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# Effects of Inescapable Shock and Shock-Produced Conflict on Self Selection of Alcohol in Rats[1]

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ANISMAN, H. AND T. G. WALLER. *Effects of inescapable shock and shock-produced conflict on self selection of alcohol in rats.* PHARMAC. BIOCHEM. BEHAV. 2(1) 27–33, 1974. – In five experiments it was found that stress of inescapable unavoidable shock produced increased self selection of alcohol. These effects were maintained only so long as the shock schedule was continued. Factors such as predictability of shock, shock schedule and nutritional deficiency were found not to alter alcohol consumption substantially. In contrast to the effects of inescapable unavoidable stress, shock-produced conflict did not lead to the self selection of alcohol. Results were interpreted in terms of a Tension Reduction Hypothesis and the role of control over aversive stimulation.

Inescapable shock Conflict Self selection of alcohol

SEVERAL investigators have demonstrated that ethyl alcohol decreases the number of responses made in an active avoidance task [2,4] and increases the distance subjects will approach in an approach–avoidance conflict situation [3, 12, 13]. On the basis of these experiments, as well as a number of other comparable reports [8], it had been suggested that ethanol reduces stress in aversively motivated situations (Tension Reduction Hypothesis).

It follows that if ethanol reduces tension associated with the stress of electric shock, then voluntary alcohol consumption in an aversive situation should be reinforcing and, consequently, should increase in frequency. However, paradoxical results have been reported concerning this prediction. Myers and Holman [14] reported that neither acclimation to alcohol, or shock presented on a partial schedule (variable or fixed interval) resulted in increased alcohol consumption. Similarly, Casey [9] found that alcohol consumption did not increase until 16 days after a stress treatment was terminated. In contrast to these reports, several other investigators (e.g., [1, 11, 17] found that voluntary alcohol consumption increased as a result of stress produced by electric shock.

One factor which might account for these discrepant results concerns the opportunity animals have for sampling the alcohol. Specifically, since voluntary alcohol consumption in a stressful situation is essentially a mode of escaping or avoiding stress, the rate of acquiring the consumatory response should be regarded in the same fashion as would a running or bar–press avoidance response. Specifically, since drinking behavior cannot be considered a defensive reaction in the rats repertoire of responses [5] it is not at all surprising that the tendency to consume alcohol is acquired as slowly as it is. It would be expected that if the probability of alcohol being sampled were maximized while the organism were in the stressful situation, then the consumatory responses should be acquired more readily. Preliminary investigations carried out at our laboratories indicated that one method which is fruitful in this respect is simply to continuously house the animal in the stressful situation with both alcohol and water freely available. In each of the studies to be reported this technique was employed. The variables manipulated in each of the experiments essentially represented an attempt to further enhance the rates of self selection of ethanol in an aversive situation.

## EXPERIMENT 1

One variable which may influence the degree of volitional alcohol consumption is the stress–rest schedule to which animals are subjected. Specifically, it has been demonstrated that monkeys [6,7] and rats [18] are more prone to gastric ulceration when maintained on a 6 hr stress–6 hr rest schedule than on a 12 hr stress–12 hr rest schedule, suggesting that animals are less able to cope, via internal mechanisms, with stress presented on a 6 hr–6 hr schedule. If the degree of stress, or the organism's ability to cope with stress, is related to self selection of alcohol, then it should follow that alcohol consumption would be differentially affected by the stress–rest schedule employed.

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## METHOD

### *Animals*

Twelve experimentally naive male Holtzman rats weighing 230–250 g upon arrival from the Holtzman Co., Madison, Wisconsin were used. Rats were individually housed in standard wire cages with ad lib food and water for seven days prior to any experimental treatment. At the start of the experiment rats weighed 260–280 g.

### *Apparatus*

During the course of the experiment twelve Plexiglas chambers (23 × 21 × 20 cm) served as the animals' living quarters. The floor of each chamber consisted of 0.16 cm stainless steel rods, spaced 1.25 cm apart (center to center), through which electric shock of 1.0 mA (constant current, 60 cycle AC) could be delivered. Occurences of shock periods, duration of shocks and intershock intervals were programmed through a series of timers, relays and a tape drive. Holes drilled in one wall of each chamber, 8.0 cm apart and 4.0 cm above the grid floor, permitted the insertion of drinking spouts of 100 cc graduated cylinders. Size of drinking spouts were uniform for all animals and permitted approximately 1–3 cc of spillage or evaporation over a 24 hr period.

### *Procedure*

Rats were randomly assigned to three groups. Rats in one group received a single 2 sec signaled inescapable shock every 30 min during alternate 6 hr periods (Group 6–6). A second group similarly received shock every 30 min. However, shock periods occurred during alternate 12 hr periods (Group 12–12). Finally, a third group received no shock exposure (Group 0–0). Shock periods in the 6–6 and 12–12 groups were counterbalanced such that, while shock was on for half the animals, it was off for the remaining rats. The shock began on the second day of the experiment and continued 11 days. Rats were maintained in the chambers for 4 additional days following termination of the shock treatment.

Alcohol and water were available ad lib throughout the experiment. On Day 1 (when no shock was presented) the concentration of alcohol was 2% (v/v). Consumption of water and alcohol on this day served as the baseline consumption rate. On subsequent days the alcohol concentration was increased daily in 1% increments until the concentration was 10% (v/v). The 10% concentration was maintained for the duration of the experiment. The positions of the alcohol and water cylinders were varied twice daily (0900 and 1700 Hr) on a random schedule and fluid consumption was recorded daily at 0900 Hr.

Only a single baseline day was employed, since the consumption of alcohol at the 2% concentration had previously not been found to be predictive of subsequent consumption with increasing alcohol concentrations. The purpose of the nonshock day was essentially to permit the animals to habituate to the novel environment. Accordingly, the self selection of alcohol among shock groups within the present investigation should be considered with respect to nonshock groups rather than the baseline measure.

## RESULTS

Figure 1 shows the mean quantity of alcohol and water consumed daily by each of the groups. An analysis of variance of the fluid consumption yielded a signficiant Shock treatment × Fluid interaction ($F(2, 9) = 4.72$, $p<0.05$). Subsequent multiple comparisons indicated that rats in both shock groups consumed more alcohol than did the nonshock group, however, alcohol consumption did not differ between the two shock groups. Among rats in Group 6–6 a preference for alcohol was developed within 3 days of the commencement of the shock schedule, whereas among rats in Group 12–12 an alcohol preference was evident as early as the first shock day. It should be noted that this preference was not evident until the shock schedule was commenced; witness the lack of an alcohol preference exhibited by all groups during the nonshock day. Inspection of fluid consumption among the animals within each group revealed for both the 6–6 and 12–12 groups, 3 of the 4 animals showed strong preferences for alcohol over water, whereas among the animals in the 0–0 group only one rat showed any preference for alcohol, and this was restricted to the first few days of training where alcohol concentrations were relatively low.

Although the Shock Treatment × Fluid × Days Interaction was not significant, inspection of the data (see Fig. 1) indicated that consumption of alcohol in the shock groups decreased following the termination of the shock schedule. The decrease was much more evident for Group 6–6 than Group 12–12. Nevertheless, differences between alcohol and water consumption among the 6–6 and 12–12 groups did not approach statistical significance.

It is interesting to note that although the voluntary consumption of alcohol was dependent on the presence of shock, no systematic differences in consumption were evident during stress and rest periods among either of the shock groups. Although constant illumination was provided, animals tended to consume most of the fluid during night hours of the diurnal cycle (9 p.m.–9 a.m.). The general trend of the results were consistent regardless of whether the data was analyzed in terms of total volumes of fluid consumed or absolute alcohol consumed/kilogram body weight ($\bar{X}$ alcohol/kg during shock days = 3.04 ml/kg, 7.80 ml/kg, 6.16 ml/kg for the 0–0, 6–6 and 12–12 groups respectively).

Immediately following the termination of the experiment rats were disected and stomaches examined for ulceration. None of the rats were found to have gastric ulceration.

## DISCUSSION

In accordance with earlier reports (e.g. [1, 11, 17], the results of Experiment 1 indicated that stress of electric shock was effective in producing volitional alcohol consumption to the extent that alcohol, the originally nonpreferred fluid, became the preferred one. Moreover, this was found to be the case regardless of whether rats were shocked on a 6 hr on–6 hr off or 12 hr on–12 hr off schedule. While the procedure of maintaining rats in the shock chamber throughout the experimental treatment, and increasing the daily concentration of alcohol in small increments, may have prompted voluntary alcohol consumption, this procedure in itself was not sufficient to promote selection of alcohol as the preferred beverage. Rather, the necessary condition appears to be that shock be administered to animals. These data are consistent with the Tension Reduction Hypothesis. Specifically, alcohol presumably reduces stress, is thus reinforcing and consequently

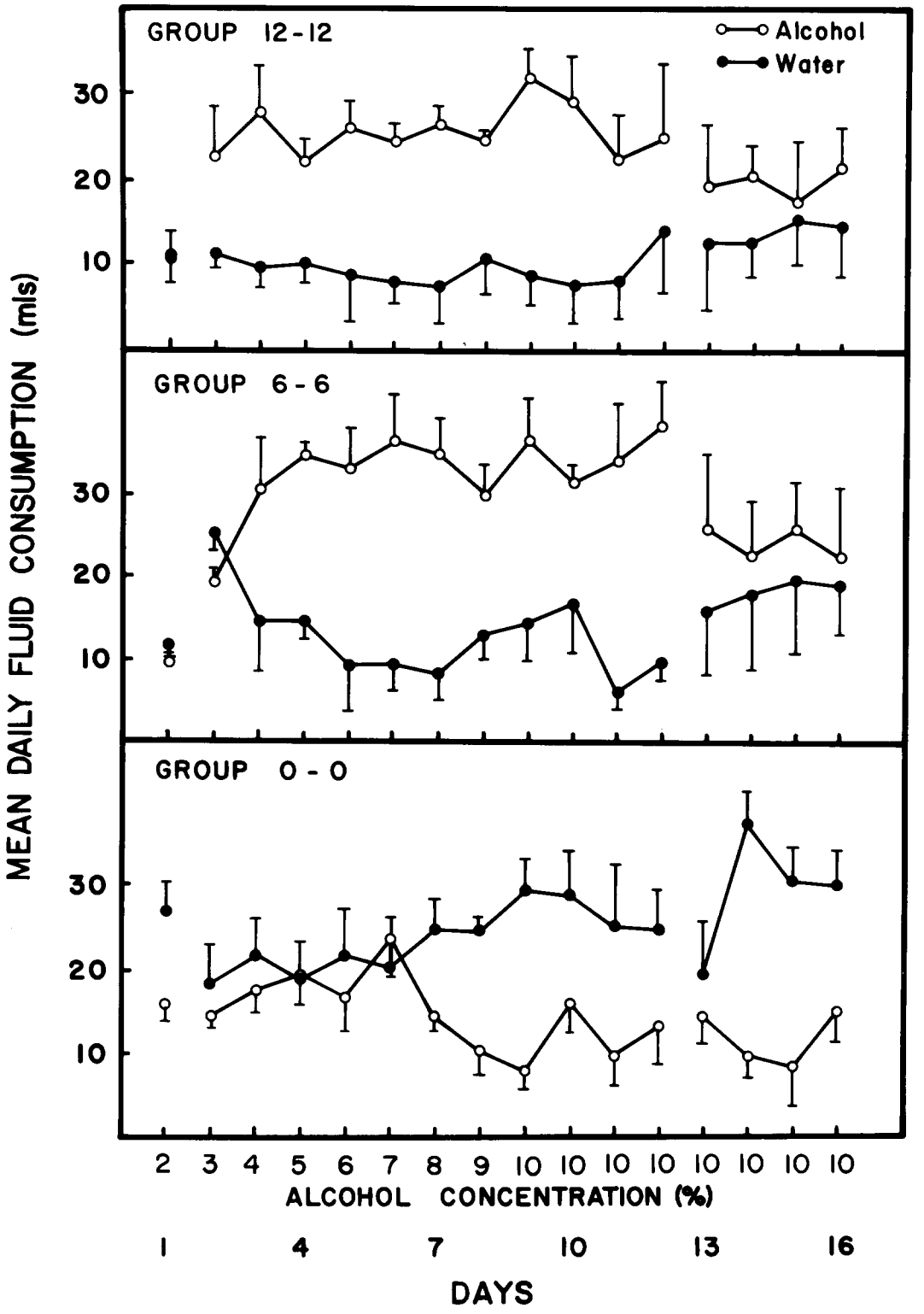


FIG. 1. Mean and standard deviation of alcohol and water consumed (ml) over sixteen days. Note: shock was not delivered on Days 13–16.

increases in frequency. The fact that the volume of alcohol consumed declined in the shock groups when the shock treatment was terminated suggests that self selection is due to physical stress (shock) and not secondary stimuli (i.e., implicit and explicit cues of the shock chamber).

## EXPERIMENT 2

Although the most parsimonious explanation of the data observed in Experiment 1 is in terms of the Tension Reduction Hypothesis, an alternative interpretation of these data does exist. Specifically, during the first few days of the stress schedule shocked rats demonstrated a marked decrease in weight (mean weight loss being 14.5 gm). Accordingly, it can be argued that because ethanol has a greater nutritive value [19] animals are more apt to consume this fluid than tap water. If this were the case, then food deprivation should increase self selection of alcohol even among nonshocked rats. One purpose of Experiment 2 was to test such a possibility.

A second point of interest with respect to Experiment 1 is the fact that unsignaled shock produced volitional consumption of alcohol. Previous reports [10] had indicated that a necessary requisite for alcohol comsumption to increase is that a signal be implicitly paired with the shock. While the results of Experiment 1 are clearly incompatible with the findings reported by Cicero *et al.* [10], it is possible that temporal cues served as a warning signal for shock, since shock was presented at fixed intervals. Were this the case, then volitional alcohol consumption should not increase if unsignaled shock were presented at random intervals. Experiment 2 was designed to test such a prediction.

### METHOD

The apparatus and strain of rats was the same as that used in Experiment 1. Twelve rats were randomly assigned to one of three treatment conditions. Rats in one group received ad lib food, and shock on a random schedule (two 1.0 mA 2 sec shocks/hr) on a 6 hr on–6 hr off basis. A second group received the same shock treatment but received only one hr of feeding time per day. Finally rats in a third group received no shock but were permitted food on the same schedule as the deprived group. Alcohol and water were presented to rats in each group on the same regimen as described in Experiment 1. Rats were maintained on this schedule over a 22 day period.

### RESULTS AND DISCUSSION

Table 1 shows the mean daily volumes of water and of alcohol solution consumed over the 22 day testing period. An analysis of variance of the fluid volumes consumed yielded a significant Treatment × Fluid interaction ($F(2, 3) = 5.22$, $p<0.05$). Comparisons between the means involved in the interaction indicated that both shock groups consumed more alcohol than did the food deprived nonshock group ($p<0.05$). Moreover, the shock-food deprived group consumed less alcohol than did the shock nondeprived group. It is unclear, however, whether this was a result of food deprivation resulting in the alcohol being more effective as a stress reducer, or whether it is simply a matter of the nondeprived group consuming more fluid (as was the case for water consumption).

TABLE 1

MEAN DAILY VOLUME (ml) OF ALCOHOL AND WATER CONSUMED AS A FUNCTION OF VARIABLE INTERVAL SHOCK AND FOOD DEPRIVATION (EXPERIMENT 2)

| Group | Fluid | |
|---|---|---|
| | Alcohol | Water |
| Non-shocked food deprived | 8.7 | 29.8 |
| Shocked food deprived | 19.5 | 19.4 |
| Shocked non-deprived | 23.5 | 26.7 |

As in Experiment 1, nonshocked animals consumed significantly more water than alcohol. In fact in Experiment 1, nonshocked rats consumed a mean of 14.2 cc water and 24.4 cc alcohol daily, while in Experiment 2 nonshocked animals consumed an average of 8.7 cc of alcohol, and 29.8 cc of water daily. Thus it seems that not only did deprivation not increase alcohol consumption, but rather it reduced the quantity consumed. Clearly, food deprivation was not responsible for the self selection of alcohol observed in shocked rats in Experiment 1 or 2. However, it was noted in Experiment 2 (see Table 1) that although shocked rats consumed more alcohol than did nonshocked rats, no preference for alcohol over water was demonstrated by the shocked groups. Since it is unclear whether this was due to the random shock schedule, or simply a spurious result, a subsequent experiment employing nonshocked (n = 4) and randomly shocked animals (n = 4) was carried out. Table 2 shows the mean total water and alcohol consumption of these groups over the 13 day test period. It is evident that rats which received shock on a random schedule consumed more alcohol than did nonshocked rats, and also demonstrated a preference for alcohol over water as had been seen in Experiment 1.

In each of these two studies, examination of the stomaches yielded no evidence of ulceration. This was also found to be the case in several additional and similar studies where rats received shock and were permitted access only to water. It appears that ulceration was not a by product of the stress treatment employed.

TABLE 2

MEAN DAILY VOLUME (ml) OF ALCOHOL AND WATER CONSUMED AS A FUNCTION OF SHOCK PRESENTED ON A VARIABLE INTERVAL SCHEDULE (EXPERIMENT 2)

| Group | Fluid | |
|---|---|---|
| | Alcohol | Water |
| Shock | 26.6 | 13.6 |
| Non-shock | 18.0 | 22.1 |

## EXPERIMENT 3

In each of the previous experiments the rats had no control over the occurence of shock. Under these conditions alcohol consumption was reliably found to increase, but in no case was ulceration found in any of the animals. Given these findings it would be interesting to determine whether some degree of control over shock would produce ulceration and whether this procedure would also produce voluntary alcohol consumption.

As previously indicated, alcohol has typically been found to reduce avoidance behavior in a conflict situation [3,12], presumably because of its tension-reducing properties. It follows then, that in a conflict situation where free choice alcohol and water are available, the probability of alcohol being consumed should increase. Moreover, because of the animals partial control over shock in such a situation it is likely that ulceration may occur as indicated by Brady (1958).

Since strain differences have been found to be an important variable in alcohol self selection studies [20] and in studies on gastric ulceration [16], two strains of rats, Holtzman and Sprague–Dawley, were employed in the present investigations. Preliminary unpublished studies indicated that, although stress increased alcohol consumption in Holtzman rats, Sprague–Dawley rats exhibited a distinct aversion towards alcohol, and a preference for alcohol was not increased through stress. If stress in a conflict situation is more aversive than that of inescapable shock, it might be expected that Sprague–Dawley rats would demonstrate increased consumption of alcohol.

### METHOD

*Animals*

Animals were 24 male rats weighing 230–250 gm upon arrival from the supplier. Half the rats were of the Holtzman strain and obtained from the Holtzman Co., Madison, Wisconsin, while the remaining rats were of the Sprague–Dawley strain procured from the Sprague–Dawley Co., Madison, Wisconsin.

*Apparatus*

The testing chambers were the same as those described in Experiment 1. The wiring of the grid floor in the eight shock chambers was modified. For half the chambers the part of the grid floor which could be electrified was that nearer the drinking spouts, while for the remaining chambers the grid floor which could be electrified was on the side opposite the drinking spouts.

*Procedure*

Rats of each strain were randomly assigned to one of three treatment groups. Unlike Experiments 1 and 2 the shock schedule was maintained continuously through each 24 hr period. One group received no shock, a second group received shock only on the side of the chamber where the drinking spouts were located (conflict group), and a third group received shock only on the side of the chamber opposite the drinking spouts (isolated group). The third group was included to control for learning to stay on one side of the chamber, and to control for possible effects of restricted movement experienced by the conflict group. Electric shock was presented at random intervals six times an hour, with each shock being 1.0 mA and 2 min in duration. Accordingly, shock was present in one side of the chambers 20% of the time. This treatment was continued for 10 consecutive days. Percentages of alcohol in the daily solutions, and the randomization of drinking tubes was the same as in Experiment 1.

### RESULTS AND DISCUSSION

Table 3 shows the mean daily volumes of water and of alcohol solution consumed. An analysis of variance of the consumption scores did not yield any significant main effects or interactions involving the shock treatment or for strain of rats. In fact, subjects in the conflict group consumed slightly less alcohol than did the isolated group. This difference, however, did not approach statistical significance. The analyses of variance of the absolute alcohol consumed/kg body weight and volume of alcohol/water ratio yielded similar results. Moreoever, inspection of the consumption scores over days revealed no systematic changes in the volumes of alcohol consumed. Examination of the animals stomachs again revealed no signs of ulceration in any of the groups.

TABLE 3

MEAN DAILY VOLUME (ml) OF WATER AND ALCOHOL CONSUMED AS A FUNCTION OF STRESS TREATMENT (EXPERIMENT 3)

| | Fluid | |
|---|---|---|
| Group | Alcohol | Water |
| Non-shock | 16.3 | 27.9 |
| Conflict | 16.9 | 23.2 |
| Isolated | 20.8 | 20.6 |

While these data appear inconsistent with a tension reduction hypothesis, there are several factors which may have been influential in producing these effects. Specifically, since shock occurred only 20% of the time, rats may often have avoided the shock and were thus not sufficiently stressed. Thus in Experiment 4 the probability of shock being present was increased from 20% to 80%.

## EXPERIMENT 4

*Apparatus and Procedure*

The apparatus and procedure were the same as in Experiment 3 except that shock was presented randomly on 24 occasions during each hour (each shock being 2 min in duration), thus resulting in the grid floor being electrified 80% of the time. Unlike Experiment 3, this study employed only Holtzman rats (n = 12) since differences in alcohol consumption were in fact not evident between the strains.

### RESULTS AND DISCUSSION

Table 4 shows the mean volumes of alcohol and water consumed by each of the treatment groups. An analysis of variance of the fluid volumes consumed yielded no significant main effects or interactions. If the data were analyzed in terms of absolute alcohol consumed/kg body weight, a significant Treatments main effect was obtained ($F(2, 9) = 4.65$, $p<0.05$). Comparisons between the means involved in this main effect indicated that the conflict group consumed significantly less alcohol than did the remaining two groups. The main source for this difference, as seen in Table 4, seems to be a result of the conflict group consuming less total fluid (alcohol and water) than the remaining groups.

TABLE 4

MEAN DAILY VOLUME (ml) OF ALCOHOL AND WATER CONSUMED AS A FUNCTION OF STRESS TREATMENT (EXPERIMENT 4)

| | Fluid | |
|---|---|---|
| Group | Alcohol | Water |
| Non-shock | 22.0 | 23.7 |
| Conflict | 13.5 | 14.1 |
| Isolated | 21.5 | 21.2 |

The fact that conflict did not increase voluntary alcohol consumption is incompatible with a Tension Reduction Hypothesis. There are, however, three distinct alternative explanations which may account for the observed consumption rates among the conflict rats. (a) While the animal is in the conflict situation administration of alcohol may reduce stress. However, when the organism is required to select the alcohol freely, the response of crossing into the shock side of the chamber (presumably when the shock is absent) results in the conflict being resolved (at least temporarily), and as a result there is no need for the alcohol. (b) Given that the organism has some control over the occurrence of shock through external means (i.e., crossing or not crossing into the shock side), the necessity for seeking other means of reducing stress, in this case consumption of alcohol, are reduced. (c) Finally, it was noted that during the first few days of the conflict treatment rats made few crossing into the shock chamber and consumed very little fluid (water as well as alcohol). Accordingly, the animals had little opportunity to sample the alcohol and to learn of its tension reducing properties. Moreover, the rats did not have the opportunity to adapt to the aversive taste of the alcohol at low concentrations. Perhaps when animals finally did commence drinking larger amounts of fluid, the relatively strong alcohol solution was too aversive for the animal.

Although conflict did not produce volitional consumption of alcohol, two of the four conflict rats did have gastric ulceration. In agreement with earlier reports [16], subsequent pilot studies confirmed this same effect and indicated that conflict treatment ranging from 5–12 days is effective in producing ulceration. If rats received more or less days on the conflict treatment then ulceration was not observed.

## EXPERIMENT 5

Experiment 5 was a further inquiry into the role of shock produced conflict on voluntary alcohol consumption. Experiments 1–4 indicated that while unsignaled inescapable shock increases the self selection of alcohol, shock produced conflict does not. As previously suggested, rats in the conflict group consumed little fluid (alcohol or water) during the first few days of training and thus may not have had the opportunity to adapt to the aversive taste of the alcohol solution. Consequently, when the rats in the conflict group did commence consuming fluid, the increased concentration of alcohol present may have been relatively more aversive than it was in the nonshocked or isolated groups, and as a result the alcohol was not consumed in appreciable quantities. It follows that if the concentration of alcohol were maintained at a constant weak concentration, than the conflict group would demonstrate increased volitional alcohol consumption relative to nonshocked rats.

### *Apparatus and Procedure*

The apparatus, procedure and strain of rats (n = 12) were the same as in Experiment 4 except that the alcohol concentration was kept constant at 3% (v/v). The experimental treatment was maintained for seven consecutive days.

### RESULTS AND DISCUSSION

Since the conflict group consumed considerably less fluid than the other two groups during the first few days of training, the data were analyzed in terms of the total volume of alcohol solution consumed minus total volume of water consumed. The analysis of variance of these scores yielded a significant Treatments effect ($F(2, 9) = 8.08$, $p<0.05$). Subsequent multiple comparisons revealed that the isolated group consumed relatively more alcohol ($\bar{X}$ alcohol $-$ $\bar{X}$ water consumed = 22.10 ml) than the conflict or nonshock groups ($\bar{X}$ alcohol $-$ $\bar{X}$ water consumed = 3.32 and 7.00 ml respectively). These differences were consistent during 6 of the 7 treatment days. Moreover, additional studies revealed comparable results when alcohol was maintained at either a 5% or 3% (v/v) solution.

Once again it appeared that conflict did not increase volitional alcohol consumption. This was not a function of alcohol tasting relatively more aversive for the conflict than the nonshocked or isolated groups since the concentration of alcohol was kept constant throughout the experiment. Moreover, the fact that the nonshocked and conflict groups consumed more liquid from the alcohol solution than from the water, attests to the fact that the concentration of alcohol used was in itself not aversive. It is interesting that the isolate group consumed greater amounts of alcohol than the other two groups, although they could passively avoid the shock. This finding is not really surprising since the treatment was apparently an aversive one in that rats in the isolate group exhibited weight loss comparable to that of the conflict group between the first and second days of training ($\bar{X}$ weight loss = 15.5 gm). Unlike the conflict group, weight increased following the second day of training among the isolated rats. It seems that partial control

over the occurence of shock (i.e., inhibitory responses precluded the occurence of shock in the isolate group) did lead to increased voluntary alcohol consumption. The reliability of this finding is questionable, however, in that the isolate group was not found to consume more alcohol than the nonshock group in Experiments 3 and 4. Were this finding found to be a replicable one it would suggest that lack of control over shock is relatively unimportant in producing volitional alcohol consumption. Given recent reports in which avoidance training increased voluntary alcohol consumption [15], this possibility becomes an increasingly compelling one. All factors considered the hypothesis that once the animals in the conflict group cross into the shock side of the chamber the conflict is resolved and the necessity for alcohol consumption is mitigated, appears to be the most viable explanation of the lack of consumption of alcohol on the part of the conflict group.

## GENERAL DISCUSSION

It is apparent from the results of the present series of experiments that exposure to inescapable shock effectively increases volitional alcohol consumption. Moreover, the self-selection was not due to nutritional deficiencies (see also [20]), or to specific stimulus factors as previously suggested by Cicero *et al.* [10]. Specifically, the present experiments employed unsignalled shock presented on either a fixed or variable interval schedule, thus precluding temporal factors as being a signal for shock. It appears that the stress per se was responsible for the self selection of alcohol. Moreover, maintenance of the consumatory response was also dependant on the presence of the primary aversive stimulus. Witness the finding that termination of the stress schedule quickly resulted in rats decreasing their consumption of alcohol. Of course, it is not unlikely that if an explicit cue had been paired with shock, subsequent presentation of this cue alone may have maintained the self selection of alcohol. The important point here is that the necessary and sufficient condition for voluntary selection is that a primary stressor be introduced. While an external cue could possibly sustain the consumatory response even when stress is terminated, it is not a necessary condition to initially establish the preference for alcohol.

It is interesting that although a Tension Reduction Hypothesis would predict that conflict, as inescapable shock, should increase voluntary alcohol consumption, this was not the case in the present investigation. Although conflict was found to produce a dramatic weight loss, comparable to that produced by inescapable shock, and on occasion was also found to produce gastric ulceration, no sign of increased selection of alcohol was apparent. It seems that control over shock may be an important determinant of alcohol consumption. Under those conditions where an external source of coping with stress is available, the necessity of consuming alcohol for possible stress reduction is minimized. In contrast, where an external source of coping with stress is not available, the importance of alcohol as a stress reducer is maximized. Quite possibly, the feedback of stress reduction in the latter situation is less ambiguous, and therefore more reinforcing.

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