"Spontaneous" fighting and mouse-killing by rats

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Within 22 groups of four rats, raised together from weaning, dominance orders were determined daily on the basis of each group member's ratio of wins to losses in spontaneous dominance encounters. No relationship was found between social rank in such intraspecies aggressive encounters and adult propensity to show interspecies aggression (mouse killing).

Aggressive behavior in rats may occur "spontaneously" (Baenninger, 1966; Grant & Chance, 1958) or in competitive situations and may be directed either against conspecifics or members of other species (Endroczi, Lissak, & Telegdy, 1958; Karli, 1956). Intraspecific dominance orders resulting from competition by rats for food or for water are correlated (Baenninger, in press; Schumsky & Jones, 1966). Dominance orders resulting from spontaneous intraspecific fighting are not correlated with those that occur when rats compete for food or for water (Baenninger, in press). A comparison of intraspecific and interspecific aggressive behavior, however, has not been reported for the rat. The present experiment determined whether or not the social rank of rats in spontaneous intraspecific aggressive encounters was related to the aggression shown when they were subsequently tested for their propensity to kill mice.

SUBJECTS AND MAINTENANCE CONDITIONS

Eighty-eight Long-Evans rat pups were assigned randomly to 22 groups of four animals at 21 days of age. Each group was housed in a cage, 18 x 15 x 9 in., with a clear Plexiglas top and front, wire mesh sides and floor, and metal back. The cages were enclosed in wooden boxes that opened at the top and front and permitted each cage to be kept on its own diurnal cycle. Two incandescent lights were mounted at the back of the box and 6 in. above the cage. A 25-W white light provided the diurnal cycle of 8 h dark and 16 h light. A 7.5-W red light was kept on at all times to permit observation of Ss during the dark part of the diurnal cycle. A commercial black hair dye was used to make distinguishing patterns on the Ss at weaning and again at 3-week intervals.

PROCEDURE

Dominance orders in spontaneous encounters were determined by recording outcomes of sequences of aggressive behavior in which one rat submitted by rolling onto his back, after which the other rat placed his forepaws and head on the submitting rat's stomach.

Each group was observed for 10 min each day at the beginning of the dark part of the diurnal cycle. Cages were observed for 5 to 7 days each week and for 6 to 14 weeks, starting immediately after weaning (21 days of age). At the end of testing for spontaneous dominance, Ss were isolated for a week and then given one 24-h test for mouse killing.

RESULTS

Dominance orders were calculated after each daily 10-min observation period. The dominance order in each cage was the rank order of the ratio of total wins to total losses for each rat. The rat with the highest ratio of wins to losses was given the rank of 1. The final dominance measure for each rat in a cage was the ranked sum of his daily ranks.

Mouse killers were neither more nor less likely than nonkillers to be dominant during intraspecific fighting in groups of four rats. Mouse killers had a mean dominance rank of 2.63, while nonkillers averaged 2.41 ($t = .95$, $df = 86$, $p > .10$); dominant Ss ranked 1, while larger numbers indicated subordination. Moreover, when the mean ranks of killers and nonkillers were determined for each cage separately, a Wilcoxon matched-pairs signed-ranks test showed no difference in dominance rank for mouse killers and nonkillers ($t = 48.5$, $N = 16$, $p > .05$).

DISCUSSION

Moyer (1968) has suggested that different kinds of aggression may exist both within and between species. He characterized mouse killing by rats as "predatory aggression" and spontaneous fighting as "intermale aggression." Our results support a separation of these two types of aggression. By showing no relation between these measures of intraspecific and interspecific aggression, this experiment suggests that particular measures of aggression have limited generality, and that aggressiveness is not a unidimensional trait in the rat. A lack of correspondence has also been found among intraspecific measures of dominance in "spontaneous" encounters and dominance in competition for food and water. In the mouse, a similar lack of correspondence among certain measures of intraspecific competition has also been found (Lindzey, Manosevitz, & Winston, 1966). The present experiment supports a view of aggression that includes under that term a number of different behavior patterns that are not necessarily correlated. Such a finding also suggests that different motivational states may underlie the different forms of aggressive behavior.

Although mouse killing and spontaneous dominance are not correlated, the details of the particular responses in the two types of aggression are not entirely different. When a rat kills a mouse, it does so in a stereotyped manner by pouncing and making rapid downward motions of the head and forepaws, biting the dorsal surface of the mouse, and usually severing the spinal cord. When a rat forces a second rat to submit, it pounces upon the dorsal surface of the second rat with downward motions of the forepaws; after the second rat has submitted by rolling onto his back, the dominant rat frequently pounces with his forepaws upon the submitting rat's stomach and may make incomplete biting movements upon the submitting rat's neck, stomach, and genitals. These commonalities in details of behavior patterns may, however, mean no more than that the rat has limited means (mouth and paws) for affecting his social and nonsocial environment.

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