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TITLE OF THESIS..ATTACK, CONFLICT, AND TARGET OF ~~AGGRESSION~~ DISPLACED AGGRESSION....

UNIVERSITY..UNIVERSITY OF ALBERTA.....

DEGREE FOR WHICH THESIS WAS PRESENTED...PH.D.....

YEAR THIS DEGREE GRANTED.....1970.....

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DATED..August 25....1970

NL-91 (10-68)

THE UNIVERSITY OF ALBERTA

ATTACK, CONFLICT, AND TARGET OF DISPLACED AGGRESSION

by

© GERI LYNN HEWITT

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1970

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Attack, Conflict and Target of Displaced Aggression" submitted by Geri Lynn Hewitt in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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ABSTRACT

This study tested predictions concerning aggressive responding toward one of several targets, who varied in similarity, following high or low attack and high or low conflict about aggressing against the attacker. Predictions were derived from N.E. Miller's model of conflict and displacement. A secondary purpose of the study was to examine the relationship between cardiac response and the anger instigation-aggression sequence.

Subjects were initially given a typed communication which related that the purpose of the study was to examine the effects of psychological stress upon the task performance of people varying in age. Subjects in the high conflict condition were informed that the body's tolerance for stressful stimuli declines rapidly in the late 30's. Subjects in the low conflict condition were informed that such tolerance declines in the late 50's. Each S was informed that he and his partner would evaluate each other's task performance. The S then performed a brief task and was given either a very favorable evaluation (one shock) or a very unfavorable evaluation (17 shocks) by a 39 year-old partner.

Subsequently, the S was given the opportunity to evaluate the learning-task performance of one of four targets who varied in age: either the original 39 year-old partner or a new partner who was either 34, 29 or 25 years old. Thus, age was used to vary degree of similarity between the original partner and the subsequent partner.

Aggression was measured in terms of the intensity, number, and duration of shocks administered by Ss to the target over a series of 15 shock trials. Subjects also completed postexperimental questionnaires which included checks on the effectiveness of the manipulations.

Results indicated that, over all conflict and attack conditions, the 39 year-old target received the least amount of aggression while the 29 year-old target received the greatest amount of aggression. Evidence for a displacement effect was equivocal. Under high conflict-high attack conditions, more shocks were given to the 34 year-old target than to the other targets. Angered Ss under high conflict may have displaced aggression from the attacker onto the most similar available target. The fact that the attacker and the most similar target did not, however, receive the most shocks under low conflict-high attack argued against acceptance of a displacement interpretation.

Under low conflict, high-attacked Ss gave more intense shocks than did low-attacked Ss whereas under high conflict, low-attacked Ss gave more intense shocks than did high-attacked Ss. This finding was discussed in terms of an hypothesized arousing effect of the high conflict communication.

Results indicated that significant differences in resting-level heart rate existed between experimental groups. This finding precluded interpretation of the role of cardiac response during anger arousal and aggression.

ACKNOWLEDGMENTS

I wish to thank Dr. Brendan Rule, who supported this effort with her ideas, encouragement, and research funds.

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INTRODUCTION

The frustration-aggression hypothesis remains the most popular explanation of aggressive behavior. This hypothesis, advanced by Dollard, Doob, Miller, Mowrer, and Sears (1939), originally proposed ". . . that the occurrence of aggressive behavior always presupposes the existence of frustration and, contrariwise, that the existence of frustration always leads to some form of aggression (p. 1)." Criticisms of the generality of the two-part hypothesis led Miller to amend the second part to read: "frustration produces instigations to a number of different types of responses, one of which is an instigation to some form of aggression (Miller, 1941, p. 338)." Miller thus made explicit what was presumably implicit in the earlier work. Miller did not, however, modify the basic presupposition that frustration always heightens the probability of an aggressive response. Whether or not overt aggression actually follows a frustration was assumed to depend upon several factors: the intensity of the frustrated drive, the degree of interference with the drive, the number of such interferences, and the amount of punishment anticipated for aggression (Dollard et al., 1939). Additional factors were cited by Doob and Sears (1939).

Definition of the terms, frustration and aggression, has provoked considerable controversy since publication of the original monograph. "Frustration" was initially defined by the Dollard group as "an interference with the occurrence of an instigated goal-response

at its proper time in the behavior sequence (1939, p. 7)." "Aggression" was initially defined as any "sequence of behavior, the goal-response to which is the injury of the person toward whom it is directed (1939, p. 9)."

Critical reviews of the "amended" frustration-aggression hypothesis have suggested that the major point of contention is the assumption that all aggression is preceded by frustration, as originally defined (Bandura & Walters, 1963; Berkowitz, 1958, 1962, 1965, 1969; Buss, 1961; McNeil, 1959). Maslow (1941), Rosenzweig (1944), Buss (1961), and Bandura and Walters (1963) have expressed strong objections to this aspect of the hypothesis. Maslow and Rosenzweig have denied that purely frustrative (blocking) stimuli would ever result in aggression: threatening stimuli must also be present. Buss, Bandura, and Walters have regarded frustration as just one of several antecedents of aggression; Buss has considered attack and annoyers to be the most potent antecedents of aggression (1961, pp. 29-32) while Bandura and Walters have stressed the role of social learning in determining aggressive behavior (1963). Berkowitz and his colleagues have also rejected the premise that all aggression is preceded by frustration but, in contrast to other critics, have maintained that frustration is a major determinant of aggressive behavior (Berkowitz, 1965a).

The dispute between the attackers and defenders of the frustration-aggression hypothesis largely derives from different interpretations of the term "frustration." Berkowitz has included attack (physical or verbal), as well as blocking operations in his definition of frustration (1962); Buss, on the other hand, has attempted to

distinguish between attack, "the delivery of noxious stimuli" to a victim, and frustration (1961, p. 1; p. 17).

Research on the Antecedents of Aggression

A review of the research literature has indicated that operations involving "pure" frustration (blocking) as well as those involving attack have increased aggressive responding. Task-frustrated Ss responded with heightened physical aggression (shock) in several studies (Buss, 1963; Geen, 1968; Geen & Berkowitz, 1967; Rule & Percival, 1970). Frustration did not result in heightened aggressiveness in several other studies (Buss, 1966b; Epstein, 1965; Loew, 1967; Rule & Hewitt, 1970).

In three studies (Geen, 1968; Geen & Berkowitz, 1967; Rule & Percival, 1970), direct comparisons were made between the effects of task frustration and attack (verbal insult) on subsequent aggression toward a partner on a learning task. Although insult led to significantly greater amounts of aggression, following exposure to filmed violence, in the Geen studies, the findings in the Rule and Percival study, while more complex, essentially demonstrated that task-frustrated Ss were more aggressive than insulted Ss when aggression appeared to be instrumental in overcoming the frustration. The instrumental role played by aggressive responding was thus of considerable importance in determining which antecedents would be most potent.

The vast majority of investigations have demonstrated, however, that attack is the most potent and reliable antecedent of aggression; consequently, operations involving attack or annoyance (harassment) are generally preferred to purely frustrative operations in studies

of interpersonal aggression. Verbal attack and/or harassment have been the most extensively used operations (see Baker & Schaie, 1969; Berkowitz & Knurek, 1969; Berkowitz & Rawlings, 1963; Feshbach, 1955, 1961; Gambaro & Rabin, 1969; Geen, 1968; Geen & Berkowitz, 1967; Hokanson, 1961; Hokanson & Burgess, 1962; Hokanson, Burgess, & Cohen, 1963; Hokanson & Shetler, 1961; Landy & Mettee, 1969; Pytkowicz, Wagner & Sarason, 1967; Rothaus & Worchel, 1964; Rule & Percival, 1970; Rule & Hewitt, 1970; Worchel, 1957). In a number of studies, physical attack (shock) has been employed to anger Ss (see Berkowitz, 1966; Berkowitz & Geen, 1966, 1967; Berkowitz & Green, 1962; Berkowitz, Green & Macauley, 1962; Berkowitz & Holmes, 1959, 1960; Berkowitz & LePage, 1967; Epstein & Taylor, 1967; Holmes, 1966; Taylor, 1967).

Although it is clear that frustration or attack can heighten aggressive behavior, presumably by creating an internal "readiness" for aggression, these operations need not inevitably result in aggressive reactions. Inhibitions about expressing aggression, resulting from moral prohibitions or fear of punishment, may prevent the individual from responding aggressively. Further, overt aggression may not occur if the individual has learned to make nonaggressive responses to a particular provocation (Bandura & Walters, 1963; Berkowitz, 1962). If nonaggressive responses are unsuccessful in overcoming the provocation, then, according to proponents of the frustration-aggression hypothesis, the likelihood is heightened that an overt aggressive reaction will occur (see Otis & McCandless, 1955).

Berkowitz, the foremost proponent of the frustration-aggression hypothesis, has suggested that an overt aggressive reaction to

frustration (in the broad sense) is also dependent upon the possession of "appropriate stimulus qualities" by the available target(s) for aggression (1962). The most suitable target for aggression is, of course, the anger instigator himself. If, however, the victim is unable to attack the instigator (due to the victim's inhibitions or the instigator's absence), then a substitute target, somehow associated with the instigator, may be attacked.

Displacement of Aggression

The notion that aggression may be displaced onto substitute targets was expressed by Freud (1938) and further elaborated by the frustration-aggression theorists (Dollard et al., 1939). Displacement presumably serves a homeostatic function, permitting energy from blocked goal-directed activity to be re-directed toward some other goal.

Although evidence from both the clinic and the laboratory has supported the notion of aggression displacement (see Miller, 1948), no theory can predict the actual target of displaced aggression (Kaufmann, 1965). The authors of the frustration-aggression monograph made a systematic attempt to analyze displaced aggression as an instance of stimulus generalization. Miller (1944; 1948) further developed the original analysis to the degree that general predictions concerning target choice could be ventured.

In the Miller model of conflict and displacement, selection of the substitute target is essentially determined by the available targets' degree of similarity to the anger instigator. That is, the strength of the victim's desire to aggress against the instigator is assumed to generalize to similar targets; the strength of the generali-

zation varies directly with the association (similarity) between the instigator and other available targets, thereby yielding an "approach" gradient. Thus, when direct aggression toward the instigator is prevented merely by the latter's absence, aggression will be displaced onto the most similar target available.

Miller's conflict model does not always predict that aggression will be displaced to the most similar target available. If the victim anticipates retaliation or guilt feelings as a consequence of direct counteraggression, then the resultant inhibitions about aggressing are also assumed to generalize to targets varying in similarity to the instigator. Again, the strength of generalization is assumed to vary directly with the similarity between the instigator and other available targets, thus yielding an "avoidance" gradient. Approach and avoidance tendencies are assumed to sum algebraically thus yielding the greatest net approach (aggressive) tendency at the point on the stimulus similarity dimension where the avoidance (inhibitory) tendency is weakest.[1] Since the avoidance gradient is assumed to fall off more steeply with increasing stimulus dissimilarity than does the approach gradient, the tendency to aggress is greater than the inhibitory tendency at some point along the similarity dimension. At that point, aggression occurs.

Prediction of this point (or target) of aggression is difficult. The Miller model gives only general guidelines: as the strength

[1]The model assumes, however, that the instigator is the most probable target of aggression whenever aggressive tendencies toward him are stronger than competing inhibitory tendencies.

of the inhibitory response increases, the point of strongest displacement is assumed to shift toward targets increasingly dissimilar to the instigator. As Berkowitz (1962) has stated: the stronger the inhibitions relative to aggressive tendencies, the less similar the substitute target will be to the frustrater. Unfortunately, the strength of the victim's inhibitions concerning direct counteraggression can only be conjectured.

Not all theorists go along with the Miller-Berkowitz approach to displacement of aggression. Buss (1961, p. 62) has asserted that, when anger is present, the displacement of aggression is not based on stimulus generalization. Anger presumably lowers the thresholds for all aggressive responses, thus rendering many stimuli—not just similar ones—capable of eliciting displaced aggression. Bindra (1959) has viewed the displacement of aggression as the result of enduring response habits (i.e., hostility) which can lead to indiscriminate aggression against a variety of targets. Bandura and Walters (1963, p. 19), in rejecting the Miller model, have mainly criticized the model's "nonsocial approach to a problem in social learning." These investigators have minimized the role of immediate frustration and emphasized the role of social learning and imitation in determining the targets of displaced aggression.

Research on Displaced Aggression

Very little research with human subjects has been directly addressed to Miller's theoretical formulations. A series of early animal studies (Brown, 1948; Kaufman & Miller, 1949; Miller & Kraeling, 1952; Miller & Murray, 1952; Murray & Berkun, 1955) supported Miller's

main assumptions, thus promoting widespread acceptance of the conflict model.

Research with human Ss has focused on stimulus qualities of the target of displaced aggression. Berkowitz (1962) has postulated that stimulus generalization may occur along attitudinal dimensions, as well as along physical dimensions. This notion was supported by several early studies (Miller & Bugelski, 1948; Berkowitz, 1959; Berkowitz & Green, 1962; Berkowitz & Holmes, 1959, 1960) which demonstrated that the aggressive responses of angered individuals generalized from the instigator to disliked persons. Aggressive responding in these studies was indirectly assessed via questionnaire ratings. The instigator and the disliked individual(s) were presumably viewed as functionally similar since both aroused negative affect; consequently, feelings of anger easily generalized from one to the other.

Berkowitz and his colleagues have carried out a series of additional suggestive studies (Berkowitz, 1965a, 1965b; Berkowitz & Geen, 1966, 1967; Geen & Berkowitz, 1967) in which the aggressive cue value of a stimulus person was varied by means of verbal labels, such as names or occupational roles, associating the person with filmed violence. The findings demonstrated that overt aggression (shock) toward an anger instigator was significantly increased when the instigator was associated with the aggressive film. Unfortunately, the target of aggression in these studies was always the anger instigator himself.

The possible relevance of such label-mediated generalization to hostility displacement was suggested, however, in a more recent experiment (Berkowitz & Knurek, 1969). In this study, Ss were trained,

via classical conditioning procedures, to have a negative attitude toward a critical name. Following anger arousal by the E, each S discussed an issue with two other men (accomplices), one of whom possessed the critical name. Results demonstrated that angered Ss displaced their hostility, via unfriendly behavior and questionnaire ratings, to the accomplice bearing the disliked name.

Other studies have focused upon dimensions of "physical" similarity along which potential targets for displaced aggression might vary from the instigator. Most of these studies have examined displaced aggression that occurs in the absence of the anger instigator. Moore (1964) conducted a study in which children played a card game where Ss either associated losses with a child-figure card and winnings with a plain card or learned to make the reverse associations. Frustration was manipulated by varying the number of chips the S lost to the appropriate card. Following the frustration manipulation, Ss played a cork-gun shooting game in which they could select targets from three pairs of figures that varied from the card-game figure on a dimension of physical similarity (clothing pattern). Predictions concerning displacement gradients under the different conditions were not supported. Moore pointed out that aggression anxiety may have influenced some of the children's choices. As noted earlier, when inhibitory tendencies conflict with aggressive tendencies, predictions from the Miller model are complicated. A more valid test of Moore's predictions would have included targets chosen from three or four points, rather than just two points, along the similarity dimension.

The study bearing perhaps the most relevance to Miller's theoretical formulations was carried out by Hokanson, Burgess and Cohen (1963). Their primary concern was the physiological changes accompanying displaced aggression to various targets. Contrary to predictions, displaced aggression did not result in arousal reduction proportional to the similarity between target and frustrater; only direct aggression to the frustrater resulted in significant tension reduction. This finding was not supported in a study by Holmes (1966) who found no differences in arousal reduction between frustrated Ss permitted direct aggression and those permitted to displace aggression.

More relevant to the present discussion, the Hokanson group obtained no support for their second hypothesis that the intensity of aggressive responses would be proportional to the similarity between target and frustrater. In fact, frustrated Ss directed the same amount of shock toward the frustrater and substitute targets. Holmes (1966), using just one substitute target, obtained similar results.

The relevance of Hokanson's results to the Miller model cannot be determined. In the first place, the degree of conflict concerning direct aggression was not varied or even assessed in this study. Secondly, shock intensity was measured by the pressure Ss exerted in delivering shock (via plunger), yet Ss were not instructed that the intensity of shock could, in fact, be varied. Most aggression experiments using similar apparatus have allowed Ss to vary the "actual" shock voltage by adjusting a dial and/or the number of shocks administered on each trial; some studies have also allowed Ss to vary the duration of shocks. The validity of the pressure measure, however,

remains to be established. Thirdly, the dimension of similarity along which targets supposedly varied cannot be specified in this study: the targets varied on a number of dimensions, none of which were even roughly quantified. The targets included E (the instigator), E's assistant, a psychology student and an undergraduate.

One of the main problems in testing Miller's propositions has concerned quantification of the dimension of stimulus similarity. This dimension must be specified, and the stimuli must be scaled. In addition, definite differences must exist between potential targets on the similarity dimension in any study of displaced aggression.

Only two studies (Murney, 1955; Wright, 1954) have investigated displaced aggression with human Ss in a conflict situation. These studies presented correlational evidence supporting the proposition that targets of displaced aggression are chosen further out on the similarity dimension as a function of aggression anxiety. Both studies are, however, subject to the same criticisms regarding specification and scaling of the stimulus similarity dimension as the Hokanson et al. (1963) study.

Present Study

Very little has been achieved toward adequate testing of the basic assumptions of the Miller model. Miller's formulations have been accepted or rejected by most investigators apparently on the basis of intuition and/or findings from the early animal studies. The few pertinent experiments that have used human Ss have been characterized by poor research designs, methodological problems, and weak or equivocal results.

The present study was designed to establish some empirical bases for acceptance or rejection of Miller's basic propositions. Displacement of aggression was investigated under conditions in which Ss' inhibitions about attacking an anger instigator were manipulated. Half of the angered Ss were placed in a conflict situation, in which strong inhibitory tendencies competed with strong aggressive tendencies; the remaining angered Ss were placed in a low conflict situation, involving weak inhibitory tendencies and strong aggressive tendencies. The angered Ss, as well as nonangered control Ss, were then confronted with one of four target persons toward whom they could aggress, via shock. Thus, Ss were placed in a 2 x 2 x 4 factorial design involving: (1) high or low conflict; (2) high or low attack; and (3) one of four targets of aggression who varied in age: either the 39 year-old instigator or a 34, 29, or 25 year-old substitute target.

Subjects' heart rate was recorded throughout the experiment to determine what role, if any, activation plays in the anger instigation-aggression sequence. The Miller analysis predicts that arousal reduction following the expression of aggression should be greatest when the target is the anger instigator. This prediction was supported by Hokanson et al. (1963) but contradicted by Holmes (1966). The expression of aggression to targets other than the instigator should result in less arousal reduction; this reduction should, however, be proportional to the similarity of the substitute target to the instigator. Hokanson's findings did not support this prediction. Specific predictions on these derivations from Miller's model were not advanced

for the present investigation. It was expected, however, that angered Ss would display greater physiological arousal than nonangered Ss.

Experimental hypotheses. Because it was anticipated that low-attacked Ss would display similar amounts of aggression in all conditions, predictions were made in terms of Ss in high attack conditions. Under low conflict, it was expected that:

(1) relative to the three substitute targets, the anger instigator would receive the strongest aggressive attacks;

(2) the three substitute targets would receive aggressive attacks proportional to their similarity to the anger instigator;

(3) relative to nonattacked Ss, attacked Ss would display more aggression toward the instigator and would tend to display more aggression toward the substitute targets.

Under high conflict, it was expected that:

(4) relative to the two most similar substitute targets, the anger instigator would receive the weakest aggressive attacks;

(5) the strongest aggressive attacks would be directed toward one of the two most similar substitute targets;

(6) relative to nonattacked Ss, attacked Ss would display more aggression toward the substitute targets.

METHOD

Subjects

The Ss were 146 male students at the University of Alberta who volunteered to participate in a 45-minute psychology experiment for $2.00. Approximately half of the Ss were enrolled in introductory psychology. The experiment was advertised in two ways: (1) through a booklet placed on the table where introductory psychology students signed up to participate in experiments for course credit or for money, and (2) through posters placed in campus locations with heavy concentrations of first year students. The posters stated that the experiment was open only to students who had never been in a psychology experiment before. Of the 128 Ss whose data were retained for analyses, 87 related that this was their first experiment.

Apparatus and Materials

Experimental room. The S was seated in the front half of the 12' x 14' experimental room while E was situated in the back of the room behind a curtain that divided the room. From this location, the E read instructions and operated the tape recorder (via silent foot pedal), shock generator, and Viso-cardiette.

Communication system and recordings. The S was led to believe that he could communicate with his experimental partner, who was presumably seated in an adjoining room. A microphone was situated on the S's table, and a speaker was attached to the wall facing S. All responses

of the S's partner(s) were, in fact, pre-recorded and played back over the speaker during the experiment.

Four tape recordings were made, with the same male voice playing an identical role on the first half of each tape. (See Appendix A for tape transcripts.) This role involved a simple introduction, emphasizing the fact that the speaker was 39 years old, and for Ss in high attack conditions, included a highly critical appraisal of the S's task performance. For Ss in the low attack conditions, E bypassed this section of the tape.

The second half of one tape was completed by the original male voice while the three other tapes were completed by males who claimed to be one of the following ages: 34, 29 or 25. (Each of the males involved was close to the age he portrayed on tape.) This section of the tape included another simple introduction (with the exception of the tape made in its entirety by the same person) and a string of 21 pre-planned "guesses" to a learning task which the S was to attempt to teach his "partner."

Signal Lights. A small light bulb on a wooden platform was attached to the S's table and could be flashed on and off by E. The S was told that he could use his microphone whenever the light was on. A small switchbox with wires presumably leading into the adjoining room was also situated on S's table. The S was led to believe that by flipping the switch, he could signal his partner via a light similar to his. The switch actually flashed a small light visible only to E.

Viso-cardiette. Each S's heart rate was recorded throughout the experiment on a Sanborn 51 Viso-cardiette. Two active and one

ground electrodes were taped to the S's arms to obtain the recording. Important points during the experiment were noted on the recording by means of an event marker.

To avoid interruption of experimental procedures, it was necessary that heart rate for each S be recorded on a single roll of permapaper. Consequently, in order to conserve paper, heart rate was not recorded during the following events: reading of conflict communication, delivery of general instructions, and the planned subject "mix up."

Shock Generator. The arrangement of the shock generator apparatus enabled E to deliver shocks surreptitiously to the S. A small metal box containing two 22½ volt batteries was situated beside S's table. Two electrodes were attached to wires leading from the batteries and were taped to the S's arms at the appropriate time during the experiment.

A long cord led away from the generator, ostensibly into the adjoining room where the partner was presumably seated at the controls. The cord was actually connected to a decade interval timer which regulated each shock delivered by the E at 0.5 second. The E was able to administer shocks to the S from her position behind the curtain by means of a plunger which was connected to the timer by a hidden cord.

The shock generator was equipped with a potentiometer which allowed E to vary the voltage available from 30 to 45 volts. It was discovered during pilot work that about one S in five could not feel the original 22½ volt shock. During the final study, E initially set the regulator at 30 volts; if S could not feel shock at this level or

perceived only a vague twinge, then E increased the voltage to approximately 35. Of the total number of Ss, four could not feel the 35 volt shock but were able to feel a 40 volt shock.

Shock Box. This apparatus was a modified form of Buss' (1961) aggression machine. This particular model was equipped with a large, central dial which could be adjusted to shock intensity levels ranging from 0 to 330 volts. The S was led to believe that he could use the shock box to vary the intensity, number, and duration of shocks received by his partner in the experiment. Shock intensity could presumably be varied simply by turning the central dial to the desired level, and by then pressing the shock-delivery button. Number of shocks could be varied, Ss were told, by pressing the shock-delivery button more than once; duration of shocks could be varied by pressing the button for varying lengths of time.

Eight descriptive labels around the central dial of the box indicated the approximate severity of shocks at various voltage levels: slight shock—0 to 55 volts; moderate shock—56 to 110 volts; strong shock—111 to 170 volts; very strong shock—171 to 225 volts; intense shock—226 to 400 volts; severe shock—401 to 450 volts. To enhance the credibility of the shock apparatus, a governor was attached to the machine which prevented Ss from turning the dial beyond the 330-volt level.

The E could record the amount of shock administered by the S from her position behind the curtain. (See Appendix B for record sheet.) The central dial was connected, via battery, to a small meter on E's desk which enabled her to record intensity levels selected by S. The

shock-delivery button was connected to two electric shunt-clock timers, one visible to E and the other visible to S. From the timer, E could record the number of shocks delivered, as well as their total duration, on each trial. A second timer was located on the shock box in order to give the S feedback concerning the length of shocks he had administered as well as to increase credibility concerning the use of shock. Many Ss appeared to regulate the duration of shocks quite judiciously.

Conflict Communications. Two messages were constructed in an attempt to induce differential amounts of inhibition between subject groups concerning the administration of shock to the 39 year-old partner. The two messages varied in only one respect: the ages specified at which the body's tolerance for stressful stimuli presumably starts to decline. The high conflict communication (reprinted below) specified "the late 30's" while the low conflict communication specified "the late 50's."

> In this experiment, subjects' physiological responses are recorded while they perform intellectual tasks under psychological stress, or tension. More specifically, this study deals with the effects of psychological stress upon the task performance of people who vary in age.
>
> Studies of physiological processes indicate that the body's tolerance for stressful stimuli begins to decline rapidly in the late 30's. As a result of this decline, such individuals are likely to suffer physically harmful effects from even mild stress. Data from this experiment will help to determine how psychological tension affects the relationship between physiological processes and task performance at various ages.

Concept Learning Task. This task was a modified version of Buss' "learning experiment" (1961, pp. 47-51); its purpose was to provide several opportunities for the S to shock his partner. Briefly, the S was to present the programmed task to his partner over a series

of trials and to administer positive (flashing light) or negative (shock) reinforcements contingent on the partner's performance.

Materials for the task included a stack of index cards, with four different words typed on each card, a checklist of correct responses for the cards and, of course, the tape of the partner's pre-recorded responses, complete with 15 errors. During the course of the task, every S was thus required to administer shock to his partner on 15 trials. Appendix C contains materials for the task. Details concerning the administration of the Concept Learning Task are included in the Procedure section.

Questionnaires. At the conclusion of the experiment, the S was asked to complete a questionnaire concerning his reactions to the experiment (see Appendix D). Using a series of five-point, bipolar adjective scales, S rated his feelings about the shock evaluation he had received as well as the shock he had administered. The S also estimated the painfulness of the shocks he had both given and received. Additional questions required S to indicate his general feelings during the experiment and to recall his partner's age.

On a second questionnaire, S was asked to rate the 39 year-old partner on a series of 12 seven-point bipolar scales (see Appendix D).

Pilot Work. Preliminary work was carried out on the use of the age dimension to vary similarity between the instigator and other targets of aggression. A complete summary of the procedures and results are contained in Appendix E. In pilot work, the effects of various conflict communications were also examined. These communications, along with a complete summary of procedures and results, are contained in

Appendix F. The specific procedures used in the final investigation were determined during this preliminary work and are outlined in the following section.

Procedure

The S was taken into the experimental room by a female E and seated at a table. The S was asked if he had been in other psychology experiments. (Several Ss had participated in related aggression experiments and so were not used in the present study; these Ss were paid and then released.) The S was then assured that if he wished to leave the experiment at any time, he would be able to do so. No S did choose to leave. The S was then informed that his heart rate would be recorded throughout the experiment. The E then taped three electrodes to the S's arms and recorded a two-minute period of basal heart rate.

During this period, E left the room for a brief period, ostensibly for the purpose of attending to a second subject in the experiment. The presumed second subject was fictitious; his responses and comments were recorded on tape and played back by E at the appropriate times during the experiment. Upon returning to the room, E handed a conflict communication to the S and took a second sheet into the adjoining room. The E was unaware of the S's conflict condition until the end of the experiment. (Each conflict sheet was clipped to a folded paper that revealed which annoyance condition S was in. These packets had been randomized within each target condition. Before giving S the conflict communication, E removed the folded paper and did not open it until just before the attack manipulation.)

The E then moved behind the curtain which shielded her from S's view and read the general instructions. (See Appendix G.) The Ss were told that, in order to control the influence of extraneous variables such as facial expressions and mannerisms, they had been situated in separate rooms. The Ss were informed that the S in the room with E (Subject 1) was listening directly to E's voice while the S in the adjoining room (Subject 2) was listening to E's voice over the loudspeaker system connecting the two rooms. The Ss were told that they would be able to communicate with each other via microphone. The E then related that a central interest in the study concerned the physiological responses which occur when individuals work under stress. Consequently, both Ss had been wired to physiological recording apparatus for the entire experiment.

The Ss were then instructed that, in the next part of the experiment, Subject 1 would complete a task in logical thinking. Subject 2's task was to evaluate the quality of Subject 1's work by means of harmless electric shocks. Subject 2 would be able to vary the number of shocks from one, if he considered Subject 1's performance excellent, to 10, if he considered the performance very poor. If Subject 1 was given five or more shocks, then he would have to repeat the task. The anticipated shock evaluation supposedly provided the stress under which the Subject 1 would work; the evaluation actually provided the basis for the annoyance manipulation. Subjects were further instructed that, in the second half of the experiment, Subject 2 would complete a learning task while Subject 1 would evaluate his performance.

The Ss were then provided with the opportunity to introduce themselves, presumably to add interest to the experiment. The real purpose was to communicate Subject 2's age (as well as "to demonstrate" his existence) to Subject 1. It was suggested that the Ss exchange information regarding their age, university major and hometown. The E then played the tape in which Subject 2 related that he was 39 years old, from Edmonton and studying education at the university. He added that this was his first psychology experiment. Then Subject 1 introduced himself, following essentially the same format.

The E proceeded to describe Subject 1's task (see Appendix H), which required the creation of a logical argument either for or against student participation in campus decisions. Subject 1 could limit his argument to a single issue, such as tuition fees, or he could present a more general case concerning student participation. Subject 2 was told to evaluate Subject 1's argument on strictly logical grounds. Subject 1 was then informed that he would have three minutes to jot down notes and prepare his argument. Following this, Subject 1 would present his argument to Subject 2 via microphone. Subject 2 was then to evaluate Subject 1's performance by administering shock.

After Subject 1 had worked on his task for 150 seconds, E appeared to attach the two shock electrodes to the S's left arm. The E then returned to her position behind the curtain, flipped a few switches and informed Subject 1 that his microphone was on; the E added that he would have up to three minutes in which to present his argument. Most Ss took between two and three minutes to express very definite opinions on the issue. The majority favored an active but

limited student role in administrative decisions. Although several Ss felt that all decisions should be left to the administrators, two Ss later confided that they had presented this view in order to win a good evaluation from "the old guy."

After Subject 1 had finished his presentation, E instructed Subject 2 to go ahead with his evaluation. The E then unfolded the paper previously attached to the conflict communication and learned whether Subject 1 was in the high or low attack condition. In the high attack condition, E delivered eight shocks to Subject 1; in the low attack condition, E delivered just one shock. Following the shock administration, E asked Subject 1 whether he had received any shocks and, if so, how many had been received. Subjects who did not perceive the correct number of shocks reported that the shocks were too weak to be distinguished accurately. For these Ss, E then left the room, presumably to see if Subject 2 was operating the shock apparatus correctly. Upon returning, E turned the potentiometer on the shock generator from 30 to 35 volts and suggested that Subject 2 give his evaluation again. (The S was not told that the voltage had been increased; E explained that the duration of the shock had been increased.) Following the second evaluation, all but four Ss correctly perceived the number of shocks given. For these Ss, the potentiometer was adjusted to 40 volts and on the subsequent evaluation, all four Ss correctly perceived the number of shocks. Five Ss were released from the experiment when shock was not delivered due to a faulty electrode connection.

In the low attack condition, E then removed the shock electrodes from Subject 1's arm and suggested that they proceed with the

next phase of the experiment. In the high attack condition, however, E remained behind the curtain and asked Subject 2 if he could give any constructive criticisms that might help Subject 1 to improve his argument. The E then played the tape, on which Subject 2 delivered the following message to Subject 1 in a rather condescending tone:

> Well... I don't think you've really thought about the issue. The arguments you've given are the same tired old clichés I've heard before—they haven't convinced me in the past, and they don't convince me now... I think you should give it some more thought.

The E then informed the Ss that Subject 1 would have two additional minutes in which to think about his arguments; following that, Subject 1 would have another chance to present his arguments to Subject 2. After the two-minute period, Subject 1's microphone was again "turned on." Most Ss reacted to Subject 2's criticisms right away, telling him that he was supposed to judge the arguments on the basis of logic, not emotion, that clichés were often true, that Subject 2 was obviously from a different generation, etc. Most Ss then reiterated the arguments presented earlier, but with greater emotion and, frequently, with more extreme statements. A few Ss conceded that Subject 2's "viewpoint" had some validity, but that a little participation was essential. No S switched his point of view.

Following this second presentation of arguments, E instructed Subject 2 to consider the additional comments that Subject 1 had made and, in light of the original arguments, to go ahead with his evaluation. The E then delivered nine shocks to all Ss in this high attack condition. The same procedure was again used to check the number of shocks Subject 1 perceived he had been given. Nearly all Ss correctly

perceived the number on the first attempt. The E then removed the shock electrodes and suggested that the Ss proceed with the second phase of the experiment.

For all Ss, E then began reading the instructions for the task which Subject 2 was to learn. Suddenly a buzzer rang out (activated by E), and E feigned a startle reaction. With apparent disgust at the disturbance, E went to the door and called down the hall. Then, E walked into the hall, whispering loudly, and finally returned to the S, telling him that she would return in a minute. The E proceeded to bang a few doors and walked up and down the hall rather loudly before returning to the room approximately three minutes later. Subjects who retained the 39 year-old partner for the entire experiment were simply told that there had been a mix-up in Ss for another experiment, and that E would begin the instructions again for the learning task.

Subjects in the other target conditions were told that a mix-up in Ss for the present experiment had occurred. The E explained that Subject 2 had somehow gotten into the wrong experiment, and that the guy who should have been in the present experiment had been wandering around looking for his experiment. Since the present Subject 2 was "really needed" in the other experiment, E would have to let him go. The problem, E explained, was that there wasn't enough time to repeat the first part of the experiment with the newly-arrived S. These events were highly credible; a number of Ss offered at this point to come back another time or suggested they could stay late if the other S could. The E pointed out that other Ss were closely scheduled throughout the day and suggested that the two Ss just do the learning task; that way, complete experimental data would be obtained from Subject 1.

The E then moved behind the curtain and suggested that the Ss introduce themselves since this procedure had been carried out in the first part of the experiment. This time, Subject 1 introduced himself first. Then, E played the tape with the new partner relating that he was 34 (29 or 25) years old. The new partner gave the same background information as the original partner had reported. No S thought this coincidence was unusual. Many Ss had, in fact, very similar backgrounds.

For all Ss, E then read the instructions concerning the Concept Learning Task (see Appendix C). The Ss were instructed that Subject 2 would try to learn a concept. Subject 1 would be given a stack of index cards with four words typed on each card. One word on each card would pertain to the concept Subject 2 was to learn. Subject 1 was to read the four words on the first card to Subject 2, who would then try to guess which of the words was the correct one. If he guessed correctly, Subject 1 was to flash a light in Subject 2's room by flipping the switch on his table. If, on the other hand, Subject 2 guessed incorrectly, Subject 1 was to give him shock. Then Subject 1 was to read the four words on card two and to continue the same procedure until Subject 2 had chosen the correct word three times in a row. At that point, Subject 2 was considered to have "learned" the concept. Before giving further task instructions, E informed Ss that she would explain the operation of the shock apparatus to Subject 1 and place the electrodes on Subject 2. Then E left the room, presumably to attach the shock electrodes to Subject 2.

Upon returning, E removed the cover from the shock box, situated on a nearby table, and placed the apparatus on Subject 1's table. The E then described how the machine was to be operated. (See Appendix B.) The E informed Subject 1 that the machine could generate electric shocks ranging from zero to 330 volts. The E emphasized that, under the present conditions, the shocks delivered to the other S could not cause tissue damage. Subject 1 was told that the shock he had received was $22\frac{1}{2}$ volts, which was classified as "slight shock"; E adjusted the dial to the $22\frac{1}{2}$ volt level so S could see where the shock fell, relative to other intensities. (Two Ss asked about the amperage of shocks generated by the machine; E explained that the output was regulated at 15 milliamperes.) Subject 1 was told that Subject 2 would be expecting either a shock or a flashing light, following each guess on the learning task. Subject 1 was instructed to deliver a shock for an incorrect response. The E then demonstrated, with the shock box switched "off," how the S could vary the intensity, number and duration of shocks given to Subject 2. In contrast to several earlier studies in which duration measures have been obtained (Berkowitz & LePage, 1967; Loew, 1967; Hartmann, 1969), Ss were explicitly told that the duration of shock received by the other S varied directly with the length of the button press. The E added that Subject 2 had agreed to participate in the experiment under these conditions.

After answering questions concerning the operation of the shock box, E then gave Subject 1 the cards and a list indicating the correct response for each card. Subject 1 was told that the concept to be learned was "fruit." The E made certain Subject 1 understood his

role and requested that he check off Subject 2's correct responses on the list. Then E moved behind the curtain "to activate" the Ss' microphone for the task. In a few seconds, however, E re-appeared, carrying a clipboard and appearing somewhat confused. The E approached the S, saying, "Let's see... what was your age again?" Following the S's answer, E replied, "That's right... and the other S is 39 (34, 29, 25)." This exchange was included to remind Subject 1 of his present partner's age.

The E then told Subject 1 to begin reading the first card for the Concept Learning Task. Following each card, E played the taped voice of the partner. All of the tapes were identical, with the partner taking 21 trials to make three correct responses in succession. Subject 1 was given 15 opportunities to shock his partner for an incorrect response. A few Ss mentioned, after the task, that they thought Subject 2 had taken very long to learn the concept. Several other Ss stated that they could never have learned the task and were amazed that Subject 2 could do it.

Following the concept task, E removed the shock box and asked Subject 1 to fill out a questionnaire concerning his reactions to the experiment and to rate the 39 year-old partner on 12 semantic-differential scales. The E also took questionnaires to the adjoining room.

Following completion of the forms, E glanced at the S's responses while removing the recording electrodes. The E then asked the S questions about his reactions to the experiment, how he felt about being evaluated with shock, etc., in an attempt to uncover S's feelings and possible suspicion. Of the five Ss discarded because of suspicion,

several had not indicated their very strong suspicions on paper. They apparently didn't want to "mess up" the experiment.

After this initial interview, conducted in a casual manner, the E then debriefed the S. The E emphasized that the S's original partner had been told to evaluate S's arguments with a specific number of shocks. It was explained that half of the experimental Ss had deliberately received low ratings. It was expected, E related to S, that Ss who had received low evaluations would express their annoyance during the learning task by giving higher, longer, and more shocks than Ss who had received high evaluations. The Ss in the substitute-target conditions were told that the changing of partners in the experiment was by design, and that it was anticipated that annoyed Ss would still give greater amounts of shock than non-annoyed Ss to the new partner; the annoyance would presumably "carry over" or generalize to the new partner.

The E stressed that the S's partner had not, in fact, been connected to the shock apparatus, so it was not possible for S to shock anyone during the experiment. Most Ss expressed relief at this point although a few indicated disappointment. The S was informed that the intensity, length, and number of shocks he had attempted to administer had been recorded by E. He was further told that his physiological responses would be analyzed to determine the relationship between them and events during the experiment.

During the debriefing period, if S asked whether his partner(s) had been real, the E explained that the voices had been pre-recorded. Otherwise, S was led to believe that the partners had been real, primarily because a number of other experiments using a similar type of deception were being planned for use with the same subject population.

Finally, E asked the S how he felt about the experimental deceptions. Nearly all Ss felt they were necessary and denied feeling upset about the procedures. Many expressed relief that the evaluation had been rigged. Although several Ss had been visibly upset immediately following the partner's evaluations in the high attack condition, these Ss appeared to be comfortable following the debriefing. Many Ss indicated that they thought the experiment was quite worthwhile and wanted to participate in "more experiments like this."

The E cautioned the S not to discuss the experimental procedures with anyone and pointed out how different the S's own experience and reactions would have been if he had had prior knowledge of the procedures. The S was then paid and released.

RESULTS

Summary of Experimental Design

A total of 128 male Ss was assigned to the 16 conditions of a 2 x 2 x 4 factorial design with three repeated measures. The design included two levels of conflict (low, high), two levels of attack (low, high), four levels of aggression targets who varied in age (39, 34, 29, 25) and three blocks of five aggression trials each. Dependent measures included: (1) intensity, number and duration of shocks administered by Ss; (2) Ss' questionnaire ratings of the experiment and of the 39 year-old partner; (3) changes in Ss' heart rate during the experiment.

Analyses of Shock Data

The major dependent measures of aggression were the intensity, number, and duration of shocks. Separate analyses were calculated for the three measures. To simplify the analyses, the 15 trials for each measure were separated into three blocks of five trials, and a mean score was calculated for each block; thus, for each analysis, only three aggression scores were used for each S[1].

Intensity. Intensity scores were based on the voltage levels selected by Ss for each shock trial. Appendix I (Table 1) contains a

[1]In order to check the validity of this procedure, an analysis of variance was calculated for the intensity measures using all 15 trials for each S; the results were essentially identical to those obtained using blocks of trials.

summary of the analysis of variance for intensity scores. The main effect for target was significant ($F = 3.30$, $df = 3/112$, $p < .025$). More intense shocks were directed toward the 29 year-old target [T(29)] than toward the 25 or 39 year-old targets [T(25); T(39)] ($p < .05$, for both comparisons, Duncan's multiple range test). Shocks administered to T(29) were not significantly more intense than those delivered to the 34 year-old target [T(34)] ($p < .10$, Duncan's multiple range test). Mean shock intensities for T(39), T(34), T(29), and T(25) were 40.9, 49.0, 66.5, and 40.41, respectively.

The trials main effect was highly significant ($F = 57.34$, $df = 2/224$, $p < .005$), and indicated an increase in intensity of shocks over trials. The mean intensities for the first, second, and third trials were 31.69, 52.63, and 63.28, respectively. The three means differed significantly from each other ($p < .001$ for all comparisons, Duncan's multiple range test).

Two interactions were significant: the Conflict x Attack effect ($F = 6.48$, $df = 1/112$, $p < .025$) and the Conflict x Attack x Trials effect ($F = 3.97$, $df = 2/224$, $p < .025$). The interaction between conflict and attack indicated that, under low conflict (LC), Ss in high attack (HA) conditions gave more intense shocks than did Ss in low attack (LA) conditions; under high conflict (HC), however, HA Ss gave less intense shocks than did LA Ss ($p < .05$, for all comparisons, Duncan's multiple range test). The interaction of conflict and attack with trials showed that the form of the Conflict x Attack interaction became pronounced only on the second and third blocks of trials. Tables 1 and 2 present the means for these interactions. Figure 1 depicts the interaction between conflict and attack with trials.

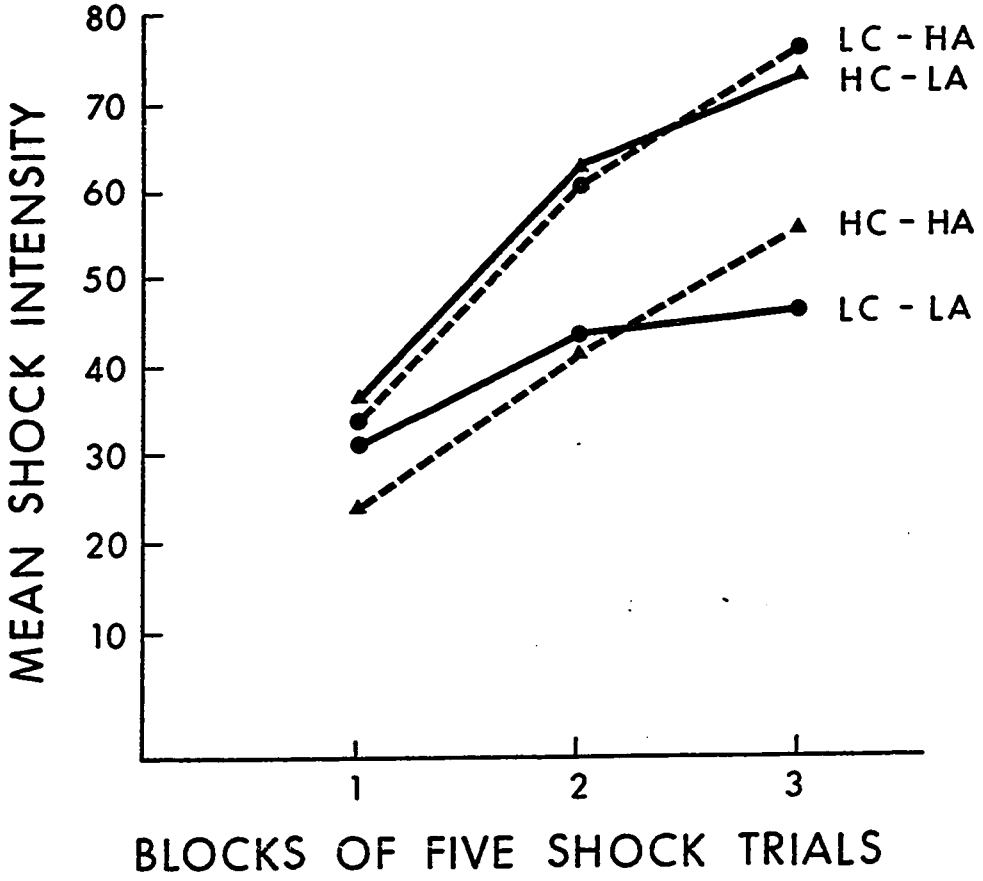

Fig. 1. Mean shock intensity given in conflict x attack conditions.

TABLE 1

Mean Shock Intensity for Each
Conflict x Attack Condition

	Low Conflict	High Conflict
Low Attack	40.44^{b}	58.17^{a}
High Attack	57.30^{a}	40.90^{b}

Note: Cells containing same superscript are not significantly different at the .05 level by Duncan's Multiple Range Test.

TABLE 2

Mean Shock Intensity for Each
Conflict x Attack x Trials Condition

	Trial 1	Trial 2	Trial 3
Low Attack			
Low Conflict	30.72	44.25	46.34
High Conflict	37.09	63.16	74.25
High Attack			
Low Conflict	34.19	60.81	76.91
High Conflict	24.75	42.31	55.62

Although the Conflict x Attack x Target interaction for shock intensity did not reach significance, a Duncan's multiple range test showed that more intense shocks were given to T(29) by HC-LA Ss than were given to other targets under any condition ($p < .05$, for 11 of 15 comparisons). Under HC-LA, T(29) received more intense shocks than did T(25) and T(39), ($p < .01$ for both comparisons, Duncan's multiple range test). Figures 2 and 3 depict the intensity means for the 16 conditions.

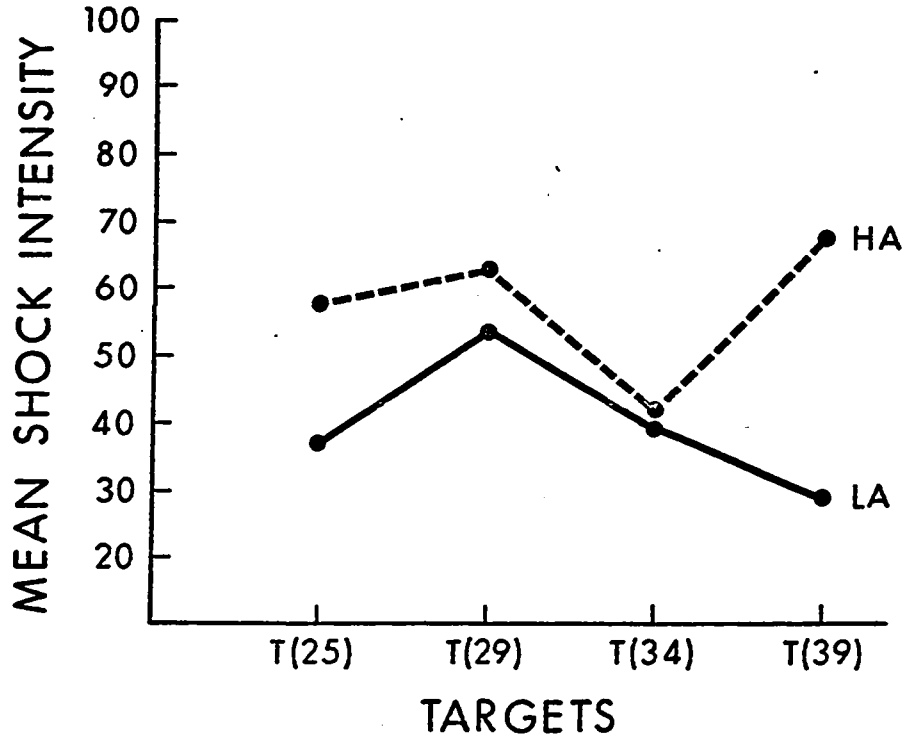

Fig. 2. Mean shock intensity given in low conflict-high attack and low conflict-low attack conditions.

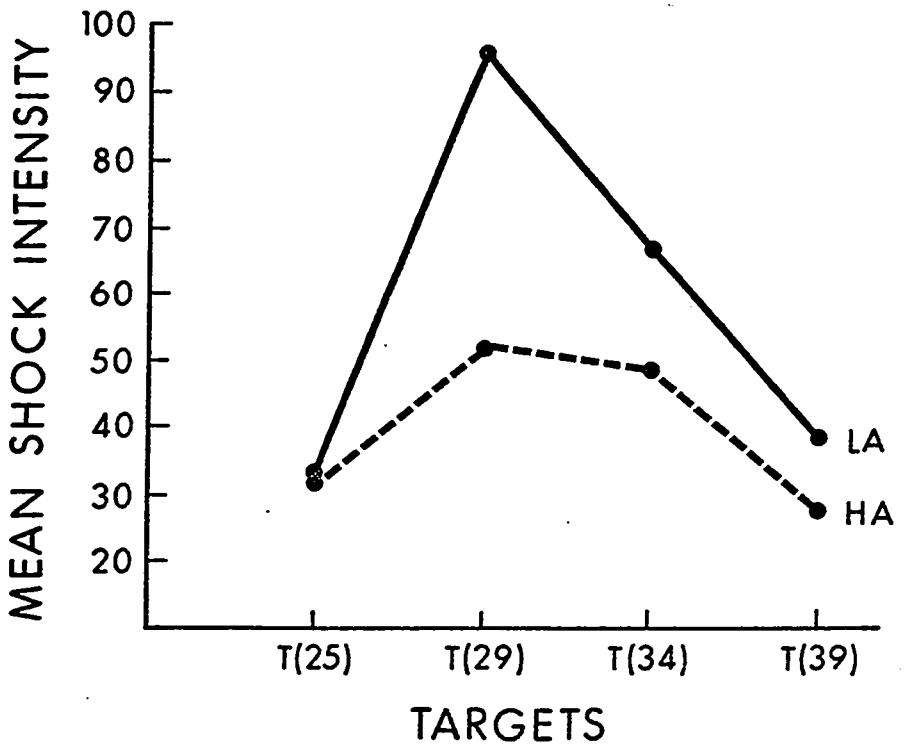

Fig. 3. Mean shock intensity given in high conflict-high attack and high conflict-low attack conditions.

Number. Number scores were obtained by counting and averaging the number of button presses made by Ss on each block of shock trials. Appendix I (Table 2) contains a summary of the analysis of variance on the number scores. The trials main effect was significant ($F = 5.69$, $df = 2/224$, $p < .005$), and demonstrated that the number of shocks administered by Ss increased over trials. The mean number of shocks given of the first, second, and third trials were 1.07, 1.12, and 1.17, respectively. Significantly more shocks were given on the third trial than on the first trial ($p < .005$, Duncan's multiple range test). The number of shocks delivered on the second trial did not differ significantly from the other trials.

The Attack x Target effect reached significance ($F = 3.10$, $df = 3/112$, $p < .05$). The most striking aspect of this interaction was the contrast between the number of shocks delivered to T(34) under HA, relative to LA, conditions. Although the other targets received relatively similar numbers of shock following HA and LA, T(34) received the least number of shocks (relative to the other targets) under LA but received by far the greatest number of shocks under HA. The difference between the HA and LA groups in number of shocks administered to T(34) was significant ($p < .05$, Duncan's multiple range test). Table 3 presents the means for this interaction. Figure 4 depicts the interaction between attack and target.

The Conflict x Attack x Target x Trials interaction also reached significance ($F = 2.18$, $df = 6/224$, $p < .05$). Table 4 presents the means for this interaction. This four-way interaction was essentially uninterpretable. Only one aspect of the interaction was stable: on trials two and three, Ss in HC-HA conditions

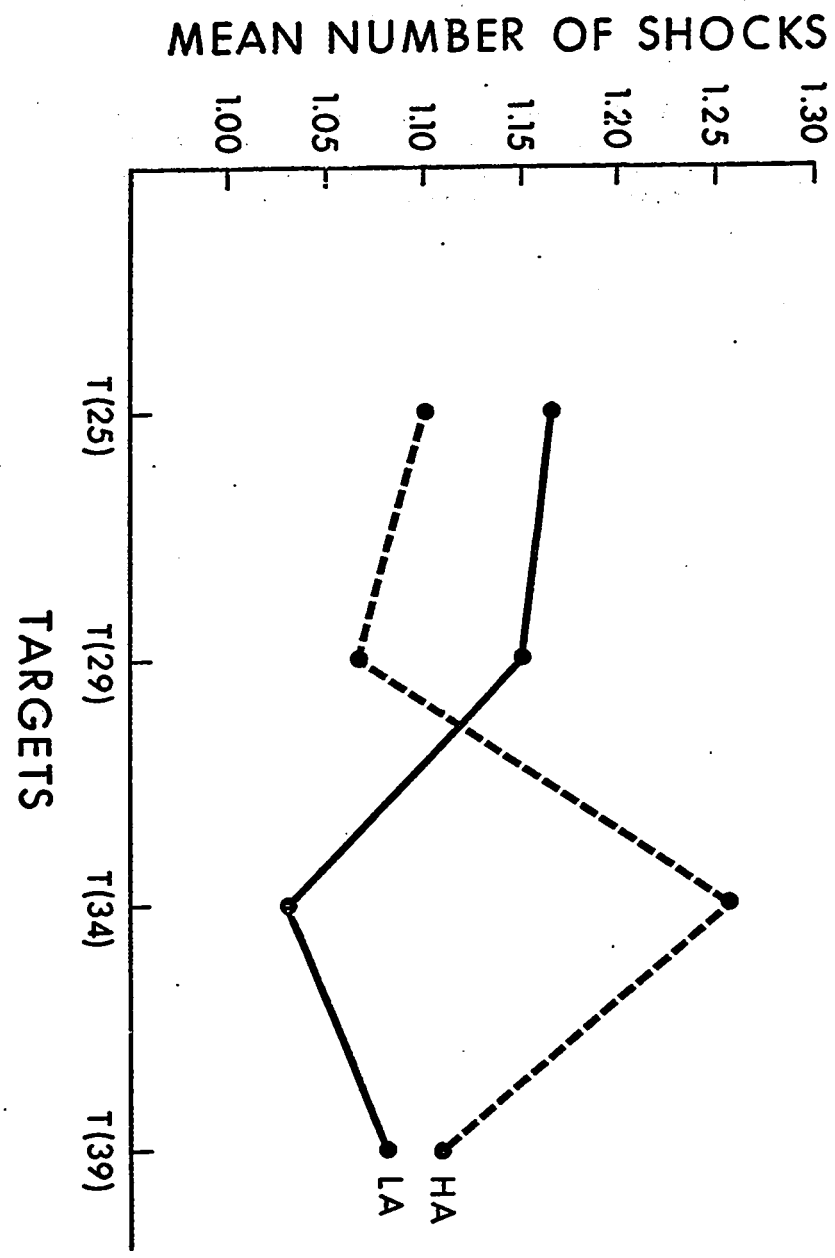

Fig. 4. Mean number of shocks given in low and high attack conditions.

TABLE 3

Mean Number of Shocks for Each
Attack x Target Condition

	Low Attack	High Attack
T(39)	1.08^{ab}	1.11^{ab}
T(34)	1.03^{b}	1.26^{a}
T(29)	1.15^{ab}	1.07^{b}
T(25)	1.17^{ab}	1.10^{ab}

Note: Cells containing the same superscript are not significantly different at the .05 level by Duncan's multiple range test.

gave the greatest number of shocks to T(34), relative to the other targets ($p < .05$, for six of eight comparisons, Duncan's multiple range test). This finding was consistent with a displacement effect; when conflict prevented angered Ss from strongly attacking the instigator, the most similar substitute target received the most aggressive attacks.

Although the Conflict x Attack x Target interaction for number of shocks did not reach significance, a Duncan's multiple range test demonstrated that T(34) received more shocks from Ss in the HC-HA condition than any other target received from Ss in any condition ($p < .05$, for 14 of 15 comparisons). Figures 5 and 6 depict the number means for the 16 conditions.

Duration. Duration scores were based upon the total amount of time the shock delivery button was depressed by Ss on each shock trial. Appendix I (Table 3) contains a summary of the analysis of

TABLE 4

Mean Number of Shocks for Each
Conflict x Attack x Target x Trials Condition

	Trial 1	Trial 2	Trial 3
T(39)			
Low Attack			
Low Conflict	1.05	1.12	1.17
High Conflict	1.06	1.07	1.00
High Attack			
Low Conflict	1.05	1.05	1.22
High Conflict	1.02	1.22	1.10
T(34)			
Low Attack			
Low Conflict	1.00	1.00	1.00
High Conflict	1.07	1.07	1.05
High Attack			
Low Conflict	1.17	1.05	1.05
High Conflict	1.27	1.52	1.50
T(29)			
Low Attack			
Low Conflict	1.02	1.2	1.22
High Conflict	1.07	1.1	1.30
High Attack			
Low Conflict	1.05	1.22	1.05
High Conflict	1.02	1.02	1.02
T(25)			
Low Attack			
Low Conflict	1.07	1.15	1.15
High Conflict	1.02	1.07	1.52
High Attack			
Low Conflict	1.05	1.02	1.25
High Conflict	1.12	1.05	1.07

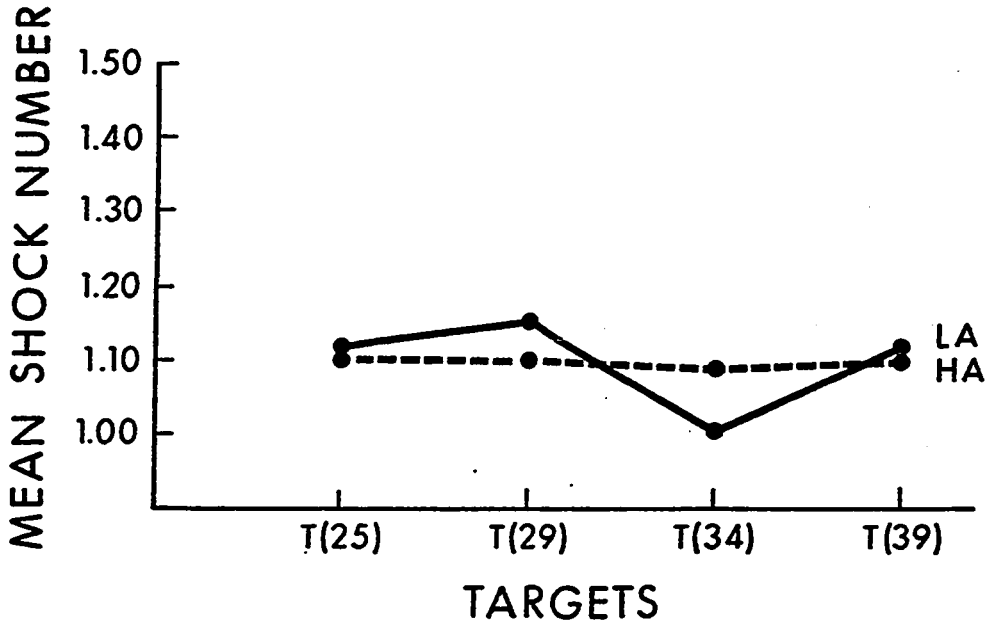

Fig. 5. Mean number of shocks given in low conflict-low attack and low conflict-high attack conditions.

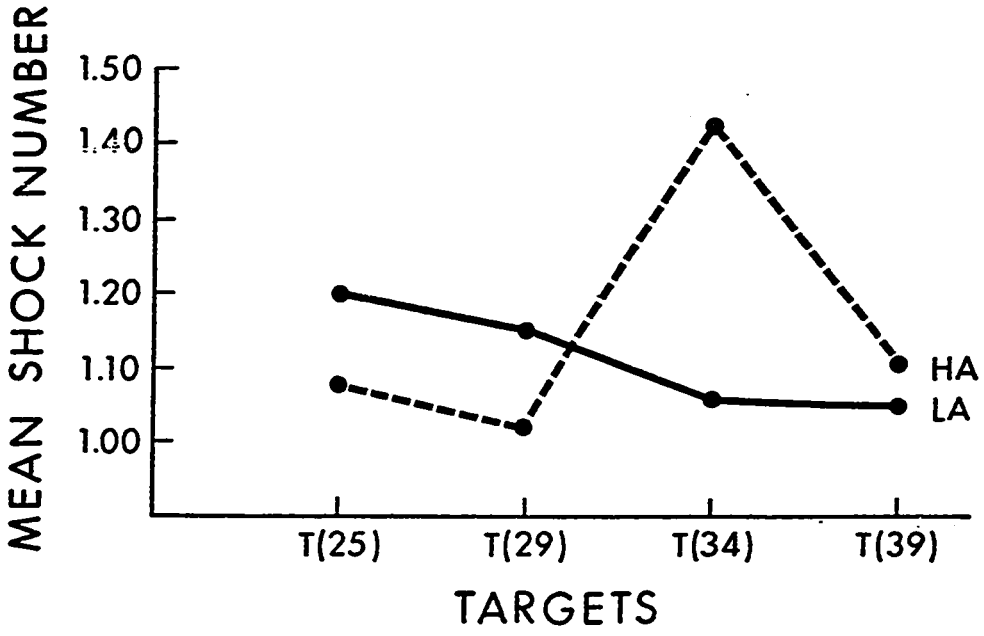

Fig. 6. Mean number of shocks given in high conflict-low attack and high conflict-high attack conditions.

variance of the duration scores. The trials main effect was significant ($F = 16.77$, $df = 2/224$, $p < .005$). The mean shock duration for the first, second, and third trials was .41, .49, and .52 seconds, respectively. Shocks given on trials two and three were significantly longer than those given on trial one ($p < .001$, for both comparisons, Duncan's multiple range test).

Although analysis of variance did not yield a significant target main effect ($F = 2.31$, $df = 3/112$, $p < .10$), Duncan's multiple range test did reveal several significant differences. Significantly shorter shocks were administered to T(39) than to T(29) and T(34), ($p < .05$). The mean shock duration, given in seconds, received by T(39), T(34), T(29), and T(25) was .37, .54, .52, and .46, respectively.

The Conflict x Attack x Target effect for shock duration was not significant. A Duncan's multiple range test revealed a tendency for HC-LA Ss to give longer shocks to T(34) than to T(39), ($p < .10$, Duncan's multiple range test). Figures 7 and 8 depict the duration means for the 16 conditions.

Summary of Findings on Shock Data. The results indicated that, when considered over all conflict and attack conditions, T(39) received the least amount of aggression (intensity, duration) while T(29) received the greatest amount of aggression (intensity, duration). Results from analysis of the number measure suggested that T(34) might be the victim of displaced aggression across two of the three blocks of trials under HC-HA conditions. Analysis of the intensity measure yielded an interesting Conflict x Attack interaction: Ss in HC-LA and LC-HA conditions gave more intense shocks than did Ss in LC-LA and HC-HA

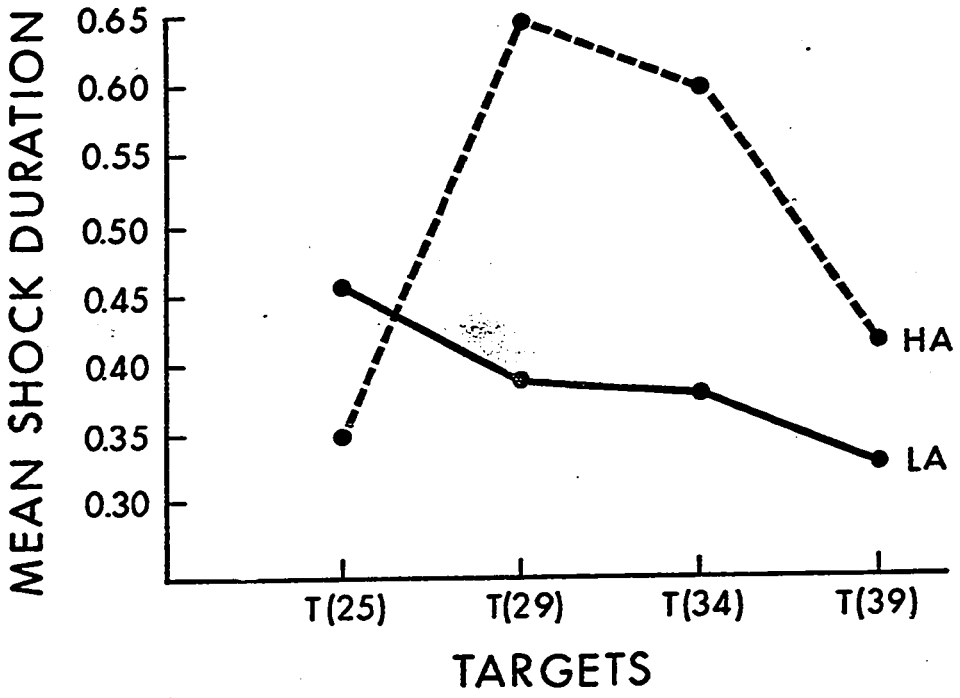

Fig. 7. Mean shock duration given in low conflict-low attack and low conflict-high attack conditions.

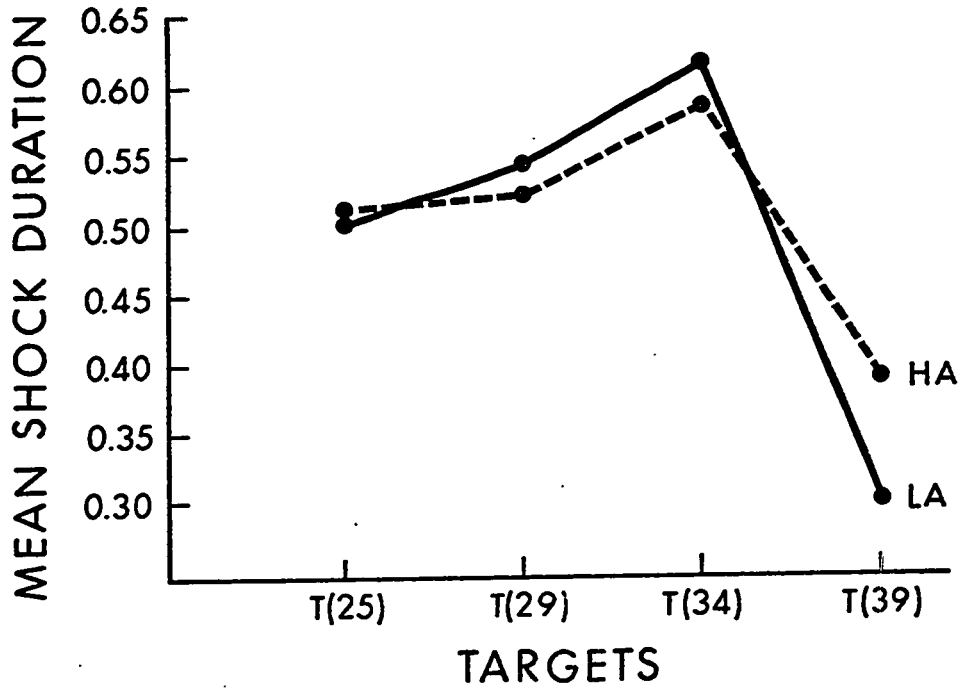

Fig. 8. Mean shock duration given in high conflict-low attack and high conflict-high attack conditions.

conditions. Duncan's multiple range tests were carried out on intensity, number, and duration means obtained in the non-significant Conflict x Attack x Target interactions and yielded several more specific differences among the 16 conditions.

Analyses of Questionnaire Data

Subjects responded to post-experimental questions concerning their reactions to the experiment on a first questionnaire, and subsequently rated T(39) on a second questionnaire. On the initial questionnaire, Ss used five-point scales to rate: (a) the painfulness of shocks received and delivered; (b) their feelings about giving and receiving shock; and (c) their general feelings during the experiment. Subjects were also asked to recall their partner's age. A 2 x 2 x 4 (Conflict x Attack x Target) analysis of variance was used to analyze all responses from both questionnaires. Appendix J contains a summary of the analyses of variance carried out on ratings made on the first questionnaire.

Subjects rated the painfulness of the shock(s) they had received on a five-point bipolar scale; labels were typed under the points and ranged from "not at all painful" at one pole to "extremely painful" at the other pole. Subjects in HA conditions rated their shocks as more painful (between "not at all painful" and "slightly painful") than did LA Ss ($F = 7.24$, $df = 1/112$, $p < .01$). The respective means for HA and LA Ss were 1.50 and 1.20. Although Ss who received 17 shocks regarded this experience as slightly more painful than did Ss who received just one shock, the mean ratings of pain indicated that neither group found the experience very painful.

Appendix J (Table 1) contains the analysis of these pain ratings. On a similar scale, Ss estimated the painfulness of shocks they had administered to their partner. Analysis of these ratings yielded no significant effects (Appendix J, Table 2).

Subjects used four bipolar scales, assessing anxiety, annoyance, worry and anger, to rate their feelings concerning the shock evaluation which followed their task performance. Analyses of variance (Appendix J, Tables 3 and 4) were carried out on the combined anxiety-worry ratings and on the combined anger-annoyance ratings. Relative to LA Ss, HA Ss indicated greater feelings of anger and annoyance concerning the shock evaluation ($F = 191.55$, $df = 1/112$, $p < .001$). Ratings by LA Ss averaged 1.09 while those given by HA Ss averaged 2.5 on the five-point scales. Analysis of the combined anxiety-worry ratings yielded no significant effects.

Subjects used four bipolar scales to rate their feelings about shocking their partner. Each scale was analyzed separately (Appendix J, Tables 5-8). Subjects in LA conditions tended to be more afraid about giving shock than were Ss in HA conditions ($F = 3.69$, $df = 1/112$, $p < .06$). The mean fear scores for LA and HA Ss were 1.70 and 1.44, respectively. The higher fear indicated by LA Ss, relative to HA Ss, may reflect the fact that Ss in the former group had experienced only one shock and, consequently, were probably more uncertain about the possible effects of shocks; Ss in the HA group, on the other hand, had safely experienced a number of shocks and were probably more reassured about their harmless effects, at low intensities, anyway. Analyses of the scales assessing annoyance, pleasure, and anxiety about giving shock yielded no significant effects.

Subjects used four bipolar scales, assessing anger, annoyance, worry and anxiety, to indicate what their feelings had been throughout the experiment. Analysis of the combined anger and annoyance ratings yielded a significant main effect for attack ($F = 22.79$, $df = 1/112$, $p < .005$). The mean anger-annoyance ratings were 1.46 for HA Ss, and 1.07 for LA Ss. Analysis of the combined worry-anxiety ratings yielded no significant effects. These two analyses are summarized in Tables 9 and 10 of Appendix J.

The final item on this questionnaire required Ss to write down the age of their partner; Ss in the T(34), T(29), and T(25) conditions were asked to recall the ages of the first and second partners. Six Ss were unable to recall the correct age(s) and were subsequently replaced by other Ss.

On the second questionnaire, Ss rated the 39 year-old partner on a series of 12 seven-point bipolar scales; ratings given by each S were averaged over the 12 scales. Analysis of these ratings (Appendix J, Table 11) revealed a highly significant main effect for attack ($F = 245.96$, $df = 1/112$, $p < .001$). As expected, LA Ss gave more favorable ratings (mean = 5.28) to the partner than did HA Ss (mean = 3.69). The Attack x Target interaction also reached significance ($F = 3.30$, $df = 3/112$, $p < .025$). The interaction indicated that under LA, Ss in the T(25), T(29), and T(34) conditions gave the 39 year-old partner equally high ratings and under HA, gave him equally low ratings ($p < .05$, for all comparisons between HA and LA groups, Duncan's multiple range test). Ratings by Ss in the T(39) condition followed this pattern but showed less contrast; under HA, these Ss rated the 39 year-old partner

more favorably than did the other groups ($p < .05$ for all comparisons, Duncan's multiple range test). Table 5 presents the mean ratings for this interaction.

Overall, the questionnaire ratings strongly supported the success of the attack manipulation. Relative to LA Ss, HA Ss rated themselves as being significantly more annoyed and angry (a) at the evaluation they received, and (b) during the entire experiment. Further, HA Ss rated the 39 year-old partner much less favorably than did LA Ss.

Only one shred of evidence indicated that the conflict manipulation might have had the desired effect. Subjects in HA conditions tended to give less intense shocks to the 39 year-old partner under HC than under LC ($p = .10$, Duncan's multiple range test). No differences emerged, however, between the conflict groups on ratings of fear or anxiety about giving shock to the target.

TABLE 5

Mean Rating of T(39) for Each Attack x Target Condition

	Low Attack	High Attack
T(39)	5.16^{a}	4.11^{b}
T(34)	5.32^{a}	3.59^{c}
T(29)	5.31^{a}	3.43^{c}
T(25)	5.34^{a}	3.62^{c}

Note: The lower the score, the more unfavorable the rating. Cells containing the same superscript are not significantly different at the .05 level by Duncan's multiple range test.

Analyses of Physiological Data

Heart rate (HR) was measured by counting the number of beats occurring during 20-60 second samples of various events during the experiment; HR scores for each S were based upon the mean number of beats, counted in five-second intervals, for the various sample periods. The 60-second interval just preceding E's presentation of the conflict communication was used as an estimate of base line (BL) or resting-level HR. The degree of HR change during various events was calculated by subtracting the average of each S's basal HR from his average reading for the critical event; the resultant difference scores thus provided an adjusted measure of cardiac response. Analyses of variance were then carried out on these difference scores. Appendix K contains a summary of these analyses.

Analysis of variance of BL scores (Table 1) unexpectedly yielded a significant Conflict x Attack interaction ($F = 4.80$, $df = 1/111$, $p < .05$) and a nearly significant main effect for attack ($F = 3.56$, $df = 1/111$, $p < .07$).[1] The possibility that cues were systematically transmitted to Ss by E during the BL period is negated by the fact that E was still unaware of the conflict and attack conditions to which Ss had been assigned. Examination of the interaction scores indicated that Ss randomly assigned to the HC-HA condition had higher resting-level HR than did Ss assigned to the HC-LA and the LC-HA conditions ($p < .01$, $p. < .05$, respectively; extension of Duncan's multiple range test to

[1]The BL recording for one S was virtually unreadable and so was omitted from this analysis.

unequal replications, Kramer, 1956). Thus the initially higher HR of Ss in the HC-HA group appeared to determine the significant Conflict x Attack interaction. Table 6 presents the mean HR scores for this interaction.

TABLE 6

Mean Resting-Level HR for Each Conflict x Attack Condition (Reported in Terms of Five-Second Intervals)

	Low Conflict	High Conflict
Low Attack	6.92^{ab}	6.65^{b}
High Attack	6.86^{b}	7.48^{a}

Note: Cells containing the same superscript are not significantly different at the .05 level by Duncan's multiple range test.

Unexpected differences between conditions in resting-level HR have been reported in at least one other study (Burgess & Hokanson, 1968); BL differences were apparently overwhelmed, however, by changes in the independent variables since similar (mirror-image) differences did not re-appear in subsequent analyses of difference scores.

The potential difficulties raised by significant differences in resting-level HR were highlighted in the present study by results of the analyses of variance carried out on the difference scores (see Appendix K, Tables 2-12). Analyses of five of the 11 experimental events yielded significant ($p < .05$ to $p < .005$) Conflict x Attack interactions, while two additional analyses yielded nearly significant

Conflict x Attack interaction ($p < .07$). Table 7 presents the difference scores for both significant and nonsignificant Conflict x Attack effects. No other significant effects were obtained.

The direction of the mean difference scores of the Conflict x Attack interactions was the same in every analysis (significant or not): the LC-LA and HC-HA Ss always exhibited the lowest increases (and greatest decreases) in HR, while LC-HA and HC-LA Ss always exhibited the greatest increases (and lowest decreases) in HR. Apparently the significant BL interaction strongly influenced every analysis of the difference scores. In the analyses yielding significant Conflict x Attack interactions, the mean increases (or decreases) in HR acted essentially as constants, preserving the mirror-image form of the original BL interaction.

Additional analysis. Elliott (1970) reported that resting-level HR has shown considerable uniformity across studies. Following an initial rest period of five minutes or less, a mean HR of approximately 74 bpm has been widely obtained in situations "free of strong impending demands or threats (p. 157)." Elliott suggested that a mean resting rate of 80 bpm or higher signifies the existence of "unrelaxing properties" in the situation.

Although potentially arousing objects (e.g., microphone, speaker) were present during the recording of resting-level HR in the present study, the overall mean HR of 84 bpm for 127 Ss appeared quite high in view of Elliott's conclusions. It will be recalled that, in the present study, resting-level HR for the HC-HA group was significantly higher than resting-level HR for the HC-LA and LC-HA groups;

TABLE 7

Mean Heart Rate Change (Event less BL)
for Interaction Between Attack and Conflict

Event

1. Task Instructions

	LC	HC
LA	1.43	1.47
HA	1.60	1.38

2. Writing Task

	LC	HC
LA	1.49	1.51
HA	1.80	1.34

3. Electrodes On

	LC	HC
LA	.75	.96
HA	.99	.72

4. Presenting Arguments

	LC	HC
LA	1.87	2.11
HA	2.06	1.74

5. Comparison Between First and Second Shock Evaluations, for LA and HA Ss, respectively**

	LC	HC
LA	-.06	.38
HA	.46	.07

6. Removal of Electrodes***

	LC	HC
LA	-.20	.21
HA	.42	-.01

7. Shock Box Instructions*

	LC	HC
LA	-.14	.11
HA	.08	-.17

8. Preceding Concept Task (30 seconds)

	LC	HC
LA	.34	.54
HA	.63	.29

9. Concept Task (S teaches and shocks partner; first 60 seconds)

	LC	HC
LA	.40	.69
HA	.82	.54

10. Concept Task (Final 30 seconds)**

	LC	HC
LA	-.13	.23
HA	.16	-.07

11. Administration of Questionnaire*

	LC	HC
LA	-.11	.34
HA	.10	.03

*$p < .05$
**$p < .025$
***$p < .005$

the respective means for the HC-HA, HC-LA, and LC-HA groups were approximately 90 bpm, 82 bpm, and 80 bpm. The possibility that removal of Ss with extremely high resting-level HR from the data analyses might eradicate the significant BL interaction appeared encouraging.

Consequently, analysis of variance (see Appendix K, Table 13) was carried out on resting-level HR following the exclusion of Ss with a mean HR of 98 bpm or higher; no more than three Ss were excluded from any one condition. The resultant overall mean HR was 80 bpm. Results indicated that the Conflict x Attack interaction had been slightly "suppressed" but hardly eliminated ($F = 3.90$, $df = 1/89$, $p < .06$). The main effect for attack was, however, virtually eradicated ($F = 1.69$, $df = 1/89$, $p < .25$). Since the exclusion of highly aroused Ss did not result in relatively equal resting-level HR among groups, analyses on the difference scores were not carried out.

In sum, the findings of these analyses of HR emphasize that greater control should be exercised over factors which may have a contaminating influence on resting-level HR. In the present study, some Ss ran from classes and up a flight of stairs to get to the experiment on time. In addition, some Ss were heavy smokers; no S was used, however, who admitted to having smoked 20 minutes prior to the experiment. It is possible that a larger proportion of the "hurriers" and smokers ended up in two or three of the 16 experimental conditions thus causing differences in resting-level HR. Greater control over such possible contaminants might be attained through extension of the pre-experimental rest period and elimination of heavy smokers from similar studies in which HR is recorded (see Elliott & Thysell, 1968).

Graphed HR Measures. The mean HR change from BL which occurred during each of 11 experimental events, is depicted for all 16 conditions in Figures 9-12. Inspection of these figures reveals a remarkable similarity in HR changes experienced by each group. Deviation from BL was greatest during the initial events and then decreased during the remaining events, thereby reflecting adaptation effects. As a result, the height of the peak on event 10 (teaching and shocking the partner), for example, is not strictly comparable to the heights attained in the early part of the experiment.

Nevertheless, it is clear that, relative to surrounding events, events 3, 5 and 10 revealed maximum deviation from BL. On these events, Ss were engaged in "active" behavior: writing, talking, and teaching and shocking the partner. These trends offer some support to Elliott's contention (1969) that HR may reflect emotional arousal only when responses can be initiated to cope with the arousal. It might be argued that the physical "exertion" required on the "active" events increased cardiac activity. On the other hand, "filling out questionnaires" would presumably be in an "exertion" category similar to "writing" or "talking," yet Ss did not show a peak in arousal on this event. In addition, other studies (Elliott, 1969; Weiner, 1962), have shown that, in situations which are emotion provoking (for example, Ss are told to make up a story to tell), HR increases most when Ss are planning their response, and increases only slightly further when the response is being carried out. Thus, most of the HR increase is attributable to the Ss' anticipation of making some overt "coping" response and not due to the effort involved in actually responding.

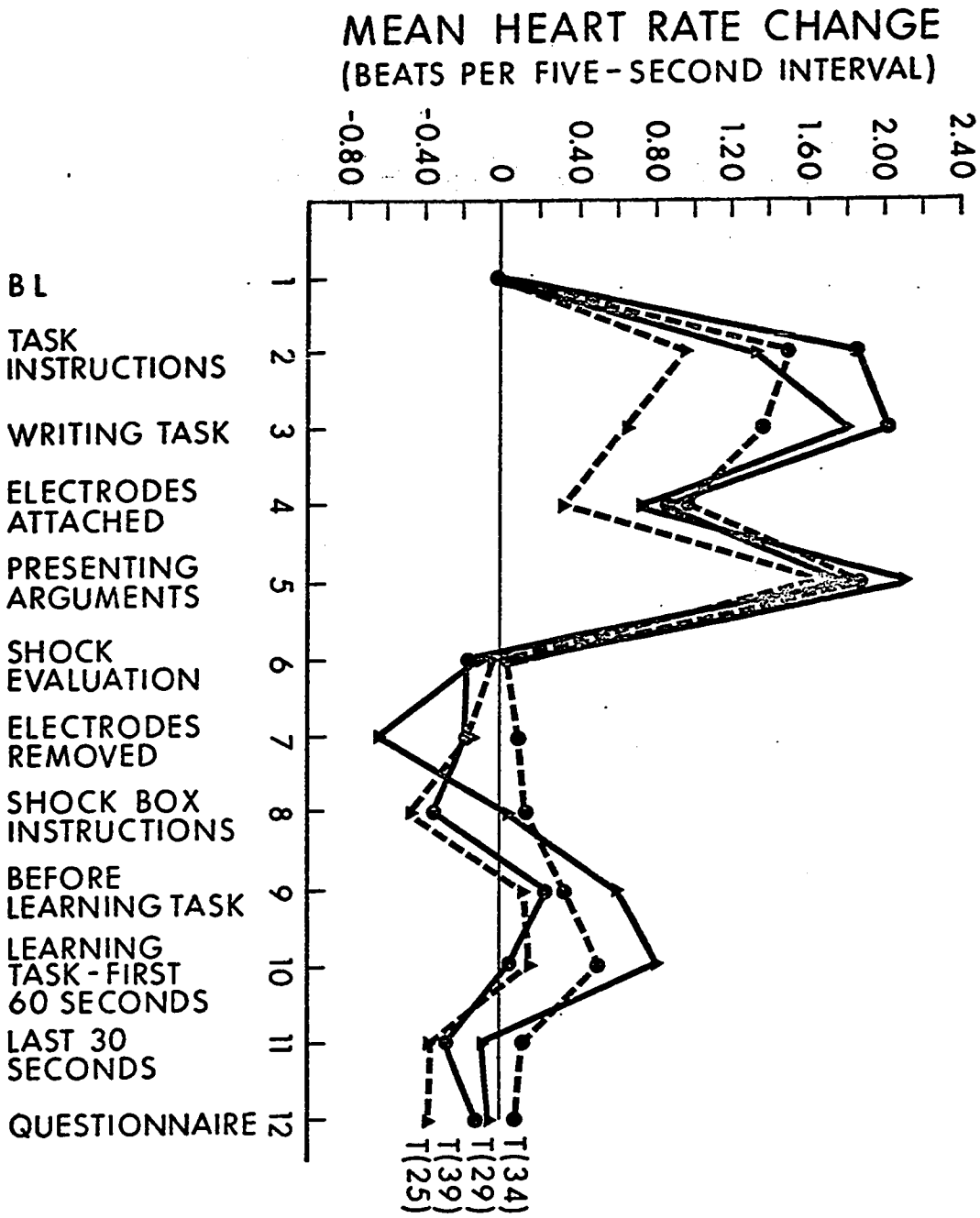

Fig. 9. Mean heart rate change from base level over 12 events for low conflict-low attack subjects.

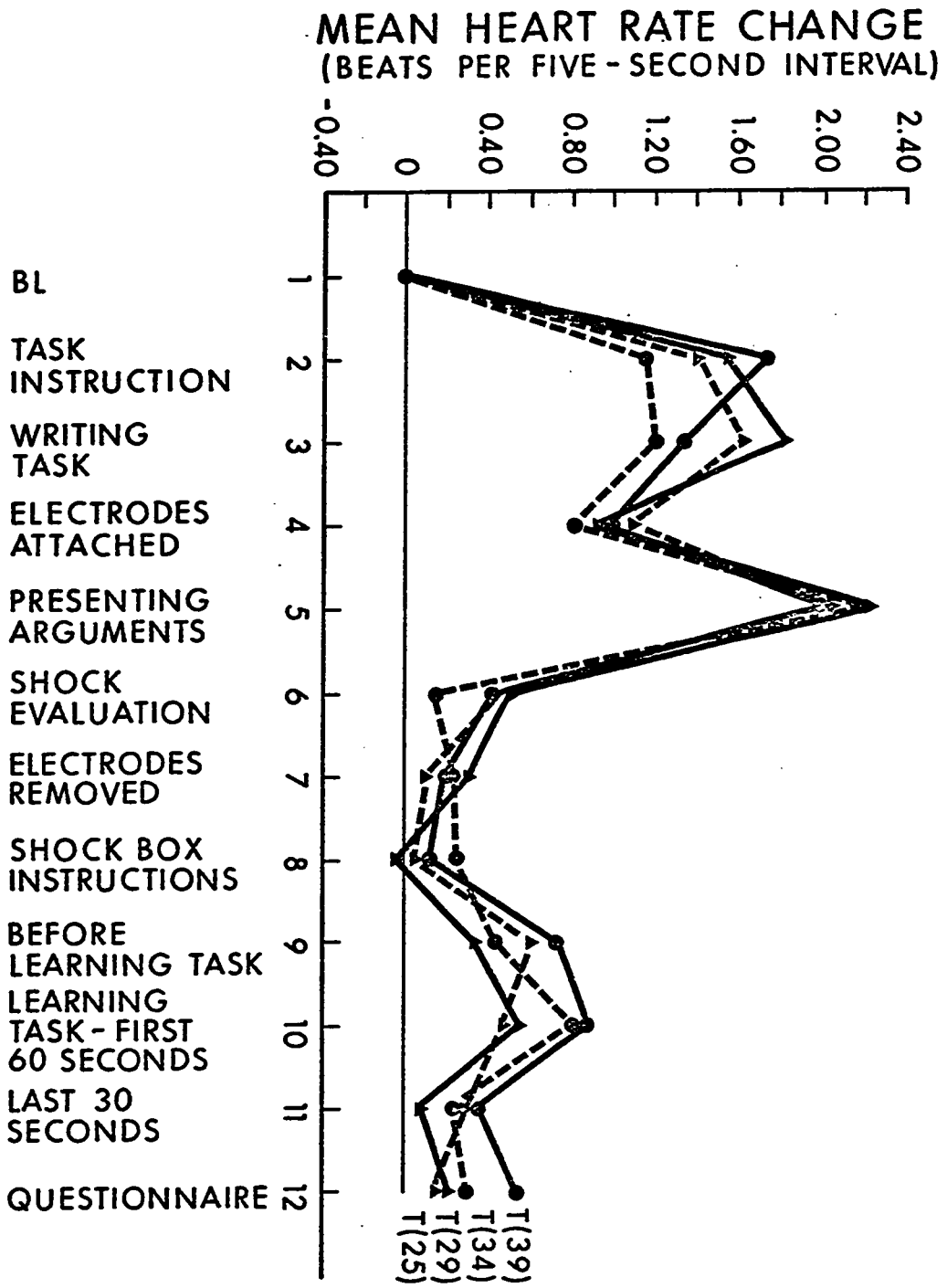

Fig. 10. Mean heart rate change from base level over 12 events for high conflict-low attack subjects.

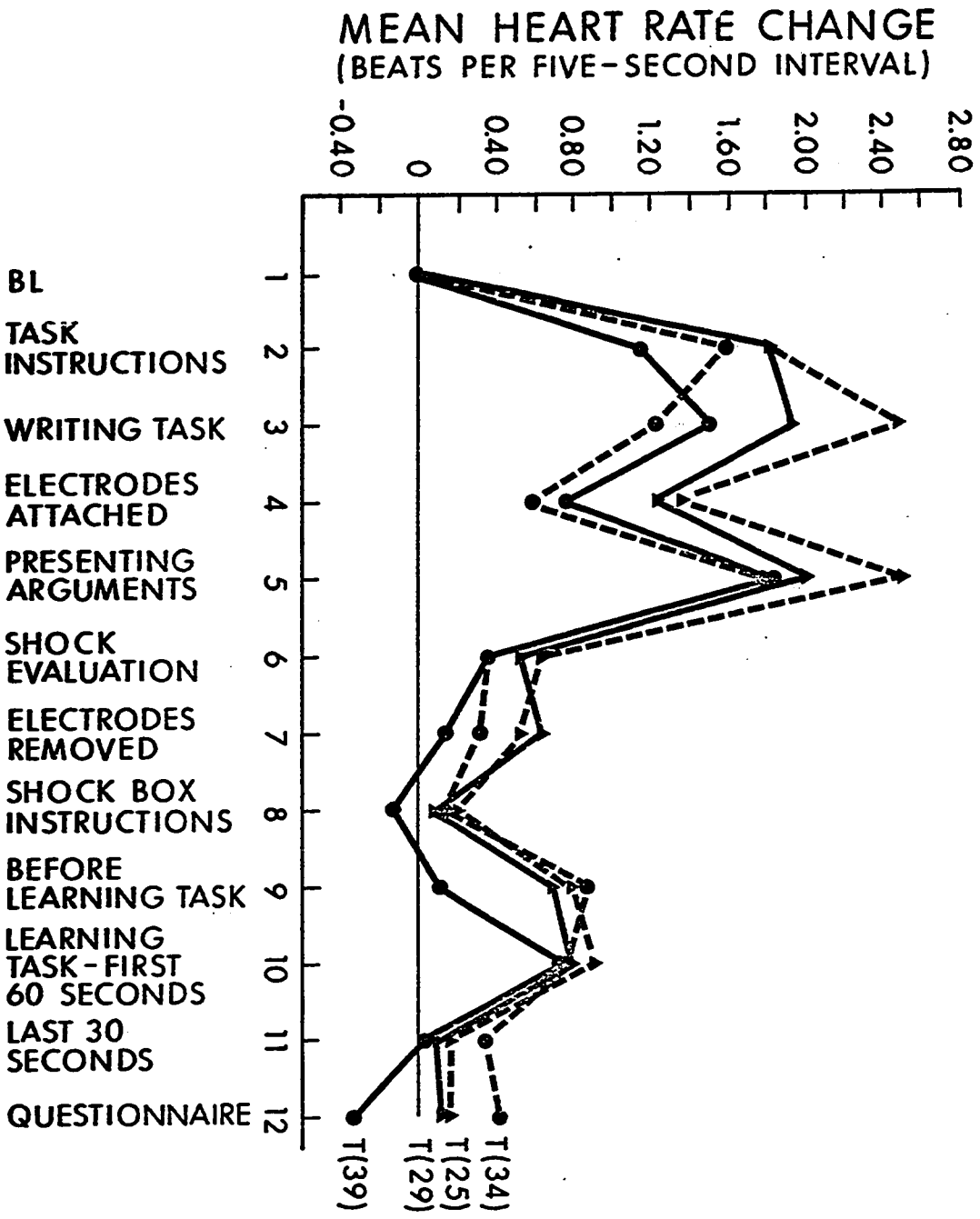

Fig. 11. Mean heart rate change from base level over 12 events for low conflict-high attack subjects.

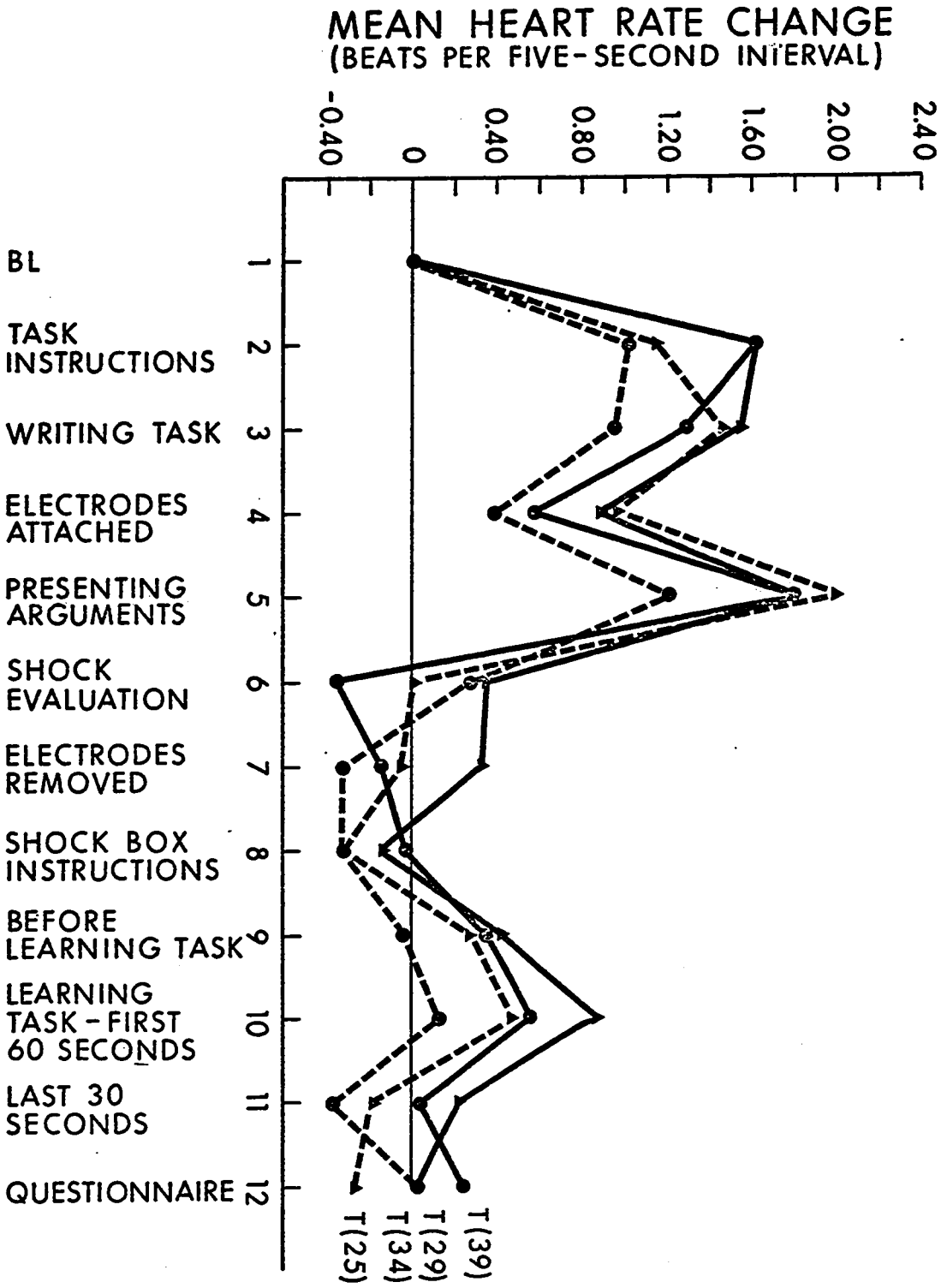

Fig. 12. Mean heart rate change from base level over 12 events for high conflict-high attack subjects.

DISCUSSION

The first prediction asserted that, under low conflict, Ss in the high attack conditions would direct the strongest aggressive attacks to the 39 year-old target, relative to the other targets. Even the trend of the three-way interaction means did not support this prediction. Several points should be made concerning the lack of support for this prediction. The first point concerns the age of the anger instigator. Although each of the four targets related the same background information to Ss, the possibility arises that Ss attributed higher status and possibly greater wisdom to the 39 year-old target than they did to the other targets. Several Ss indicated that he was older and more experienced than they, and that he probably had given more thought to the student participation issue than they had. Further, several Ss assumed that the 39 year-old partner had returned to university for an advanced degree. Thus, the age of the instigator in this study might have led to assumptions about status, and consequently, caused some Ss to inhibit retaliatory aggression. Several studies have demonstrated that high-status instigators are likely to receive less counteraggression than are low-status instigators (Cohen, 1955; Roberts & Jessor, 1958; Thibaut & Riecken, 1955). The fact that the 34 and 29 year-old targets were also older than the "average" university student and yet did receive strong aggressive attacks argued against this possibility.

Questionnaire ratings of the 39 year-old partner at the conclusion of the experiment indicated that, under high attack, Ss who completed the entire experiment with the 39 year-old partner gave him more favorable evaluations than did Ss who changed partners during the experiment. Although this finding could mean that Ss did make unwarranted assumptions about the first partner's position and intelligence, alternative interpretations can be offered for this finding. Angered Ss may have evaluated the instigator more favorably because direct counteraggression had: (a) successfully drained off aggressive feelings or (b) produced feelings of guilt which led Ss to try to "compensate" the victim via favorable ratings. Because of significant differences in resting-level HR between groups, the first alternative could not be checked in terms of cardiac activity. No other data were available to check this alternative. The second alternative seemed unlikely in view of relevant research on harm-doers (Berscheid & Walster, 1967; Berscheid, Boye & Walster, 1968; Davis & Jones, 1960). It seemed more probable that, if guilt had been aroused, Ss would have denigrated, rather than have made a feeble attempt to "compensate," the victim in order to justify their actions.

Perhaps the most likely explanation is that angered Ss had an opportunity to revise their opinions of the instigator while "working" with him during the second half of the experiment; angered Ss in the other target conditions did not have the same opportunity and so retained their original, highly negative impressions. If this interpretation is correct, then the relatively high ratings of the 39 year-old partner by angered Ss need not have reflected attribution of high status to this individual on the basis of his age.

The problem remained, then, of explaining why low conflict-high attack Ss did not direct their strongest aggressive attacks at the anger instigator. A compelling explanation, from Miller's point of view, is the possibility that, relative to Ss in the 39 year-old target-condition, Ss in the three other target conditions suffered additional frustration or annoyance (see Dollard & Miller, 1939, p. 40). Subjects in low conflict-high attack conditions were led to believe that they would be able to evaluate (i.e., retaliate against) the aggressor in the second half of the experiment. Subjects who completed the experiment with the instigator received this opportunity whereas Ss in the other target conditions were denied their chance for retribution against the instigator. The prevention of direct counteraggression could have further angered these Ss, thus resulting in aggressive attacks on a similar substitute target equally strong or stronger than the attacks received by the instigator. In future investigations, inhibitory as well as aggressive tendencies should be further examined.

The prediction concerning "proportionate" aggressive responding under low conflict received no support from any of the aggression measures: the substitute targets did not receive aggressive attacks from Ss in high attack conditions proportional to the targets' similarity to the anger instigator. Thus the assumption that a linear-gradient (or negative growth curve), ascending across target conditions from the least similar target to the instigator himself, would be a function of aggressive responding under low conflict-high attack conditions was not substantiated.

This lack of support for one of the basic suppositions of the Miller model is intriguing in view of the supportive results from animal studies, in which approach (and avoidance) tendencies have been plotted against distance from goal (Brown, 1940, 1948; Miller, 1948), and in view of the widespread acceptance of the assumption. This finding is consistent, on the other hand, with the essentially negative results obtained with human Ss in studies which have attempted to generalize the original model to situations involving aggression. When approach (aggressive) tendencies have been plotted against a dimension of target similarity, the predicted gradients have not emerged (Hokanson, Burgess & Cohen, 1963; Ferson, 1958; Moore, 1964).

The prediction that, under high conflict-high attack, the strongest aggressive attacks would be directed toward one of the two most similar targets to the instigator, received some support from several findings. Even the Conflict x Attack x Target means for each of the three aggression measures were consistent with this prediction. Although the comparisons for intensity and duration of shocks did not reach significance, the comparison for number of shocks did attain significance. More shocks were given to the 34 year-old target than to the other targets under high conflict-high attack conditions.

Significant interactions obtained in analysis of the number variable initially appeared to support a displacement effect. In the significant Attack x Target interaction, Ss in high attack conditions gave significantly more shocks to the 34 year-old target than did low-attacked Ss whereas the number of shocks given to other targets did not differ between high and low attack conditions. Moreover, means

obtained in the significant Conflict x Attack x Target x Trials interaction indicated that the difference in number of shocks given to the 34 year-old target between high and low attack conditions was mainly attributable to the large number of shocks administered under the high conflict-high attack condition. On the second and third trials, high conflict-high attack Ss gave more shocks to the 34 year-old target than were given to any other target. This finding was consistent with a displacement effect. Angered Ss under high conflict may have displaced aggression from the instigator onto the most similar target available. The fact that the instigator and most similar substitute target did not, however, receive the most shocks under low conflict-high attack argues against acceptance of a displacement interpretation.

A somewhat puzzling finding emerged in analysis of the intensity measure; the significant interaction between conflict and attack (and trials) was not expected. The interaction revealed that, under low conflict, Ss in high attack conditions gave more intense shocks than did Ss in low attack conditions, as expected; under high conflict, however, low-attacked Ss gave more intense shocks than did high-attacked Ss. Superficially, it appeared that the high conflict communication enhanced the aggressive responding of low-attacked Ss but inhibited the aggressive responding of high-attacked Ss. It might be conjectured that the high conflict communication was more arousing to Ss than was the low conflict communication. Subjects in the former condition believed that they would have to evaluate a partner who was presumably unable to tolerate much stress.

It is possible that the hypothesized arousing effect of the high conflict communication served to "energize" the aggressive responding of low-attacked Ss. Berkowitz (1969) and Geen (1968) have proposed that general, undifferentiated arousal can facilitate aggressive responses in the presence of aggressive cues. Geen & O'Neal (1969) demonstrated that, following exposure to filmed aggression, Ss who were stimulated with white noise gave more shock to an experimental accomplice than did non-stimulated Ss. The high conflict communication may have had a similar arousing effect upon low-attacked Ss thus resulting in heightened aggression.

How, then, can the decreased aggression of high conflict-high attack Ss be explained? It seems plausible that the arousing effect of the high conflict communication, combined with a strong aggressive attack from the partner, resulted in high arousal among Ss in the high conflict-high attack conditions. These Ss had been arbitrarily attacked but were aware that strong counteraggression was not possible. On the basis of studies carried out by several investigators (Bandler, Madaras and Bem, 1968; Berkowitz, et al., 1969; Schachter, 1964; Schachter & Singer, 1962), it might be conjectured that the highly aroused Ss in high conflict-high attack conditions interpreted their general state of arousal as "strong anger." If so, these Ss may have experienced heightened anxiety about evaluating the partner. Berkowitz, et al. (1969) demonstrated that individuals who were led to believe they were very angry, following a moderate provocation, gave less shock to the provocateur than did Ss who were led to believe they were moderately angry. Because extreme anger was not justified by the moderate

provocation, Ss who perceived themselves as very angry presumably became quite anxious about their inappropriate emotional response and, as a result, inhibited strong aggressive responses. It is conceivable that a similar process occurred among high conflict-high attack Ss in the present study and accounted for their low aggressive responses.

A highly reliable main effect for trials emerged in the analysis of each aggression measure, and demonstrated that the intensity, number and duration of shocks showed a definite tendency to increase over trials. Such increases in aggression over trials has been widely obtained (Baron & Kepner, 1970; Buss, 1963, 1966a, b; Geen, 1968; Loew, 1967). Buss (1966b) has speculated that the increase occurs because Ss initially administer shocks of, for example, low intensity but tend to experiment with other intensities as the trials progress. This increased variability necessarily produces an "upward drift" in mean shock intensity over trials. In the present study, the fact that many Ss gave moderately long or intense shocks on the first block of trials and showed further increases on subsequent trials tends to argue against the Buss interpretation.

An alternative explanation of the trials effect concerned the S's violation of middle-class prohibitions against physical aggression and the absence of subsequent punishment or disapproval. Walters and Parke (1964) demonstrated that, when punishment does not follow the violation of prohibited acts, the frequency of subsequent violations (of the specific prohibitions) may increase. Thus, in the present experiment, the lack of negative consequences to the S, either from E or from the victim, may have weakened the S's inhibitions against further aggression.

An additional factor that may have increased aggression over trials is the hypothesized "brutalizing" influence of aggression upon the aggressor (see Feshbach, 1964, pp. 260-261). Continued aggression against a victim may evoke "defensive" responses (e.g., intellectualization) in the aggressor which are incompatible with empathic responses, thereby reducing inhibitions against further aggression.

One of the major difficulties in testing Miller's conflict model in any situation involves specification and quantification of some dimension of "nearness" to the goal (Miller, 1959, p. 226). Determination of the model's utility for situations involving aggression requires that appropriate dimensions of "nearness" to the anger instigator be defined and quantified. Although quantification of a dimension can be achieved through the use of a variable like "age," the creation of "nearness" or psychological similarity of a target to the instigator may require a more complex, less quantifiable variable (e.g., social status, physical appearance). The use of more complex variables, however, is likely to increase the probability of confounding between the inhibitory variable and the similarity variable: people are generally more inhibited, for example, about attacking people of high status than people of low status. Although these variables are confounded in the real world, an adequate test of the model requires that the competing inhibitory factor be segregated from the tendency to approach or aggress. In future studies, additional similarity dimensions, both simple and complex, must be examined.

Experimental studies of aggression have frequently employed a learning paradigm in order to provide opportunities for Ss to express

aggression. The use of such "learning" tasks obscures the motivational basis for the administration of aversive stimuli to a victim. Specifically, how can the intent to harm the learner be distinguished from the intent to help the learner? Although Ss in the present study were instructed to evaluate their partner's performance on the learning task, via shock, some Ss may have used the shock in an attempt to help the partner learn the task (see Rule & Hewitt, 1970). The use of large amounts of shock could thus reflect a S's desire to teach his partner or the desire to injure him. This difficulty can be avoided by discarding the learning paradigm and employing a task in which the shock delivered by Ss is strictly evaluative (see Berkowitz, 1966; Berkowitz & Holmes, 1959; 1960; Hokanson, Burgess & Cohen, 1963). The disadvantage in using such tasks is that the Ss are generally allowed just one opportunity to evaluate the instigator; since many Ss tend to use shock very cautiously at first, a single trial may not be indicative of the aggression the S would express on the second or third trial. A definite need exists for the creation of a task, extrinsic to the learning paradigm, which permits Ss to evaluate a target on several occasions.

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APPENDIX A

Containing Transcripts of Tape Recordings

The first half of the four tape recordings was identical and contained the following messages:

> I'm 39 years old. I'm studying education... at the University here. My hometown is Edmonton... and this is the first time I've been in a psychological experiment.
>
> Well... I don't think you've really thought about the issue. The arguments you've given are the same, tired, old clichés I've heard before—they haven't convinced me in the past, and they don't convince me now... I think you should give it some more thought.

The second half of three tapes contained introductions by the substitute targets of aggression. Except for the age given, the introductions were identical:

> I'm in education, and I'm 34 (29, 25) years old... I come from Edmonton... This is the first time that I've been in a psychology experiment.

All four tape recordings concluded with the 21 pre-planned "guesses" to the Concept Learning Task.

APPENDIX B

Containing: Instructions for Operation of Shock Box

Shock Data Sheet

INSTRUCTIONS FOR OPERATION OF SHOCK BOX

This apparatus is capable of generating electric shocks from very mild to very intense levels—from zero to 330 volts. This black arrow indicates the upper limit that this machine is set to deliver—a maximum of 330 volts is available.

The shock that you received was $22\frac{1}{2}$ volts, which is here under "Slight Shock." As the dial is moved clockwise, the shocks become increasingly painful. I want to emphasize that, under the present conditions, the shocks delivered by this machine cannot cause tissue damage or any other permanent effect.

Now, in the next part of the experiment, Subject 2 will be expecting either a shock or a flashing light after each guess that he makes. If he gives a correct answer, all you have to do is flip this switch on and off—it will activate Subject 2's light. If he gives a wrong answer, then you will deliver a shock to him. Now, to do this, first adjust the dial. Then press this button (E demonstrates procedure). You can vary the length of each shock by pressing the button for varying lengths of time. This timer here reflects the duration of each shock that is given (E demonstrates). You can also vary the number of shocks for a given wrong response just by pressing the button more than once (E demonstrates).

I've asked Subject 2 if he will be willing to participate in the experiment under these conditions, and he is. Do you have any questions about the operation of the shock apparatus?

OK, then here are the cards for the concept task. When I tell you to go ahead, you'll begin reading the words on the first card to Subject 2. Then wait for his response. After he gives it, then either flash his light or deliver a shock depending on whether he is right or wrong. Then read the words on card 2 and continue the same procedure.

Here is a list of the correct responses—if he chooses the right word, place a check here, so you'll know how he's doing. We'll continue with the task until he gets three right in a row. Do you have any questions? I'll tell you when your microphone is on.

Data Sheet

Date: _____

Condition: _____

Subject: _____

Reported Shocks: 1st _____

Age: _____

2nd _____

	Intensity	Number	Duration
1. garden			
2. lesson			
3. carrot			
grape**			
4. rootbeer			
5. guitar			
6. pinetree			
7. peppermint			
orange**			
8. red			
9. music			
10. mint			
11. leaf			
12. field			
lime**			
13. cinnamon			
14. vegetable			
15. sphere			
persimmon**			
date**			
cherry**			

APPENDIX C

Containing: Instructions for Concept Learning Task

Concept Learning Task

Check List of Correct Responses

INSTRUCTIONS FOR CONCEPT LEARNING TASK

Now, in the next part of the experiment, Subject 2 will attempt to learn a concept. Subject 1 will be given a stack of index cards with four words typed on each card. One of these words pertains to the concept Subject 2 will try to learn.

Subject 1 will read the four words on the first card to Subject 2. Subject 2 will then guess which of the words is the correct one. If he guesses correctly, then Subject 1 will flash Subject 2's light, by flipping the switch in front of him on and off. If Subject 2 guesses incorrectly, then Subject 1 will give him shock.

Following this, Subject 1 will read the four words on card 2. This same procedure will continue until Subject 2 chooses the correct word three times in a row. At that point, he is considered to have learned the concept.

LEARNING TASK

1	sing	kumquat	picture	garden
2	amber	lesson	melon	ring
3	carrot	book	shape	peach
4	swim	grape	wing	yellow
5	jewel	flute	currant	rootbeer
6	ballad	apple	guitar	jelly
7	pinetree	pinecone	color	pineapple
8	opera	peppermint	conductor	tangerine
9	orchard	post	orange	potato
10	bush	apricot	red	concert
11	country	purple	music	plum
12	lemon	car	mint	piano
13	pencil	fig	diet	leaf
14	field	rhumba	round	mango
15	manager	green	lime	cheese
16	rhubarb	cinnamon	yam	pollen
17	vegetable	seed	pear	sun
18	sphere	avocado	native	hot
19	spring	persimmon	crop	nut
20	date	summer	raddish	seedless
21	tropical	tree	cherry	bee
22	pumpkin	honey	ginger	nectarine
23	aspic	banana	weed	croquette
24	berry	almond	section	squash
25	corn	stuff	papaya	cut
26	lamb	chill	salad	grapefruit
27	vanilla	strawberry	tile	rain
28	honeydew	farmer	south	domestic
29	plate	casaba	basket	knife
30	celery	bouillon	artificial	pomegranate

Correct responses for Concept Formation Task

Check off words subject gets right.

1. kumquat _____
2. melon _____
3. peach _____
4. grape _____
5. currant _____
6. apple _____
7. pineapple _____
8. tangerine _____
9. orange _____
10. apricot _____
11. plum _____
12. lemon _____
13. fig _____
14. mango _____
15. lime _____
16. rhubarb _____
17. pear _____
18. avocado _____
19. persimmon _____
20. date _____
21. cherry _____
22. nectarine _____
23. banana _____
24. berry _____
25. papaya _____
26. grapefruit _____
27. strawberry _____
28. honeydew _____
29. casaba _____
30. pomegranate _____

APPENDIX D

Containing Postexperimental Questionnaires

QUESTIONNAIRE

AGE_____

1. How did you feel about the other subject's evaluation of your argument? Rate your feelings on each of the following scales:

not at all anxious	slightly anxious	moderately anxious	strongly anxious	extremely anxious
not at all annoyed	slightly annoyed	moderately annoyed	strongly annoyed	extremely annoyed
not at all worried	slightly worried	moderately worried	strongly worried	extremely worried
not at all angry	slightly angry	moderately angry	strongly angry	extremely angry

2. What were your general feelings during the experiment? Rate these feelings on each of the following scales:

not at all anxious	slightly anxious	moderately anxious	strongly anxious	extremely anxious
not at all annoyed	slightly annoyed	moderately annoyed	strongly annoyed	extremely annoyed
not at all worried	slightly worried	moderately worried	strongly worried	extremely worried
not at all angry	slightly angry	moderately angry	strongly angry	extremely angry

3. How painful was the shock you received?

not at all painful	slightly painful	moderately painful	strongly painful	extremely painful

4. How painful do you think the shock was for the other subject?

not at all painful	slightly painful	moderately painful	strongly painful	extremely painful

5. How did you feel about being shocked?

6. How did you feel about giving shock to the other subject?

7. Rate your feelings about shocking the other subject on the following scales:

not at all afraid	slightly afraid	moderately afraid	strongly afraid	extremely afraid

not at all pleased	slightly pleased	moderately pleased	strongly pleased	extremely pleased

not at all anxious	slightly anxious	moderately anxious	strongly anxious	extremely anxious

not at all annoyed	slightly annoyed	moderately annoyed	strongly annoyed	extremely annoyed

8. Should shock be used in psychological experiments with human subjects?

9. What was your partner's age? _____

10. Any general comments about the experimental procedures?

PARTNER'S AGE_____

WARM /_____/_____/_____/_____/_____/_____/_____/ COLD

BAD /_____/_____/_____/_____/_____/_____/_____/ GOOD

FRIENDLY /_____/_____/_____/_____/_____/_____/_____/ UNFRIENDLY

UNGRATEFUL /_____/_____/_____/_____/_____/_____/_____/ GRATEFUL

BROAD /_____/_____/_____/_____/_____/_____/_____/ NARROW

GLUM /_____/_____/_____/_____/_____/_____/_____/ CHEERFUL

SOCIABLE /_____/_____/_____/_____/_____/_____/_____/ UNSOCIABLE

QUARRELSOME /_____/_____/_____/_____/_____/_____/_____/ CONGENIAL

INTELLIGENT /_____/_____/_____/_____/_____/_____/_____/ STUPID

DISCONTENTED /_____/_____/_____/_____/_____/_____/_____/ CONTENTED

AFFECTIONATE /_____/_____/_____/_____/_____/_____/_____/ HATEFUL

UNFEELING /_____/_____/_____/_____/_____/_____/_____/ FEELING

APPENDIX E

Containing: Summary of Pilot Work on Age Questionnaire

/.ge Questionnaire

SUMMARY OF PILOT WORK ON AGE QUESTIONNAIRE

The use of the age dimension to vary similarity between the instigator and targets for displaced aggression required preliminary work. It was felt that an adequate test of the experimental hypotheses demanded that targets varying on the age similarity dimension be separated by relatively equal psychological distances and that the instigator, in turn, be separated by an equivalent distance on the age dimension from the most similar target.

To complicate matters, it was expected that psychological distance between ages might not correspond to numerical distances between ages. People probably view various ages and intervals between ages in subjective, rather than objective, terms. A person might, for example, judge the distance between the ages of 20 and 25 years as psychologically greater than the distance between 50 and 55 years. A further complication was that judgments about age seemed likely to be influenced by the judge's own age.

In an attempt to deal with these problems, a questionnaire concerning individuals' perceptions of various ages and age intervals was administered to 45 male introductory psychology students in the fall, 1968. An attempt was made to control for the possible influence of the age variable by retaining only the responses of individuals whose age was between 17 and 29, inclusive. This restriction reduced the sample size to 43 since two respondents were over 30.

In the first part of the questionnaire, the students were presented with a column of numbers representing ages from 18 to 58. They were asked to encircle those ages which seemed to "go together." Results indicated that more age groupings were made among the younger ages (18 to early 30's) in the column than among the older ages. Thus, the category width, or number of years, assigned to age groupings increased as the ages increased.

In the second part of the questionnaire, respondents were asked to compare the age distance between two numerically equivalent age intervals (e.g., 20-29 and 30-39) and to indicate whether the first interval seemed larger, smaller, or equal to, the second interval. Results for the comparison between the 20-29 and 30-39 age intervals showed that 77% of the respondents perceived the 20-29 age interval as greater.

Comparisons of smaller intervals (of five years) revealed that most Ss (51%) regarded the 20-24 age interval as greater than the 25-29 age interval; 28% maintained that the intervals were equal while 21% maintained that the 20-24 age interval was smaller. Moreover, most Ss (49%) regarded the 25-29 age interval as greater than the 30-34 interval; 35% regarded the intervals as equal while 16% regarded the younger age interval as smaller. The five-year intervals covering the ages from 30 to 49 were perceived as equal by most of the subjects (56%-70%).

In summary, the findings demonstrated that the students judged intervals between ages in the twenties as psychologically greater than numerically equivalent intervals in either the thirties or forties. Such intervals in the latter age groups were perceived as

psychologically equivalent. Overall, the findings suggested that students perceived the basic interval of a year as "greater" when it occurred at the younger ages.

The results suggested that, for equalizing the psychological age distances between the instigator and substitute targets, age intervals between targets in their twenties should be slightly smaller than intervals between targets in their thirties or forties. To accommodate this reasoning, as well as to enhance the credibility of the conflict communication, the ages chosen were: 39, for the instigator, and 34, 29, and 25 for the substitute targets.

Questionnaire on Age Perception.

Some preliminary work on the scaling of age perception is being carried out by members of the psychology department. We believe that people of different ages tend to view any given age, or group of ages, differently. In order to approach this problem experimentally, we first want to learn how university students subjectively perceive ages, and intervals between ages. We would therefore greatly appreciate your cooperation in completing the following items.

Please fill in your own AGE_____.

1. The numbers in the column below represent the ages from 18 to 58. Beginning with 18, draw a large oval around each group of ages which you feel 'go together'. Work your way up to 58, including every age in some group. Use between FIVE and SEVEN age groups.

18
19
20
21
22
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33
34
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38
39
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51
52
53
54
55
56
57
58

2. Write an age-label (e.g. senior citizens) beside each group that you formed on the first page.

Underline your response.

3. I feel that the age distance between:

a. 20 and 29 is	greater than less than equal to		that between 30 and 39.
b. 30 and 39 is	greater than less than equal to		that between 40 and 49.
c. 20 and 24 is	equal to greater than less than		that between 25 and 29.
d. 30 and 34 is	greater than less than equal to		that between 35 and 39.
e. 40 and 44 is	greater than less than equal to		that between 45 and 49.
f. 25 and 29 is	greater than less than equal to		that between 30 and 34.
g. 35 and 39 is	greater than less than equal to		that between 40 and 44.

h. If you marked any of these paired intervals unequal, why do you think you perceive them this way?

4. What are the years to which you feel the following terms refer?

a. middle age

b. college age

c. young adults

d. prime of life

e. youths

f. adults

g. oldsters

h. mature adults

i. declining years physically

j. declining years mentally

APPENDIX F

Containing: Summary of Pilot Work on Conflict Communications

Original High-Conflict Communication

Final High-Conflict Communication

SUMMARY OF PILOT WORK ON CONFLICT COMMUNICATIONS

In order to test the hypotheses of this experiment, it was essential that the high-conflict communication lead angered Ss to experience considerable conflict about directly aggressing against the original partner.

Preliminary work with 55 paid, male volunteers, aged 17 to 29, was carried out at the University of Alberta in order to assess the effectiveness of the conflict communications as well as the adequacy of the age dimensions. This pilot work also provided an opportunity to refine experimental procedures.

The final forms of the high and low-conflict communications resulted in differential aggressive responding between angered Ss in several conflict groups. Five Ss were run in each of the pilot conditions. Following an aggressive attack by their 39 year-old partner, all Ss were able to vary the intensity and duration of shocks administered to the aggressor in the experiment. Only Ss who retained the 39 year-old partner throughout the experiment were able to vary number of shocks. Since none of the Ss run in this initial condition gave more than one shock per trial, it was decided to drop the number variable with subsequent pilot groups. Instructions for the final study re-incorporated the number variable when significant results were obtained with "number of shocks" in a related aggression study (Rule & Percival, 1970).

Relative to high-attacked Ss in the high-conflict condition, high-attacked Ss in the low-conflict condition delivered more intense shocks to the 39 year-old target (instigator). Mean shock intensity showed a linear increase from trial one through trial 15: low-conflict Ss averaged from 24 to 134 volts over the 15 trials while high-conflict Ss averaged from 17.5 to 50 volts. These results suggested that the Ss had attached importance to the conflict communications. Apparently, high-conflict Ss assumed that stressful shock would have harmed the instigator whereas low-conflict Ss assumed that the instigator would not have suffered from painful shocks and, consequently, used higher shock intensities.

An additional finding of importance was that angered high-conflict Ss displayed stronger aggression (range: 18 to 101 volts) toward the substitute target most similar to the aggressor than toward the aggressor himself (range: 17.5 to 50 volts). Angered low-conflict Ss, on the other hand, displayed greater aggression toward the aggressor (range: 24 to 134 volts) than toward the 34 year-old target (range: 16 to 49 volts). These results provided support for the hypotheses that, under high conflict, the strongest aggressive attacks would be directed toward one of the most similar substitute targets while the weakest aggressive attacks would be directed toward the instigator.

These findings received further support from results of analyses of (a) the duration measure and (b) a "total" aggression score, Intensity x Duration. (For the latter analysis, a composite score was obtained for each S by multiplying intensity and duration scores for each trial and by then summing over the 15 trials.) Results

from these analyses paralleled those of the intensity score analysis. On the basis of these data as well as the verbal comments made by Ss during the postexperimental interview, it was decided that the conflict communications (and age dimension variable) were having the desired effects.

[ORIGINAL HIGH CONFLICT COMMUNICATION]

Preliminary information

In this experiment, subjects' physiological responses are recorded while they perform intellectual tasks under psychological stress or tension. More specifically, this study deals with the effects of psychological stress upon the task performance of people who vary in age.

Studies of physiological processes indicate that the body's tolerance for stressful stimuli begins to decline in the late 30's. Data from this experiment will help to determine how psychological tension affects the relationship between physiological processes and task performance at various ages.

[FINAL HIGH CONFLICT COMMUNICATION]

Preliminary information

In this experiment, subjects' physiological responses are recorded while they perform intellectual tasks under psychological stress, or tension. More specifically, this study deals with the effects of psychological stress upon the task performance of people who vary in age.

Studies of physiological processes indicate that the body's tolerance for stressful stimuli begins to decline rapidly in the late 30's. As a result of this decline, such individuals are likely to suffer physically harmful effects from even mild stress. Data from this experiment will help to determine how psychological tension affects the relationship between physiological processes and task performance at various ages.

APPENDIX G

Containing General Instructions

GENERAL INSTRUCTIONS

Now that you've both had a chance to read the preliminary information, we can begin the general instructions. It is very important in this type of research that we prevent extraneous variables from influencing the results. Variables such as the appearance, facial expressions or mannerisms of another subject or the experimenter might influence a subject's performance apart from the stress.

For this reason, the subjects in this experiment have been situated in separate rooms, and the experimenter remains out of sight for most of the experiment. The subject in the room with me listens directly to my voice while the subject in the adjoining room hears my voice over the loudspeaker system connecting the two rooms. During the experiment, each of you will be able to communicate with the other by means of the microphone in front of you. You may talk over the microphone when the light in front of you is on.

As stated in the preliminary material, a central interest in this study concerns the physiological responses which occur when individuals work under stress. Both of you have therefore been wired to physiological recording apparatus for the entire experiment.

From this point on, I will refer to the subject in the room with me as Subject 1. The subject in the adjoining room will be referred to as Subject 2. In the first part of this experiment, Subject 1 will complete a task in logical thinking, and Subject 2 will evaluate the quality of Subject 1's work. This evaluation provides the stress under which Subject 1 will work.

Subject 2 will give Subject 1 harmless electric shocks to the arm, depending on how well he considers Subject 1 did on the task. Subject 2 will give one shock if he judges the work to be excellent, or he may give up to 10 shocks if he judges the work to be very poor. If Subject 1 receives fewer than five shocks, he is considered to have completed the task satisfactorily, and we will proceed with the rest of the experiment. If five or more shocks are given, then Subject 1 must try to improve his performance by attempting the task a second time.

In the second half of the experiment, Subject 2 will complete a learning task, and Subject 1 will evaluate his performance.

APPENDIX H

Containing Instructions for Logical-Thinking Task

INSTRUCTIONS FOR LOGICAL THINKING TASK

Subject 1's task is to think of a logical argument either for or against student participation in campus decisions. Subject 1 may limit his argument to one issue, such as tuition fees, or he may present a more general case for or against student participation in these campus decisions. The argument should contain several sound reasons supporting the chosen position.

Subject 2's task is to evaluate Subject 1's argument on purely logical grounds: that is, on how well the arguments support the stated position.

Subject 1 will have three minutes in which to jot down some notes and formulate his argument. At the end of the three minutes, I will turn on Subject 1's microphone, and he will verbally present his argument to Subject 2. Following this, Subject 2 will give his evaluation of the argument by administering shock.

Subject 1 should begin the task now, using the paper and pen provided.

APPENDIX I

Containing Analyses of Variance of Shock Data

TABLE 1

Mean Shock Intensity

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	42779.445	14259.815	3.305	<.025
B: Attack	1	3.961	3.961	.001	
A X B	3	15858.674	5286.225	1.225	
C: Conflict	1	42.003	42.003	0.010	
A X C	3	24136.883	8045.628	1.864	
B X C	1	27965.440	27965.440	6.481	<.025
A X B X C	3	6320.029	2106.676	0.488	
Error	112	483300.458	4315.183		
J: Trials	2	66144.443	33072.221	57.343	<.005
A X J	6	5245.391	874.232	1.516	
B X J	2	1912.828	956.414	1.658	
A X B X J	6	1930.255	321.709	0.558	
C X J	2	385.474	192.737	0.334	
A X C X J	6	2745.359	457.560	0.793	
B X C X J	2	4583.943	2291.971	3.974	<.025
A X B X C X J	6	788.057	131.343	0.228	
Error	224	129190.917	576.745		

TABLE 2

Mean Shock Number

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	0.141	0.047	0.287	
B: Attack	1	0.060	0.060	0.366	
A X B	3	1.525	0.508	3.102	<.05
C: Conflict	1	0.167	0.167	1.017	
A X C	3	0.908	0.303	1.848	
B X C	1	0.034	0.034	0.206	
A X B X C	3	0.575	0.192	1.169	
Error	112	18.353	0.164		
J: Trials	2	0.582	0.291	5.688	<.005
A X J	6	0.438	0.073	1.428	
B X J	2	0.092	0.046	0.898	
A X B X J	6	0.378	0.063	1.232	
C X J	2	0.013	0.006	0.124	
A X C X J	6	0.562	0.094	1.832	
B X C X J	2	0.182	0.091	1.778	
A X B X C X J	6	0.670	0.112	2.183	<.05
Error	224	11.457	0.051		

TABLE 3

Mean Shock Duration

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	18361.758	6120.586	2.311	
B: Attack	1	3510.211	3510.211	1.325	
A X B	3	4219.487	1406.496	0.531	
C: Conflict	1	2704.065	2704.065	1.021	
A X C	3	3345.924	1115.308	0.421	
B X C	1	2435.128	2435.128	0.919	
A X B X C	3	6314.445	2104.815	0.795	
Error	112	296672.208	2648.859		
J: Trials	2	8115.724	4057.862	16.774	<.005
A X J	6	1647.922	274.654	1.135	
B X J	2	249.016	124.508	0.515	
A X B X J	6	1062.130	177.022	0.732	
C X J	2	438.599	219.299	0.907	
A X C X J	6	2522.255	420.376	1.738	
B X C X J	2	102.349	51.174	0.212	
A X B X C X J	6	302.922	50.487	0.209	
Error	224	54188.417	241.913		

APPENDIX J

Containing Analyses of Variance of Questionnaire Data

TABLE 1

Rated Painfulness of Shocks Received

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.773	0.591	1.518	
B: Attack	1	2.820	2.820	7.241	< .01
A X B	3	0.898	0.299	0.769	
C: Conflict	1	0.070	0.070	0.181	
A X C	3	0.273	0.091	0.234	
B X C	1	0.195	0.195	0.501	
A X B X C	3	1.523	0.508	1.304	
Error	112	43.625	0.390		

TABLE 2

Rated Painfulness of Shocks Given

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	2.156	0.719	1.052	
B: Attack	1	1.125	1.125	1.647	
A X B	3	1.313	0.438	0.641	
C: Conflict	1	1.531	1.531	2.242	
A X C	3	0.906	0.302	0.442	
B X C	1	2.000	2.000	2.928	
A B C	3	4.438	1.479	2.166	
Error	112	76.500	0.683		

TABLE 3

Combined Anxiety and Worry Ratings
Concerning Shock Evaluation

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.131	0.377	0.588	
B: Attack	1	1.221	1.221	1.905	
A X B	3	2.834	0.945	1.474	
C: Conflict	1	0.018	0.018	0.027	
A X C	3	1.318	0.439	0.686	
B X C	1	0.158	0.158	0.247	
A X B X C	3	0.396	0.132	0.206	
Error	112	71.781	0.641		

TABLE 4

Combined Anger and Annoyance Ratings
Concerning Shock Evaluation

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.797	0.599	1.813	
B: Attack	1	63.281	63.281	191.554	<.001
A X B	3	0.547	0.182	0.552	
C: Conflict	1	0.008	0.008	0.024	
A X C	3	1.289	0.430	1.301	
B X C	1	0.383	0.383	1.159	
A X B X C	3	1.414	0.471	1.427	
Error	112	37.000	0.330		

TABLE 5

Rated Fear about Giving Shock

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.711	0.570	0.931	
B: Attack	1	2.258	2.258	3.685	< .06
A X B	3	1.586	0.529	0.863	
C: Conflict	1	0.070	0.070	0.115	
A X C	3	0.398	0.133	0.217	
B X C	1	0.070	0.070	0.115	
A X B X C	3	2.648	0.883	1.441	
Error	112	68.625	0.613		

TABLE 6

Rated Annoyance about Giving Shock

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.563	0.521	0.748	
B: Attack	1	0.781	0.781	1.122	
A X B	3	0.906	0.302	0.434	
C: Conflict	1	0.125	0.125	0.179	
A X C	3	1.063	0.354	0.509	
B X C	1	0.031	0.031	0.045	
A X B X C	3	1.406	0.469	0.673	
Error	112	78.000	0.696		

TABLE 7

Rated Pleasure about Giving Shock

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.648	0.549	1.063	
B: Attack	1	0.195	0.195	0.378	
A X B	3	1.711	0.570	1.104	
C: Conflict	1	0.945	0.945	1.829	
A X C	3	0.711	0.237	0.459	
B X C	1	0.070	0.070	0.136	
A X B X C	3	0.836	0.279	0.539	
Error	112	57.875	0.517		

TABLE 8

Rated Anxiety about Giving Shock

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	2.531	0.844	1.024	
B: Attack	1	1.125	1.125	1.366	
A X B	3	2.688	0.896	1.088	
C: Conflict	1	0.125	0.125	0.152	
A X C	3	0.938	0.313	0.379	
B X C	1	0.281	0.281	0.341	
A X B X C	3	3.531	1.177	1.429	
Error	112	92.250	0.824		

TABLE 9

Combined Anger and Annoyance Ratings of General Feelings

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	0.672	0.224	1.045	
B: Attack	1	4.882	4.882	22.786	$< .005$
A X B	3	0.695	0.232	1.082	
C: Conflict	1	0.125	0.125	0.583	
A X C	3	1.234	0.411	1.920	
B X C	1	0.008	0.008	0.036	
A X B X C	3	0.352	0.117	0.547	
Error	112	24.000	0.214		

TABLE 10

Combined Worry and Anxiety Ratings of General Feelings

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	0.953	0.318	0.608	
B: Attack	1	0.125	0.125	0.239	
A X B	3	2.391	0.797	1.524	
C: Conflict	1	0.195	0.195	0.374	
A X C	3	1.852	0.617	1.180	
B X C	1	0.008	0.008	0.015	
A X B X C	3	0.383	0.128	0.244	
Error	112	58.563	0.523		

TABLE 11

Ratings of 39 Year-Old Partner

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.197	0.399	1.203	
B: Attack	1	81.547	81.547	245.957	$< .001$
A X B	3	3.287	1.096	3.304	$< .025$
C: Conflict	1	0.037	0.037	0.111	
A X C	3	2.275	0.758	2.287	
B X C	1	0.313	0.313	0.945	
A X B X C	3	0.861	0.287	0.865	
Error	112	37.134	0.332		

APPENDIX K

Containing Analyses of Variance of Heart Rate Data

TABLE 1

Mean Base Level HR

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	6.643	2.214	1.679	
B: Attack	1	4.694	4.694	3.560	< .07
A X B	3	4.216	1.405	1.066	
C: Conflict	1	0.907	0.907	0.688	
A X C	3	3.437	1.146	0.869	
B X C	1	6.334	6.334	4.804	< .05
A X B X C	3	1.113	0.371	0.281	
Error	111	146.376	1.319		

TABLE 2

Mean HR during Task Instructions (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	2.118	0.706	0.582	
B: Attack	1	0.044	0.044	0.036	
A X B	3	2.348	0.783	0.645	
C: Conflict	1	0.237	0.237	0.195	
A X C	3	1.636	0.545	0.450	
B X C	1	0.509	0.509	0.420	
A X B X C	3	2.833	0.944	0.779	
Error	108	131.003	1.213		

TABLE 3

Mean HR during Writing Task (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	5.326	1.775	1.360	
B: Attack	1	0.150	0.150	0.115	
A X B	3	5.894	1.965	1.505	
C: Conflict	1	1.520	1.520	1.165	
A X C	3	0.792	0.264	0.202	
B X C	1	1.760	1.760	1.348	
A X B X C	3	6.614	2.205	1.689	
Error	108	140.961	1.305		

TABLE 4

Mean HR during Attachment of Electrodes (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.445	0.482	0.479	
B: Attack	1	0.000	0.000	0.000	
A X B	3	3.535	1.178	1.171	
C: Conflict	1	0.026	0.026	0.026	
A X C	3	0.493	0.165	0.164	
B X C	1	1.779	1.779	1.769	
A X B X C	3	1.209	0.403	0.401	
Error	107	107.622	1.006		

TABLE 5

Mean HR during Presentation of Arguments (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.867	0.622	0.409	
B: Attack	1	0.249	0.249	0.164	
A X B	3	3.233	1.078	0.708	
C: Conflict	1	0.056	0.056	0.037	
A X C	3	0.209	0.070	0.046	
B X C	1	2.404	2.404	1.579	
A X B X C	3	0.747	0.249	0.164	
Error	110	167.513	1.523		

TABLE 6

Mean HR during Shock Evaluation (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.152	0.384	0.447	
B: Attack	1	0.367	0.367	0.427	
A X B	3	0.686	0.229	0.266	
C: Conflict	1	0.031	0.031	0.036	
A X C	3	0.397	0.132	0.154	
B X C	1	5.290	5.290	6.156	< .025
A X B X C	3	1.425	0.475	0.553	
Error	109	93.679	0.859		

TABLE 7

Mean HR during Removal of Electrodes (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	0.347	0.116	0.182	
B: Attack	1	1.281	1.281	2.012	
A X B	3	2.802	0.934	1.468	
C: Conflict	1	0.001	0.001	0.002	
A X C	3	1.489	0.496	0.780	
B X C	1	5.888	5.888	9.253	< .005
A X B X C	3	0.351	0.117	0.184	
Error	110	70.000	0.636		

TABLE 8

Mean HR during Shock Box Instructions (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	0.590	0.197	0.419	
B: Attack	1	0.045	0.045	0.097	
A X B	3	0.663	0.221	0.471	
C: Conflict	1	0.000	0.000	0.000	
A X C	3	1.051	0.350	0.748	
B X C	1	1.931	1.931	4.119	< .05
A X B X C	3	0.896	0.299	0.637	
Error	110	51.566	0.469		

TABLE 9

Mean HR preceding Learning Task (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	0.578	0.193	0.304	
B: Attack	1	0.003	0.003	0.005	
A X B	3	0.830	0.277	0.435	
C: Conflict	1	0.149	0.149	0.234	
A X C	3	2.740	0.913	1.438	
B X C	1	2.218	2.218	3.492	< .07
A X B X C	3	1.378	0.459	0.723	
Error	110	69.868	0.635		

TABLE 10

Mean HR during first 60 seconds of Learning Task (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.136	0.379	0.503	
B: Attack	1	0.496	0.496	0.659	
A X B	3	1.301	0.434	0.576	
C: Conflict	1	0.001	0.001	0.001	
A X C	3	1.016	0.339	0.450	
B X C	1	2.742	2.742	3.645	< .07
A X B X C	3	2.366	0.788	1.048	
Error	111	83.494	0.752		

TABLE 11

Mean HR during final 30 seconds of Learning Task (less BL)

Source of Variation	df	Sum of Squares	Mean Squares	F	p
A: Target	3	0.255	0.085	0.161	
B: Attack	1	0.002	0.002	0.003	
A X B	3	0.517	0.172	0.326	
C: Conflict	1	0.117	0.117	0.221	
A X C	3	1.956	0.652	1.231	
B X C	1	2.953	2.953	5.577	$< .025$
A X B X C	3	1.040	0.347	0.655	
Error	111	58.778	0.530		

TABLE 12

Mean HR during Administration of Questionnaire (less BL)

Source of Variation	df	Sum of Squares	Mean Square	F	p
A: Target	3	1.325	0.442	0.928	
B: Attack	1	0.061	0.061	0.127	
A X B	3	0.609	0.203	0.426	
C: Conflict	1	0.964	0.964	2.027	
A X C	3	1.929	0.643	1.352	
B X C	1	2.133	2.133	4.483	$< .05$
A X B X C	3	0.790	0.263	0.554	
Error	107	50.907	0.476		

TABLE 13

Mean Base Level HR less Subjects with Rates of 98 bpm or Higher

Source of Variation	df	Sum of Squares	Mean Squares	F	p
A: Target	3	1.163	0.388	0.481	
B: Attack	1	1.363	1.363	1.689	
A X B	3	1.335	0.445	0.552	
C: Conflict	1	0.111	0.111	0.137	
A X C	3	3.886	1.295	1.605	
B X C	1	3.152	3.152	3.905	$< .06$
A X B X C	3	0.543	0.181	0.224	
Error	89	71.836	0.807		