ALCOHOLIC DRINKING: SUPPRESSION BY A BRIEF TIME-OUT PROCEDURE*

GEORGE BIGELOW, IRA LIEBSON and ROLAND GRIFFITHS
Department of Psychiatry, Baltimore City Hospitals and Department of Psychiatry and Behavioral Sciences. The Johns Hopkins University School of Medicine, Baltimore, Maryland, U.S.A.

(Received 27 November 1973)

Summary—Volunteer chronic alcoholics were given daily access to substantial quantities of alcohol within a residential research setting. Drinking was suppressed to an average of approximately one-half of Baseline levels when 10 or 15 min of physical and social isolation was required as an immediate consequence to receiving each one-ounce drink of 95-proof ethanol. This time-out procedure suppressed the drinking of nine out of ten subjects. Drinking returned to high levels when brief contingent time-out was discontinued. The relevance of such reversible controlling relationships to the treatment of alcoholism is discussed.

Experimental study of alcoholics' drinking has focused primarily upon the characteristics and consequences of alcohol ingestion (Mello 1968; Mello and Mendelson, 1970; Nathan and O'Brien, 1971, Schaefer et al., 1971; Gottheil et al., 1972). However, research with alcoholics within experimental drinking situations can also provide data concerning the controllability of alcoholics' drinking (Bigelow et al., 1972; Gottheil, et al., 1973) and especially concerning specific manipulable environmental conditions which exert control over such drinking and which might be used to reduce it (Cohen et al., 1971b; Cohen et al., 1971c; Mills et al., 1971; Bigelow and Liebson, 1972).

The reduction of drinking is a primary goal of any alcoholism treatment program. Yet treatment efforts suffer from a lack of empirical information concerning factors which influence alcoholics' drinking. Current practice is based upon tradition, speculation and personal anecdotes. The basic experimental analysis of and modification of alcoholic drinking within the laboratory appears to offer the opportunity to gain the needed empirical understanding of environmental factors which support alcoholic drinking and of those which can be manipulated to alter this behavior. Knowledge of such controlling variables should provide an empirical base for further advances in the prevention, management and remediation of alcoholism.

The present report describes a simple behavioral procedure which has suppressed the drinking of chronic alcoholics given access to substantial quantities of alcohol within a residential hospital research ward. The procedure utilized has been that of contingent time-out from positive reinforcement (Leitenberg, 1965), which consists of scheduling as an immediate consequence to taking an alcoholic drink an interval during which other reinforcers are unavailable. In the present case time-out has consisted of a brief period of physical and social isolation. Such a contingent isolation procedure is widely used as a technique for suppressing undesirable behaviors in other populations and settings (Bur-
METHOD

Subjects
Ten male volunteer subjects referred from the Emergency Room of Baltimore City Hospitals participated. All were chronic alcoholics with histories of prior hospitalization for alcoholism.

Subjects were generally admitted to the six-bed Behavior Research Ward in a state of intoxication or withdrawal from alcohol. They were medically and psychiatrically screened prior to research participation. Criteria which precluded participation included central or peripheral neurological abnormalities, physical or laboratory evidence of liver disease, or histories suggesting seizures, pancreatitis, peptic disease, GI bleeding, or severe functional psychiatric disorder.

Procedure
Subjects were detoxified under medical supervision and their informed consent obtained prior to research participation. Informed consent involved subjects' agreement to participate in 'behavioral studies on alcoholism', in which alcohol would be made available for their consumption and in which the conditions of availability might be altered from time to time. Details of the experimental procedures were described when they were implemented. Subjects were given no instructions or explanations of what they were 'supposed to do, or of what outcomes might be expected.

Following consent to participate each subject was given access to a daily alcohol ration ranging, between subjects, from 12 to 24 drinks. Drinks consisted of 30 cm³ (1 oz) of 95-proof ethanol mixed in 60 cm³ (2 oz) of orange juice, and were provided by the ward staff upon request between 7:00 a.m. and 11:00 p.m.

Within this framework an experiment evaluating the effect of a brief, contingent time-out procedure on the drinking of alcoholics was conducted. Time-out consisted of a brief period of physical and social isolation. A within-subject experimental design was employed: each subject was exposed to both control and experimental conditions—usually followed by a reversal.

During the initial Baseline control condition subjects consumed their drinks in the main ward social area, and were free to participate in other activities while they drank. During the immediately following experimental Contingent Isolation condition subjects were required to sit for 10 min in an isolation booth immediately upon receiving each drink (15 min for subjects G and D). Six subjects were subsequently returned to the Baseline condition.

The isolation booth was a three-sided booth with a curtain across the fourth side, 30 in square inside. It was located on the ward about 15 ft from the main social area. The effect of the time-out procedure was to eliminate virtually all concurrent behavioral alternatives as an immediate consequence to receiving an alcoholic drink. Socializing, reading, talking, recreation, etc. were not permitted during time-out. The only activities permitted were drinking and smoking.

Tables 1 and 2 present a summary of the sequence of experimental conditions and the durations of exposure to each for the ten participants. Initial exposures to baseline conditions ranged in duration between 5 and 10 days. Exposures to contingent isolation ranged
Alcoholic drinking: suppression by a brief time-out procedure

in duration between 3 and 13 days. Variations in the duration of exposure to conditions and in whether a reversal was performed were substantially determined by the duration for which the particular subject agreed to participate in the research.

Two subjects were selected because the time-out procedure alone produced negligible suppression of their drinking and were exposed to a further behavioral manipulation. A temporal spacing requirement was imposed such that at least one hour had to elapse between receipt of successive drinks. Preliminary data (unpublished) suggested this manipulation could decrease subjects' disposition to drink. Under this ‘spacing’ condition the effects of Contingent Isolation were re-assessed according to the sequence of conditions shown in Table 2.

Subjects participated in the study consecutively rather than concurrently. Thus, during each subject’s participation other subjects on the six-bed research ward were involved in a variety of other experiments involving alcohol self-administration.

Table 1. Drinking by alcoholic subjects exposed only to Baseline and Contingent Isolation conditions. The percentage of available drinks consumed in each condition is shown. Figures in parentheses show the number of days exposure.

<table>
<thead>
<tr>
<th>Subject</th>
<th>No. Drinks available</th>
<th>Baseline 1</th>
<th>Contingent isolation Baseline 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>24</td>
<td>75.8 (5)</td>
<td>37.5 (9) 63.3 (4)</td>
</tr>
<tr>
<td>C</td>
<td>24</td>
<td>100.0 (7)</td>
<td>43.8 (11) 100.0 (3)</td>
</tr>
<tr>
<td>M</td>
<td>24</td>
<td>87.5 (10)</td>
<td>88.3 (6) 95.8 (4)</td>
</tr>
<tr>
<td>Sa</td>
<td>18</td>
<td>100.0 (8)</td>
<td>1.7 (6) 100.0 (6)</td>
</tr>
<tr>
<td>Sm</td>
<td>15</td>
<td>98.0 (6)</td>
<td>46.7 (6)</td>
</tr>
<tr>
<td>Ho</td>
<td>12</td>
<td>96.7 (6)</td>
<td>40.0 (3) 100.0 (3)</td>
</tr>
<tr>
<td>G</td>
<td>12</td>
<td>100.0 (5)</td>
<td>70.0 (5) 100.0 (3)</td>
</tr>
<tr>
<td>D</td>
<td>12</td>
<td>100.0 (6)</td>
<td>0.0 (13)</td>
</tr>
<tr>
<td>Total</td>
<td>—</td>
<td>93.4 (5)</td>
<td>45.6 (5) 90.4 (3)</td>
</tr>
</tbody>
</table>

Table 2. Drinking by alcoholic subjects exposed to temporal spacing requirement. The percentage of available drinks consumed in each condition is shown. Figures in parentheses show the number of days exposure.

<table>
<thead>
<tr>
<th>Subject</th>
<th>No. drinks available</th>
<th>Baseline</th>
<th>Contingent isolation only</th>
<th>Spacing &amp; contingent isolation only</th>
<th>Spacing only</th>
<th>Baseline 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>18</td>
<td>100.0 (7)</td>
<td>97.2 (4)</td>
<td>30.0 (5)</td>
<td>71.1 (5)</td>
<td>100.0</td>
</tr>
<tr>
<td>Mi</td>
<td>15</td>
<td>100.0 (6)</td>
<td>100.0 (5)</td>
<td>34.7 (6)</td>
<td>66.7 (6)</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>—</td>
<td>100.0</td>
<td>98.6 (5)</td>
<td>32.2 (6)</td>
<td>62.2 (6)</td>
<td>100.0</td>
</tr>
</tbody>
</table>
RESULTS

Data for individual subjects are shown in Tables 1 and 2. Table 1 presents data for the eight subjects exposed only to baseline and contingent isolation conditions. Table 2 presents data for the two subjects who were also exposed to the temporal spacing requirement.

On the average, contingent isolation suppressed drinking to about one-half of control levels. Although the magnitude of contingent isolation’s suppressive effect upon drinking has varied somewhat across subjects, the individual data indicate that the average effect was also the modal effect.

![Contingent Isolation Graph](Image)

The ten subjects consumed 94.6 per cent of the available drinks during the initial baseline period. During the subsequent contingent isolation period (without temporal spacing of drinks) they consumed only 52.1 per cent of the available drinks. This difference is highly significant statistically ($p < 0.0001$ according to a test for difference of proportions). The six subjects who were subsequently returned to baseline conditions again consumed 91.9 per cent of the available drinks.

Contingent isolation exerted a suppressive effect upon the drinking of nine of the ten alcoholic participants in this study. For seven of the ten subjects this suppressive effect was demonstrated while drinks were freely available. For two subjects this suppressive effect became evident only when the additional requirement of one hour temporal spacing between drinks was superimposed. Subject $M$, the only subject with whom suppression was not demonstrated, was not available for exposure to this temporal spacing condition.

The course over days of the time-out effect upon drinking has been variable across subjects. Most subjects have displayed greater variability of drinking during contingent isolation periods than during control periods (due, possibly, to a ceiling effect during control periods). In general there has been no clear trend in the level of drinking across consecutive days of contingent isolation. Two subjects ($H$ and $Ho$) showed their greatest magni-
Alcoholic drinking: suppression by a brief time-out procedure 111

Subj. So...Fig. 2. With subject Sa near-total suppression of drinking occurred during the contingent isolation phase, although the maximum available alcohol was always consumed during control phases.

...of suppression on the first day of exposure to contingent isolation. The magnitude of suppression increased over several consecutive days for four subjects (C, Sm, G and Mi). Three subjects (Su, D and S) showed no apparent trend over time. Only one subject (C) showed a large magnitude of suppression and subsequently returned to heavy drinking while the contingent isolation condition remained in effect. Temporal correlations suggest that relapse in this subject was related to the fortuitous occurrence of a specific emotional stress (an impending biopsy). This subject’s drinking had been gradually suppressed to zero, but drinking resumed on the fifth day of contingent isolation within 10 min of discussing with the subject the biopsy plan.

The strength of this contingent isolation procedure, and its temporal course, are represented graphically in Figs. 1–4 which show daily alcohol intake through the course of experiments with four representative subjects.

Fig 3. Subject Sm’s drinking became progressively more suppressed until he terminated his research participation.
The effectiveness of this simple time-out procedure in suppressing alcoholics' drinking is especially striking in contrast to the widespread traditional belief in a 'loss of control' phenomenon with alcoholics. This study joins a growing body of literature (e.g. Bigelow et al., 1972; Gottheil et al., 1973) which is resulting in a gradual retraction or reformulation (e.g. Keller, 1972) of the loss-of-control hypothesis.

More significant than simply demonstrating that alcoholics' drinking can be restrained, the present study demonstrates control to be exerted by a specific manipulable variable—brief, contingent isolation. Further, this procedure has effectively suppressed drinking even in the midst of a drinking episode. Specifically, contingent isolation has been shown to suppress drinking of alcoholics who have been drinking 360–720 cm$^3$ (12–24 oz) of 95-proof ethanol daily for 4–8 consecutive days immediately prior to the introduction of contingent time-out. Clearly, alcoholics' drinking can remain responsive to and controllable by environmental consequences even after several consecutive days of substantial drinking.

Previous studies with alcoholics have demonstrated that the non-contingent imposition of a period of isolation and reinforcer-unavailability does not itself suppress drinking (Nathan and O'Brien, 1971; Cohen et al., 1971a; Cohen et al., 1971b). The studies by Cohen et al., represent pioneering demonstrations of the controllability of alcoholics' drinking. In this work drinking was suppressed when consumption of more than five drinks resulted in long-duration (24–48 hr) withdrawal of a wide variety of reinforcers (social, recreational, dietary, therapeutic, and vocational, as well as access to alcohol). The research was conducted using a drinking baseline procedure which prohibited consecutive days of heavy drinking either immediately prior to or during the experimental condition. The present study extends the control of drinking to the more naturalistic baseline of continuous drinking, while at the same time greatly reducing the breadth and duration of reinforcer loss.

The present data do not reveal the mechanism by which the time-out procedure suppresses drinking. The 10–15 min time-out duration was selected as being the average
duration taken to consume a single drink by this subject population, with the aim being to eliminate specifically those social and recreational activities which generally occur concurrently with the consumption of alcoholic beverages. If time-out eliminated those reinforcers which normally maintained drinking, drinking would be suppressed. However, Shipley et al. (1972) have demonstrated that contingent time-out from one reinforcer can suppress behavior which is maintained by another reinforcer. Consequently, the time-out procedure may be an effective behavioral suppressant either because it eliminates those sources of reinforcement which previously maintained drinking, or because the isolation acts as an aversive event which suppresses drinking directly.

The results with two subjects exposed to the requirement of one-hr spacing of drinks indicate that such temporal spacing enhances the controllability of alcoholic drinking and establishes a more sensitive behavioral baseline for evaluating conditions which may influence the disposition to drink. The requirement of temporal spacing might further be used experimentally to reveal the suppressive effectiveness of other variables whose actions would be masked if drinking were unrestrained.

Several clinical applications involving time-out procedures with alcoholism have been reported. Sulzer (1966) and Pickens et al. (1973) have reported case studies in which contingent time-out was utilized. The community-reinforcement treatment of alcoholism reported by Hunt and Azrin (1973), and the employee alcoholism program described by Cohen et al. (1973) are both conceptually based upon the principle of arranging an immediate time-out from reinforcement as a consequence to drinking.

Since one of the defining characteristics of alcoholism is that it has the consequence of ultimate loss of reinforcement (social, economic, occupational, etc.) it may be surprising that programming reinforcement loss can suppress drinking. The difference appears to be in the immediacy and reliability of the occurrence of time-out. Although loss of, or time-out from reinforcement occurs naturally as a consequence to chronic excessive drinking, its occurrence is generally long delayed and unreliable. The effective application of a contingent time-out procedure is characterized by immediacy and reliability.

The contingency management approach represented by the present contingent isolation time-out procedure is both conceptually and operationally different from those behavior therapy procedures which attempt to produce an aversion to alcohol by pairing drinking with some trauma. The latter approach is conceptually based upon a respondent conditioning model, and attempts to produce changes in affective processes or autonomic mechanisms which would subsequently be reflected in behavioral change (Franks, 1966). The present contingent time-out procedure is conceptually based upon an operant behavior model, which emphasizes that the consequences of a behavior are a primary determinant of its recurrence.

The demonstrated relationship between drinking and contingent isolation is a reversible one. Drinking is suppressed during the contingency but returns to high levels when the time-out contingency is discontinued. Recognition of such reversible relationships has been of great utility to the physical and biological sciences. Reversible relationships (e.g. the freezing of water) indicate that current circumstances are controlled by the current values of relevant parameters. Irreversible relationships (e.g. the burning of wood) indicate that current circumstances are controlled by the past values of relevant parameters. Both kinds of relationships are important in the control of behavior, just as they are in the control of other physical events. However, there has been a tendency within the mental health field to overlook behavioral control via reversible relationships, in preference to attribut-
ing causation to less accessible historical and intrapsychic factors. Intervention via reversible procedures should receive increased attention.

The present demonstration of the effectiveness of the contingent time-out procedure indicates that the causes of alcoholics' drinking are located at least significantly within environmental conditions rather than solely within the individual. This demonstration should serve as an impetus to further exploration of contingency management in the modification of alcoholic drinking. Such therapy via contingency management will involve the re-programming of environmental conditions on a relatively chronic basis, and should represent the development of a behavioral technology for both achievement and maintenance of sobriety.

REFERENCES


Alcoholic drinking: suppression by a brief time-out procedure

