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ELICITATION OF AGGRESSION BY A PHYSICAL BLOW[1]

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Squirrel monkeys were exposed to brief tail-pinches in the presence of a cloth-covered ball. Attack was elicited against the ball as a direct function of the force of the tail-pinch. This finding in conjunction with previous findings regarding electric shock and intense heat demonstrates that several types of aversive stimulation can elicit aggression.

Electric shock elicits aggression when administered to the tail of monkeys (Azrin, Hutchinson, and Sallery, 1964a) or to the feet of rats (O'Kelly and Steckle, 1939; Ulrich and Azrin, 1962; Azrin, Ulrich, Hutchinson, and Norman, 1964b; Ulrich and Crain, 1964) to the feet of cats (Ulrich, Wolff, and Azrin, 1964), and to the feet of monkeys (Azrin, Hutchinson, and Hake, 1963). Evidence was obtained in one of these studies (Ulrich and Azrin, 1962) that aggression also resulted from exposure to intense heat, suggesting that aggression may be a reaction to many types of aversive stimulation in addition to electric shock. The present experiment investigated the use of a physical blow as a possible elicitor of aggression.

METHOD

Subjects

Six experimentally naive male squirrel monkeys served. Their weights ranged from 480-730 g. During the experiment, all *Ss* were housed in individual cages where they had free access to food and water.

Apparatus

Brodie and Boren (1958) had found that a blow, or pinch, was an effective aversive stimulus as evidenced by the emergence of typical avoidance performance (Sidman, 1953). The physical blow in the present experiment was a tail-pinch similar to the one described by Brodie and Boren. A piston was pressed against the tail of the *S* for 1 sec by the sudden release of air pressure against the piston. The *S* was loosely restrained in a chair that permitted considerable movement while maintaining the tail in a fixed position (Hake and Azrin, 1963).

Aggression was measured by a procedure described previously (Azrin *et al.*, 1964a). A cloth-covered ball was suspended above the *S* from a switch. The switch closed whenever the *S* attacked the ball by pulling the ball to its mouth. An observer independently recorded whether switch closure was accompanied by actual biting into the ball. Attack was considered to occur only when *S*'s teeth were in contact with the ball.

The closure of the switch confirmed the occurrence of attack.

Procedure

For the first two days, *Ss* were given an initial period of adaptation to the restraining chair, during which time the tail-pinch apparatus was attached to the tail but was not activated. Subsequently, *Ss* were given 30 presentations of the pinch stimulus during each experimental session. Two days elapsed between the sessions to minimize injury to the tail. For the same reason, three days elapsed after the most intense stimulus. The stimulus was presented every 30 sec independently of *S*'s behavior. During each session, the stimulus intensity was constant. For all *Ss*, the order of the stimulus intensities in pounds per square inch (psi) was: 20, 40, 60, 0, 10, 20, 40, 10, 0. This design provided two sessions at each stimulus intensity except for the single session

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at the highest stimulus intensity of 60 psi. At 0 psi, the tail of the *S* was in the tail-pinch apparatus but no pinch stimulus was delivered. An attack response was considered to occur if *S* bit the ball at any time during the 30-sec interval that followed a given stimulus presentation. Only one attack response was recorded for each stimulus presentation; thus, the number of attack responses could not exceed the number of stimulus presentations. An attack probability of .75, for example, means that three-fourths of the stimuli produced an attack.

RESULTS

Some "spontaneous" aggression occurred during the first 10 min of the first session when no tail-pinch was delivered. This spontaneous aggression was absent for all *Ss* thereafter in the absence of the tail-pinch. Figure 1 shows that for all *Ss* the probability of attack was a direct function of the intensity of the pinch stimulus. "Spontaneous" aggression at 0 psi was absent for five of the six *Ss* and occurred at a very low level (probability less than 0.1) for the sixth *S*, S-23. Two *Ss* showed much less attack than the other four: attack occurred only 9% of the time for S-4 and 13% of the time for S-24 even at the highest intensity of 60 psi. For the other four *Ss*, an attack resulted after almost every pinch stimulus at the highest stimulus intensities.

Table 1 shows that the probability of attack was a direct function of the stimulus intensity for the first, as well as for the second exposure to the various stimulus intensities. Also, there

Table 1

Mean Probability of Attack Following a Pinch Stimulus, N-6

		1st session	*2nd session*
Intensity of Pinch Stimulus (pounds/sq. in.)	0	.04	.005
	10	.31	.24
	20	.41	.63
	40	.67	.67
	60	.72	

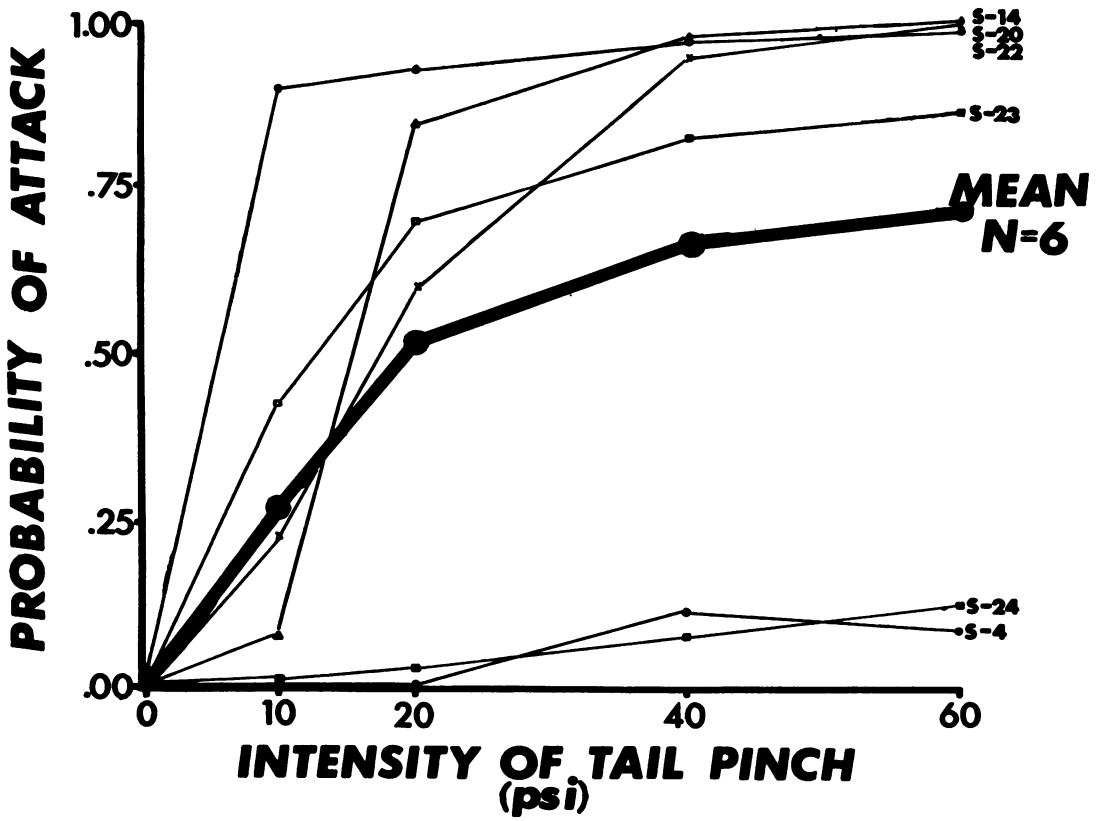

Fig. 1. Probability of attack against an inanimate object. The narrow lines are for individual monkeys; the broad line is the average of the six monkeys.

appears to be no consistent difference in the probability of attack between the first and second exposure to a given stimulus intensity. The same was true for individual *Ss*.

DISCUSSION

For all six *Ss*, a direct relation existed between the stimulus intensity and the probability of attack. A puzzling finding was the low overall probability of attack of two of the *Ss*. An explanation on the basis of individual differences in general docility does not appear plausible since one of the two *Ss* did attack in a later experiment using the same general procedure but substituting tail-shock for the tail-pinch. This failure of an occasional *S* to exhibit elicited aggression has been noted in previous studies that applied foot-shock to rats (Azrin *et al.*, 1964b) and tail-shock or foot-shock to monkeys (Azrin *et al.*, 1964a). The consistency of elicitation of attack from most *Ss* contrasts sharply with the reduced level of attack by these other few *Ss*. At present, there is no satisfactory explanation of these differences. In spite of the individual differences between *Ss*, the elicited aggression was a direct function of the intensity of the aversive stimulus.

Previous findings have shown that elicited aggression was a direct function of the intensity, frequency (Ulrich and Azrin, 1962), and duration (Azrin *et al.*, 1964b) of foot-shock as well as the intensity of tail-shock (Azrin *et al.*, 1964a). The present findings revealed that the probability of elicited aggression was a direct function of the force of a tail-pinch. It appears, therefore, that elicited aggression is a reaction to several types of aversive stimulation and is not restricted to electric shock. The phenomenon may be roughly designated as a pain-aggression reaction.

The pinch stimulus does not appear to have an overall advantage over electric shock for general use in studying elicited aggression. In order to minimize injury to the tail, only a small number of stimulus presentations were allowed each session and two days or more of rest was necessary between sessions. Preliminary study showed that in the absence of these precautions, the probability of attack was greatly affected by the order of presentation of the various stimulus intensities. In the preliminary studies, it was found that once the highest intensity of stimulation was provided (60 psi), the *Ss* appeared to be sensitized to any further stimulation as was exhibited by a high level of spontaneous attack and a high probability of attack at all stimulus intensities.

Several writers have noted that physical injury or "pain" appears to induce aggressive tendencies even against animals or objects that played no role in producing the pain (Masserman, 1946; Scott, 1958). Also, there have been many popular reports that animals wounded in their natural habitat display a general disposition to attack. The present results provide experimental confirmation of this phenomenon of general aggression following physical injury.

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