis was only partially supported. The third hypothesis was that some behaviours are prepared responses and are more likely to be learned in the context of some emotions than are other behaviours. There is evidence suggesting that aggression might be more easily learned or

displayed in the context of frustration than non-aggressive behaviours. This hypothesis was not supported. Although there was a consistent sex difference in aggression, the amount of aggression by either sex was not affected by the presence of frustration, either during learning or testing.

The results support the usefulness of the methodology and indicate that emotions affect the display of voluntary, purposeful behaviour, especially in a state- or context-dependent manner. Some implications of these results for the study of emotions, as well as criticisms of the thesis experiments, are discussed.

Acknowledgements

Emotion is a topic that does not fall exclusively into any well-defined area of psychology. For that reason, this thesis is not a thesis in developmental or cognitive or social psychology, although it contains elements of those and other disciplines. It is a difficult matter, then, to find committee members willing to comment on a thesis that necessarily contains elements outside of their respective areas of expertise. Nor can I claim to have mastered the diverse areas of Dr. W. Carment, Dr. D. deCatanzaro, Dr. L. Siegel or Dr. H. Weingarten, my committee members. Understandably, then, I am grateful for their willingness to read my thesis, to consider the issues they had little interest in, and to overlook my naivete about the issues they knew well. In particular, I would like to thank Dr. Linda Siegel, who agreed to supervise the thesis. Without her, I could not have pursued my ideas of emotion and behaviour. I am especially pleased that Dr. Lee Brooks expended the time and energy that he did in improving my understanding of cognitive psychology. Most importantly, Dr. Harvey Weingarten knows I cannot thank him enough. I won't even try.

I am indebted to others as well. "Support and

encouragement" has become a trite phrase, but when applied to Rosemary, it is not. Janet and Bruce became good friends, office mates and fellow complainers, and Gordon set an example of sportsmanship that I couldn't follow. Finally, I would like to dedicate this thesis to my mother and sister, and to the memory of my father. Without them, I would never have attended a University in the first place.

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Introduction

This dissertation is concerned with the effects of emotions on behaviour. It is hypothesized that behaviour learned in the context of a particular emotional state will be more likely to recur when that same emotional state is present subsequently. For example, if aggressive behaviour is learned when a person is frustrated then the probability of aggression is increased when a frustrating state is experienced a second time. Similarly, if the behaviour learned during frustration is non-aggressive, then this will be the behaviour most likely to recur during frustration.

Before discussing this hypothesis, it should be pointed out that no attempt will be made in this thesis to define emotion. Perhaps because emotion has been studied from many different perspectives such as physiological, cognitive, social, behavioural, and developmental psychology, there are disparate views of emotion, as well as a great deal of variability in the degree of knowledge regarding emotional phenomena. Strongman (1978), for example, cites no fewer than 28 theories of emotion, most of them drawing on very diverse types of evidence concerning differing aspects of emotion. None of these theories provides a definition of emotion that has been generally accepted, and it might be

argued that the present state of knowledge does not permit such a definition. In fact, it has been maintained by some that emotion is not a useful concept in the study of behaviour. Historically, this has been the position of many of those who study animal learning, a position that will be discussed more fully later. More recently, Vanderwolf and Kelly (1988) have questioned the use of the term emotion in the study of physiological psychology. Partly because of the problem of definition, they suggest "that folk psychological concepts such as 'emotion'....may often provide misleading guides for the investigation of the control of behavior by the brain" (p. 56).

Although it may be difficult to provide an adequate definition of emotion, the effects of emotions can be investigated without such a definition. The question of interest in this thesis is whether certain events cause emotions which, in turn, influence the way people behave. That is, do these events induce a central motive state that is influential in determining behaviour? If such a state exists, and if it has effects on behaviour, then these effects should be able to be identified and the existence of the state can be inferred.

The hypothesis investigated in this thesis is that emotions act as contextual cues in the learning and display of behaviour, and it is derived from the view that emotions

may serve as contextual cues in learning. A number of studies will be reviewed that have indicated that the environment surrounding the task, or the context in which learning occurs, serves as a cue for recall. Whether a pigeon learns to peck a disk for food, or a person memorizes a list of words, they will have difficulty remembering what they have learned if the experimental environment is changed. Performance will deteriorate if the pigeon is placed in a different cage or if the person is asked to remember the words in a different room. On the other hand, if the environmental context at the time of recall is the same as the context at the time of learning, then recall will be significantly better. The effects on performance that may result if changes are made in the experimental environment between the time of learning and the time one tests for the retention of that learning are referred to as "context effects" (e.g., Wesselis, 1982). The task remains the same, but the performance environment is altered.

For the present purposes, studies of contextual cues can be broadly classified into two different categories. The first are external changes that occur where, for example, learning occurs in one room and is tested in a different one. The second type of context change to be discussed involves internal changes specific to the experimental subjects. Hunger, thirst, and drug states are examples of internal

changes that have been shown to serve as contextual cues (e.g., Levine, 1953; Overton, 1966; Webb, 1955).

The environmental and internal contextual experiments to be discussed can be further divided into two more categories on the basis of the type of learning that is investigated. The first of these is from research investigating memory, where inferences concerning mnemonic processing are based on such tasks as recalling or recognizing words that were learned at an earlier time. A very different line of research focuses on the conditions under which behaviours are learned, rather than with memory or other cognitive processes.

Subsequent sections review evidence which illustrates the pervasive effects of context on learning and behaviour selection. In general, this evidence indicates that performance improves if learning is tested in the same context, internal or external, that was present at the time the learning occurred. Contextual cues are important aids in the retrieval of memories and in the facilitation of learned behaviour. It will be argued that emotions can be viewed as a special class of internal contextual cues that affect the display of learned behaviour. Specifically, behaviours learned in the presence of a particular emotional state may be more likely to occur subsequently when that emotional state is again experienced.

External stimuli and behaviour. The role of external stimuli in learning has been extensively investigated by animal learning theorists. For example, it has long been known that environmental stimuli can easily become discriminative stimuli (e.g., Schwartz, 1984). If a rat learns to press a bar for food, but food is only available when a light is on in the cage, the rat will soon learn to press the bar only in the presence of that light. In other words, behaviours learned in the presence of these discriminative stimuli are more likely to occur when these stimuli are again present. Other things being equal, behaviour that is reinforced in the presence of environmental stimuli is more likely to be repeated when those stimuli are encountered again.

That a light or a tone can come to act as a discriminative stimulus is not surprising since it is reliably associated with the presence or absence of reinforcement. Since discriminative stimuli reliably predict reinforcement, one might expect an animal to learn this contingency. It is less clear, however, if discrimination effects are analogous to context effects, where a given context is not reliably associated with reinforcement, but is continually present throughout the experiment. An effect of stimulus change that is perhaps more closely related to context effects is seen in the phenomenon of stimulus

generalization. Riccio, Urda and Thomas (1966) found, for example, that if pigeons were trained to peck a key when the floor of the experimental chamber was inclined 30 degrees, that the rate of pecking declined as the floor became increasingly horizontal. The more the floor angle deviated from training conditions, the less the pecking response generalized to the new stimulus condition, even though this stimulus change was not associated with changes in reinforcement. This is just one of many experiments examining the effects of stimulus change. The reduction in performance that occurs when a training stimulus is altered is referred to as generalization decrement (e.g., Mackintosh, 1974). Results such as these have traditionally been interpreted using such terms as stimulus control and the effects of reinforcement, rather than context changes, but it is still the case that the elicitation of learned behaviour can vary when the environmental context is altered.

Internal states and behaviour. So far, the evidence that has been reviewed concerning contextual cues has dealt with external stimuli, that is, stimuli originating from the environment such as those we can see or hear. Additional evidence, however, suggests that internal contexts, or states, can function in a manner analogous to external contexts. Perhaps the most substantial evidence of this nature has been derived from studies of state-dependent

learning and drug-discrimination learning. State-dependent learning is said to occur when responses learned in one state are not performed (or are not performed as well) when the organism is tested in a different state. This condition is usually studied by using drugs to alter the mental state of the organism. In the most influential of these studies, Overton (1964) showed that responses learned by rats during a drug-state induced by the drug pentobarbitol were not performed in the non-drug state. If the animal were subsequently tested in the drug state, however, the learned response re-appeared. The response appeared to be specific to the drug state in which it was learned. The same effect was evident for responses learned in the non-drug state; these did not transfer to the drug condition.

Some authors have suggested that state-dependent learning is best thought of as an example of discrimination learning. The supposition is that drugs produce distinctive internal peripheral cues, such as a dry mouth, and that the learned response becomes conditioned to those cues during training (e.g., Brown, Feldman & Moore, 1968). However, this explanation has been criticized (see Overton, 1978). For example, state-dependent learning appears most reliably with drugs that cross the blood-brain barrier and have a central effect. Where both central and peripherally acting forms of a drug are available, it is typically the case that only the

centrally acting form has state-dependent or drug-discrimination properties. While peripheral effects may be involved, it appears unlikely that drug discriminations are based solely on discriminable peripheral stimuli. Although the mechanism is unclear, the effect seems to be centrally based.

That emotions might have state-dependent or discrimination effects has been discussed by Overton (1978) as a possible mechanism that might underlie state-dependent and drug-discrimination learning. Drugs may produce emotions and if emotions act as memory cues, then state-dependent learning may result from phenomena related to emotion.

External stimuli and memory. As an illustration of the effects of contextual stimuli on memory, Thomson and Tulving (1970) had adults learn lists of two-word phrases, the first word being either strongly or weakly associated with the second word. The word pair BLOW-COLD, for example is weakly associated. This is assumed to be true because when individuals are asked to produce a word that they think is associated with BLOW, they are only moderately likely to respond with the word COLD. If given the word ICE, on the other hand, they are very likely to respond with COLD, indicating that these words are strongly associated. After learning a list of such phrases, subjects were subsequently asked to remember the second item of the word pair, and were

shown cue words to aid their retrieval of each pair. Not surprisingly, recall was greatly improved if that cue was part of the word pair that was learned, regardless of whether it was a weak or strong associate of the recalled word. Contrary to expectations, however, a strongly associated word had a minimal impact on retrieval if it had not been previously presented as part of the word pair. In this case, the word ICE, which had not been previously presented in conjunction with COLD, only slightly improved retrieval of COLD even though the two words are strongly associated. The effects of contextual stimuli on memory led Tulving to propose the encoding specificity principle (Tulving & Pearlstone, 1966; Tulving & Osler, 1968; Thomson & Tulving, 1970; Tulving & Thomson; 1973) which states that "specific encoding operations performed on what is perceived determine what is stored, and what is stored determines what retrieval cues are effective in providing access to what is stored." (Tulving & Thomson, 1973, p. 369).

In the previous experiment, contextual items were not incidental to the learning task. Subjects were instructed to attend to these items and they were varied as a part of the experimental manipulation. In contrast, Smith's (1979) research provides an example of incidental contextual cues. He asked adults to learn a list of words in one room and subsequently had them recall these words in the same or in a

different room. The rooms were as different as possible in terms of size and furnishings. Subjects who were tested in the same room in which they learned the words recalled more words than those who were tested in a different room. The characteristics of the learning environment were not explicitly made a part of the test material and the context of the room was therefore incidental to the learning task. A similar effect was found by Greenspoon and Ranyard (1957). They asked adults to learn two lists of nonsense syllables, each in a separate, distinctive room, and then tested them on a recall task. They report that recall of each list was better when subjects were tested in the room in which they had learned the list. Godden and Baddeley (1975) found the same effect when scuba divers were given two presentations of a word list either on land or 20 feet under water. A word list heard under water could not be as easily remembered on land and vice-versa. Recall in the same environment averaged 12.5 of 36 words, while recall in the opposite environment averaged only 8.5 words.

Subjects are not asked to attend to incidental cues, such as the nature of the room, and these cues do not seem to be related to the learning task. It is somewhat surprising that these cues have an effect similar to that of explicit cues, such as those used by Thomson and Tulving, that are a part of what the subject is asked to learn. It is

unclear whether context effects resulting from incidental cues are due to the same processes mediating these effects when the contextual cues are explicit. One possibility is that the distinction between incidental and explicit contextual cues is an experimental artifact. Subjects probably process contextual information regardless of whether they have been asked to do so by the experimenter. Smith (1979), for example, eliminated the decremental effects on memory of being tested in a different room when he asked adults to visualize the room in which they had learned the word lists. This visualized context, in fact, had the same effect as actually testing the subjects in the learning environment. Since the subjects were able to visualize the learning environment, it is apparent that this contextual information was processed with the learning material even though subjects had not been asked to do so. Although subjects and experimenters may not be aware of it, it seems likely that subjects encode many seemingly irrelevant aspects of the experimental context. These aspects may appear unrelated to what the subject is trying to learn but they may also affect memory retrieval, perhaps in much the same way as cues that are an explicit part of what the subject has been asked to learn. Learning involves more than what would seem necessary for successful performance. Learning how to do a task may include learning when and where to do it.

Tulving's encoding specificity principle, the principle that what is remembered is influenced by the extent to which the retrieval cues available match those at the time of learning, is not universally accepted (Baddeley, 1976). However, there is a great deal of evidence attesting to its utility (Wessells, 1982). In fact, much of the following evidence, which concerns state-dependent effects and mood-dependent memory, as well as external contextual effects on behaviour, might also be viewed as examples of encoding specificity.

Internal states and memory. Since internal contextual cues have been found to affect behaviour, it is perhaps not surprising that such cues have been hypothesized to affect memory as well. In the present context, the most relevant evidence indicates that emotions may function as internal cues affecting memory. This evidence suggests that one may have a better memory for events that occurred during a particular emotional state if these events are recalled during a subsequent occurrence of that same emotional state.

Much of this evidence comes from studies of mood-congruent learning where people appear more likely to remember material that is compatible with their mood. Sad people are better able to remember sad events, for example, and happy people are more likely to remember happy events (e.g., Bower, 1981; Ellis, 1985; Isen, 1985). For the

present thesis, however, the most relevant evidence comes from studies of mood-dependent learning, where the remembered material is emotionally neutral and not congruent with the subject's mood. Mood-dependent effects on memory have been investigated in both children and adults. Bartlett and Santrock (1979) induced emotional mood in 5-year-old children by varying the experimenters' behaviour as well as by reading the children happy and sad stories. The affect manipulation proved to be effective in aiding the childrens' free-recall of critical words from each story. Children in the happy-at-test condition remembered more of these words from the stories they had previously heard when they were happy, and children tested in the sad condition remembered more from the stories they had heard while sad. In contrast, the children tested in the happy condition had more difficulty recalling words they heard while sad and children tested in the sad condition had more difficulty recalling words heard when happy. In a test of cued-recall, however, in which the children were given additional cues (e.g., Can you remember all the toys in the story?), mood was no longer an effective cue. Presumably, sufficient contextual cues are available for recall in the cued-recall task, so emotional cues become redundant. In fact, in this study, emotion appeared to be a fairly weak recall cue. The children's overall free-recall scores were quite low compared to their performance on the

cued-recall task.

Bower, Monteiro and Gilligan (1978) studied mood-dependent memory in adults. They used hypnosis to induce states of happiness and sadness in their subjects, but they did not find a state-dependent effect in two experiments. The word list that each subject learned was remembered equally well regardless of whether or not the subject was again in the same emotional state in which the list was learned. This suggests that emotions act as weak recall cues at best. In explaining their results, Bower et al. pointed to the fact that each subject learned only one word list. Apparently, being asked to learn a word list by an experimenter was a memorable experience. Thus, there were sufficient contextual cues available in the testing situation that the addition of an emotional cue did not add appreciably to the subjects' ability to remember the list. Subsequently, in an effort to enhance the effect of emotional cues, these authors had subjects learn two word lists, one in each of two different emotional states. Other contextual cues in the learning situation were the same, and the distinctive cue associated with each list was that of emotion. In this situation, a state-dependent effect was found. When a person learned one word list while happy and another while sad, the list learned in the happy state was not as easily recalled while sad and vice-versa. Supposedly, when two lists were

learned, variation in mood was the only available contextual cue to help the subject to discriminate between the two lists. Each list seemed to become associated with a particular emotional contextual cue, and each list was easier to retrieve from memory if that emotional cue was again present.

In 1982, Bartlett, Burleson and Santrock reported comparable mood-dependent memory effects using a two-list design in 8-year-olds, as well as 5-year-olds, where mood changes were induced by having the children think about happy or sad experiences. They noted that the effect was much more robust than that found with the one-list design used by Bartlett and Santrock.

Recently, Bower and Mayer (1985) reported a failure to replicate the findings of Bower et al. (1978) on mood state-dependent learning and concluded that the effect, if it exists, must be small. This conclusion should be tempered, however, by the knowledge that a mood-dependent effect has been demonstrated by others. Nevertheless, this failure to replicate indicates that the effects of emotional cues on memory are not well understood, and suggests caution in inferring the influence of emotional cues in other domains, such as behaviour.

Summary

The aforementioned studies provide strong support for the view that contextual cues affect memory and behaviour. The evidence reviewed supports the following conclusions:

> (1) Behaviours learned in the presence of particular environmental cues are subsequently performed best in the presence of those cues and deteriorate in their absence.
> (2) The same conclusion appears to be true for internal cues, such as those associated with certain drug states.
> (3) Environmental stimuli also serve as memory cues. Material learned in the presence of such cues is not as easily remembered in their absence.

These conclusions lead to the suggestion that emotional states may also function as internal contextual cues. Although equivocal, studies of memory that support this view were also presented. Since external and internal contexts influence both behaviour and memory, and since emotions seem to produce similar contextual effects on memory, it is a short step to the suggestion that emotions might have similar effects on behaviour. If a person learns to respond a certain way while in a particular emotional state, then the reintroduction of that state would be an important impetus to the subsequent display of that behaviour. In other words, emotional states may help to determine behaviour by selecting the learned behaviours appropriate to the situation. An important corollary of this idea is that behaviours are best learned in the emotional state in which they will occur and,

perhaps more importantly, they will be less affected by subsequent learning involving a different state. Therapy designed to control anger-related violence, for example, would probably be optimally successful if carried out in the context of anger-arousing situations.

Whether emotions do affect behaviour in this manner is an empirical question, of course, and it is important to realize that the effects of emotions on human memory may not entirely correspond to their effects on the performance of other tasks. This possibility becomes particularly salient when one considers that emotions do not even show the same effects on all forms of memory tasks. For example, in the foregoing discussion, the fact that Bartlett and Santrock (1979) obtained emotion-dependent effects in free-recall but not in cued recall was noted. More specifically, when the children were given other cues that helped them to remember the target words in a story (e.g., Can you remember all the toys in the story?), the emotional cues associated with each list were not influential. Moreover, they obtained no effect of emotion when testing for recognition, rather than recall, of story words. Notwithstanding these variations, the weight of the evidence points to the possibility that emotions influence performance on memory tasks, at least under some circumstances. This, as well as the other evidence presented on the influence of contextual cues, suggests that

performance on other kinds of tasks, such as those involving learned behaviour may be similarly influenced by emotions.

Alternative views

While the above hypothesis that emotions act as contextual cues in the display of behaviour may seem plausible, there are also reasons for supposing it is not, or that if emotions act as contextual cues, that the effect would be a minor one. In fact, there are at least three views of the effects of emotions on behaviour that have commonly been advanced that have implications for the present thesis. First, there is evidence that emotional events are better remembered than non-emotional ones. Perhaps behaviours learned during emotional arousal are simply better remembered than ones learned in a neutral state. Physiological arousal, a characteristic of emotion, has been shown to improve learning, and may underlie improved memory for emotional events. Nevertheless, increased learning due to emotion would not in itself determine what behaviour was learned. The arousal view is a prominent view regarding the effects of emotion and will be relevant to some of the controls in this thesis, although it is not an alternative explanation of why some behaviours rather than others occur in the presence of emotion. Second, it is likely that some emotional behaviour is innate and that learning plays a minor

role in its appearance. Frustration, for example, may lead naturally to aggression. Finally, there are explanations of how non-emotional behaviours are learned that may apply to emotional behaviours as well. These explanations contend that behaviours occur because they have resulted in reinforcement in the past, and principles of reinforcement have been used to account for the learning of both emotional and non-emotional behaviour. Consideration of these alternative views seems appropriate.

Effects of Arousal. A number of studies indicate that increased arousal at the time of learning may lead to improved memory performance. Such an effect coincides with a common assumption about emotions. Emotional events are often thought to be better remembered than non-emotional ones. This assumption is one that we seem to make early in life. Taylor and Harris (1983) found, for example, that seven year old children believe that events which cause emotion are more likely to be remembered than those that do not.

The effects of arousal on memory and behaviour are complex and not well understood. Effects may differ depending on whether cortical, autonomic or behavioural arousal is being studied (Lacey, 1967). Furthermore, variations in the type of memory task, and the complexity of the task, often have differential effects (Archer & Margolin,

1970; Broadhurst, 1957; Butter, 1970; Corteen, 1969; Hamilton, Hockey & Quinn, 1972; Schwartz, 1975; Wesner, 1972; Yerkes & Dodson, 1908). Finally, whether arousal is measured at input, when learning occurs, or output, at the time of retrieval, may also lead to different results (Eysenck, 1976). In general, however, studies indicate that increased arousal at the time of learning does, under some circumstances, lead to improved memory performance, at least at longer retention intervals of about 20 minutes or more.

Emotional states are typically characterized by physiological arousal (e.g., Schachter, 1964). This arousal is primarily mediated by the sympathetic branch of the autonomic nervous system and involves a number of physiological effects including heart rate, blood pressure, galvanic skin resistance and respiratory changes (Schwartz, Weinberger & Singer, 1981). Since physiological arousal affects memory performance, the assumption has been made that emotions will be associated with similar effects. Parkin, Lewinsohn, and Folkard (1982), for example, had subjects free associate to each member of a word list that was comprised of emotional and neutral words. They found that emotional word associations were better remembered than neutral ones after a seven day delay between learning and testing. The implication, then, is that emotions produce increased physiological arousal which affects memory for items learned

during that arousal.

In fact, Gilligan (1983) has demonstrated that emotional arousal during learning affects memory. Gilligan induced different levels of emotional mood in adults using hypnosis. The happier or angrier the subjects were while learning, the more they subsequently recalled while in a neutral state. This was not true of sadness, however. Moderate levels of sadness improved recall, but high levels had a detrimental effect. Since happiness, anger and sadness all involve physiological arousal (Averill, 1969; Ekman, 1983; Schwartz, Weinberger & Singer, 1981), something more than sympathetic nervous system activity appears to be involved in the consolidation of emotion related material. Nevertheless, Gilligan's results do indicate that the presence of an emotional state during learning may influence later recall.

A possible physiological mechanism for improved memory consolidation resulting from emotional arousal is suggested by physiological research on stress. McGaugh (1983a, 1983b) has investigated the role of hormones, particularly epinephrine, released by the adrenal medulla in response to stress. These hormones have been found to influence memory and performance in a variety of tasks. Epinephrine administered immediately after learning seems to improve memory consolidation. That a similar effect results

from the natural release of epinephrine seems likely. Types of emotional arousal which involve the release of such hormones might also be expected to result in similar influences on memory. Regardless of the nature of the influence, it is possible that behaviour learned during emotional arousal will be better remembered, and may therefore be more likely to occur, than if that same behaviour had been learned in a non-emotional state.

Innate emotional behaviour. A second view of the relationship between emotions and behaviour suggests that some of these behaviours may be innate. For example, there is a consistent body of evidence indicating that frustration stemming from perceived insult or personal attack induces aggression. Negative events that are perceived as unjustified or intentional, and that supposedly result in feelings of annoyance or anger, may increase the probability of aggression (e.g., Mallick & McCandless, 1966; Buss, 1971; Zillman, Bryant, Cantor & Day, 1975; Zillman & Cantor, 1976). It is unclear, however, whether aggression in such circumstances is an innate response to frustration, or whether frustration results in aggression simply because people have learned to respond that way in frustrating situations. Increased emotional arousal may simply increase the vigor of the aggressive response, but not be involved in the selection of that response (Bandura, 1973). In addition,

personal insult may reduce the inhibiting effect of social sanctions against aggression (e.g., Zillman, 1979). While these factors may affect the display of aggression, however, they say nothing about why aggression occurs in the first place. It is clear that aggression can be learned, and that it appears in a variety of circumstances, not just in response to frustration (e.g., Bandura, Ross & Ross, 1961; Buss, 1966; Christy, Gelfand & Hartmann, 1971; Kuhn, Madsen & Becker, 1967), and it has been suggested that frustration-related aggression also is learned (Bandura, 1973; Zillman, 1979). It has also been suggested, on the other hand, that frustration results in anger, which innately increases the probability of aggression (Berkowitz, 1969; Rule & Nesdale, 1976; Berkowitz, 1978).

Whether anger innately increases the tendency to aggress is uncertain, but there is evidence that there are other innate emotional responses in humans. It would appear, for example, that there are facial expressions (Ekman, 1972; Izard, 1978) associated with emotions that seem to be largely innate in that they are found in all cultures and follow a consistent developmental pattern. The same may also be true of body posture (Bull & Gidro-Frank, 1950; Pasquarelli & Bull, 1951). Whether there are more volitional, goal-directed responses that are similarly influenced is unclear, but anger-related aggression is one possibility.

The view that many factors influence the display of aggression, and that learning is one such factor, is no longer in doubt. Nevertheless, the idea that aggression is a natural result of frustration remains, either as an addition or as an alternative to the state-dependent view of emotions being advanced in this thesis.

Emotional Behaviour and Learning. The argument being presented in this dissertation, that emotion related behaviour may be learned, is certainly not unique. How that learning occurs, however, has traditionally been explained in a very different way. Historically, psychologists in the area of animal learning have regarded emotional behaviour as resulting from the same principles of learning as any other behaviour (e.g., Powers & Osborne, 1976). In this view, emotional behaviour is thought to be the result of both classical and operant conditioning.

In Pavlovian classical conditioning, the unconditioned stimulus of food will elicit the unconditioned response of salivation. If a tone is consistently paired with the presentation of food over a series of trials, the tone will become associated with the food and, when presented alone, will also come to elicit salivation. The tone becomes a conditioned stimulus and salivation to the tone is the conditioned response. Emotional responses can be conditioned to a variety of previously neutral stimuli in the same way.

Watson and Rayner (1920), for example, conditioned a one-year-old boy to become fearful of a white rat. The boy showed fearful reactions, such as crying, to a loud sound, and by first showing him a white rat every time he was to be frightened by the sound, the boy soon became frightened of white rats. An additional example is provided by Estes and Skinner (1941), who demonstrated that a rat will freeze upon hearing a tone that has been previously paired with electric shock. The emotional responses that are conditioned in such situations include not only observable behaviour, but also autonomic responses, such as increased heart rate, that are characteristic of emotions.

Other forms of emotional behaviour, such as running from a threatening situation, or aggression in response to it, are thought to result from operant conditioning. These behaviours have been reinforced in the past and are thus more likely to occur subsequently in similar situations. If aggression successfully removes a threat, for example, then the aggressive response is reinforced and aggression will become more likely in threatening situations. In such a situation, a person also may show the conditioned or unconditioned responses associated with fear, but the aggressive behaviour is not caused by that fear, it is the result of past reinforcement. In the same situation, aggressive behaviour would occur even if the person was not

frightened.

Emotional behaviour, then, is proposed to be the result of conditioning, and is similar to other types of learned behaviour. An individual's actions do not result from anger or fear, but occur because he or she has learned to react that way in similar situations. The emotion experienced by the individual may result from classical conditioning, but it is not the emotion that directs the behaviour, it is the learning history of the individual. This view is in obvious contrast to the one presented in this thesis, where the emotional state is thought to be an important influence determining behaviour.

Present Research

While the previous literature review provides evidence suggesting that emotions may act as contextual cues in the learning and display of behaviour, there is also evidence supporting alternative views. Emotional arousal may facilitate learning or there may be emotion-specific response patterns that interfere with the learning of new behaviour. Alternatively, it is possible that much of emotional behaviour is best analyzed in terms of existing behavioural models that do not require the concept of emotion in explanations of learning. The five experiments in this thesis provide evidence that is useful in determining the

applicability of these various hypotheses.

Arguably, conditions of frustration are the most frequently studied and the best understood of the situations that might be considered to result in emotional arousal. On the assumption that frustration does involve such arousal, a frustration procedure and a non-frustration procedure were employed in the present studies to induce two different emotional states. Similarly, aggressive behaviour also has been extensively studied, and aggression and non-aggression were therefore the behaviours of interest in these studies.

To permit the inference that emotions function as intervening variables in the display of behaviour, it was first necessary to develop a methodology that provided data not easily subjected to explanations derived from traditional learning theory. External stimulus change and conditions of reinforcement are the variables most frequently referred to in such explanations. In the present experiments, therefore, it was important to reduce the influence of these variables.

In Experiment 1, the hypothesis that frustration acts as a contextual cue was investigated by teaching either aggressive or non-aggressive behaviour to 4-year-old children under conditions of either frustration or non-frustration. Experiment 2 was designed to investigate the possible influence of arousal by determining whether frustration alone increased the effectiveness of the learning conditions. More

specifically, are behaviours more likely to be learned when a subject is frustrated, or when a subject is not frustrated? A variant of the frustration-aggression hypothesis, that aggressive behaviours are more likely to be learned under conditions of frustration than are non-aggressive behaviours, was examined in Experiment 3. Sex-differences in the display of aggressive and non-aggressive behaviour were observed in these studies; in order to gain a better understanding of the influence of emotional state, these differences were further examined in Experiments 4 and 5. Taken together, the data from these studies provide evidence that is useful in evaluating which of the hypotheses outlined above might lead to a clearer understanding of emotions and their influence on behaviour.

Design Considerations and Methodology

The global objective of this dissertation is to evaluate the hypothesis that emotions can act as contextual cues and assist in the selection of behaviours to be performed during emotional arousal. The experiments proposed to test this view must incorporate a methodology to assess the hypothesis that emotions function as contextual cues, and also permit an assessment of whether the alternative explanations proposed also operate. Prior to describing the experiments that comprise this thesis, a general review of methodological issues and design seems appropriate. In addition, because of overlap in methods and procedures in the experiments, it is possible to describe general methods and procedures common to the thesis studies.

To be able to discuss those considerations that influenced the design of the general experimental method that was developed, it is first necessary to outline briefly the more pertinent aspects of that method. Procedural details will be discussed more fully in later sections.

Emotional state was manipulated by placing 4-year-old children in either a frustrating or a non-frustrating situation by either granting or denying them access to a desirable toy. While in these states, either aggressive or non-aggressive behaviours were taught to the children using a

modelling procedure. Specifically, subjects watched television films of models performing the behaviours in question. Subjects were later tested, again being either frustrated or non-frustrated, by observing which modeled behaviours they imitated.

Design Considerations

External contextual cues. It has repeatedly been pointed out in the preceeding discussions that behaviour and memory are influenced by a variety of contextual cues. In particular, external, environmental cues have a strong contextual effect. Further, studies of emotions and memory suggested that emotions may be rather weak cues in comparison. It was therefore necessary to develop a methodology that eliminated the influence of all contextual cues other than those associated with the emotional manipulation. To illustrate the problem, one could not simply teach a behaviour to a subject in the presence of an emotional cue, and then test whether the behaviour occurred in the absence of that cue. Other factors common to the experimental situation, such as the presence of the experimenter, would inevitably be present during both the learning and the testing situations. These factors would also be expected to function as contextual cues, and their presence would increase the likelihood of the behaviour being

performed in the test situation. In such a case, changes in behaviour could not be ascribed to the presence or absence of the emotional cue. Therefore, two different behaviours were taught in the present studies, one in each of two different emotional states, and all other factors, such as the experimental room, the presence of the experimenter and the experimental equipment, remained constant throughout the sessions. This procedure is analogous to that employed by Bower and his colleagues (1978). As noted above, these authors taught subjects two different word lists, one in each of two different emotional states.

Teaching by modelling. An additional design consideration concerned the explanation of emotional behaviour discussed earlier that is derived from principles of reinforcement. Learned behaviour, whether it occurs in conjunction with an emotion or not, can be accounted for by principles of reinforcement. In this view, optimal conditions for learning include the following: (a) The organism must actually perform the behaviour; (b) the behaviour must be reinforced; and (c) since behaviour is usually acquired gradually, it must be strengthened through repeated reinforcements. In the present thesis, behaviours were taught in a manner that did not involve any of these three considerations. The behaviours were taught to children using the modelling techniques developed by Bandura and his

co-workers (reviewed by Bandura, 1973). Each subject watched films of other children employing the relevant behaviours. The subjects did not perform the behaviours during learning, they were not reinforced and learning occurred in one experimental session.

Inducing emotions. To examine the effects of emotions it is first necessary to be able to induce emotional states reliably. Emotional state was manipulated by the presence or absence of frustration. The procedure involved the deliberate, arbitrary and undeserved refusal of a child's access to a desirable toy. "Frustration procedure" is probably a more descriptive term since frustration does not refer to an emotional state; it refers to the experimental manipulation that removes or reduces the possibility of obtaining a goal object. This definition does not assume, in other words, that there is an emotional state of frustration or that this procedure causes an emotional change. It is the inference that an emotional change occurs that is being tested; it cannot be taken for granted. If the frustration procedure produces an emotional change, then observable effects on behaviour should result, and the emotional change can be inferred from these effects.

Subject selection. Theoretically, one could examine hypotheses about emotion with subjects of any age, but the experimental task was designed for use with

preschool children. It was thought that children of this age might be less concerned with socially appropriate behaviours and therefore more likely to display the types of behaviours taught to them by the experimenter. In addition, young children might be less likely to have learned a consistent behavioural pattern, either aggressive or non-aggressive, in response to frustration.

General Method

The design considerations described above led to the development of the following method. Subject selection, the apparatus and the general procedure were similar in all the experiments. Consequently, they will be discussed in this general section and variations will be described when introducing the individual experiments.

Subjects

A total of 323 preschool children between the ages of 3 and 5 participated in the research. These children were drawn from 17 day care centres, located in Hamilton, Dundas, Burlington and Brampton. Parental permission was obtained for each participating child and the research was approved by the University Ethics Committee.

The method was developed through pretesting and pilot work with 167 children. These pilot subjects ranged in age

from 2 to 6 years. A total of 124 children were included in the experiments that comprise the body of this dissertation. These children ranged in age from 3 years, 9 months to 5 years, 3 months, as pilot work had shown that the experimental task was too difficult for children under 3 years, 6 months of age. Each subject was assigned to one of 11 experimental groups, each containing from 10 to 14 children. Each group had subjects from at least three centres. An additional 32 children began to participate in the multiple session experiments described below, but they did not provide complete data. A variety of causes, including mechanical failures, absenteeism, failure to comprehend instructions and fatigue accounted for their failure to complete the experimental sessions.

Apparatus

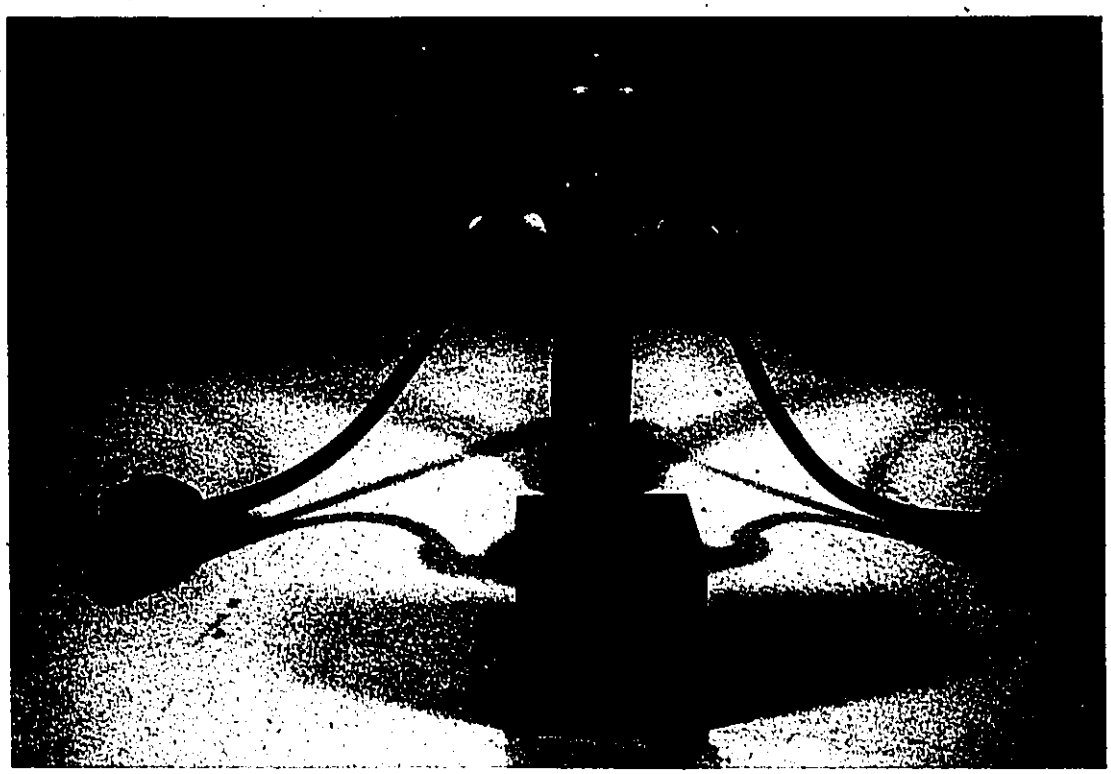
A plastic inflatable robot was equipped with a speaker that was connected to a tape recorder (Figure 1). Two long arms were attached, each ending in a distinctively shaped styrofoam hand. Pretesting on different styrofoam shapes and colours ensured that the children did not differentially approach either hand. The right hand was a red block, six inches square, and the left was a green sphere, eight inches in diameter. The children were told that a black Plexiglas box, approximately 30 centimeters per

side, was the robot's toy box. This toy box, constructed for the study, had a total of 12 compartments, 3 on each of the 4 sides of the box. Each compartment was covered by a door and each door was fastened with a different type of lock. Each compartment contained a prize. Smarties, bubblegum and a number of small plastic toys such as spacemen, dinosaurs and farm animals were used as prizes.

Four colour films were used in the research. Two of these films showed aggressive behaviour toward the robot and the other two depicted non-aggressive behaviour. One of each of these types of film showed a 6-year-old male actor, and the other an 8-year-old girl. When subjects were to learn a particular type of behaviour, they were shown both films of this behaviour, one containing the male and the other the female model. In other words, every subject saw both sexes of model. This was done to avoid possible sex-of-subject by sex-of-model interactions in imitation. The films were structured as follows:

> (1) The aggressive films depicted a child actor playing with the toy box. After about 5 seconds of such playing, the robot said the following:
>
> "Stop playing with my toy box. I don't like you anymore, and I want you to stop playing with my toy box. I don't want to give you the toys inside of it. They are mine and I don't want you to have any. I want to keep them all for myself. You can't play with my toy box

Figure 1. Inflatable, plastic robot and toy box used in the experiments.



anymore. Stop playing with my toy box."

At this point the child in the film became upset, went to the green hand and kicked, hit and bounced the hand. This activity continued for approximately 20 seconds at which point the robot announced:

"I'm sorry. I wasn't nice. I can see that you're unhappy. You want to play with my toy box. When you hit my arm, I knew you were unhappy. I have changed my mind because you hit my arm. You made me change my mind because you hit and kicked my arm. You can play with my toy box. You can keep the prizes in it."

(2) The non-aggressive films were similar to the aggressive ones. Again, they began with a child actor playing with the toy box for approximately five seconds after which the robot made the same statements that were made in the aggressive films, telling the child to stop playing with the toy box. At this point the child went to the red hand and hugged, kissed and stroked the hand. This activity continued for approximately 20 seconds at which point the robot announced:

"I'm sorry. I wasn't nice. I can see that you're unhappy. You want to play with my toy box. When you hugged my arm, I knew you were unhappy. I have changed my mind because you hugged my arm. You made me change my mind because you hugged and kissed my arm. You can play with my toy box. You can keep the prizes in it."

All films were projected on a color television by a Betamax videorecorder. In addition, 15 test sessions were videotaped to establish the reliability of observer ratings.

Procedure

Prior to the initiation of the research in each day care centre, the experimenter spent a few hours getting to know the children. Since the experimental sessions were conducted in a separate room and each child participated individually, this procedure helped to prevent the children from becoming frightened when separated from the rest of the children.

Each child in the study participated in an introductory session in which a small group of children, usually five or six, would accompany the experimenter to the experimental room (Pilot work indicated this introductory procedure was useful in helping children relax and increased willingness to participate in subsequent sessions.). Once there, the children were shown the robot and introduced to the toy box and its contents. The robot was then turned on and said:

> "Hello. I am Robbie the robot and I would like to play with you. That box on the floor is my toy box. It has toys in it. You can play with my toy box. If you can get the toys from inside it, you can keep them and take them home. I will give them to you. You can keep them for your very own."

It was then explained to the children that they could not all play at the same time and that they would each get a chance to play individually with Robbie. In order to familiarize them with the robot, they were encouraged to

approach the robot, to touch it and to play with its arms. The children then left together and rejoined the rest of the children in the day care. A total of eleven subjects, in all studies, refused to touch the robot, apparently too frightened to do so. These children were later given an opportunity to play with the toy box, but were not tested. From this point on, each child participated individually in each session.

Frustration procedure. A subject who was to be frustrated walked into the experimental room and sat by the toy box in anticipation of playing with it. One of the Smarties would be removed from the toy box to assure the child that there were really prizes in it. The robot then said:

> "Stop playing with my toy box. I don't like you anymore, and I want you to stop playing with my toy box. I don't want to give you the toys inside of it. They are mine and I don't want you to have any. I want to keep them all for myself. You can't play with my toy box anymore. Stop playing with my toy box."

The Smartie was then returned to the toy box and the experimenter said he was sorry that Robbie was being mean but that we could not play with the toy box anymore and that perhaps we should watch television instead. If the child agreed to this suggestion (only four did not), then either the aggressive or the non-aggressive films described previously were shown on a television set in a corner of the

room. After seeing the films, the child was promised another turn later, and then returned to the playroom.

Non-frustration procedure. The non-frustration sessions were similar to the frustration sessions except that, after the child was seated by the toy box, the robot repeated his initial statement that the child could play with the toy box and could keep the prizes inside it. After each child had successfully opened all of the doors and retrieved all of the prizes, receiving help with the locks if necessary, the child was then shown the films appropriate to the assigned experimental condition. After seeing the films, the child again returned to the playroom with the promise of another turn with the robot.

Testing procedure. During the test session, the robot refused to allow the child to play with the toy box. At this point, the child had two equally effective solutions to the problem of making the robot change its mind and the object of the session was to see which film the child would imitate. One film depicted aggressive behaviours to the robot's arms, while the other film depicted non-aggressive behaviours toward the other arm. There were, in other words, two equally effective methods of solving the problem of not being able to play with the toy box. These solutions involved different behaviours and different arms of the robot in order to make them as distinct as possible and to provide two different dependent measures of the children's responses. Whether the

children imitated the aggressive or the non-aggressive behaviours contained in the films could be measured as well as whether the behaviours were directed toward the robot's right or left arm.

After the robot refused permission to play with the toybox, the experimenter said to the child, "Robbie doesn't want us to play with his toybox. Can you make him change his mind?" If the child said no, the experimenter asked, "What did the children on TV do to make Robbie change his mind? Maybe you could do that?" These questions usually were sufficient. However, if a child appeared to be frightened of the robot and would not approach it, or claimed not to remember what to do, the child was asked if the experimenter should change the robot's mind. The child was then asked what should be done and the experimenter would act out the child's instructions. This latter procedure was implemented in order to reduce the chance of a response bias. For example, perhaps the girls would be reluctant to be aggressive against the robot and would therefore imitate the non-aggressive films. There was no significant pattern of refusals, and no sex-differences, across the last three experiments. In the first two experiments, however, a bias was indicated in that most of the children who refused (11 vs 2) had the experimenter imitate the aggressive behaviours.

Statistics. Unless otherwise stated, all of the statistical analyses reported in this thesis were conducted

using two different statistical tests. One of these was a procedure developed by G. R. Morrison (1978) and the other was developed by McDonald, Davis and Milliken (1977). Since the number of subjects in the various conditions varies from 10 to 14, the expected values in any of the cells are too small to justify the use of a chi-square. A Fisher's exact test is the type of analysis that would most commonly be used on this type of data. It has been known for some time, however, that the Fisher exact test does not provide an accurate probability estimate (Siegel, 1956). This is because the Fisher test assumes fixed row and column totals. For example, if one asks for a yes or no response from 10 subjects in each of two groups, the row totals are fixed and equal to 10. The Fisher test also assumes, however, that the column totals (i.e., the numbers of yes and no answers) also are fixed. Obviously, this is not the case since one cannot know the column totals until after the experiment has been conducted.

All probability levels were obtained using both the McDonald et al. and the Morrison tests, and only those found to be less than .05 by both tests have been reported as significant. Both tests were in close agreement and no result was found to be significant by one test and not by the other. Fisher's test also was calculated for the results of Experiment 1 and these probability levels are included for comparison.

Experiment 1

In Experiment 1, the hypothesis that frustration acts as a contextual cue was investigated by teaching either aggressive or non-aggressive behaviour to 4-year-old children under conditions of either frustration or non-frustration. If frustration acts as a contextual cue, then the behaviour learned in the context of frustration should be more likely to be displayed when the subject experiences frustration a second time.

Method

Each child in the study participated in three separate experimental sessions over two days. The first experimental session was conducted during the morning each day, with subjects being assigned to either a same-context or a control group. The conditions for each group are shown in Figure 2. In the same-context group the children were frustrated during this session and were then shown both of the non-aggressive films, one with the male, the other with the female model. None of the same-context group saw the aggressive films at this stage because preliminary data suggested an aggressive bias in children of this age. If non-frustrated children are simply shown both types of film (control group in Figure 2), many of them will display

aggression regardless of whether they have viewed the aggressive films first or second. Same-context subjects who viewed aggression while frustrated would therefore be expected to be aggressive when tested, not because of the effects of frustration, but because of this aggressive bias. This bias made it advisable to show only the non-aggressive films to the same-context subjects during the frustration session when they saw their first films. The order in which the children saw the male and female models was counterbalanced across subjects.

The second session took place that afternoon when the subjects in the same-context group were again brought individually into the experimental room. This time they were not frustrated and were able to play with the toy box. Each child was then shown the two films, not already seen, that depicted the aggressive solution to the problem of making the robot change its mind.

After the last set of films, the child again returned to the playroom with the promise of another turn with the robot the following day. When the child returned the next day, the third session, the test session, was conducted. Again, the robot told the children that they could not play with the toy box. At this point, the child had two equally effective solutions to the problem of making the robot change its mind and the object of the session was to see which

Figure 2. Design of Experiment 1 showing whether the subjects in each group are frustrated or not frustrated during each of the two training sessions. All subjects were frustrated during the test session, and each saw the non-aggressive model in the first training session and the aggressive model in the second session.

GROUP	TRAINING SESSIONS	TEST
Same-context	1) F — NA 2) N — A	F — ?
Control	1) N — NA 2) N — A	F — ?

F - Frustration
N - Non-Frustration
A - Video showing Aggressive model.
NA - Video showing Non-Aggressive model.

? - Which model will the child imitate

solution the child chose.

The control group received the same treatments as the same-context group with the exception of the first session where they were not frustrated. In other words, the control children were not frustrated before seeing either set of films but they were frustrated during the test session. There is no experimental reason to expect these children to imitate either type of film. The aggressive bias mentioned previously, however, suggested that they would be more likely to imitate the aggressive films. The children in the same-context group, on the other hand, were expected to show non-aggressive behaviour when tested, in contrast to the control subjects' aggressive behaviour.

In summary, the general procedure was first to frustrate the children in the same-context group and then to show them films of the non-aggressive technique of making the robot change its mind. Later, the children were shown the films of the aggressive solution. They saw these latter films after they had been playing with the toy box so that the environmental context was the same as that experienced before seeing the first films. Thus, the only relevant difference between the two situations was the emotional context. After seeing the films of both solutions, the children subsequently were frustrated by the robot again. According to the mood-dependent hypothesis, the children,

upon frustration, should attempt to make the robot change its mind and let them play with the toy box by employing the non-aggressive solution contained in the films they saw when previously frustrated. The control group, in contrast, should not imitate the non-aggressive films any more often than the aggressive ones.

Results

The results, shown in Figure 3, clearly support the hypothesis that frustration acts as a contextual cue in the determination of behaviour. When frustrated in the test session, 92% (11/12) of the children in the same-context group imitated the non-aggressive behaviour contained in the films they had seen when previously frustrated. In contrast, only 29% (4/14) of the children in the control group imitated the non-aggressive behaviour they had seen while not frustrated ($p<.001$; Fisher's, $p<.01$).

A further analysis of the components of the behaviour displayed during the frustrated test state reinforced the conclusion that the children in the same-context group selectively imitated the non-aggressive films. The models, it will be recalled, directed their aggressive behaviours toward the green hand and their non-aggressive behaviours toward the red one. One would predict, then, that the children in the same-context group would approach the red

Figure 3. Percentage of subjects in the same-context (experimental) and control groups who imitated non-aggressive behaviour and the percentage who imitated aggressive behaviour.

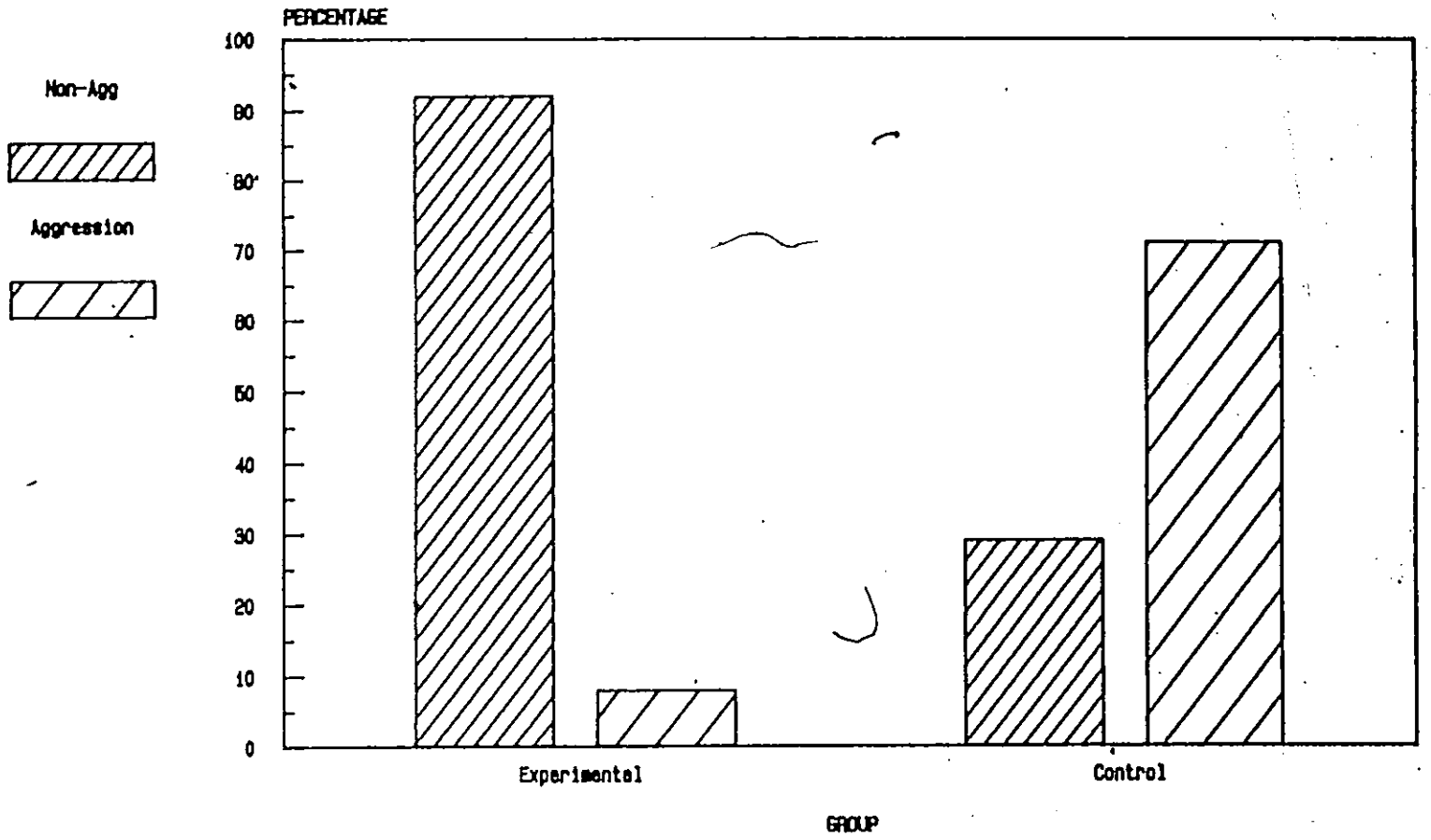
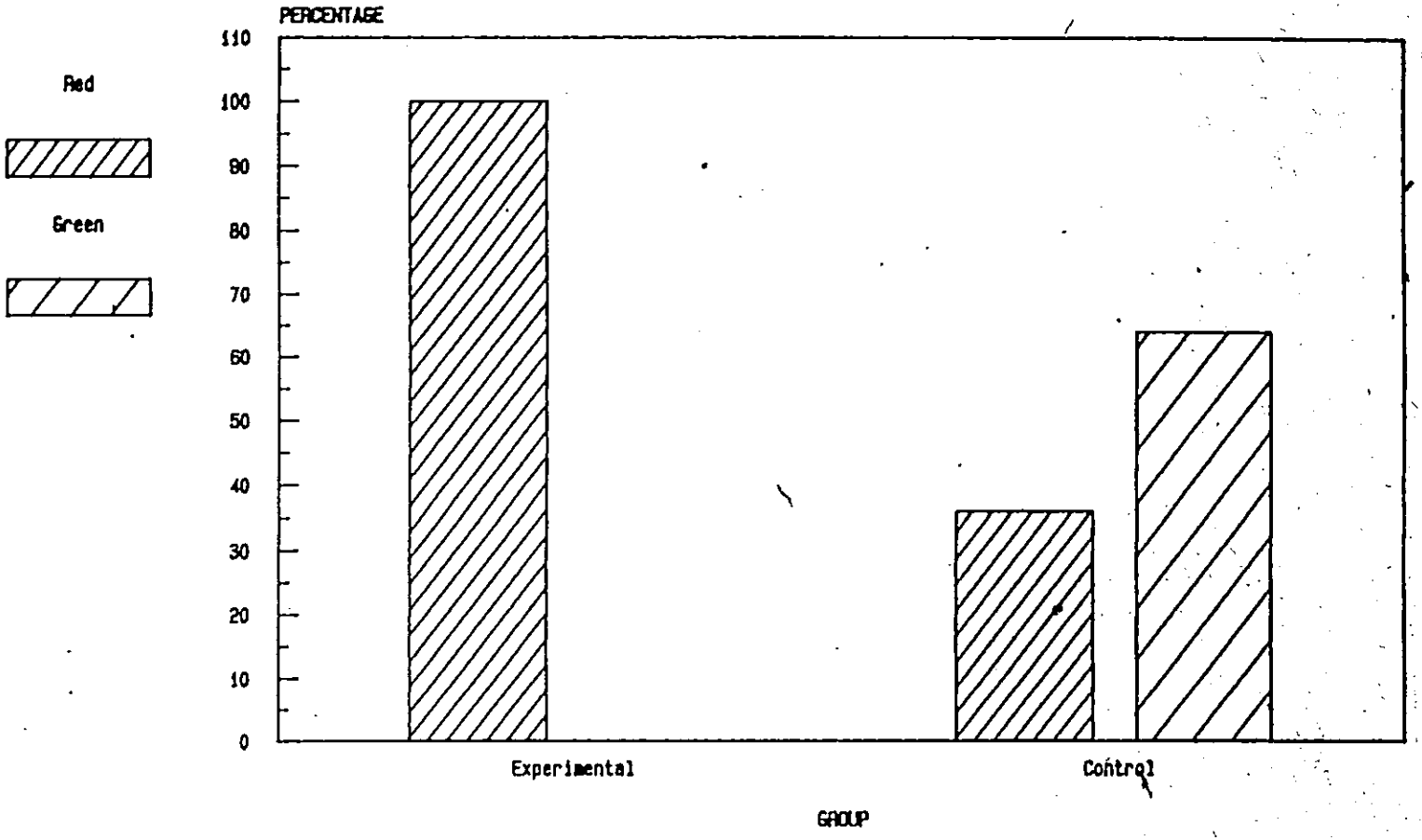

PERCENTAGE
100
90
80
70
60
50
40
30
20
10
0
Non-Agg
Aggression
Experimental
Control
GROUP

Figure 4. Percentage of subjects in the same-context (experimental) and control groups who approached the red hand of the robot and the percentage who approached the green hand.


Red
Green
PERCENTAGE
110
100
90
80
70
60
50
40
30
20
10
0
Experimental
Control
GROUP

hand more often than the control children since they had seen the non-aggressive films while frustrated. Figure 4 indicates that this is the case ($p<.001$, Fisher's, $p<.01$). All of the children in the same-context group approached the red hand during the test session, compared to only 36% of the children in the control group.

Discussion

These data support the hypothesis that an internal state of frustration can serve as a contextual cue to influence the type of behaviour displayed when subsequently frustrated. This is shown by the fact that the frustrated children in the same-context group behaved in a non-aggressive fashion, and that is the behaviour they had seen when previously frustrated.

These results suggest that frustration acts as a contextual cue and they also pose problems for the reinforcement model of emotional behaviour discussed in the introduction. It would be difficult to interpret these results in terms of reinforcement theories which typically attempt to explain learning without reference to such hypothetical variables as internal state. A modelling procedure was employed because it presents problems for this view of learning (e.g., Bandura, 1971). There are three reasons why such a reinforcement view would appear unsuitable

when applied to the present results:

(1) Most behaviourist positions hold that reinforcement is a critical ingredient in the learning process and the children in the present experiment were never reinforced for their behaviour. The models in the films were reinforced by gaining access to the toy box and it might be argued that the subjects were vicariously reinforced by observing this result. This was true of both sets of films, however, and the subjects would therefore have been equally reinforced for both types of behaviour. There was no differential reinforcement for either type of behaviour that would have resulted in one type of behaviour being displayed in one circumstance but not in another. In fact, if reinforcement were important one would have expected the children to imitate the films they saw when they were not frustrated, since this was the time when they typically ate the candy they had obtained from the toy box. Obviously, the eating of candy was not an effective reinforcer and the identification of a more potent potential reinforcer in this situation would be difficult.

(2) Behaviour often occurs only in the presence of certain stimuli. If a tone reliably signals the availability of food, for example, an animal will soon learn this relationship and will attempt to obtain food when it hears the tone. Food seeking behaviour comes to be controlled by

the presence or absence of the tone. It was previously pointed out that emotional behaviour has often been thought to be influenced by this form of stimulus control. If a tone reliably precedes shock then the presentation of that tone will soon lead to avoidance behaviour. Whether the avoidance behaviour occurs depends on the presence or absence of the tone. Emotional behaviour, then, is controlled in the same way as appetitive behaviour and can be explained in the same terms. This form of discriminative control, however, cannot be easily applied to the results of the present experiment since no such stimulus changes were employed.

(3) Behavioural learning theories usually consider new behaviours to be gradually acquired. As a behaviour is repeatedly reinforced, it begins to occur more reliably and becomes increasingly precise. In contrast, behaviour in the present experiment was accurately imitated after only one experience with each film.

Although the present results are compatible with the idea that emotions function as contextual cues, they are also compatible with the view of emotions discussed in the introduction that behaviour learned during emotional arousal is more memorable. Recall that the children who were frustrated imitated the behaviours they had previously seen while frustrated. Perhaps the children simply remembered those behaviours better and would have imitated them

regardless of whether or not they were frustrated when they were tested. This possibility was examined in the next experiment.

Experiment 2

The literature on arousal reviewed previously indicates that material learned while physiologically aroused is often better remembered (e.g., Kleinsmith & Kaplan, 1963; Berlyne & Carey, 1969; Corteen, 1969) and that emotion appears to be associated with arousal (e.g., Schachter, 1964; Ekman, 1984). Consistent with this view is the finding that emotional events are often better remembered than non-emotional events (e.g., Parkin, Lewinsohn & Folkard, 1982; Gilligan, 1983).

These findings suggest that behaviours learned during emotional arousal may be more likely to occur than behaviours learned during non-arousal, not because of context effects but simply because they are better remembered. This possibility was tested in the present study by evaluating whether subjects would be more likely to imitate films they see when they are frustrated (i.e., emotionally aroused) than films they see when they are not frustrated. This should occur regardless of whether the subjects are tested under conditions of frustration or non-frustration. In Experiment 1, children were more likely to imitate the films they saw when they were frustrated, but they were also tested while frustrated. The results were interpreted in terms of a

context effect: frustration at testing acted as a contextual cue for the imitation of behaviour seen when previously frustrated. In the present experiment, subjects were tested when they were not frustrated. The arousal view predicts that the subjects in this study also should imitate the films seen when frustrated.

Method

There were two groups of children in the study. Figure 5 summarizes the experimental design and, for comparison, also includes a summary of the conditions experienced by the same-context group in the first study. Children in the non-aggression group saw non-aggressive films while frustrated and aggressive films while not frustrated. These conditions were identical to those received by the same-context group in the first study. The children in the non-aggression group were tested while not frustrated, however, whereas the children from the same-context group in the first study were frustrated during testing. The arousal view predicts that these children in the non-aggression group will imitate the non-aggressive films they viewed while frustrated. If arousal, rather than a context-effect also accounts for the results of the first study, then the results from the non-aggression group also should match those from the same-context group in the first study.

Figure 5. Design of Experiment 2 showing whether the subjects in the non-aggression and aggression groups saw the non-aggressive or the aggressive model during each training session. The subjects in both groups were frustrated during the first training session and were not frustrated during either the second training session or during the test session. (The same-context group from Experiment 1 is included for comparison.)

GROUP	TRAINING SESSIONS	TEST
Same-context (from Exp. 1)	1) F ——— NA 2) N ———→ A	F ———→ ?
Non-aggression	1) F ——— NA 2) N ——— A	N ———→ ?
Aggression	1) F ———→ A 2) N ——— NA	N ———→ ?

F - Frustration
N - Non-Frustration
A - Video showing Aggressive model.
NA - Video showing Non-Aggressive model.

? - Which model will the child imitate

The aggression group (see Figure 5) was similar to the non-aggression group except the order in which they saw the films was reversed. They saw the aggressive films while frustrated and the non-aggressive films while not frustrated. The aggression group controls for a possible aggressive bias in the subjects. When tested under non-frustrating conditions, it seemed possible that the children would be more likely to imitate aggressive than non-aggressive behaviour. The results from the non-aggression group and the aggression group would then be the same, the children in both groups being aggressive. The arousal view, on the other hand, predicts the children in the non-aggression group will be non-aggressive and the children in the aggression group will be aggressive.

The experimental paradigm used in Experiment 1 was modified to examine the arousal hypothesis. The children had to be tested when they were not frustrated, after the robot had been nice to them and they had played with the toy box. However, there was no reason for the subjects to approach the robot after playing with the toy box. Hence, there was no problem to solve and no reason to imitate either of the two types of films.

The observation that the children liked to watch television suggested a way of getting them to approach the robot and imitate the films. The children first played with

the toy box during the test session and received all the prizes. They were then told there were no more films to see, but that another film could be made like the ones they had already seen, that they could be the actor or actress and see themselves on television. Each child could then choose to imitate either an aggressive or a non-aggressive model. Each subject was videotaped and shown the results on television.

Results

Both the percentage of children in each of Groups 2 and 3 who imitated aggressive behaviour and the percentage who imitated non-aggressive behaviour are shown in Figure 6 (The same-context group from the first study also is shown for comparison.). Seventy percent (7/10) of the subjects in the non-aggression group imitated aggressive behaviour from the films viewed when not frustrated. Of the subjects in the aggression group, 91% (10/11) also imitated aggressive behaviour. In contrast to the non-aggression group, the aggression group saw the aggressive films when they were frustrated. There is not a significant difference in the number of aggressive subjects between the two groups ($p > .1$). The children in both groups were more likely to be aggressive, regardless of the emotional context in which they saw the films. Across both groups, significantly more subjects were aggressive than non-aggressive ($p =$

.004).

The percentages of subjects in Groups 2 and 3 who approached the red versus the green hand of the robot are shown in Figure 7 (Results of the same-context group from the first study are again shown for comparison.). Sixty-seven percent (8/12) of the children in the non-aggression group approached the red hand of the robot, compared to only 27% (3/11) of the subjects in the aggression group ($p < .05$). Prior to testing, the children in the non-aggression group had seen the models approach the red hand when they were frustrated while the children in the aggression group had seen the models approach the green hand. These results are compatible with the view that the subject's imitation is influenced by arousal. Nevertheless, in comparison, the subjects in the same-context group from the first study were significantly more likely to approach the hand appropriate to the frustration modelling session than were the children in Groups 2 and 3 in this study ($\chi^2 = 4.56$, $p < .05$).

Discussion

The present results indicate that children were more likely to imitate films seen while frustrated than films viewed when they were not frustrated. The frustrated children who had seen the filmed models approach the red hand of the robot approached that same hand when they were tested.

Figure 6. Percentage of subjects in the non-aggression (Group 2) and aggression (Group 3) groups in Experiment 2 who imitated non-aggressive behaviour and the percentage who imitated aggressive behaviour. (The same-context or experimental group from Experiment 1 is included for comparison.)

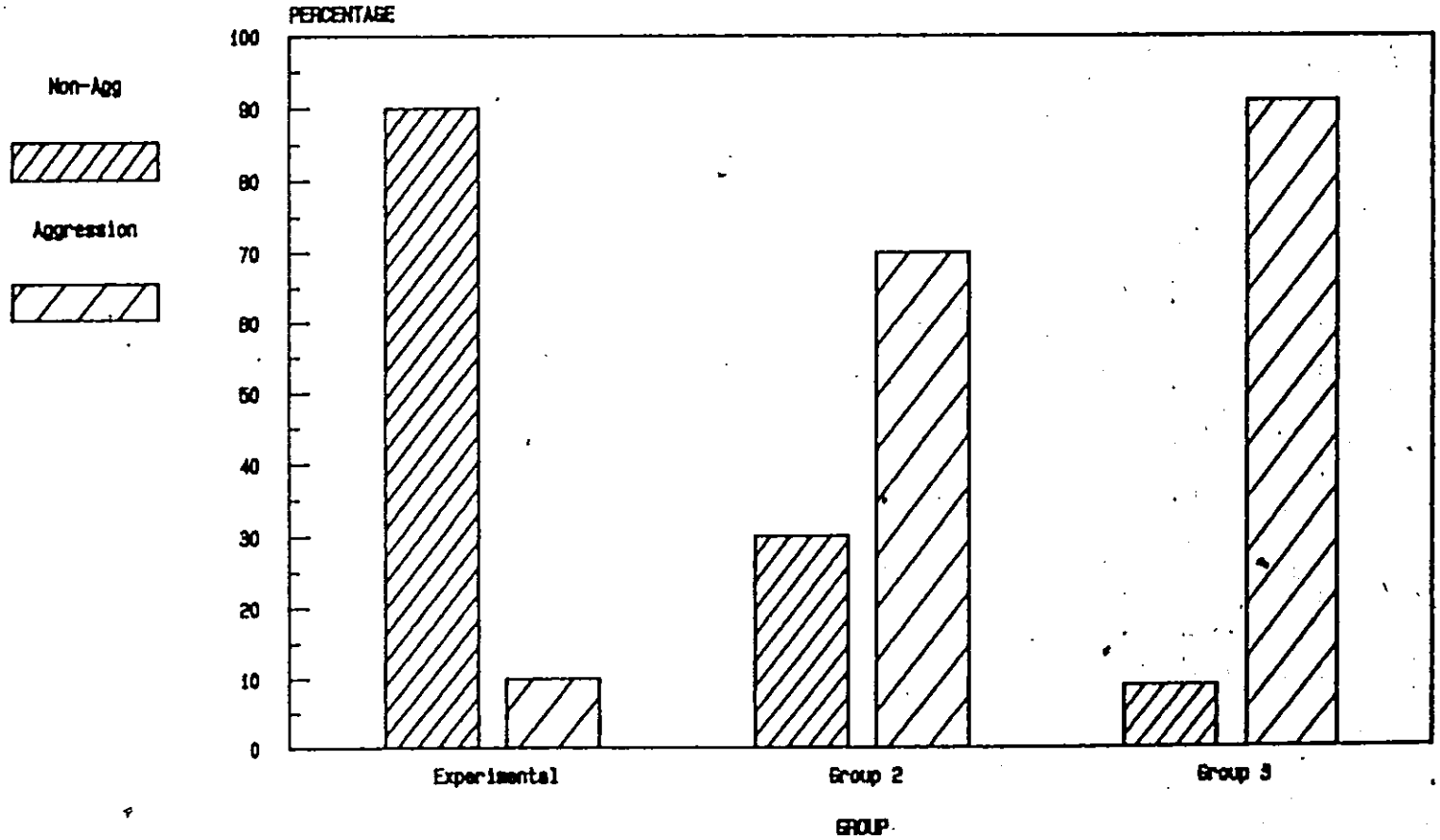
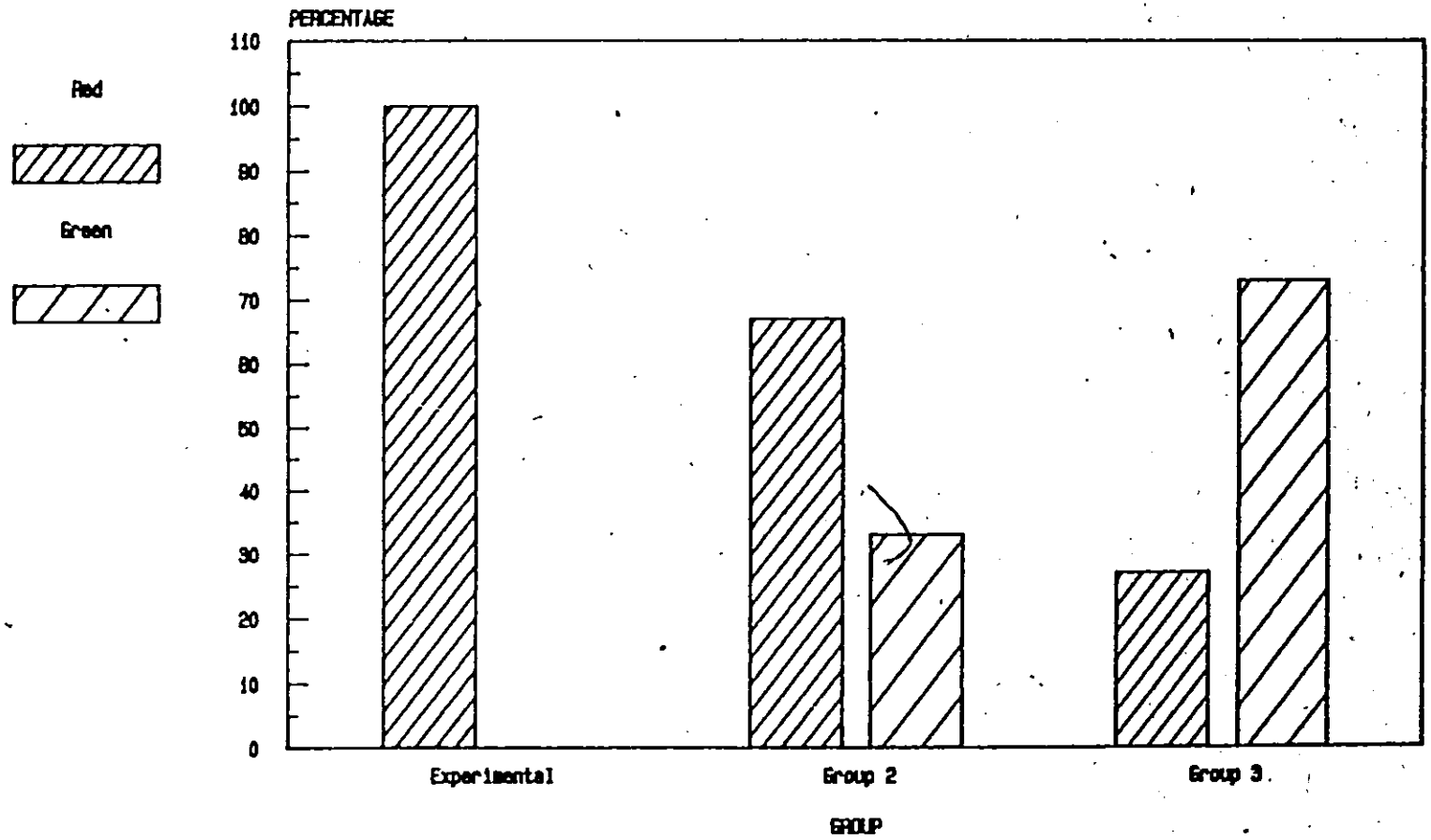

Non-Agg
Aggression
PERCENTAGE
100
90
80
70
60
50
40
30
20
10
0
Experimental
Group 2
Group 3
GROUP

Figure 7. Percentage of subjects in the non-aggression (Group 2) and the aggression (Group 3) groups in Experiment 2 who approached the red hand of the robot and the percentage who approached the green hand. (The same-context or experimental group from Experiment 1 is included for comparison.)


PERCENTAGE
110
100
90
80
70
60
50
40
30
20
10
0
Red
Green
Experimental
Group 2
Group 3
GROUP

Similarly, frustrated children who saw the models approach the robot's green hand also approached the green hand. An effect of frustration was not seen, however, in the analysis of the children's aggressive versus non-aggressive behaviour. Most subjects were aggressive during the test session regardless of whether they had seen aggressive or non-aggressive films when they were frustrated. Frustration did not alter the aggressive bias in these children, although the direction of that aggression (i.e., the hand of the robot that was approached) was influenced by the films seen during frustration.

The present data imply that the results from Experiment 1 may be partially due to the effects of arousal. In that study, frustrated subjects imitated the behaviour contained in the films they had seen previously while frustrated. Even though they were tested when they were not frustrated, the subjects in the present study also were more likely to imitate the films they saw when they were frustrated, at least in terms of which hand of the robot they approached. Although the effect was not large and cannot account entirely for the results of Experiment 1, it is likely that an arousal effect contributed to those results.

The data from both Experiment 1 and Experiment 2 suggest that frustration produces context-dependent effects as well as effects consistent with an arousal hypothesis.

This means that behaviours learned during frustration are more likely to occur when the person is subsequently frustrated. Although less pronounced, behaviours learned during frustration also are more likely to occur if the person is not frustrated. However, this does not imply that the behaviour will be shown during all future instances of frustration. Presumably, the behaviour is unlikely to occur if it is not appropriate in the situation encountered. This raises the question of the generalization of such behaviour and is a matter for future investigations.

The results suggest emotions influence behaviour. We seem to behave in consistent, identifiable ways when we are emotionally aroused. The data also suggest, at least in the case of humans, that which behaviours occur in response to which emotions may be influenced by learning. This does not imply that all emotions will affect behaviour in the same way. The effects of a frustration procedure may not be the same as the effects of emotions produced in other ways. In support of this view, Gilligan (1983) found that a high level of sadness impairs, rather than enhances, recall. The suggestion is only that different emotions will affect behaviour, perhaps in different ways, and that empirical investigations of such effects seem worthwhile.

It is also not clear that the results of this last experiment are necessarily due to physiological arousal,

although they are consistent with this hypothesis. The finding that frustration during learning increased imitation may have been because frustration affected attention, or consolidation, processes in ways not related to arousal. It has been mentioned that sadness increases physiological arousal, for example, and the impaired recall associated with this state would seem to question the role of arousal in the increased imitation found for frustration. It should be added, however, that Gilligan only found impaired recall with high levels of sadness; low levels improved recall. As he points out, different emotions might be associated with different optimum levels of arousal. This would be consistent with previous observations of the effects of arousal, notably work regarding the Yerkes-Dodson law (e.g., Broadhurst, 1957), where both high and low levels of arousal impair performance while moderate levels improve it. This is also consistent with observations of the effects of epinephrine (McGaugh, 1983). Optimum facilitation of performance occurs with moderate, rather than high or low, doses of the drug. Different emotions, then, may have different optimum levels of arousal, and a given emotion may facilitate or impair performance, depending on the intensity of that emotion.

It has also been suggested by Clark, Milberg, and Ross (1983) that physiological arousal is at least partially

responsible for the state-dependent effect of emotions. These investigators found that arousal, induced by physical exercise, produces a state-dependent effect. If tested while aroused, subjects were more likely to recall word phrases they had learned when previously aroused, rather than ones they had learned when not aroused. The reverse was true if they were tested under conditions of non-arousal. This effect was found even if physiological arousal was produced in different ways during learning (physical exercise) and testing (erotic films).

Clark et al. also point out, however, that this state-dependent effect of arousal is probably not entirely responsible for the state-dependent effect seen with emotions since they found that arousal alone does not aid in the retrieval of emotional memories. The emotional state also seems to be necessary, but additional arousal produced by exercise will accentuate the effect of the emotion. In addition, Bartlett, Burleson and Santrock (1982) found that reduced arousal, resulting from relaxation, eliminated the state-dependent effect of emotions, even though additional measures indicated that emotional states, although reduced, were not eliminated by their procedure. Arousal, then, is probably one of the factors involved in the effects of emotions, although it may not be the only factor. It seems reasonable, therefore, to suggest that the results of the

present experiment are also due to the effects of arousal. However, aspects of the frustration situation other than arousal might have been responsible for these results. For example, since the films were related to the frustrating situation, the films seen during frustration may have been more closely attended to than those seen by the children when they were not frustrated.

Although the role of learning has been emphasized in the first two studies of this dissertation, the results do not imply that all emotional behaviour is learned. Unconditioned emotional responses undoubtedly occur. Facial expressions and body postures associated with some emotions are possible examples that have already been mentioned (Bull & Gidre-Frank, 1950; Ekman, 1972; Izard, 1978; Pasquarelli & Bull, 1951). The same might also be said of vocal indices of emotion, such as crying (Plutchik, 1984). It is also possible, then, that there are non-reflexive, or instrumental, behaviours associated with certain emotional states. The next section deals with what many believe is an example of this type of relationship, the seemingly natural link between frustration and aggression.

Experiment 3

The view presented at the beginning of this thesis was that frustration acts as a contextual cue and that behaviours learned during frustration will therefore be more likely to occur during subsequent instances of frustration. Implicit in this view is the idea that aggression is not a necessary response to frustration. The data from the first two experiments support this view. How, then, does one account for the finding that frustrations that are perceived as unwarranted or unjustified, or as personal attacks or insults, have consistently been shown to increase aggression (e.g., Burnstein & Worchel, 1962; Cohen, 1955; Geen, 1968; Kregarman & Worchel, 1961; Mallick & McCandless, 1966; Pastore, 1952; Rothaus & Worchel, 1960; Zillman, Bryant, Cantor & Day)? If frustration leads to non-aggression as easily as it does to aggression, then why does frustration so often result in aggression?

As with many topics in psychology, the relationship between frustration and aggression has been examined by the proponents of both nature and nurture. Some have held that aggression is an inherited, genetically determined behaviour trait, while others have maintained that aggression is entirely learned and that there is no innate relationship

between frustration and aggression. Alternatively, it may be that both factors are involved. Perhaps some types of emotional responses are more easily learned than others. This view is derived from Seligman's (1971) concept of "preparedness". This term describes the fact that animals often seem easily able to learn species-typical behaviours that are thought to be evolutionarily advantageous, and that there are other types of behaviour that are very difficult for a given species to learn. Perhaps aggression is such a behaviour in humans. Perhaps aggression is more likely to be learned as a response to frustration than are other behaviours. These competing views will be discussed more fully in the following sections.

Aggression as an innate response. Cross-cultural studies of the facial expressions associated with different emotions and the development of emotional expression in infants (e.g., Ekman, 1972; Izard, 1978; Emde, Kligman, Reich & Wade, 1978) strongly suggest that such expressions have an innate basis. These studies indicate that the expressions characteristic of given emotions are the same for all cultures and that infants acquire the different facial expressions of emotions in the same sequence and at roughly the same ages. Although we may at times be able to suppress them, these expressions and, perhaps, postures as well (Bull, 1950), are thought to be involuntary concomitants

of emotion and occur naturally as a result of, and may contribute to, emotional sensation.

Emotional responses such as internal autonomic changes, or skeletal movements involving startle, freezing, running and the like also have been seen as emotional behaviours (e.g., Watson & Rayner, 1920; Estes & Skinner, 1941, Skinner, 1974). In much the same way that a dog will salivate upon presentation of food, or to a stimulus associated with food, emotional responses will occur naturally to relevant events such as shock, or to stimuli associated with those events. These behaviours may be characteristic of one species but not others (Bindra, 1970), but they are thought to occur in all members of a given species. They are part of the genetic heritage of the species and are not learned.

Dollard, Doob, Miller, Mowrer & Sears (1939) suggested that aggression in humans was an example of such an innate response pattern. It was their contention that frustration, defined as the thwarting of a goal response, always led to aggression and that aggression always presupposed frustration. This view was initially influential, but it soon became obvious that aggression can also result from conditions other than frustration and that frustration does not necessarily lead to aggression (see Zillman, 1979). Although aggression does not result from

every instance of frustration, there is evidence that a specific type of frustration does lead to aggression. It was mentioned previously that frustrations that are perceived as unwarranted or unjustified, or as personal attacks or insults often do increase aggression. In the context of the present discussion, the question of central concern is whether such frustrations activate an innate aggressive response. Berkowitz (1965) has suggested that frustrations that result in aggression do so because of an intervening state of anger and that anger carries with it an innate propensity to aggress. Rule and Nesdale (1976) also conclude that arbitrary frustrations of the kind discussed above may activate an innate tendency to aggress, although they recognize that this tendency may be easily overcome and that other types of behaviour may be learned (Rule, personal communication, May, 1987). Similarly, Baron (1977) concludes that intense, unwarranted frustration is an antecedent of aggression, although it is only one of a number of such influences.

Aggression as a learned response. In contrast to the idea of innate aggression is the view that aggression is entirely learned. There is a great deal of evidence in support of the view that aggression can be learned. There have been many studies of the modelling of aggression, for example, which show that people will readily imitate aggression, that they easily learn new forms of aggressive

behaviour simply by seeing them performed by another person (see Bandura, 1973 and Baron, 1977 for reviews). In addition, there have been many studies showing that aggression is influenced by a number of factors, not just frustration. This evidence suggests that aggression is largely learned and that whether aggression actually occurs is dependent on a number of additional social and cognitive factors (e.g., Dodge, 1980; Dodge & Frame, 1982; Ferguson & Rule, 1980; Rule, Nesdale & McAra, 1974). Typically, people actively make decisions about how they will behave on the basis of such factors as probable payoffs, social judgements and internal rules of conduct, which are themselves influenced by social systems such as family, community and culture.

Although aggression may be influenced by a variety of factors, we are still left with the question of why unwarranted frustration increases aggression. Bandura (1973) maintains that emotional arousal functions to increase the intensity and duration of behaviour. Frustration induced arousal, then, will increase aggression, but so will other sources of arousal. Further, frustration will not only increase aggression, it will increase other behaviours as well. Emotional arousal, in other words, is not response specific, and arousal resulting from frustration does not result in innate aggression but simply increases the

intensity of whatever response is selected. What response will be selected will be determined by the person's appraisal of the situation and by his or her learning history. Arousal, from whatever source, facilitates the performance of that response, but does not influence its selection.

A number of studies are consistent with Bandura's view. Christy, Gelfand and Hartmann (1971), for example, found that both success and failure in a competitive game increased subsequent aggressiveness in boys, but only if they had previously seen an aggressive model. Competition did not increase their aggressiveness if they had not been exposed to a model, or if they had seen a non-aggressive one. Previous modelling was required for an increase in aggression, and success increased aggression just as much as frustration resulting from failure.

Aggression as a prepared response. An alternative to the innate versus learned dichotomy is the view that both factors are involved in behaviour. Evolutionary pressures may make some types of learning easier than others. Seligman (1971) argues, for example, that phobias of snakes and heights are more common than phobias of buildings or even knives because there is an evolutionary advantage to such fears. We easily learn to be frightened of snakes because we are evolutionarily prepared for such learning.

In support of Seligman's concept of preparedness, there is considerable evidence that not all responses and reinforcers are equally associable (see Seligman & Hager, 1972). Bolles (1970,1971), for example, points out that a frightened rat will either flee, freeze or attack, and appears to experience difficulty learning any other form of behaviour in order to avoid a painful or aversive event. Dobrezecka, Szwejkowska and Konorski (1966) have shown that dogs find it very difficult to learn to lift one paw to the sound of a metronome and a different paw to the sound of a buzzer when both sounds come from the same location. When the sounds come from different locations, however, they are easily able to learn the task. Conversely, they are able to learn to move one paw, or not move it, when the two sounds come from the same location, but find it difficult to learn this one-paw response when the two sounds come from different locations. In other words, the learning of the same response is easy in one situation and difficult in the other.

The concept of preparedness emerges as a possible explanation for the evidence mentioned previously that arbitrary and unwarranted frustration often leads to aggression. It is possible that aggressive behaviours are more easily learned after frustration than are non-aggressive behaviours. Alternatively, perhaps if a person has learned both aggressive and non-aggressive behaviour, that

unwarranted frustration will increase the probability of the aggressive response being selected.

The above analysis implies that arbitrary frustration and personal insult will not necessarily lead to aggression, even if Berkowitz is correct in assuming that such events result in anger. An additional implication, however, is that aggression may be one of the more easily learned responses to such frustrations. Aggression may be more readily displayed or more readily learned under conditions of frustration than non-frustration. This possibility is suggested by the results of Parker and Roger (1981) who found that frustrated second and third grade boys are more likely to watch aggressive than non-aggressive models. They also are more likely subsequently to imitate the aggressive models than are boys who were not frustrated when viewing the models. Although it is not clear that the same attentional difference would also be found with females or with children of different ages, Parker and Roger tentatively conclude that "prior frustration increases the probability that an individual will observe, remember, and hence perform more acts of violence" (p. 302). Anger-induced aggression may be learned, in other words, but the mechanism involved may be quite different from the straightforward reinforcement model proposed by Bandura, or from the contextual view presented here. If frustrated children are shown both aggressive and

and non-aggressive models, perhaps they subsequently will be more likely to imitate the aggressive model, or perhaps frustrated children will be more likely to chose the aggressive response if they have previously seen both the aggressive and the non-aggressive models.

Conclusions

In contrast to the innate and preparedness views, Bandura's contention that aggression is a learned response to frustration is consistent with the central hypothesis in this thesis, that emotional behaviour is learned. Bandura's (1973) formulation leads to the following conclusions:

1) Aggression is learned.

2) Non-aggressive behaviour is as easily learned as aggressive behaviour.

3) Unless a person is explicitly taught to be aggressive, frustration is no more likely to lead to aggressive than non-aggressive behaviour.

Taken literally, the state-dependent hypothesis of emotional behaviour also leads to the prediction that one can learn non-aggressive behaviour as easily as aggressive behaviour in response to frustration. Although compatible with Bandura's view, the mechanisms presumed to be involved in this learning are quite different since he does not incorporate a state-dependent view of emotion. In contrast

to Bandura, it is assumed here that emotions do not just influence the intensity and duration of behaviour but that they also direct it. Nevertheless, learning is assumed to be paramount. This conclusion, however, is not required by the results of the first two experiments. Although either aggressive or non-aggressive behaviour may be learned in response to frustration, it is still possible that aggression is more easily learned.

The above considerations imply that frustration will not improve the learning of aggressive over non-aggressive behaviour. If a frustrated child watches both aggressive and non-aggressive videos, for example, that child should learn the behaviours in each one equally well. Given the preparedness view, and the results of Parker and Roger, mentioned above, this assumption may be incorrect and does not appear to have been tested.

An additional implication of Bandura's view, and of the state-dependent view presented in this thesis, is that if a person has learned both aggressive and non-aggressive behaviour and is later frustrated, that subsequent frustration will not increase the probability of the person choosing the aggressive response. For example, if a child sees both aggressive and non-aggressive videos, that child should be no more likely to imitate one than the other when subsequently frustrated. Again, this implication has not

been tested.

The present hypothesis, then, is that regardless of whether a child is frustrated during learning or during testing (or both), frustration will not increase aggression. This hypothesis is examined in the current experiments by testing the following propositions: (a) Children who are shown both aggressive and non-aggressive videos will learn both types of behaviour equally well, whether they are shown the videos when frustrated or when not frustrated. (b) Children who see both the aggressive and the non-aggressive videos will be no more likely to be aggressive than non-aggressive when they are subsequently tested, whether they are tested when they are frustrated or not frustrated. In other words, regardless of whether a child is in a frustrated state during learning or during testing, that frustration will not increase the probability of aggression.

These predictions suggest that four different groups of subjects should be tested, two groups that are either frustrated or not frustrated during learning, and another two groups that are either frustrated or not frustrated during testing. Initially, however, only two of these groups need to be tested. A group of children who see both aggressive and non-aggressive videos while they are frustrated and who are also tested when frustrated, should be no more likely to imitate aggression than children who view the videos and are

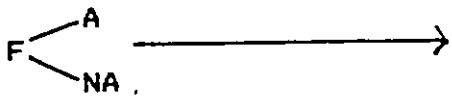
tested without ever being frustrated. If these two groups of children show equivalent levels of aggression, then it would not be necessary to test groups of children who were frustrated only at learning or only at testing. Neither of these two groups would be expected to be more aggressive than the group that was frustrated both at learning and at testing.

In addition, pilot data indicated that the male subjects tended to be more aggressive than the females and thus raised concerns about possible ceiling effects with males. Consequently, separate groups of male and female subjects were tested in the present experiment. While female subjects were tested under both of the conditions described above, male subjects were tested only under the condition where they were not frustrated either during learning or during testing. This group was tested to provide base rate data on the frequency of aggression among the males. If most of the boys in this condition were aggressive, then testing them under conditions that involve frustration would not be able to increase the frequency of aggression.

Method

Figure 8 summarizes the experimental design for the two groups of female subjects who were tested. Each child participated in two experimental sessions. During the first

Figure 8. Design of Experiment 3 showing whether the subjects in each group are frustrated or not frustrated during both the training and the test session. Subjects in both groups see both aggressive and non-aggressive models during the training session.

GROUP	TRAINING	TEST
F-F		F - ?
N-N		N - ?

F - Frustration
N - Non-Frustration
A - Video showing Aggressive model.
NA - Video showing Non-Aggressive model.

? - Which model will the child imitate

session, each child was either frustrated or not frustrated, depending on experimental condition, and was then shown two films. One film depicted aggressive behaviour, the other non-aggressive behaviour. Approximately 24 hours later, each child was tested, again after being either frustrated or not frustrated, depending on experimental condition, to see which type of film she would imitate. The Frustration-Frustration group (group F-F) experienced the effects of frustration at both learning and testing. Subjects in this group were frustrated before seeing the films and were also frustrated during the test session. Subjects in the No frustration-No frustration group (group N-N) were not frustrated when they saw the films or when they were tested.

There were two important differences in methodology between the first experiments and the present one. In the first experiments, children saw two films during each session, one containing a male model and one containing a female model. Both of these films, however, were of the same type. That is, they depicted either aggressive or non-aggressive behaviour, but not both. In the current experiment children saw films of both aggressive and non-aggressive behaviour during the training session. The order in which the films were shown was counterbalanced across groups.

Another important difference in this set of

investigations was that the children saw films of only one of the models. They would see either the male or the female model, but not both. This was done, not only to examine the possible effects of different sex models, which will be discussed later, but also because of time considerations. The children in the previous investigations saw only two films as well. They saw both the male and female models being aggressive, for example. If this procedure were followed in the present method, the children would have to see all four films - both sexes of model and both types of behaviour. In the case of a frustrated child, this would require about 12 minutes of films and any frustration effect would likely have dissipated by that time. For this reason, only two films were shown to each subject. Both types of behaviour were shown, but each child saw only a same-sex model.

Results

Data for both the male and female subjects are shown in Figures 9 and 10. There were no significant differences between the two groups of female subjects. As Figure 9 shows, 50% of the girls in group N-N (5/10) imitated aggressive behaviour, as did 31% (4/13) of group F-F, $p > .1$. Figure 10 illustrates the percentage of female subjects in the two groups who approached the green versus the red

hand of the robot. Fifty percent (5/10) of the girls in group N-N approached the green hand, as did 33% (5/15) of group F-F, $p > .1$.

The percentage of male subjects in group N-N who were aggressive and the percentage who were non-aggressive also are shown in Figure 9. Ninety percent (9/10) of the boys in this group imitated aggressive behaviour, indicating substantial aggression even under conditions of no frustration. The percentage of male subjects who approached the green versus the red hand of the robot is shown in Figure 10. Seventy percent (7/10) of these children approached the robot's green hand.

Discussion

The data from the girls are consistent with the view that non-aggressive behaviour is as likely to be learned under conditions of frustration as is aggressive behaviour. The amount of aggression shown by the girls did not depend upon frustration, either during learning or during testing. Regardless of whether they had seen the films when they were frustrated or not frustrated, the subjects were no more likely to imitate the aggressive than the non-aggressive models. Furthermore, whether the subjects were tested when they were frustrated or when they were not frustrated, they were still no more likely to imitate aggressive than

Figure 9. The left panel shows the percentage of female subjects in each group who imitated non-aggressive behaviour and the percentage who imitated aggressive behaviour, while the right panel shows the percentages for males. The subjects in Group N-N were never frustrated and the subjects in group F-F were frustrated both when seeing the models and during the test session.

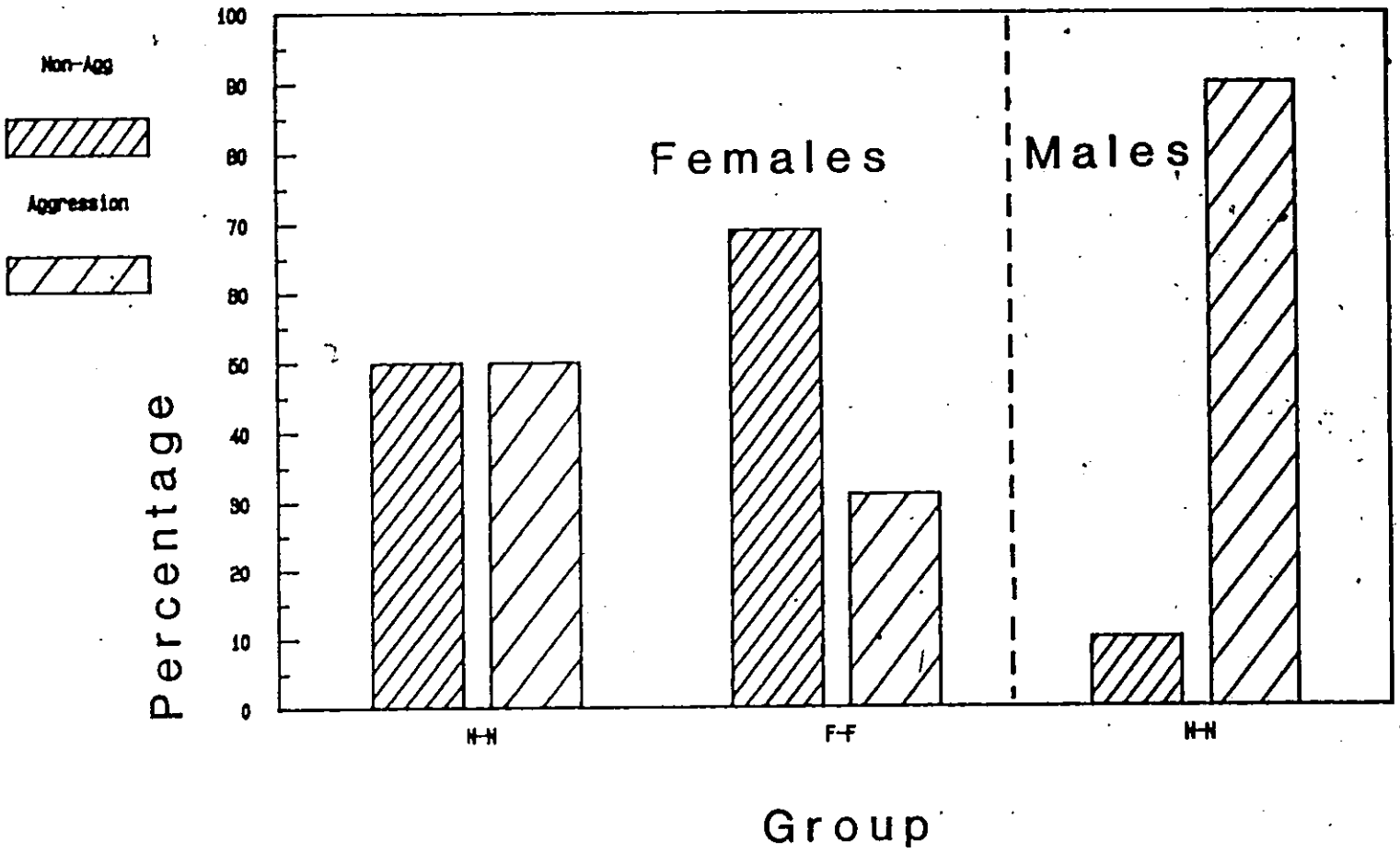
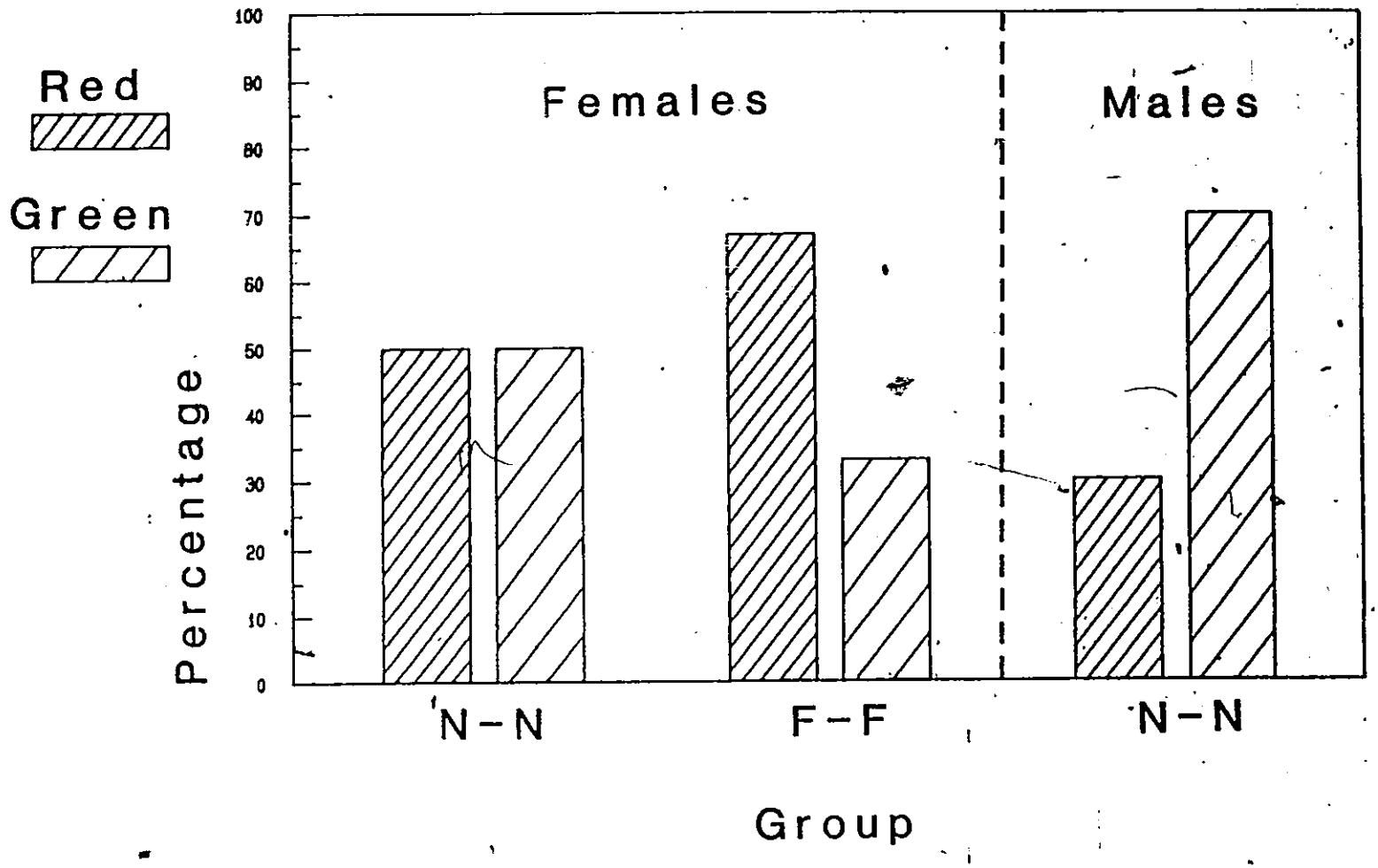

Non-Agg
Aggression
Percentage
100
90
80
70
60
50
40
30
20
10
0
Females
Males
M-M
F-F
M-M
Group

Figure 10. The left panel shows the percentage of female subjects in each group who approached the red hand of the robot and the percentage who approached the green hand, while the right hand shows the percentages for males. The subjects in Group N-N were never frustrated and the subjects in group F-F were frustrated both when seeing the models and during the test session.


Red
Green
Females
Males
Percentage
100
90
80
70
60
50
40
30
20
10
0
N-N
F-F
N-N
Group

non-aggressive behaviour.

These data support Bandura's contention, and the contention of this thesis, that emotions do not elicit innate, purposive behaviour and, specifically, that frustration-induced aggression is a learned response. On the basis of the present data, this conclusion is applicable only to the female subjects. Since the boys were consistently aggressive in the absence of frustration, there was no point in testing male subjects in this experiment under conditions of frustration since the level of aggression could not be increased under these conditions. To determine whether frustration will increase aggression in male subjects, it is first necessary to reduce the base rate of aggression in subjects who do not experience frustration. If this could be accomplished, then it would be possible to see whether the addition of frustration would increase aggression over this lowered baserate. The issue of whether the boys can be made less aggressive using the present paradigm is examined in the next section.

Experiment 4

In the previous experiment, it was not possible to determine whether frustration increases the level of aggression in males since the boys were maximally aggressive even when they were not frustrated. Frustration could not increase aggression over this ceiling level. To see whether frustration will increase aggression, then, it is first necessary to find a way to reduce the boys aggressiveness. In the last study, the male subjects were taught aggressive and non-aggressive behaviour by having them observe a male model. The present study sought to reduce the level of aggressive imitation by showing the boys a female rather than a male model.

It is not clear that boys will be less likely to imitate an aggressive female than an aggressive male, but this possibility is suggested by studies of the relative influence of same-sex and cross-sex models. It has been suggested that children develop appropriate sex-role behaviour, at least in part, because of a preference to imitate same-sex rather than opposite-sex models (e.g., Bandura & Walters, 1963). One way in which this might happen is that children are more likely to be influenced by a model if they and the model are subject to the same reinforcement

contingencies. For example, Bussey and Perry (1976) found that third-grade children were more likely to imitate a model if they and the model had first experienced similar consequences for performing similar behaviours. Presumably, a boy learns to imitate the masculine behaviours of his father because he is more likely to receive the same social consequences that his father does for this behaviour than he is to receive the consequences his mother does for feminine behaviour. He learns to do what men do because, at least in this society, these are the behaviours that are seen as appropriate and he is more likely to be reinforced for them.

The idea that children are more likely to imitate same-sex models has been criticized (Maccoby & Jacklin, 1974; Barkley, Ullman, Otto & Brecht, 1977) since there are many studies that have failed to find this effect. However, this may be because these studies typically employ only one model of each sex and children may typically learn a sex-typed behaviour by seeing it performed by many members of the same sex. Same-sex imitation has been reliably obtained using multiple same-sex models (Perry & Bussey, 1979; Bussey & Perry, 1982; Bussey & Bandura, 1984).

The varying results found in studies of same-sex imitation also may have resulted from differences in the nature of the behaviour being studied. Barkley et al. (1977) suggested that sex-typed behaviours, whether they are

masculine or feminine, may be differentially imitated by males and females, regardless of the sex of the model. They studied seven year old children and found that girls were more likely than boys to imitate feminine behaviour, regardless of the sex of the model. A similar effect for masculine behaviour was not found with the boys however. Boys and girls appeared to imitate masculine behaviour equally. Although they did not report an analysis of this possibility, their data suggest that male subjects would imitate masculine behaviour if it was displayed by a male model but not if it was displayed by a female model (a mean of 16.9 vs a mean of 2.3). This latter mean is very similar to that obtained for the girl's imitation of masculine behaviour.

The observation that degree of imitation is influenced by both the sex of the model and the sex-appropriateness of the behaviour has been shown by a number of investigators (e.g., Bandura, Ross & Ross, 1961, 1963; Fryrear & Thelen, 1969; Zimmerman & Kousa, 1975). In general, these studies have shown that boys are more likely to imitate masculine behaviour if they observe a male model, and that girls are more likely to imitate feminine behaviour if they observe a female model. Whether a similar effect would be observed with aggression is unclear. What is important in the context of the present study is whether boys

would be less likely to imitate aggression if they were shown a female rather than a male model. This possibility is supported by Hicks (1965), who found that both boys and girls were less likely to imitate the aggressive behaviour of a peer female model than that of a peer male model. In addition, Maccoby and Wilson (1957) did not find sex-differences in imitation when only female models were observed.

The effects on imitation of the sex of the model and of the sex-appropriateness of the modelled behaviour suggest that the boys in the last experiment were more aggressive than the girls because they had seen only a male model, and the girls had seen only a female model. If the males were shown a female model, perhaps their level of aggression would be reduced. One could then repeat the last experiment using male subjects to see if the boys' level of aggression would be altered by the presence or absence of frustration.

In the previous experiment, children were tested under two conditions. Some were frustrated during both learning and testing (group F-F) and some were never frustrated (group N-N). In the present experiment, the subjects were not frustrated when viewing the videotapes, but they were frustrated during the testing session (group N-F). Rather than retesting one of the previous groups from Experiment 3, the N-F manipulation was selected in this

experiment both because of economy in terms of experimenter time and to provide information on the effects of frustration experienced only at the time of testing.

Method

Four groups of children were tested, two groups of each sex. One group of each sex saw a same-sex model, and the other group saw a model of the opposite sex. As in the last experiment, each child saw both an aggressive and a non-aggressive film during the learning session. The children saw the films when they were not frustrated after having played with the toy box. Each child was tested approximately 24 hours later, after being frustrated by the robot, to determine whether the aggressive or the non-aggressive model would be imitated. All children experienced the same conditions. They each saw the films when not frustrated and were tested when frustrated.

Results

The results of the present experiment can be seen in Figures 11 and 12. Figure 11 shows the percentage of the children in each of the four groups who imitated the aggressive versus the non-aggressive models. The boys showed a significant difference in level of aggression depending on whether they had seen the male or the female model. Only 50%

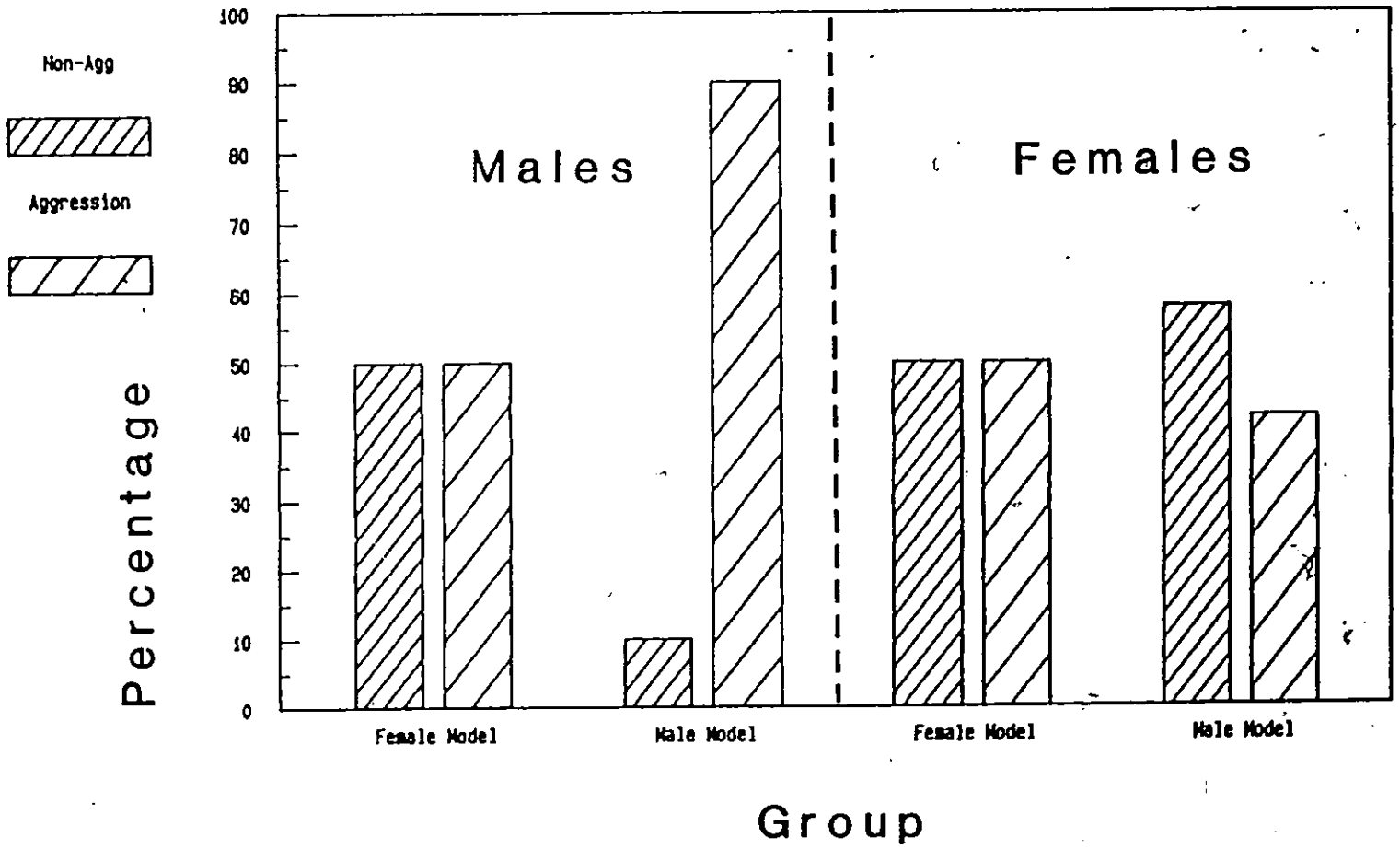
(5/10) of the boys who had seen the female model were aggressive compared to 90% (9/10) of the boys who had seen only the male model, $p < .05$. In contrast, the female subjects' level of aggression did not seem to be affected by whether they saw a male or a female model. Fifty percent (6/12) of the girls who saw the female model were aggressive compared to 42% (5/12) of the girls who saw the male model.

Sex-of-model did not affect whether the subjects approached the green or the red hand of the robot (Figure 12). Seventy percent (7/10) of the boys who had seen the female model approached the green hand of the robot compared to 60% (6/10) of those who had seen the male model. Fifty-eight percent (7/12) of the girls who saw the female model approached the robot's green hand, as did 25% (3/12) of the girls who saw the male model. This difference did not reach significance, $p < .1$. Sixty-five percent (13/20) of the subjects in the two male groups approached the green hand, compared to 42% of the total number of girls (10/24). This difference was not significant, $\chi^2 = 2.54$, $p > .1$.

Discussion

The data indicate that 4-year-old boys are more likely to imitate the aggressive behaviour of a male model than they are that of a female model. The same is not true of 4-year-old girls, who are equally likely to imitate

Figure 11. Percentage of each group of male and female subjects who imitated non-aggressive behaviour and the percentage who imitated aggressive behaviour. The data for the two groups of male subjects are shown in the left panel and the data for the females in the right. One group of each sex saw a female model and the other saw a male model.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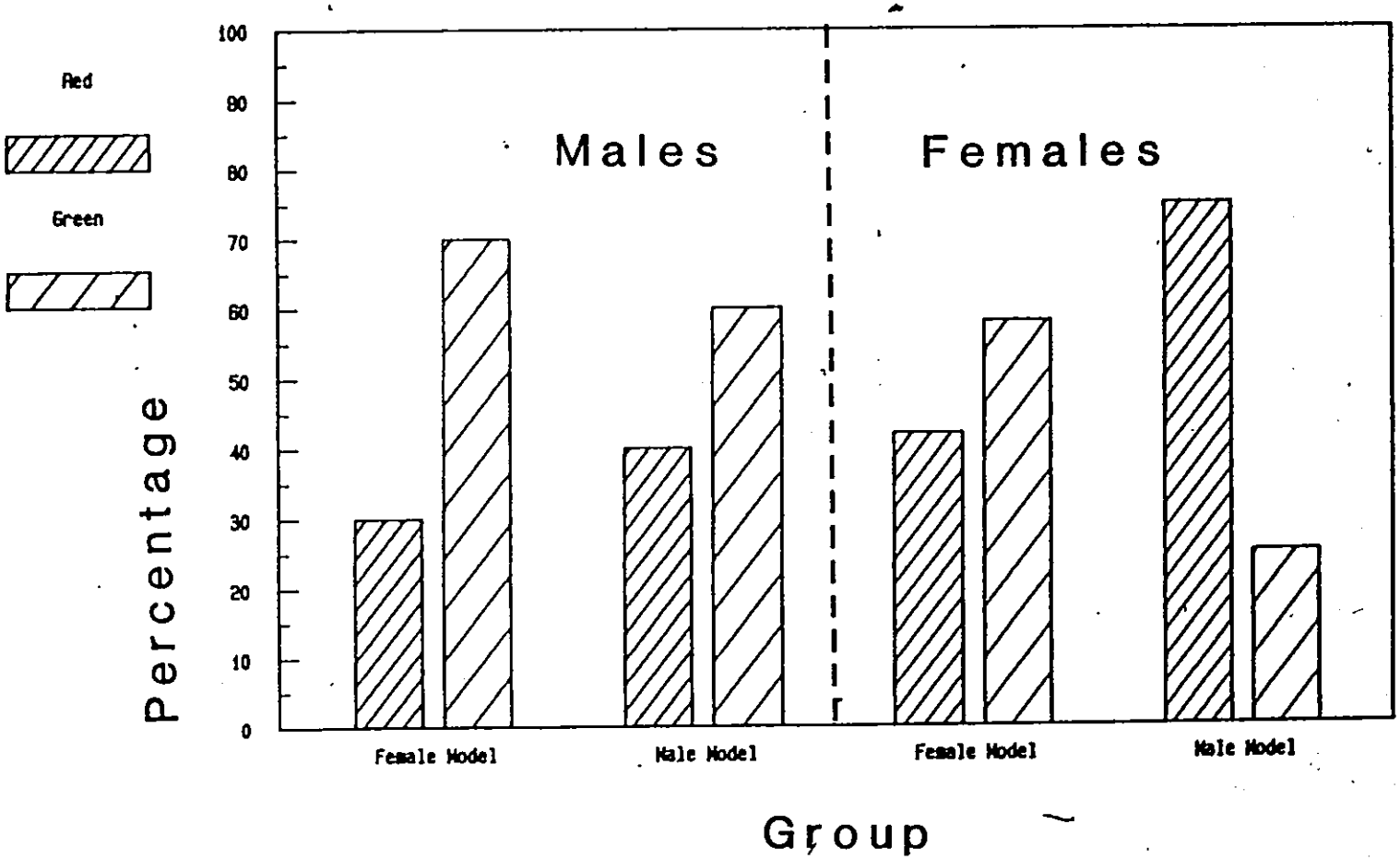
Female Model
Male Model
Group

Figure 12. Percentage of each group of male and female subjects who approached the red hand of the robot and the percentage who approached the green hand. The data for the two groups of male subjects are shown in the left panel and the data for the females in the right. One group of each sex saw a female model and the other saw a male model.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Female Model
Male Model
Female Model
Male Model
Group

non-aggressive and aggressive behaviour, regardless of whether the model they see is male or female.

The imitative behaviour of the boys follows the predictions made on the basis of the finding reviewed in the introduction. The imitative behaviour of the girls is less clear. One might have expected the girls to have shown an increased imitation of the non-aggressive behaviour of the female model. Although Hicks (1965) did report less imitation by girls of a female aggressive model, this result was not found by Bandura, Ross and Ross (1963). Further, while it may be true that girls are more likely to imitate the feminine behaviour of a female model, it is not clear that the non-aggressive behaviour of the models in the present study is seen as distinctly "feminine" by the children. Perhaps of more importance, however, is that unlike the present study, previous studies have not required children to choose between two alternative types of behaviour. Each type of behaviour is typically shown to different groups of children and the number of times a given behaviour is imitated is measured. Response choice and response frequency may be differentially affected by modelling variables. For example, when children were shown both male and female models, Bussey and Bandura (1984, Exp. 2) found that the sex of the model had less of an influence on female subjects imitation than it did on males, a result

similar to that obtained here.

It now seems likely that the high rate of aggression evidenced by the male subjects in Experiment 3 was at least partially due to their having been exposed to a male aggressive model. Given that the boys who see a female model are less aggressive, it should now be possible to repeat Experiment 3 to determine whether male subjects' level of aggression would be influenced by the presence or absence of frustration.

Experiment 5

The purpose of Experiment 3 was to determine whether frustration would increase the probability that a child would imitate aggressive rather than non-aggressive behaviour. Frustration did not increase the aggressiveness of female subjects, even when they were frustrated both during learning and during testing. The purpose of the present experiment was to determine whether frustration also fails to increase aggression in male subjects.

In Experiment 3, female subjects were assigned to one of two treatment conditions. In one condition, subjects were never frustrated (group N-N), neither during the training session when they were viewing the two videotapes showing aggressive and non-aggressive behaviour, nor during the testing session when they imitated either the aggressive or the non-aggressive behaviour seen in the films. The subjects in the second treatment condition (group F-F) were frustrated both when viewing the films and during the testing session.

The male subjects in Experiment 3 were maximally aggressive, even when they were never frustrated. This base rate of aggression had to be reduced before it could be determined whether frustration would increase aggression in males. In Experiment 3, subjects saw a same-sex model. That is, the girls saw a female model and the boys saw a male

model. The results of Experiment 4 indicate that boys tend to be less aggressive if they see a female rather than a male model. In the present experiment, then, boys were shown a female model in an effort to reduce the baserate of aggression. Effects of frustration on aggression could then be more readily observed.

Method

Two groups of boys were tested under conditions that were identical to those given the two groups of girls tested in Experiment 3. One group of boys (group N-N) was never frustrated, neither when viewing the videotapes nor during testing. Each boy in the second group (group F-F) was frustrated on both occasions. Each boy in both groups saw the two videotapes of the female model, one showing aggressive behaviour and the other non aggressive behaviour.

Results

The results of the present experiment can be seen in Figures 13 and 14. There were no significant differences between the two groups of male subjects. Figure 13 shows the percentage of boys in each group who imitated the aggressive versus the non-aggressive behaviour of the models. Sixty-seven percent (8/12) of group N-N imitated aggressive behaviour, as did 64% (7/11) of group F-F, $p > .1$.

Figure 14 shows the percentage of male subjects in the two groups who approached the green versus the red hand of the robot. Fifty percent (6/12) of the boys in group N-N approached the green hand, as did 55% (6/11) of group F-F, $p > .1$.

Discussion

In the present experiment, frustration did not increase the probability of boys imitating aggressive over non-aggressive behaviour. This is the same result that was found for the female subjects in Experiment 3. It would appear that children who were frustrated before seeing the aggressive and non-aggressive models were no more likely than non-frustrated children to learn the behaviours of the aggressive model. Furthermore, children who were frustrated after seeing the models were no more likely than non-frustrated children to imitate aggressive behaviour. These results are not consistent with a preparedness view of frustration and aggression. Frustration does not appear to make it easier to learn aggression, nor is aggression more likely to occur in response to frustration.

It might be argued that, had more subjects been tested, an effect of frustration might have been found. Confirming the null hypothesis is a difficult matter and the present results do not permit such firm conclusions.

Figure 13. Percentage of male subjects in each group who imitated non-aggressive behaviour and the percentage who imitated aggressive behaviour. The subjects in Group N-N were never frustrated and the subjects in group F-F were frustrated both when seeing the models and during the test session.

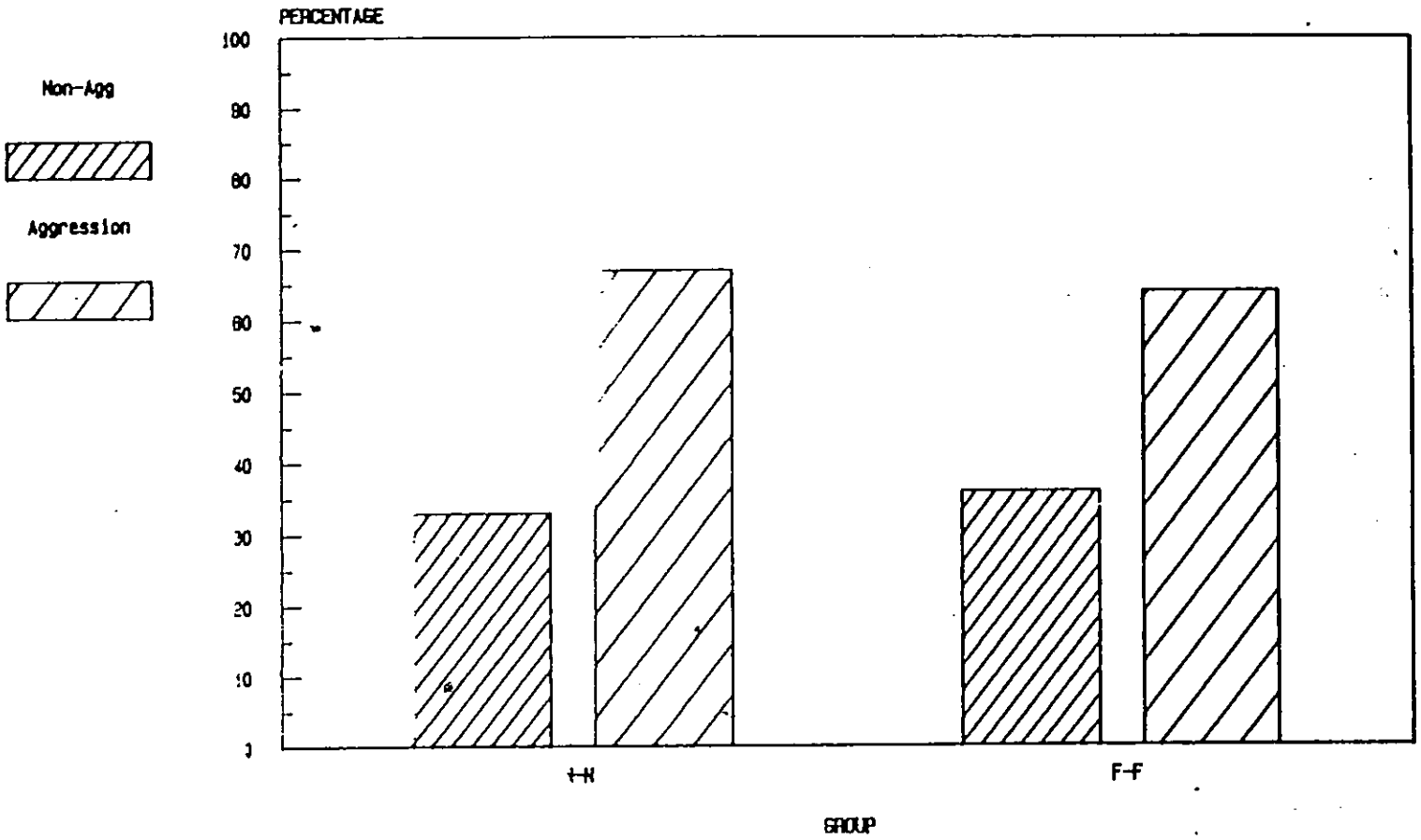
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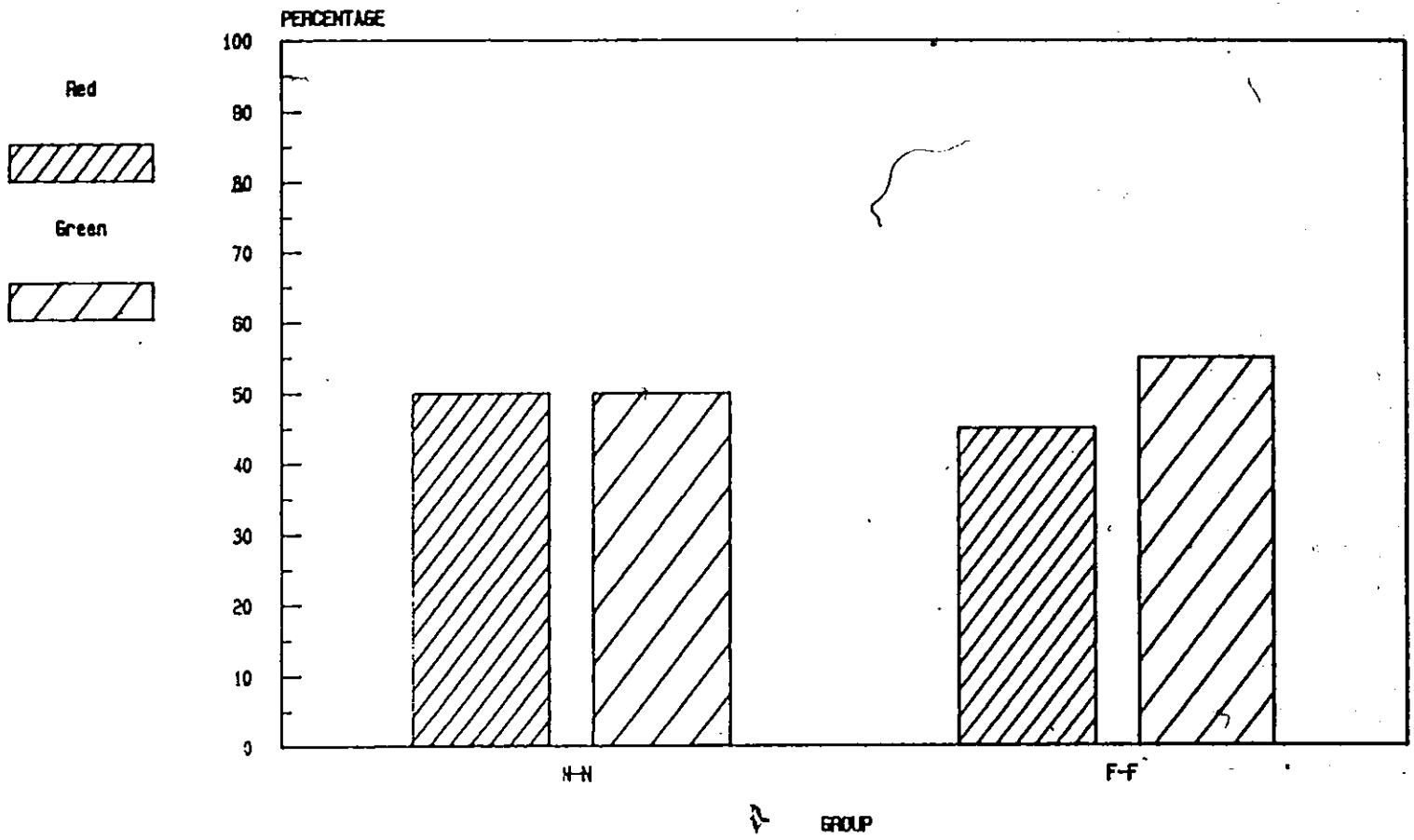
Figure 14. Percentage of male subjects in each group who approached the red hand of the robot and the percentage who approached the green hand. The subjects in Group N-N were never frustrated and the subjects in group F-F were frustrated both when seeing the models and during the test session.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However, what the present results do indicate is that frustration has a weak effect on aggression at best, and that there are more important factors determining whether aggression will occur.

The present results are consistent with the state-dependent view of frustration presented in this thesis. Frustration did not influence response choice because both aggressive and non-aggressive responses were learned in the same motivational context and were therefore not state-dependent. In this situation, frustration would not favour the selection of one behaviour over the other.

The finding that frustration does not favour the occurrence of aggression also is consistent with Bandura's view of the effects of frustration. Bandura's position is similar to that of Hull (1943) in regarding frustration as a general drive, or energy source, that increases the frequency and intensity of behaviour. The behaviour displayed, however, is the result of the organism's learning history. Presumably, the same behaviour would result in a given situation regardless of whether the person was frustrated or not. Frustration increases aggression because it increases the intensity of the response, not because it increases the probability of aggression. The results of the last three experiments are in line with this view.

In contrast to Bandura, the position being advanced

in this thesis is that frustration is a specific arousal source, not a general one. That is, frustration will not only increase the frequency and intensity of a response, but it will also play a role in the selection of that response. The results of Experiment 1 indicate that responses learned in the presence of frustration are more likely to be repeated during subsequent frustrations; this indicates that frustration influences the selection of behaviour. Frustration will increase the probability of aggression, not just its intensity, if aggression has previously been learned in the context of frustration.

General Discussion

The central thesis of this research was that emotional behaviour includes not only emotional reactions such as laughing, crying and facial expressions, but also learned, goal-directed behaviour. The possibility of an association between emotions and learned behaviour was investigated by examining three processes that might be involved in such a relationship.

The results of Experiment 1 supported the hypothesis that learned behaviour can be state-dependent. Frustrated children were more likely to imitate filmed models they had previously seen while frustrated, rather than those they had seen when they were not frustrated. These children imitated the non-aggressive behaviour they had seen on the films, even though they were frustrated. In contrast, the control children, who were not frustrated before seeing the films, were more likely than the children in the experimental group to imitate the aggressive, rather than the non-aggressive, models. The experimental subjects' non-aggressive behaviour was also directed toward the robot's red "hand", the one seen in the non-aggressive films.. The control subjects chose each hand equally often. These measures, of both the behaviour and discrimination of environmental cues, are consistent with

the idea that behaviours learned when people are in a given emotional state are more likely to occur later if they are feeling the same emotion.

Experiment 2 provided data concerning the hypothesis that behaviours learned during emotional arousal are more likely to be displayed than are behaviours learned in a more neutral state. Perhaps people can more easily learn behaviour when experiencing such arousal. The children might imitate the models they see while frustrated, even though they are tested while not frustrated. This hypothesis was only partially supported. The aggressive bias of the children in this group (likely due to the boys, see below) was too strong to be affected by this procedure. However, the measure of which of the robot's hands they approached was consistent with the hypothesis. Whether they picked the red or the green hand depended on which hand they had seen the model approach when they were frustrated.

The results of Experiments 1 and 2 suggest that emotions are influential both during the learning and during the performance of behaviour. At least some of this influence may be due to the physiological arousal associated with emotional states. Evidence reviewed earlier indicates that physiological arousal can have similar influences on memory at both the encoding and the retrieval stages.

Experiments 3, 4 and 5 were conducted to investigate

the hypothesis that aggression is not a prepared response, that it is no more likely to be either learned or displayed during frustration than is non-aggression. This hypothesis was supported. There was no interaction between type of behaviour and emotional state, either at learning or during testing. If children saw both aggressive and non-aggressive films, they were no more likely to imitate the aggressive behaviour if they saw these films when frustrated rather than when they were not frustrated. Similarly, they were no more likely to imitate aggression if they were tested when they were frustrated than they were if they were tested when they were not frustrated. There was a sex difference in aggression, however, with boys being more aggressive than girls. This aggressive bias only occurred, though, when the boys viewed a male model. Sex of model did not influence the behaviour of the girls.

In sum, the data support the contention that emotions influence learned behaviour. Three possible types of influence were investigated; the evidence suggests the involvement of two of these, which are state-dependent and arousal effects. This is not to suggest that these are the only two processes involved; there are undoubtedly others as well. These results do indicate, however, that emotions affect behaviour through the action of a number of separate and potentially identifiable processes.

Implications

Perhaps the major implication of these results is that behaviours are more likely to occur in the emotional state in which they are learned. More importantly, it is likely that these behaviours will not be changed by learning involving a different state. If so, then therapy designed to change behaviour should consider the emotional state in which it occurs. Techniques to control anger related violence, for example, may be optimally successful if carried out in the context of the anger state. New ways of behaving while angry would have to be taught, and teaching these behaviours while the person was angry would probably be the best approach. This does not mean, of course, that other approaches will not work, since some transfer of learning between states almost certainly is possible. Nevertheless, it seems likely that the most successful behaviour therapies would be those that consider the emotional state in which the behaviour occurs.

That this state-dependent view of emotions applies to imitative behaviour has interesting implications as well. Whether or not a child will imitate televised violence, for example, has been the subject of some controversy. Geen (1983), for example, concluded that observation of television violence is correlated with a child's aggressiveness, and that violence viewing causes aggression. Freedman (1984), on

the other hand, concluded that there is no convincing evidence of a causal relationship and that aggressive children may simply watch more violent television. Huesman, Lagerspetz and Eron (1984) present data suggesting that both conclusions may be correct. Path analysis of data from large-sample studies of children in the United States and Finland indicated a bidirectional effect. The viewing of violence leads to aggression, and increased aggression results in increased violence viewing. These authors emphasize, however, that television violence is only one of many factors influencing a child's aggression. Currently, a conservative conclusion would seem to be that children can learn this violence, and that some children, under some circumstances will imitate it as well. The present data suggest that whether or not a child imitates behaviours seen on television may well be influenced by the emotional state the child is in at the time of viewing. If a child happens to have been frustrated before watching a program containing violence, then the chances of the child imitating that violence when subsequently upset may be quite high. Further, if behaviours learned during emotional arousal are more likely to be performed regardless of emotional state, then the child who is upset while watching televised violence may be more likely to display this violence even when not upset. The data, however, only permit this speculation in cases

where the violence is seen as a solution to the child's problem. It has not been established that frustration always increases the likelihood of behaviours previously seen while frustrated. This, in fact, is very unlikely. Such behaviour is not likely to be displayed if it is inappropriate. Aggression, for example, may be displayed under some frustrating circumstances but not others, even aggressive children learn that violence is sometimes not appropriate.

Also related to the learning of televised violence is the present finding that boys will learn violence more easily than other types of behaviour if the model is a male peer. It would be particularly disturbing if these results also generalized to adult male models, since much of the aggression on television seems to be portrayed by adult male actors.

The results of the last three experiments which concerned the relationship between frustration and aggression may seem surprising. That aggression is neither more easily learned, nor more likely to be displayed during frustration appears to contradict the view that arbitrary frustration increases aggression. If this view is correct, and evidence was previously reviewed suggesting that it is, then some explanation must be found for this relationship. If aggression is learned, then why is it learned in response to frustration more often than other behaviours? One possible

explanation may be that the current experiments were not sensitive enough to reveal a relationship. In order to clearly support a hypothesis of no differences, many more subjects would have to be tested in each condition. Nevertheless, since frustration was not able to exert an effect in these experiments, any relationship between frustration and aggression, at least under the present conditions, must be quite weak.

A more likely explanation may be that the current data deal only with instrumental behaviour. That is, both the aggressive and the non-aggressive behaviours were potential solutions to the problem causing the frustration. In situations where the frustrating problem does not have a ready solution, one might find an increased tendency toward aggression. In such situations aggression may occur as a last resort, not necessarily because it is learned but because no other behaviour is available as a solution to the problem. The role of learning in this form of aggression, if it exists, is still an open question.

Further, the present data do not rule out the possibility that frustration also plays a role in the type of instrumental aggression studied here. The state-dependent view, in fact, suggests that it does. If one assumes that aggression has previously been learned in a frustrated state, then one would expect aggression to occur during subsequent

episodes of frustration. This view assumes that either aggression is more often learned during frustration than are other forms of behaviour or that aggression is less often learned during non-frustration. One can perhaps assume that aggression rarely serves a socially acceptable purpose during periods of non-frustration, and is therefore less likely to be learned during these periods. On the other hand, aggression is often useful in solving problems of frustration and, in young children it is one of the few forms of behaviour available in achieving this end. Toddlers do not possess the forms of communication that allow the non-aggressive solution of personal conflicts. The only way to obtain a desired toy, for example, is through physical means. If another child objects, then both children must engage in behaviours that we normally call aggressive. Such tactics must be used by most, or all, young children during periods of interpersonal conflict.

Such a view implies that children must be taught not to be aggressive when frustrated, and it is not surprising if these efforts are not entirely successful. The increased socialization pressures on young girls to be non-aggressive implies that they will be more successful in this endeavour. The fact that they were, generally, less aggressive in these experiments supports this view.

Nevertheless, sex differences in aggression has been

a consistent finding in the psychological literature and has been interpreted from both sides of the nature-nurture issue. In most mammalian species, the males are more aggressive than the females; this difference seems to be due to the male hormone testosterone (Moyer, 1976). It has been persuasively argued by Maccoby and Jacklin (1974) that the sex differences often observed in human cultures are also biologically based. On the other hand, Tieger (1980) argues that there is no good cross-cultural evidence that children under six years of age exhibit sex differences in aggression, implying that children must learn whatever sex differences appear later, a conclusion disputed by Maccoby and Jacklin (1980).

It is apparent that the current results do not necessarily distinguish between either the nature or the nurture interpretation of sex differences in aggression. Aggression can be learned. Sex differences in such learning may be due to biological differences in learning this type of behaviour, or they may be due to cultural effects influencing the display of aggression. Further, if aggression in humans is related to testosterone levels, independently of learning, sex differences in aggression may not be pronounced until after puberty.

It must be recognized that many of the implications derived from the present data are somewhat conjectural, but regardless of whether they are eventually supported, the

results of this research do suggest that emotions have effects on learned behaviour and that these effects can be usefully studied. It does not seem necessary to know what emotions are, or to be able to identify them, to be able to do this. At this point, it is enough to know that there are situations which affect behavioural choice in a way that is sufficient to justify the postulation of a hypothetical internal state. The nature of this state may be unknown, but this knowledge is not necessary for an examination of its effects. It might be argued, in fact, that the nature of emotions will never be fully understood until we have a reasonable knowledge of their effects on behaviour. It was pointed out in the introduction that the preoccupation to date has been with determining the causes of emotion, and with investigating emotion related responses, such as visceral reactions and facial expressions. Some understanding of these phenomena is important, but equally important is an understanding of the results of emotions. Knowledge of the determinants of emotions and the effects of emotions are both important prerequisites for defining and identifying emotional states.

Criticisms

One limitation of this work is the lack of knowledge concerning the generalizability of the results. It is not

clear whether all emotional states have the same effect on behaviour. It was previously noted that Bower and his associates have obtained contradictory results in their studies of mood-dependent effects on memory. The inference that the present results would also be found for other emotions and other behaviours cannot be taken for granted, and the effects on behaviour of other emotions should be studied as well. Further, the influence of environmental context is unclear since it was kept constant throughout these experiments. Whether the behaviours learned in this context will generalize to other situations is therefore uncertain. This uncertainty extends to different types of frustration as well. Will behaviour learned in one frustrating situation be displayed in a different frustrating situation? These questions of generalization temper the implications of the present findings, and are worthwhile topics for future research.

Another of the questions that arises as a result of this research concerns the involvement of autonomic arousal in these emotional effects. One possibility is that the state-dependent effect of frustration is due to the effects of this arousal as a stimulus cue. If some behaviour is learned in its presence, then arousal might subsequently act as a contextual cue facilitating the display of that behaviour. Clark (1982) has suggested such a process in the

retrieval of emotional memories, with autonomic arousal being one of many emotional cues influencing such retrieval. As Clark notes, however, this conclusion is complicated by unresolved questions concerning the nature of autonomic arousal. If all emotions produce similar arousal, then all emotional memories will be equally activated by such arousal, whatever its source. The memories that will actually be retrieved will then depend on other components of the emotional situation. Conversely, if different emotions produce different patterns of autonomic arousal, then each emotion will activate emotion specific memories. A further possibility is that level of arousal also is a discriminating cue. For example, high levels of arousal may be associated with different memories than low levels of arousal.

Clearly, the role that autonomic arousal plays in emotional behaviour is still a matter of debate. Although different emotions have been associated with different patterns of arousal (Averill, 1969; Ekman et al., 1983; Schwartz et al., 1981), these differences are usually slight and there is not a uniform opinion as to whether they are functionally significant. Schachter (1964) and Mandler (1984), for example, consider autonomic arousal to have the same effects for all emotions. This conclusion is predicated on the idea of discriminable differences in arousal. In this view, emotion involves the cognitive labelling of autonomic

arousal and if emotion producing events do not result in perceived differences in arousal, then different labels cannot result. Different emotions, and their consequent labels, result from different environmental events, not from differences in arousal. Although one may not be able to discriminate differences in emotional arousal, however, such differences may still have implications for emotional memory and behaviour. There is growing evidence that different emotions result in the release of different amounts and types of hormones (McGeer & McGeer, 1980) and that these hormones affect memory consolidation (McGaugh, 1983a, 1983b). While it is not clear whether these hormones are involved in the context-dependent effects of emotion being discussed in this thesis, they may account for the increased memorability of material learned during emotional arousal.

At any rate, discussing the thesis data in terms of physiological arousal is probably premature since no independent measures of arousal were taken. Such measures were not ethically permissible and could only have provided correlational evidence at best. The point is only that the data are consistent with aspects of the literature on arousal. That literature leaves unresolved questions, however, and whether the present data are best discussed in such terms may be a matter of debate.

An important question that now arises is whether one

is compelled to interpret these results in terms of emotional states, or whether some alternative explanation might prove just as satisfactory. Great care was taken, for example, to maintain a constant environment so that the children could not associate the different films they had seen with different environmental cues. There were, however, at least two differences. One was the fact that the robot did not say exactly the same things before each film. In one condition, the robot told the children that they could play with the toy box before they saw films, and in the other condition the robot told them that they could not. The other was that the children received prizes in one situation but did not receive them in the other. One might then choose to explain the results in terms of these different stimuli, rather than in terms of a hypothetical internal state. The different films, in other words, may have become associated with these different stimuli. When one of these stimulus situations was again present, the behaviour associated with it would be more likely to occur.

The problem with this explanation, however, is that these experimental variations do not produce identifiable, external stimulus changes in the absence of their associated meanings. It is unlikely that the robot's words, devoid of meaning, would provide usable different cues. If the robot had said the same things, but in a different language, one

would not expect the same effects. Similarly, if the toy box and the prizes had been replaced by rocks, or by some other unimportant objects, it is equally unlikely that their presence or absence would have much of an effect. It is not change per se, but the value of the change that is important. Differences in the experimental manipulations are important because they are important to the child.

It is, of course, possible that the different experimental situations produce conditioned or unconditioned responses in the child. The words of the robot in the frustration condition, for example, might have previously been associated with negative outcomes, thus producing conditioned reactions such as physiological arousal. Alternatively, frustration may be inherently negative, producing these reactions without any prior conditioning. In either case, these responses do not occur during non-frustration, and different behaviours can be learned in their presence or absence. To the behaviourist, if one type of behaviour is learned in the presence of these cues, then that behaviour will be more likely to occur when those stimuli are again present. This behaviourist view, it might be argued, does not require an additional emotional construct.

There are two important points to be made about this interpretation. The first is that we are no longer talking

about environmental changes. We are now talking about something unseen and unmeasured which is hypothesized to occur inside the person. That emotions involve central or peripheral changes is, of course, perfectly compatible with the view of emotions being developed in this thesis. Second, that behaviours are learned in the presence of stimuli means, to the behaviourist, that they are reinforced in the presence of those stimuli. The present results, however, are not easily interpreted by reinforcement theories of learning. The children have not been obviously reinforced for performing any of the behaviours before the test session. One might argue that the subjects were vicariously reinforced, that is, they saw the models in the films being able to play with the toy box and this may have been reinforcing. However, this same reinforcement occurred in all films and was not differentially associated with either experimental condition. Further, Bandura (1965) has shown that such vicarious reinforcement does not affect learning.

It has also been argued (e.g., Baer & Sherman, 1964) that unreinforced imitation can be accounted for by a previous history of learning to imitate. Children who have been reinforced in the past for imitating others will continue to do so even though they have not been reinforted on every occasion. Again, however, this argument does not account for the discrimination shown by the children in the

present experiments. It may apply to the fact that the children imitate the films, but it does not explain why they imitate some films but not others.

Finally, any of the criticisms described above do not easily account for the data of Experiment 2. If the children were responding on the basis of any simple model of discrimination learning, frustrated children should imitate films they have previously seen while frustrated, and non-frustrated children should imitate films they have previously seen while not frustrated. This did not happen. Children who were tested when they were not frustrated were more likely to imitate films they had previously seen while frustrated.

The present results, then, do not lend themselves to interpretations in terms of external stimuli or reinforcement. It seems reasonable to suppose that frustration results in internal stimuli, but it is not clear whether these are peripheral, somatic stimuli, or central, cognitive stimuli. In any case, it seems doubtful that these stimuli became associated with the behaviours seen here through the action of reinforcement. Since a reinforcer is defined as any consequence which increases the rate of a response, it might be tempting to say that because the response occurred, it must have been reinforced. Even if the behaviour appears full-blown, it may have been learned

through covert activity, as one might do in practicing a speech, for example. This is unacceptable, however, since definitions used in this manner become tautologies - the behaviour increased because it was reinforced, and we know that it was reinforced because it increased. This is not to say that some reinforcing event might not be found in the future, but it must be found and not merely presumed.

Another possible interpretation of the the present results might be that the data are characteristic of problem solving tasks, not of emotions. Since the children learned solutions to the problem of not being able to play with the toy box, processes of problem solving rather than processes of emotion might have been the relevant influences on behaviour. In answer to this criticism, it should first be pointed out that emotional situations, at least those involving negative emotions, are usually situations involving problems that must be solved. Situations causing fear, for example, usually require some action, perhaps to be removed from danger, that can be seen as problem solving activity. It may be that in these situations problem solving processes are part of the emotional reaction. A narrowing of attention and a concentration on the problem at hand, while perhaps characteristic of emotion, are probably characteristic of most other situations that a person finds interesting as well. These effects may be involved in the observation made

earlier that emotional events may be well remembered, since these events are more salient and more likely to be attended to.

Such an analysis, however, does not easily account for the state-dependent effects found in these experiments since it suggests that one solution was more attended to, and better learned, than the other. These would therefore be the most likely behaviours, at all times, since they were the best learned. This did not occur. The children who were tested when they were frustrated behaved differently than the children who were tested when they were not frustrated.

Finally, the thesis might be criticised on the grounds that there was no verification of the presence of an emotion. Since no independent measures of emotion were taken, what evidence is there that the frustration procedure produced an emotion? For example, physiological measures of arousal changes might have been taken to justify the supposition of emotional changes. It might be argued that without such evidence there is no justification for discussing the results in terms of emotion. In answer to this criticism, it must be reiterated that at no time before analyzing the data was one entitled to assume that the frustration procedure produced an emotional change. The frustration procedure was hypothesized to have certain predictable effects on behaviour. In this sense, emotion is

a hypothetical variable intervening between the frustration procedure and the behaviour. Emotion is a useful intermediate term that is used to "explain" why certain events result in predictable behaviour. It is not necessary to independently identify this state to investigate this question. If such a state exists, and if it has effects on behaviour, then these effects should be able to be identified and the existence of the state can be inferred. If such effects cannot be identified, then no conclusions can be drawn. Either the state does not exist (or it was not induced), or it has no effects on behaviour, or it has effects that the investigator did not examine.

To say that such effects would establish the existence of an emotional state might be misleading. If such effects are found one is still not entitled to reify the concept and to assume that emotions exist as real and separate entities. Emotion is an introspective term presumably describing the effects of a number of separate and potentially identifiable processes. The assumption guiding the present research was that the processes that operate in contextual effects and in state-dependent learning are the same as, or similar to, some of the processes that produce emotional effects. Further, these processes were assumed to be most often set in motion by certain kinds of environmental events. Frustration is the most studied of these types of

events and was the one chosen for this research. Emotion, then, is simply a useful term for describing the processes activated by these events. The present research was intended to examine how these processes interact with behaviour.

An additional hypothesis that could have been made in this thesis was that frustration would result in sympathetic arousal. In this sense, however, measures of arousal would not provide independent verification of an emotional state but would only provide verification of another hypothetical property of emotion. In other words, such evidence would be no more independent than is the evidence of a state-dependent effect. A valid independent measure could only come from a well established and accepted measure that had been verified outside of the hypothetical system in question. Emotions have not been well enough investigated to provide such a measure in all cases. A measure of arousal may have provided converging evidence in the present thesis, but it would not have been definitive.

There is one criticism of the view presented here, however, that probably is appropriate. Although not explicitly stated, the implication has been that the processes discussed in this thesis are sufficient to account for learned emotional behaviour. This is undoubtedly an oversimplification. This analysis has been a reductionist one and, while a valid first step, the final determinants of

behaviour are probably a great deal more complex than such a view will allow.

An indication of this complexity is contained in the results of a study of the childhood histories of parents who physically abused their children, compared to a matched group of non-abusing parents (Shattuck, Cuddy, Shearman, Norman, Evans, & Boyle, 1982). If behaviours are learned in the emotional state in which they occur, it seemed reasonable to hypothesize that these parents had learned their abusive behaviours, and that an examination of their childhood histories would demonstrate an opportunity for such learning.

The data supported the hypothesis in that 100% of the abusive parents had experienced violence as children ranging from spankings to severe beatings. However, many of the non-abusive parents had experienced similar levels of violence and this measure was not a very good predictor of abuse. The best measure is shown in Figure 13 which indicates the probability of being an abuser given the number of types of punishment received as a child. These punishments included not only violence but also discipline techniques which did not involve physical aggression such as isolation, scolding and ridicule. That these latter forms of punishment correlate so highly with subsequent physically abusive behaviour is difficult to reconcile with the notion that this abuse occurs because it is learned and displayed

during emotional arousal. Certainly, the punishments these parents received as children were emotionally arousing, but the non-aggressive punishers were just as likely to contribute to aggressive parenting practices as were the physically aggressive punishments. Why such practices as ridicule and isolation should subsequently contribute to physical aggression is unclear. This is, of course, a correlational, retrospective study and many other factors may be involved. Perhaps the non-abusive parents had a greater opportunity to learn non-violent behaviour, for example. Certainly, the fact that the abusive parents had all experienced violence is a suggestive finding. Nevertheless, these data indicate that it would be premature to assume that learned emotional behaviour results solely from the factors investigated in this dissertation.

Finally, it is worth reiterating that context effects are not unique to emotions. The same might also be true of the effects of autonomic arousal. Perhaps all of the processes associated with emotion also will be found to be active in non-emotional spheres. Whether this is true or not, a reasonable suggestion might be that the number and type of processes that are activated by emotional events may ultimately provide a workable definition of emotion. In defence of this notion, the present data do suggest that emotions result from the action of a number of separate and

potentially identifiable processes, and that the effects of these processes on behaviour can be usefully studied.

Figure 15. The probability of an adult being an abusing parent as a function of the number of forms of punishment that adult received from his or her own parents as a child.

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