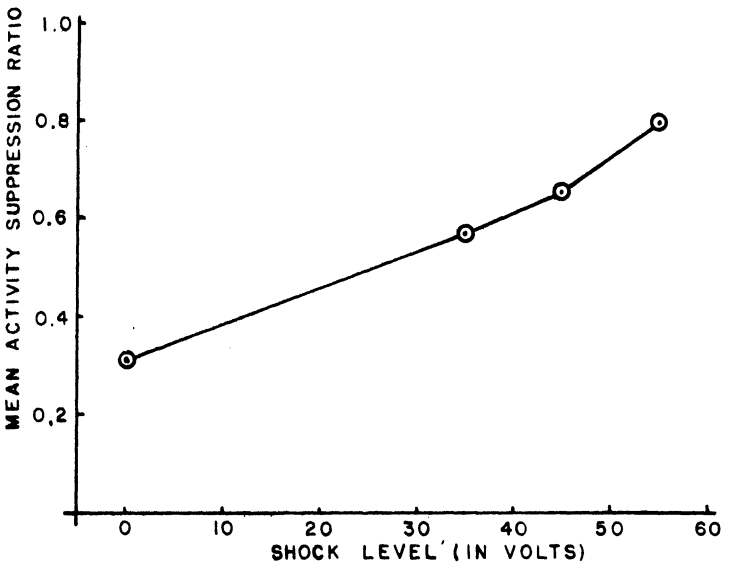

Fig. 1. Mean activity suppression ratios for all groups as a function of shock intensity.

decline in activity is not likely due to those processes alone. There is also the possibility that the intermixing of shock and no-shock animals in the random sequence of running each day could supply the no-shock animals with alarm pheremone cues from the shocked animals in a manner similar to that reported by Courtney, Reid, & Wasden (1968). This important possibility is currently being explored.

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(Recevied for publication November 9, 1973.)

Bulletin of the Psychonomic Society
1974, Vol. 3 (3A), 172-174

Activity level and secondary motivation: Frustration

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Three groups of hooded rats were given 15 placements to either continuous reward, alternating partial reward, or nonreward in a box where activity level was monitored. In acquisition, nonrewarded animals appeared more active than continuously rewarded animals, with partially rewarded animals showing activity levels similar to the group matching their reward type on that trial. In extinction, the continuously rewarded Ss' activity rose to a level significantly above both the nonrewarded and partially rewarded groups, consistent with predictions of frustration-induced arousal and activity.

Following a review of 20 years of research on the double runway frustration effect (e.g., Amsel & Roussel, 1952), Scull (1973) concludes that the major impact of that research is not a conclusive judgment on frustration theory, but rather a pointing out that "the double runway is a much more complex situation than anticipated." Scull lists a number of conceptions, in addition to frustration theory, which have been generated, some introduced to supplement that theory, others expressed as competitive alternatives. A number of situations somewhat simpler than the double runway are also discussed, with the data from these less complex situations often providing the more useful and unambiguous information about frustration and related notions.

Among the simplest situations mentioned were those in which an increase in general activity level was observed following a reduction or removal of reward. These studies have involved either open-field activity measures following runway trials (Gallup & Altomari, 1969; Gallup & Hare, 1969; Tacker & Way, 1968; Topping, Cole, Matamores & Linenberger, 1970), or

both the NR animals ($t = 2.29$, $df = 20$, $p < .05$) and the PR animals ($t = 2.24$, $df = 20$, $p < .05$). The CR vs NR difference was also significant on the second trial of extinction ($t = 2.11$, $df = 20$, $p < .05$). The large rise in activity did not persist, however, as no apparent differences between groups were seen after the third extinction trial. The NR and PR groups did not significantly differ in extinction.

DISCUSSION

These results are substantially in agreement with the previously mentioned studies in supporting the contention that a frustration response following nonreinforcement within the context of reinforcement will manifest itself in increased activity or "agitated" behavior, as first suggested by Miller & Stevenson (1936). However, the increase in activity on nonreinforced trials during acquisition for PR animals, when compared to NR animals, was not as strong as that reported by Dunlap et al (1971).

The failure of the increased activity of the CR animals to persist beyond the first few trials of extinction is in agreement with the observation of Tacker & Way (1968), and suggests that the activity changes observed here represent only the initial transient emotional reaction to a frustrating situation and do not index the frustration responses presumed to be affecting response persistence in multiple-trial situations. The failure of the PR group to differ from the NR group in extinction is consistent with the typical frustration theory explanation of the partial reinforcement effect in extinction, namely, that PR experience in acquisition precludes a major interfering frustration reaction during consistent nonreinforcement (extinction).

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(Received for publication November 9, 1973.)

Bulletin of the Psychonomic Society
1974, Vol. 3 (3A), 174-176

Activity level and secondary motivation: Incentive

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Activity level was monitored in the startbox before a runway trial for a group of eight rats running for food reward, and for a second group of eight rats receiving identical treatment but with no reward given. There was no evidence for an excitatory incentive response, as the groups' activity levels did not differ during acquisition. In extinction, the previously rewarded animals were more active, suggesting a frustration effect.

Hull (1952) and Spence (1956) have suggested that an incentive response is conditioned when neutral stimuli are paired with consummatory responding. The subsequent elicitation of this learned response leads to an increment in motivation. Spence then went on to explain instrumental runway behavior in terms of this secondary motivation. There have been numerous reports consistent with Spence's suggestion, including a series of studies showing an increase in activity level following the presentation of a stimulus which had been paired with food (e.g., Sheffield & Campbell, 1954; Bindra & Palfai, 1967; Zamble, 1967). However, several investigators have reported an apparent demotivational effect of a stimulus paired with food (e.g., Trapold, 1962; Armus & Sniadowski-Dolinsky, 1966). Several theorists have suggested that since the consummatory response to a goal stimulus is usually demotivating, it is most consistent to assume that the learned response based on it also be demotivational (Bolles, 1967; Brown & Farber, 1968).

Spence originally used the incentive-motivation notion to explain runway behavior, with the generalization of the responding to startbox cues initiating the running response. However, all of the studies referenced above have been performed in other types of situations. This study attempts assessment of changes in activity level in the startbox of a food-reward runway, as this would seem to be an appropriate addition to the currently available information.

A second, quite unrelated reason exists for the present study. Klare (1974) has argued that a measured decline in activity in the startbox of a shock-escape runway is due to fear-induced freezing. However, an alternative possibility is that the decline in activity is due to preparatory responses to facilitate running on the part of the shocked Ss. In the present study, the level of activity in the startbox was compared between Ss receiving food reward for running in the runway and the Ss not receiving reward, and thus not running. Significant activity reductions for food-reward Ss could be interpreted as due to preparatory responses to facilitate