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ABSTRACT

This study investigates the effects of pain and non-pain consequences on groups of 22 high- and 22 low-aggression boys, as determined by a peer rating scale. The boys, who had a mean age of 10 years, 8 months, were instructed to hit a punching apparatus. Through earphones, half of each group heard pain cues, i.e., "ouch", while the other half heard neutral stimuli. The conditioning session lasted three minutes and was followed by a 2-minute extinction period. Frequency of hitting for each 30-second interval was recorded. It was found that the boys in the pain-cue condition exhibited significantly more hitting responses than the boys in the non-pain-cue condition, and the high aggressive boys performed almost twice as many hitting responses and responded less to extinction than the low aggressive boys. (DP)

A paper based on a presentation given at the 1973 Biennial Meeting of S.R.C.D. in Philadelphia.

THE EFFECTS OF PAIN CUES ON HITTING BEHAVIOR

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Aggressive behavior has been defined in several ways (Buss, 1961; Kaufmann, 1965). At one level, it has been described in terms of specific forms of behaviors, e.g., teasing, hitting and pushing (Brown & Eliott, 1965). At another level, aggressive behavior has been defined in terms of some unitary concept. For instance, Walters and Brown (1964) used the magnitude or intensity of a response as a chief defining characteristic of aggression. Thus, any response which has the characteristic of being high magnitude is likely to be judged as aggressive. And so it goes; each investigator uses his or her own specific way of defining aggressive behavior.

Many of these definitions, however, may not be very useful. For example, for one child pushing may be a form of negative attention seeking (i.e., a dependent behavior); while, for another child pushing may, in fact, be an aggressive behavior. So, a response with the same topography can be two different kinds of behavior. In these cases, some would say that it is necessary to discern intent, i.e., was the intention of the child to gain attention or to do harm or injury? By assessing intention, the correct definition can be made. The problem with this approach is the assessment of intention. Because intention is a private matter, it is very difficult (and at times impossible) to assess the intentions of an individual, and therefore, very difficult to label a specific behavior correctly.

Unitary-types of definitions also run into certain problems. For instance, using a high magnitude definition, drilling a tooth with a high speed drill

and resetting a broken leg must be included under the label of aggressive behavior since they are high intensity responses. But, are they aggressive responses? And, how about a softly spoken statement which is, nonetheless, stinging, stabbing and sarcastic? Low intensity, but, is it not an aggressive behavior? So, using this definition, some behaviors are included which should not be included and certain ones are excluded that should not be excluded. Because of these problems and others, such definitions may not be useful.

One definition that avoids some of the shortcomings of the other definitions and captures the primary characteristic of an aggressive act is a pain-cue definition. In this case, any response which is maintained or reinforced by the pain cues of the victim can be labelled an aggressive response. For example, if a response produces a pain cue in the victim (facial grimace or "Ouch") and this consequence maintains the response, then this response can be considered an aggressive response. On the other hand if this response was maintained by social attention, other than pain cues, this response would not be considered aggressive. It would be labelled as some other kind of social behavior. As long as the behavior is maintained by the pain cues of the victim then it can be defined as aggressive behavior; no other consequence is important.

Such a definition has been used by others. For example, in categorizing different types of aggression Buss (1961) described "angry aggression" as aggression positively reinforced by the pain cues of the victim. Skinner (1969) stated that "No behavior is aggressive because of its topography. A person who is, at the moment, aggressive is the one who, among other characteristics, (1) shows a heightened probability of behaving verbally and nonverbally in such a way that someone is damaged (together with a lowered probability of acting in such a way that he positively reinforced), (2) is reinforced by such consequences

(p. 129)." In each case, the consequence (pain) is the defining characteristic of the aggressive response.

The results of the studies dealing with the effects of pain cues have revealed that this consequence can have both suppressing and facilitating effects. Buss (1966) found that when victims gave feedback such as moans or groans, subjects lowered the intensity of aggression (i.e., delivery of shock). More recently, Baron (1971a; 1971b) found that there was an inverse relationship between the magnitude of pain cues and intensity and duration of shock. Different reasons may account for not finding a reinforcing effect of pain cues.

One, the responses may not have been aggressive (i.e., responses maintained by pain cues) but an instructional response. The subjects in these studies were told that they were to be teachers to teach the learner (the victim). Thus, the responses in these studies would be maintained by other consequences, e.g., correctness of the learner.

Two, the discriminative stimulus properties or the setting condition necessary to produce responses effectively reinforced by pain cues were not present. Feshbach, Stiles and Bitter (1967) demonstrated that when subjects were previously insulted, pain cues of the victim increased responding. In another study, it was found that subjects, who were previously anger aroused and watched an aggressive film which focussed on the pain cues of the victim, delivered more shock than aroused subjects exposed to an aggressive film which focussed on the instrumental aspects of aggression (Hartmann, 1969). Therefore, under certain conditions subjects will exhibit responses that will be maintained by pain cues.

A third factor which may influence the effect of pain cues is the characteristics of the subject. For example, Hartmann (1969) noted that adolescent

delinquents with long offense records were more aggressive, using the Buss aggression machine, than the delinquents with short offense records, this finding being especially true for frequent offenders previously aroused and exposed to the pain-cue film. It is quite possible that for some individuals pain cues can serve as effective reinforcers and maintain behavior (see Sears, Maccoby & Levin, 1957, for the development of aggression).

In the present study two types of subjects, high and low aggressive boys, were selected to participate in an experiment to test the effects of pain cues on hitting. For one-half of the high aggressive and low aggressive subjects hitting was followed by pain consequences and for the other half of each group, the responses were followed by nonpain consequences. It was expected that for the high aggressive boys more responses would be exhibited under the pain-cue condition than under the nonpain-cue condition. The opposite was anticipated for the low aggressive children.

Method

Subjects

A total of 365 males from grades 3 to 6 were administered a peer rating of aggression. From this group 44 subjects were selected on the basis of their aggression scores, 22 high aggressive boys and 22 low aggressive boys. The mean aggression score for the high aggressive boys was .68 (out of a possible 1.00) with a range of .54 to .84 and for the low aggressive boys, the mean score was .01 with a range of .00 to .02. The mean age of the 44 boys was 10 years and 8 months (range was 8:9 to 12:9).

Procedure

Peer Rating Questionnaire. The questionnaire was a modified form of one used by Walder, Abelson, Eron, Banta and Laulicht (1961). It consisted of

several pages on which the names of the boys in a homeroom class were listed. Each child in the class was asked to cross out the boy's name (or boys' names) who fit a particular description.

After two demonstration questions were asked by the experimenter and to which the children responded, the experimenter asked 12 questions dealing with aggressive behavior. Some examples are: "Who does not obey the teacher?"; "Who are the boys who fight well?"; "Who starts a fight over nothing?"; and, "Who does things that bothers others?". From this questionnaire an aggressive score for each boy was obtained. This score was a ratio of the actual number of times the members of the class selected a boy over the number of possible selections. The 22 boys with the highest ratios were classified as high aggressive and the 22 boys with the lowest ratios were classified as low aggressive. These 44 boys participated in the conditioning phase of the experiment to test the effects of pain cues on hitting.

Conditioning Phase. Half the boys in each category were randomly assigned to the Pain-Cue Condition and the other half of each group were randomly assigned to the Nonpain-Cue Condition.

Each subject was tested in an experimental room which contained a punching apparatus adapted from one used by Cowan and Walters (1963). It was a box with the front panel being 25 x 23.75 in. On this panel expressionless eyes and eyebrows were painted on a white background. A punching device was placed just below the eyes in the general area of where a nose would be. It consisted of a circular disk 10 in. in diameter padded with foam and covered with red vinyl. A minimum force of 39.2 neutons was necessary to move this device .5 in. which constituted a response. To avoid injury each child wore a pair of boxing gloves.

While in the room, the experimenter told the subject that he was going to play with a toy and then was shown how the punching apparatus worked (the experimenter hit the pad with an appropriate amount of force). After this demonstration, the subject was given one try. If he did not hit the pad with sufficient force, the experimenter demonstrated the response again, followed by another response from the subject.

Each subject was then told that the toy was a talking doll and spoke through earphones that the experimenter was going to put on him. He was instructed that he could start playing upon hearing the word, "begin", over the earphones. After the earphones were adjusted, the experimenter left the area and out of sight of the subject.

During the experimental session of 3 minutes the boys in the Pain-Cue Condition heard a pain consequence follow each response. These consequences consisted of "hurts", "ouch", and "ow" presented with appropriate affect. For the subjects in the Nonpain-Cue Condition each response was followed by either "cups", "tub" or "door" delivered in a neutral tone. The order in which the consequences were delivered for a given subject was dictated by one of four random order lists. After the experimental session, an extinction period of 2 minutes followed during which no verbal consequences was presented after each response. The frequency of hitting responses was recorded at the end of each 30-sec. interval.

Results

The mean frequencies of hitting responses as function of Type of Subject, Type of Consequence and Trials are presented in Fig. 1. Because the length of

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Insert Fig. 1 about here

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the experimental and extinction sessions were different, a single analysis of the data was not appropriate. For each session, therefore, a mixed analysis of variance was used (the Between factors were Type of Subject and Type of Consequence and the Within factor was Trials). In order to assess the effects of the experimental and extinction sessions, a mean score was necessary. This score was the number of responses by each subject during each session over the number of minutes in that session. Once again a mixed analysis of variance was used. The data used in each analysis were square-root transformations of the raw scores.

Experimental Session. The data from this session revealed that for the high aggressive boys more hitting occurred in the Pain-Cue condition (M = 40.42) than in the Nonpain-Cue condition (M = 24.55). For the low aggressive boys there was also more hitting under the Pain-Cue condition (M = 18.33) than under the Nonpain-Cue condition (M = 15.08); but, this difference was minimal. The analysis, however, indicated that the Type of Subject and Type of Consequence interaction was not significant, F = 1.34, df = 1/40, p = .25. Thus, the type of consequence (pain and nonpain) did not differentially affect the high and low aggressive boys. It was found that the boys in the Pain-Cue condition (M = 29.33) exhibited significantly more hitting responses than the boys in the Nonpain-Cue condition (M = 19.81), F = 4.03, df = 1/40, p = .05. Pain consequences, therefore, effectively maintained the performance of hitting responses.

The only other effect that was significant during the experimental session was the main effect of the Type of Subject, F = 9.70, df = 1/40, p = .003. The high aggressive boys (M = 32.48) performed almost twice as many hitting responses as did the low aggressive boys (M = 16.70).

Extinction Session. A similar finding was obtained in the extinction session. That is, the high aggressive boys (M = 24.52) exhibited significantly

more responses during extinction than did the low aggressive boys (M = 3.59), F = 16.86, df = 1/40, p = .0002. The main effect of Trials was also significant, F = 11.91, df = 3/120, p < .0001. An inspection of Fig. 1 reveals that this effect is due to a progressive decline in the number of responses across extinction trials. No other effects were significant.

Experimental-Extinction Session. Analysis of these data revealed four significant effects. The most important in relation to the purpose of this study was the significant interaction between Type of Consequence and Type of Session, F = 5.26, df = 1/40, p = .03. This effect was due to a significant difference between the boys in the Pain-Cue condition (M = 29.38) and the boys in the Nonpain-Cue condition (M = 19.81) during the experimental session, t = 3.35, df = 40, p < .01 (using Fisher's LSD method of follow-up comparison) and no significant difference between the two groups (M = 12.03 and M = 16.08, respectively) during the extinction session, t < 1. It should also be noted that there was a significant decrease in responding from the experimental session to the extinction session for the boys under the Pain-Cue condition, t = 6.59, df = 40, p < .01 and for the boys under the Nonpain-Cue condition, t = 3.35, df = 40, p < .01.

As in previous results, the high aggressive boys made more hitting responses (M = 28.50) than the low aggressive boys (M = 10.15), F = 17.10, df = 1/40, p < .001. Furthermore, while there was a dramatic drop in the frequency of responding from the experimental session to the extinction session for the low aggressive boys (M = 16.70; M = 3.59, respectively), a smaller decrease was found for the high aggressive boys (M = 32.48; M = 24.52). This effect was revealed in a significant Type of Subject and Type of Session interaction, F = 5.17, df = 1/40, p = .03. Follow-up comparisons indicated that the decrease

from the experimental to the extinction session was significant for both the low aggressive and high aggressive boys, $t = 6.58$, $df = 40$ and $t = 3.36$, $df = 40$, $p < .01$, respectively.

The fourth effect that was significant was Type of Session, $F = 49.47$, $df = 1/40$, $p < .001$. As expected, there was less hitting in the extinction session ($M = 14.00$) than in the experimental session ($M = 24.59$).

Discussion

Although there was not a significant interaction between Type of Subject and Type of Consequence, there was some support that pain cues can maintain responding. First, significantly more responses were exhibited under the Pain-Cue condition than under the Nonpain-Cue condition. Secondly, while there was a significant difference between the boys in the Pain-Cue and Nonpain-Cue conditions during the experimental session, there was no difference between them in the extinction session. Thirdly, there was a significant decrease in the frequency of responses from the experimental session to the extinction session for the boys in Pain-Cue condition. These results indicate that pain cue ("ouch", "ow", "hurts") can effectively maintain behavior and the removal of these consequences reduces responding.

The question that remains is why pain cues were effective for both high and low aggressive boys and not just for high aggressive boys? The most probable explanation is the context of the experiment; that is, there were very distinct cues in the setting to indicate an aggressive situation, e.g., boxing gloves and hitting a doll. Thus, in a setting where there are many aggressive cues, a pain cue will serve as an effective consequence regardless of the child's level of aggressiveness. It may be the case that in settings where the cues for aggression are minimal that pain consequences will serve as effective reinforcers for high aggressive children but not for low aggressive children.

More work is needed to further support the feasibility and utility of a pain-cue definition of aggression. Such functional definitions (whether for aggression, dependency, achievement, etc.) are useful because they distinguish the primary characteristic of each behavior and thereby facilitate a distinction among several types of social behaviors as well as lead to a better understanding of them. From a psychological viewpoint, it will probably be more useful to define a behavior in terms of the consequences maintaining the behavior rather than in terms of the form or shape of the response.

The differences between the high and low aggressive boys support two conclusions. One, the greater amount of hitting by the high aggressive boys than by the low aggressive boys lends some empirical validity to the peer rating of aggression. Similar support has been found by others (Williams, Meyerson, Eron & Semler, 1967; Parton, 1964).

The second conclusion is related to the findings that the high aggressive boys displayed more hitting than the low aggressive boys in the extinction session and there was a smaller decrease in hitting from the experimental session to the extinction session for the high aggressive boys than for the low aggressive boys. Such results may indicate the importance of considering the previous history of the subjects. For the high aggressive boys, the stimulus properties of hitting, as a function of past association between hitting and reinforcement, may have taken on conditioned reinforcing properties which maintained these responses even in the absence of any consequence. It may also be the case that the high aggressive boys have been on an intermittment schedule of reinforcement for hitting, and thus, were more resistant to extinction. Given either interpretation, it appears that the history of the subject's aggressive development should be taken into account when investigating the effects of the experimental manipulations.

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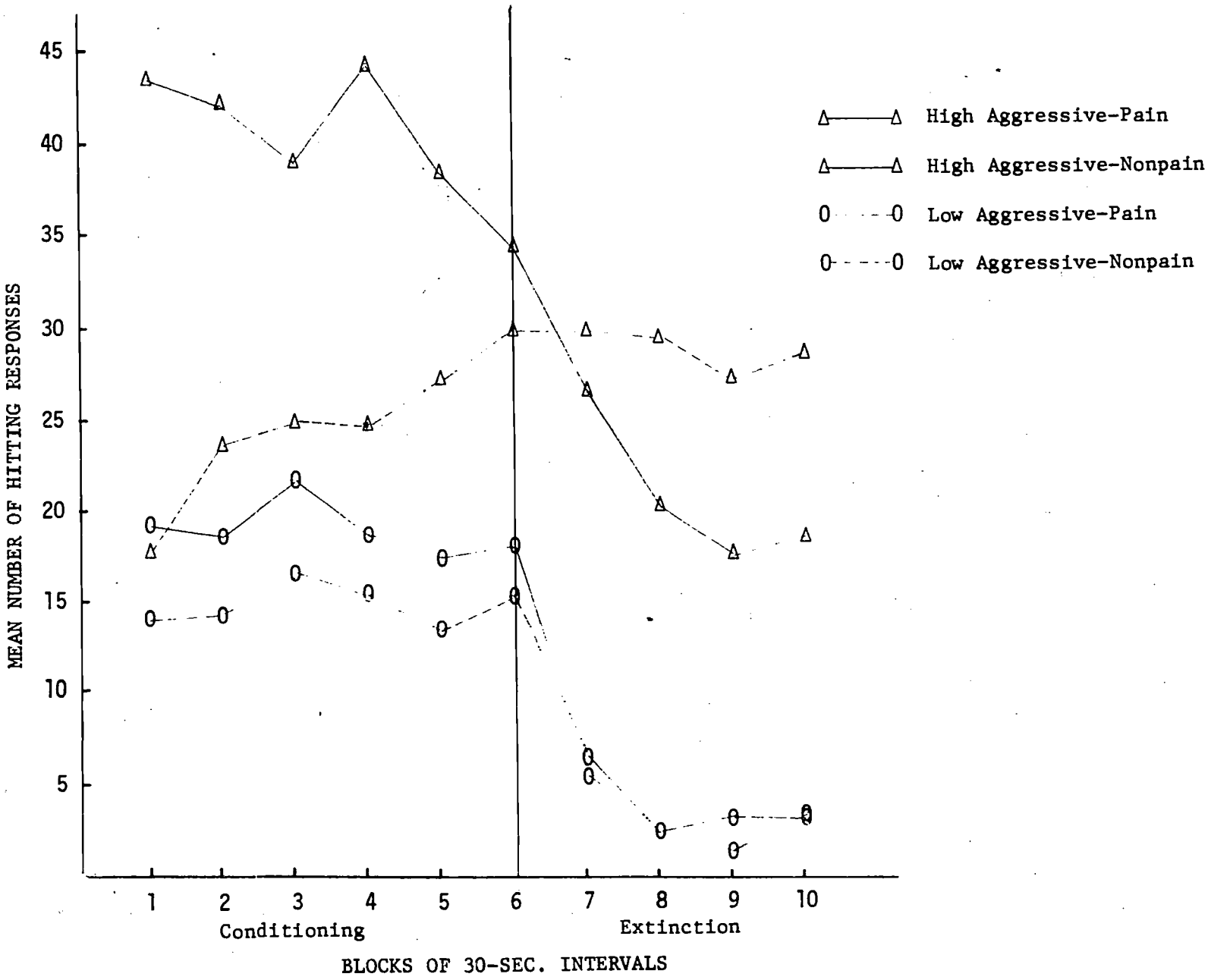

Fig. 1. Mean number of hitting responses as a function of type of subject, type of consequence and session.