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Behavioral Treatment of Alcoholism: An Avaluative Review

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FOTI, Kenneth Francis
BEHAVIORAL TREATMENT OF ALCOHOLISM:
AN EVALUATIVE REVIEW.

Western Michigan University, M.A., 1976
Psychology, general

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ACKNOWLEDGEMENTS

I would like to thank Malcolm Robertson, thesis committee chairman, Paul Mountjoy and Kathleen Lockhart, thesis committee members, for their assistance in the preparation of this manuscript.

Kenneth F. Foti
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INTRODUCTION

According to the President's Commission on Drug Abuse, alcoholism afflicts ten million Americans, and directly affects approximately another forty million as family members of the alcoholic. It is the most widespread drug abuse problem, yet very little information is known to date on how to treat it. Traditional psychotherapies have considered it only a symptom of an underlying disease process, and treatment was usually of a psychodynamic nature. As would be expected from the behavioral point of view, this mode of therapy has met with very little success.

Of concern in this paper are the psychologically based treatment methods derived from learning theory, commonly referred to as "behavior therapy". This approach, which seems to have the greatest promise in the treatment of alcoholism, is characterized by the use of objective, empirically-based evaluations of therapeutic interventions, and an adherence to a social-learning formulation concerning etiology. Within this formulation, alcohol abuse is viewed as a learned behavior pattern maintained by numerous antecedent cues and consequent reinforcers. The main reinforcer for excessive alcohol consumption has been considered, by many professionals in the field, to be tension reduction because of alcohol's anesthetic and central-depressant...
properties. However, proponents of the behavioral approach to the treatment of alcoholism have recognized that excessive drinking may be maintained by various other reinforcers, such as increased peer approval, the opportunity to engage in sexual or aggressive behaviors that would otherwise be considered inappropriate, or avoidance of physiological withdrawal symptoms.

Initially, behavioral assessment measures of drinking behavior will be presented. An historical account of studies concerning the experimental analysis of excessive drinking, electrical aversion therapy, contingency management, and controlled drinking will follow. Finally, a discussion of these research and clinical findings, and implications for future directions will be presented.
Traditional methods of assessment categorized individuals according to various criteria. The Diagnostic and Statistical Manual of Mental Disorders (1968) divides alcoholism into three categories: Episodic excessive drinking, habitual excessive drinking, and alcohol addiction, with frequency and dependence as criteria.

Jellinek (1960) categorized alcoholics as either 1) Alpha, where alcohol is used to cope with life; 2) Beta, where there are physiological withdrawal symptoms but no dependency; 3) Gamma, where dependence and loss of control exist; or 4) Delta, where the individual cannot abstain from alcohol for even a short period of time. Additional assessment procedures include the number of alcohol related arrests or hospitalizations. The major disadvantage of these procedures is that they do not allow precise or continuous monitoring of changes due to therapy (Miller, 1975). Self-reports and data obtained from significant others have also been employed, but these measures can easily be distorted. The sober alcoholic is likely to forget how much he drank the night before; and the significant other might not really know how much was consumed, or might be reporting deliberate underestimates to please the researcher.

Implementation of behavioral methods of assessment
arose out of dissatisfaction with the extensive use of these unreliable methods of assessment in evaluating treatment effectiveness. Consequently, conclusions from most prior studies using these methods could not be accepted without validation. Behavioral assessment methods which permit a more direct observation of drinking behavior, and thus are less likely to be distorted, constitute the optimal means of obtaining this validation. The procedures are of two general types: laboratory analogue measures, such as operant measures, taste rating tasks, and ad lib drinking in a simulated environment; and in vivo measures, such as blood alcohol level measures, and direct observations.

LABORATORY ANALOGUE MEASURES

Operant measures require the subject to operate a computerized lever pressing device in order to obtain alcohol (Mello and Mendelson, 1971; Nathan and O'Brien, 1971; Bigelow and Liebson, 1972). A squirt of a specified amount of liquor is usually delivered into a glass next to the lever pressing device as soon as the number of lever pressing responses required for reinforcement is reached. Motivation to obtain alcohol is then directly measured by calculating the rate, frequency, and duration of operant responding. The measure can be used to continuously monitor changes throughout treatment, or to serve as a pre-post testing device. A disadvantage of operant assessment measures is that what is
being measured is often rather obvious to the subject, and so he may alter his operant rate in accordance with the demand characteristics of the situation (e.g., the alcoholic by definition drinks to excess).

A more surreptitious laboratory analogue measure called the "taste test" is presented to the subject as being a taste experiment involving different beverages (Miller and Hersen, 1972; Miller, Hersen, Eisler, and Hemphill, 1973; Marlatt, Demming, and Reid, 1973). The subject is seated at a table with usually six beverages, three alcoholic and three non-alcoholic. Each glass, which contains exactly 100 cc of mixture, is opaque so as not to arouse suspicion of the constant amount. The alcoholic beverages are mixed so that the taste of the alcohol cannot be detected. Subjects are instructed to drink as much of each beverage as necessary in order to rate them on a number of dimensions (e.g., sweet-sour, weak-strong). Subjects are given ten minutes to complete the task. Afterwards, the exact amount consumed for each beverage is calculated by subtracting the amount of remaining beverage in the glass from the constant (100 cc). The less alcohol the subject consumes, the more effective the treatment. Taste rating sheets are in the form of a semantic differential so that attitudes toward alcohol can be assessed as well. An advantage of the taste test over an operant measure is that its function is not as obvious to the subject. Like the operant assessment,
either continuous or pre-post testing can be employed to evaluate treatment effectiveness.

*Ad lib* drinking in a simulated environment appears to constitute the most realistic of the analogue procedures because the laboratory setting is purposely constructed to closely resemble the natural drinking environment of the alcoholic. It contains a cocktail lounge, simulated bar and living quarters equipped with furnishings typically found in these settings. Observers and videotape equipment facilitate the monitoring of drinking patterns, and styles as well as social behaviors of the alcoholic within the controlled laboratory setting (Sobell, Schaefer, and Mills, 1972; Mills, Sobell, and Schaefer, 1971; Wilson, Leaf, and Nathan, 1975). However, the unlimited availability of alcohol renders this method of assessment somewhat unrealistic because alcohol is never freely available in the natural environment.

Laboratory analogue procedures permit a more objective measurement of drinking behavior than do traditional assessment procedures. The major disadvantage is that drinking behaviors emitted in the laboratory setting are subject to a certain amount of bias because it is impossible to duplicate the exact stimulus configurations of the normal drinking environment.

In addition, the analogue procedures may be construed as being too artificial, and time-limited to accurately
assess drinking behavior in the natural environment (O'Leary and Wilson, 1975). In an attempt to validate these measures Miller, Hersen, Eisler, and Elkins (1974), compared drinking scores on the operant measure and the taste test to an indirect assessment of drinking behavior in the natural environment. Retrospective data from 40 chronic alcoholics who underwent the same eight week inpatient program was obtained. Twenty subjects were assessed with the operant measure during treatment, and the remaining twenty subjects were assessed with the taste test. Ten successes and ten failures were found for both the operant measure groups, and the taste testing group. Any two of the following criteria determined a subject as a failure: rehospitalized, or arrested for alcohol abuse, verification from two reliable sources of alcohol abuse, or direct observation of abusive drinking during follow-up contacts. Successes were determined by: no arrest or hospitalization due to excessive drinking, verification from two reliable sources of complete abstinence, steady employment, and direct observation of sober behavior during each follow-up contact. Treatment consisted of aversion therapy combined with instruction of more adaptive behavior patterns, vocational and marital counseling, and anti-abuse. Follow-up data ranged from two to twenty months.

For those using the operant measure, no significant differences between success and failure subjects were found.
on age, education, length of problem drinking and length of follow-up. However, significant differences were found between the two groups on the amount of operant responding during treatment; successful subjects responded less than the failure subjects on the operant measure. For those using the teste test, no significant differences were found on any of the demographic variables mentioned above. In addition, no significant differences between groups were found on either mean alcohol consumption or the attitudinal score on the semantic differential. These results indicate that responding on the operant measure during treatment may provide a good estimate of drinking in the natural environment, and that it may also have predictive value in assessing response to treatment. However, further validation using more direct measure of drinking in the natural environment is needed.

IN VIVO MEASURES

Direct observations of drinking behavior in the natural environment constitute the best assessment procedure, but it is probably too impractical and costly for widespread clinical use, (e.g., if the alcoholic decided to frequent several bars during one night, the observer would have to follow him). Use of special data sheets requiring the alcoholic to directly observe his own behavior has been successfully used on an out-patient basis (Sobell and Sobell, 1973).
Their Alcohol Intake Sheet required the following information to be completed: date, specific type of drink, per cent alcohol of the liquor, time the drink was ordered, number of sips per drink, amount consumed, and setting. Besides providing quantifiable data, the procedure promoted awareness of drinking patterns, discussion of situations where drinking occurs, and early treatment intervention (Sobell and Sobell, 1973).

Various types of devices designed to approximate blood alcohol levels provide the second best approach in assessing drinking behavior. Direct blood samples or the more commonly used breath samples can be easily acquired at random intervals on an out-patient basis to yield an accurate estimate of the alcohol concentration in the blood (Miller, Hersen, Eisler and Watts, 1974). Breathalyzer devices have also been used to provide feedback to subjects who are taught to estimate their own blood alcohol levels during blood alcohol discrimination training (Lovibond and Caddy, 1970; Silverstein, Nathan and Taylor, 1974). Estimations are based on either teaching the alcoholic about alcohol metabolism constants, and to observe the passage of time and strength of previous drinks, or teaching him to relate to subjective cues to specific blood alcohol levels. Blood alcohol discrimination training is utilized in establishing controlled drinking in the alcoholic.

Blood alcohol levels corresponding to controlled
social drinking vary among studies. The values range from 0.65% to 0.9%, (where 0.65% represents 65 mg of alcohol per 100 ml of blood volume, and is equivalent to two or three double martinis consumed within one hour). Validation of breathalyzers is usually conducted by the company that manufactures the product, as well as by the researcher prior to using it. Accuracy is usually within 0.003%.
A detailed behavioral analysis is often considered a necessary precursor to treatment in behavior therapy. The purpose of this analysis is to provide information concerning the functional relationship of various antecedent and consequent events that maintain the target behavior, so that this information can be used to gain control over the behavior during treatment. Research in the experimental analysis of alcoholism include studies of this nature, as well as studies which examine and define the behavioral characteristics of alcoholics without these results necessarily having direct treatment implications.

Most of the information available prior to 1965 on the drinking habits, moods, anxiety level, physiological changes, and social behaviors of the alcoholic was based on indirect and unreliable self-reports, and was therefore open to question. The concurrent empirical observation of alcoholics within the controlled laboratory setting before, during and after a drinking episode provides the framework to obtain reliable information. Studies of this nature have already contributed to the detailed behavioral analysis of the drinking and social behaviors of the alcoholics.

The first empirical observation of the drinking behaviors of the alcoholic in a controlled laboratory setting
was done by Mello and Mendelson (1965). This work, which is only one of many conducted by this famous research team, is considered the pioneer work of all the prolonged laboratory drinking studies. In a representative sample of their work, Mello and Mendelson (1971) investigated the drinking patterns of the alcoholic when alcohol, in any amount, was available continuously for a twenty-four hour period, and the changes in drinking patterns when the alcohol reinforcement schedule was varied. Fifteen alcoholic volunteers, living in an inpatient research facility, obtained any amount of alcohol under two conditions: ad lib drinking, where an unlimited amount of tokens was available non-contingently to buy alcohol; and operant drinking, where subjects had to lever press on an operant console. Alcohol reinforcement was either immediate or delayed. Drinking patterns were quantified with respect to volume and frequency of each purchase. Blood alcohol levels were also assessed three times a day during the nine to twelve day drinking period.

The results of the ad lib or free access condition were as follows: 1) each subject tended to consume only two ounces of alcohol when it was available in any amount with each purchase during the day (8 am to 8 pm); and during the night (8 pm to 8 am); 2) the total number of purchases during the daytime exceeded the total number at night; 3) there was a downward trend in the total number of purchases over the duration of the drinking phase; 4) interpurchase
time was significantly higher at night; 5) the total volume purchased for each subject throughout the experiment was approximately the same no matter what the drinking pattern was; and 6) blood alcohol levels were lowest in the early morning (12 am to 8 am), because of a significant decrement in volume purchased during these hours; rose slightly with the purchase of the largest volume consumed during the day (8 am to 4 pm); and were maintained with less alcohol consumed during the night (4 pm to 12 am). In general, blood alcohol levels remained relatively constant despite large variability in volume consumed.

During the operant delayed reinforcement condition, tokens earned one day could only be spent the following day. The drinking pattern displayed during this condition was very similar to the pattern displayed during the free access condition. Subjects tended to drink in binges (i.e., to drink for three days, stop for three to four days, and then resume drinking again), and tended to order more than two ounces of alcohol with each purchase. In contrast, the subjects in the operant immediate reinforcement condition showed a spaced and moderate drinking pattern (i.e., to work for just two ounces of alcohol, consume it, and then resume working again). Such a pattern is similar to a programmed drinking paradigm, in which a fixed dose of alcohol is available only at certain intervals (i.e., once every hour).

Gottheil and his associates have also done extensive
work involving the experimental analysis of drinking patterns. In a representative sample of their work, Gottheil, Corbett, Brasberger, and Cornelison (1971) investigated the behavioral and physiological correlates of a fixed interval or programmed drinking schedule. Ten subjects had the choice to either abstain or to consume one drink, which contained one to two ounces of alcohol, at each one hour interval from 9 am to 9 pm Monday through Friday. The schedule provided thirteen decision points a day with a maximum consumption of 26 ounces of alcohol. Results indicated a broad range of drinking decisions; some subjects never chose to drink, others drank moderately throughout, and others began to drink and then stopped. In addition, subjects almost always chose to consume two ounces of alcohol with each drink. Blood alcohol levels, which were assessed four times daily, typically remained close to zero during the morning, rose to moderate levels around 2 pm, and reached close to maximum levels at 9 pm. The researchers speculated that those subjects who never drank, or decided to stop drinking, did so because adherence to such a regimented drinking schedule was aversive.

Of particular importance in the findings of these studies concerning drinking patterns is that different alcohol reinforcement schedules produce differences in drinking habits. Consequently, researchers should be aware that extrapolation of data from the laboratory to real life will only be valid if the reinforcement schedules employed within the laboratory closely approximate those reinforcement...
schedules found in the natural environment.

A closer examination of the drinking response itself was done by Sobell, Schaefer, and Mills (1972) in which the type of drink, time taken to consume a drink, number of sips, amount per sip, and time taken between sips were assessed for both alcoholics and normal, social drinkers. Twenty-six male alcoholics and twenty-three male normal drinkers served as subjects. Normal drinkers were defined as those individuals who never experienced any disruption of normal activities due to excessive alcohol consumption. The two groups drank during separate sessions at a simulated bar, and were allowed to drink a maximum of sixteen ounces of alcohol. Results indicated that chronic alcoholics significantly ordered more drinks, order more straight drinks, consumed more alcohol per sip, took more sips, finished a drink three times quicker, and took more time between drinks than social drinkers did. A clear implication of this study is to have the alcoholic order mixed drinks, and sip rather than gulp his drink in approximating the drinking habits of a social drinker.

Behavioral researchers have also been interested in examining the social behaviors of the alcoholic under controlled laboratory conditions. Nathan and O'Brien (1971) assessed the social as well as drinking behaviors in their experiment involving four skid row alcoholics and four matched skid row non-alcoholics. All subjects were recruited from the skid row area of a major city in the East. Alcoholics

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were selected on the following criteria: 1) no drug addiction; 2) no current medical treatment; 3) no neurological diseases; 4) no consumption of alcohol within two weeks prior to the study; 5) a history of withdrawal symptoms; and 6) a drinking history of more than five years. Non-alcoholics were selected on: 1) the first three criteria mentioned above; in addition to, 2) no history of spree drinking; 3) no alcohol withdrawal symptoms; 4) no arrests for alcohol abuse; and 6) several social drinking characteristics such as sipping rather than gulping drinks, preferring drinks mixed rather than straight, limiting consumption when more alcohol is available, and being ataxic at a blood alcohol level of 100 mg/ml.

Throughout the thirty-three day duration of the experiment, subjects lived in a simulated bar-home environment, and could earn points to buy alcohol by operating a lever pressing device. Alcohol, however, was only available during an eighteen day drinking period. The frequency, duration, and distribution of each subject's use of the operant console was recorded by computer in assessing drinking behavior. Blood alcohol levels were assessed three times daily, and social behavior was measured by isolating each subject in his room every other day and then calculating how many points he would spend to get out of isolation. The significant differences between the two population in terms of drinking and social behaviors were as follows: 1) alcoholics
emitted higher operant rates during the pre-drinking phase than the non-alcoholics; 2) all alcoholics stopped earning points for at least the first three days of the drinking period. Only one of the non-alcoholic subjects did the same; 3) once operant responding resumed, the alcoholics earned and spent the same number of points each day, whereas the number of points earned and spent by the non-alcoholic was more variable; 4) no alcoholic subject earned points during the post-drinking phase, when alcohol was no longer available. This was not so for the non-alcoholic; 5) alcoholics drank on the average of almost a quart of alcohol daily whereas the non-alcoholic averaged less than a pint; 6) blood alcohol levels for the alcoholics were high for the first five drinking days and were lower and more variable thereafter. Blood alcohol levels for the non-alcoholics did not have this initial high level, but had relatively low, variable levels throughout; and 7) alcoholics spent almost all their points on alcohol, whereas non-alcoholics spent almost an equal share of points on alcohol and relief from isolation.

Griffiths, Bigelow, and Liebson (1974) directly assessed the effects of alcohol on the social behavior in alcoholics by monitoring each subject's behavior at random intervals. Location, and the occurrence of an interaction, which was defined as the occurrence of a behavior that required another person, were recorded. Reliability of staff recordings was assessed on seven of the 133 observations, and agreement was

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98%. Twelve ounces of alcohol were randomly available over consecutive days for all subjects. It was found that social interactions occurred significantly more on alcohol days than on non-alcohol days. These findings are in direct opposition to Nathan and O'Brien's (1971) findings that indicate that the alcoholic prefers drinking in isolation. It should be noted that the social behavior of the alcoholic is probably a function of several complex variables (e.g., subject characteristics, the amount of alcohol consumed, etc.) that have not been fully examined in these studies.

Researchers have just recently begun to investigate some of the antecedent cues that may elicit excessive drinking in the alcoholic. Miller, Hersen, Eisler, and Epstein (1974) examined the relationship of alcohol cues to the operant drinking of alcoholics and social drinkers. In a cross-over design, twenty alcoholics and twenty non-alcoholics, matched on age and education, were exposed to two conditions; operant responding in the presence of alcohol cues (e.g., three bottles of alcohol full, half-full, and nearly empty placed on the operant console), and operant responding without alcoholic cues. Alcoholics were selected if they: 1) were diagnosed as alcoholic; 2) were receiving treatment on a voluntary basis at the hospital conducting the study; 3) had numerous arrests or job losses; and 4) had a long history of alcohol abuse. Non-alcoholics were selected if 1) there was no evidence of alcohol abuse from relatives;
and 2) if they described themselves as social drinkers. Subjects were instructed to lever press as many times as they wished and that from time to time, alcohol would be dispensed. It was found that social drinkers responded significantly more in the presence of alcoholic cues on the operant measure than did the alcoholics. These findings indicate that the alcoholic may be influenced by internal cues more than external cues in terms of drinking.

In a similar study, Miller, Hersen, Eisler, and Hilsman (1974) investigated the effects of interpersonal stress on the drinking behavior of alcoholics and social drinkers. Eight alcoholics and eight non-alcoholics, matched on age and education, were exposed to a stress situation and a non-stress situation, in a counterbalanced order, prior to assessing motivation to obtain alcohol on the operant console. In the stress condition, the experimenter introduced five social situations requiring assertive behaviors, and then role played the situation with each subject. Afterwards negative feedback was given to him no matter how well he did in the role playing. Individualized social, marital, or vocational inadequacies were then presented to the subject. The no-stress conditions included a fifteen minute talk with each subject concerning how he spent his spare time. Mention of alcohol was not allowed in these conversations. Results indicated that alcoholics responded significantly more after the stress condition on the operant task than did the
non-alcoholic subjects. Pulse rates, which were assessed before and after each experimental session, significantly increased following each stress condition for all subjects. These findings, which are one of the few unambiguous works with humans that support the tensions reduction hypothesis, indicate that interpersonal stress could be an important antecedent event to excessive drinking.
ELECTRICAL AVERSION THERAPY

Electrical aversion therapy, which is derived from classical conditioning learning theory, involves the pairing of electrical shock (UCS) with certain stimuli (CS) so that those stimuli become conditioned or endowed with negative properties. The first behavioral treatment of alcoholism (Kantorovich, 1934) employed this aversive counterconditioning procedure. Subsequent treatments, however, utilized emesis producing drugs almost exclusively. Recent reviews indicated that chemically induced aversion violated several crucial parameters involved in the conditioning procedures; and that electric shock be considered the optimal aversive agent because precise control over the rate of onset, duration, intensity, and temporal proximity to the CS was possible (Rachman and Teasdale, 1969). Until fairly recently, all behavioral treatments of alcoholism were restricted to the use of only this classical conditioning procedure, and have, in general, produced mixed results. Current research endeavors are involved in objectively assessing the efficacy of this procedure.

The first researcher to reintroduce the use of electric shock since Kantorovich's (1934) work, was Hsu (1965). Forty volunteer alcoholics agreed to attend a five day treatment regimen and booster sessions at the fourth week and six month
follow-up period. During each treatment session, subjects were presented with six beverages, three alcoholic and three non-alcoholic, and were instructed to drink them in any order. A sub-convulsive shock lasting thirty seconds was administered after swallowing the alcoholic drinks. On the fourth and fifth days of treatment, subjects were instructed to consume any five and four of the beverages respectively. This enabled them to develop an avoidance response to alcohol. Only sixteen of the forty volunteers completed the five day treatment program due to the aversiveness of the procedure. Subjects complained of anxiety in anticipation of receiving shock, headaches, and an inability to sleep. Follow-up data consisted on anecdotal self-reports of drinking patterns and only a small proportion of these accounts were reported in the study. The author states, however, that the relapse rate was disappointing.

In a widely cited study, Blake (1965) employed an escape conditioning procedure with sixty-two upper class alcoholic volunteers, in an attempt to endow the sight, smell, and taste of alcohol with aversive properties. Thirty-seven of these subjects attended a mean of twelve sessions of instruction in progressive relaxation, modeled after Jacobson's (1938) procedure, prior to receiving aversion therapy. During each conditioning trial, subjects sat in a booth to minimize any distractions, and were told to sip, but not swallow their preferred drink. A shock of increasing intensity,
starting randomly above a pre-determined level considered unpleasant, was administered as soon as the subject took the sip. The shock was terminated when the subject spit out the alcohol, so that the relief from the electric shock could be precisely paired with the subject's rejection of alcohol. Shock was delivered on 50% of the trials. On the non-reinforced trials, a green light served as a signal to spit out the alcohol.

The twelve month follow-up evaluation criteria included: improved—social drinking, or a large decrease in drinking; abstinent; relapsed—continuation of excessive alcohol consumption; and, other—drop outs, unavailable for follow-up or unreliable follow-up sources (Blake, 1967).

The aversion alone group scored 23%, 27%, 27% and 23% on the respective criteria. The aversion plus relaxation group scored 46%, 13%, 30%, and 11% on the respective criteria. The combined total of the improved and abstinent categories was 59% for the aversion plus relaxation group and 50% for the aversion alone group. This difference was not significant. However, the authors speculate that the addition of relaxation training to aversion therapy tends to increase treatment effectiveness. These results should be viewed cautiously because all subjects were upper class, fee-paying individuals, and such a population has been shown to respond quite well to treatment regardless of the nature of therapy (Franks, 1963; Hallam, Rachman, and Falkowski).
1972). In addition, no control group was included to determine the extent of influence of expectancy and placebo factors on therapeutic outcome.

Taking somewhat of a different approach to aversive counterconditioning, MacCulloch, Feldman, Oxford, and MacCulloch (1966) employed an avoidance conditioning paradigm with four alcoholics. Slides of bottles of alcohol were projected onto a screen in a hierarchy from least to most enticing. An electric shock was delivered if the subject did not turn off the slide within eight seconds of its onset. Each session began with only escape trials, and avoidance trials were gradually introduced. To promote greater resistance to extinction, attempts to avoid shock either succeeded, did not succeed, or succeeded with a delay according to a random schedule. Slides changed when the subject expressed a dislike or an indifference towards the slide, and when he emitted an avoidance response within one to two seconds following slide onset. Each session contained thirty trials, and treatment ended when either the subject felt a disinterest in alcohol, or when the stimulus hierarchy was completed.

The number of avoidance responses, galvanic skin response (GSR) recordings, and response latencies were used to evaluate treatment success. Results were disappointing in that all subjects displayed variable response latencies to the onset of the slide, failed to avoid shock quite
often, and tended to keep their respective GSR readings constant throughout the duration of the experiment. It was concluded that the experimenters had failed to condition an avoidance response to the sight of alcohol-related slides.

In an attempt to control for the design problems of Blake's (1965) study, Vogler, Lunde, Johnson, and Martin (1970) compared two control groups to two escape conditioning groups. The pseudo-conditioning group was identical in all respects to the escape conditioning group, except that shock was delivered at random intervals throughout each session. The sham conditioning group was told that they might receive a shock, but they never actually did. Both escape conditioning groups, which were modeled after Blake's (1965) procedure, were identical except that one group received a mean of three booster sessions two weeks after the end of regular treatment. Seventy-three male alcoholics having at least a three year drinking problem were randomly assigned to the conditioning, conditioning plus booster, sham, and pseudo-conditioning groups. All subjects were instructed to take four hundred sips of alcohol throughout the experiment. Because most of the subjects in the conditioning plus booster group failed to return for the booster sessions, subjects from the conditioning only group who wished to attend the booster sessions were allowed to do so. Among all groups, approximately 30% of the subjects dropped out.

Follow-up assessment criteria at the twelve month period
included number of days to first re-hospitalization and proportion of the year re-hospitalized (Vogler, Lunde and Martin, 1971). Due to the violation of random assignment, the data from the conditioning only, and conditioning plus booster groups were combined in the analysis. Results indicated that no significant differences were found between the pooled conditioning groups and the pooled control groups on any of the assessment criteria. These findings, which suggest that placebo and expectancy factors account for much of the success of electrical aversion therapy, should be interpreted cautiously due to the high attrition rate and use of unreliable assessment criteria.

The trend of using more objective assessment criteria in the investigation of electrical aversion therapy began with Miller and Hersen's (1972) case study of a forty-one year old male chronic alcoholic who was exposed to Blake's (1965) escape conditioning procedure. A total of four hundred conditioning trials were presented over a ten day period. Treatment effectiveness was assessed continuously by administering the taste test daily during baseline and treatment conditions. Results indicated that the amount of alcohol consumption significantly decreased during the first treatment condition and during all baseline and treatment conditions, thereafter. Collaborative reports at the six month follow-up revealed that the subject had remained totally abstinent for the entire duration. In addition, alcohol
consumption remained low when the subject was given the
taste test during the follow-up contact.

In a more controlled study, Miller, Hersen, Eisler, and
Hemphill (1973) added a control and psychotherapy group to
the conditioning procedure mentioned above in order to test
for placebo and expectancy effects. Thirty subjects, matched
on age and education, were randomly assigned to the three
groups. The control group was identical in all respects to
the escape conditioning group, except that an extremely low
shock intensity (0.05 milliamps) was administered. Treat­
ment for the psychotherapy group consisted of discussions
regarding social and emotional factors contributing to ex­
cessive drinking. Each group was given the rationale for
their respective treatments and thus was led to believe that
the treatment they were receiving was effective. The taste
test was administered prior to and following treatment and
the pre-test comparisons provided an assessment of treatment
efficacy. Results showed that: 1) no differences in the
amount of alcohol consumption or on the semantic differential
taste rating score were found for all groups prior to
therapy; 2) no significant differences on these same measures
were found for all groups following therapy; and 3) the
percent reduction of alcohol intake for all groups was ap­
proximately equal. The findings from this objective, well
controlled study strongly indicate that expectancy and pla­
cebo factors are significant determinants of treatment
effectiveness in electrical aversion therapy.

Wilson, Leaf, and Nathan (1975) employed an ad lib drinking procedure, which is considered to be the most reliable of the analogue procedures, in assessing the efficacy of Blake's (1965) escape conditioning procedure. In a cross-over design, four male alcoholic volunteers were exposed to the conditioning procedure and a control procedure. The only difference between the two procedures was that in the control procedure, shocks were administered prior to the sight, smell, and taste of alcohol. Three days of ad lib baseline drinking preceded and followed each treatment phase. One day of recovery preceded each treatment phase in order to bring blood alcohol levels to zero. One hundred and twenty trials were presented throughout the experiment.

Results showed that subjects one through four consumed a mean of 21.3, 13.7, 28.0, and 24.3 ounces of alcohol respectively during pre-treatment baseline. Following the escape conditioning treatment, the respective mean alcohol consumption was 21.5, 15.0, 1.5, and 26.5 ounces. Following the control procedure, the respective mean alcohol was 23.0, 15.5, 25.5, and 25.5 ounces. In general, objective assessment of electrical aversion therapy has shown that the efficacy of this procedure may be more related to placebo and expectancy factors than it is to the conditioning process itself.
CONTINGENCY MANAGEMENT

Due to the relative ineffectiveness of therapies derived from classical conditioning theory, behavioral researchers have changed their orientation, and have adopted an operant approach to the treatment of alcoholism. In this approach, excessive drinking is considered to be maintained by its reinforcing consequences and is controllable, at least in part, by systematically manipulating these consequences. Contingency management is the term given to denote the contingent presentation and withdrawal of rewards and punishments.

One of the first experimental studies involving the contingent management of reinforcers within the laboratory setting was Cohen, Liebson, Paillace, and Allen (1971). Five gamma alcoholics lived in a simulated bar-home setting and were exposed to alternating weeks of reinforcement and no reinforcement contingencies for fourteen weeks in order to establish a moderate drinking pattern. When the contingency was in effect, subjects had the opportunity to earn money by working on a hospital ward, and had access to a phone, television, reading material, and could obtain twenty-four ounces of alcohol on weekdays. If the subjects drank more than five ounces of alcohol a day, however, they were immediately removed from this enriched environment,
and put into an impoverished one, where none of the privileges mentioned above were available. Subjects were impoverished during the non-contingent weeks. Results showed that the contingency was violated six out of the ninety days that it was in effect, and was violated ninety out of the ninety days that it was not in effect. Also, subjects tended to drink close to the full twenty-four ounces of alcohol available when the contingency was violated.

In their second experiment, Cohen, Liebson, Faillace, and Allen (1971) tried to determine if the increased drinking during the non-contingent weeks was due to the absence of the contingency or, to the aversive nature of the impoverished environment. Consequently, during the non-contingent weeks, subjects lived in the enriched environment. Results indicated that subjects drank just as much during the non-contingent weeks whether they lived in an impoverished or in an enriched environment.

Bigelow and Liebson (1972) attempted to regulate the amount of drinking within the controlled laboratory setting by manipulating the number of lever presses needed to obtain alcohol on the operant console. They found that when the number of responses required to obtain alcohol increased from one hundred to one thousand, three thousand, and five thousand, alcohol consumption progressively decreased; the effort required to obtain alcohol became too great, so alcohol consumption decreased.
In their second experiment, Bigelow and Liebson (1972) regulated the temporal pattern of drinking within the controlled laboratory setting. Each of the first two drinks ordered within one hour cost one token, and excess drinks within the same hour cost either two or three tokens. For all subjects, the progressive cost for the extra drinks reduced the amount of high density drinking exhibited during baseline.

In a retrospective analysis, Cohen, Liebson, and Faillace (1972) combined data from three very similar experiments (Cohen, Liebson, Faillace, and Allen, 1971; Cohen, Liebson, and Faillace, 1971; and Cohen, Liebson, and Faillace, 1972), all of which had reinforced moderate drinking (i.e., consumption of no more than five ounces of alcohol) through access to an enriched environment. The calculation of how often nineteen subjects chose to meet the contingency requirement served as the assessment criteria. Results indicated that: 1) excessive drinking occurred on only 9.7% of the days when the contingency was in effect; 2) all subjects drank excessively when it was not in effect; and 3) subjects abstained on 13.7% of the days during the contingency. The findings of this study, in addition to the ones mentioned above, suggest that excessive drinking can be effectively prevented through differential reinforcement in a controlled laboratory setting.
In a clinical extension of Griffiths, Bigelow, and Liebson's (1974) findings, which indicated that alcohol consumption tended to increase the amount of socializing in the alcoholic, Bigelow, Liebson, and Griffiths (1974) used time out from social interactions in order to decrease excessive alcohol consumption. Ten alcoholics, living in a simulated bar-home environment, served as subjects. During the baseline period, subjects could obtain drinks in the main social area. During the time-out condition, however, they were required to sit for ten minutes in an isolation booth where socializing, reading, and any forms of recreation were not available. Drinking and smoking were the only activities allowed. Data analysis was provided only for those six subjects who had completed the study. Results showed that subjects drank 94.6% of the available drinks during baseline, but drank only 52% of the available drinks during the time-out procedure. These findings suggest that time out from social interactions may be an effective procedure in decreasing excessive drinking.

The success of these laboratory studies depends upon having precise control over when to give and withhold reinforcement, and such control in the natural environment is quite rare. Therefore, in order for the operant strategy to be successful in the treatment of alcoholism, such control must be achieved in the natural environment.

Miller (1972) was one of the first to report a successful
clinical application of contingency management in the treatment of alcoholism. In this case study, a forty-four year old male had agreed to limit himself to three drinks a day, and to consume each drink in his wife's presence. His wife, in turn, agreed not to nag him for his drinking. Also, both agreed to increase their attentive behaviors towards the other when the conditions of the contract was being met. Any violations, however, resulted in a $20 fine and a withdrawal of attention. A daily record of the number of drinks consumed per day was kept by the husband and verified by the wife. During baseline, the subject consumed approximately seven drinks a day. When the contract came into effect, consumption decreased to three drinks a day. Throughout the month of data recording, the husband was fined eight times, however, all fines occurred within the first ten days of the contract. A ten day check at the six month interval revealed that no fines occurred during this time.

In a similar study, Miller, Hersen, Eisler, and Watts (1974) contingently reinforced a forty-nine year old male alcoholic for maintaining a blood alcohol level of zero. Reinforcement consisted of $3.00 worth of coupons that could be exchanged for food and other goods. Throughout the experiment, breath tests were administered to the subject in the natural environment biweekly on a random basis. The subject was contacted by phone, and within an hour, given the test. The exact blood alcohol level was determined
within an hour after the reading and reinforcement was given when appropriate. The subject was exposed to four weeks of baseline, three weeks of contingent reinforcement, three weeks of non-contingent reinforcement. The mean blood alcohol level during these conditions were 0.14%, 0.005%, 0.08%, and 0.007% respectively.

Embry and Embry (1975) were also able to control excessive drinking in the natural environment via contingency management. In their case study, a sixty-two year old woman alcoholic with a drinking history of ten years, was fined $7.50 from her $35.00 a week allowance for every visit to a liquor store. This allowance was her only income, and it was totally controlled by her son. The subject usually frequented three liquor stores, and co-operation of the employees from these stores was elicited. All agreed to record the number of visits and the quantity purchased. The contingency was implemented, withdrawn, and reinstated for ten weeks, nine weeks, and twenty-nine weeks respectively. The subject remained unaware of the method used to obtain the data on the number of visits. The mean number of visits to the liquor store per week during treatment, no treatment, and treatment were 1.07, 2.8, and 0.7 respectively. The mean number of pints purchased per week during these conditions were 0.75, 2.9, and 0.56 respectively. These results, in addition to the findings mentioned above, indicate that excessive drinking can be successfully controlled.
in the natural environment through contingency management procedures.

In their broad spectrum approach to contingency management, Hunt and Azrin (1973) engineered a maximally reinforcing environment for the alcoholic in regards to his social, vocational, marital, and recreational well being, and then made the continuation of this improved environment contingent upon abstinence. As a first step in creating this maximally reinforcing environment, the alcoholic was provided with immediate assistance in any pressing problems (i.e., legal, financial). The various types of counseling were then introduced: vocational - learning the steps involved in getting a job; marital and family - contractually arranging reinforcers to maintain sobriety and to improve the marital relationship; social - providing a one month's paid membership to a club specifically designed to accommodate those individuals who want to stop drinking; and reinforcer-access - advising the family to purchase items needed to facilitate access to the other reinforcers (e.g., a phone to call for jobs, a radio or television for family gatherings), and when necessary, providing the initial payment for those items.

Sixteen hospitalized alcoholics, matched in terms of employment history, family stability, drinking history, age, and education, were randomly assigned to either the community reinforcement group or control group. Both groups
received general hospital treatment, which consisted of disseminating information concerning Alcoholics Anonymous, drinking statistics, and medical contraindications. For the control group, this was the only form of treatment.

Data concerning the number of days employed, days drinking, and days spent away from home were collected four to eight times during the first month, and then two times a month until the sixth month. A family member was usually present at each follow-up contact to verify the information. For the community reinforcement and control groups, the mean percent of time spent: 1) drinking was 14% and 79% respectively; 2) unemployed was 5% and 62% respectively; 3) away from family was 16% and 36% respectively; and 4) institutionalized was 2% and 27% respectively. Differences on all measures were statistically significant. This broad spectrum approach to the treatment of alcoholism appears to be successful in securing the proper life adjustments that are needed to help maintain sobriety.
CONTROLLED DRINKING

Complete abstinence has been considered the only viable treatment goal for the alcoholic by many professionals in the field. This contention was based on the belief that alcoholism was a progressive, irreversible disease characterized by a loss of control during periods of drinking and a profound craving during periods of sobriety (Jellinek, 1960). However, recent evidence has accumulated which reports that individuals, who were at one time considered alcoholic, have been able to acquire a moderate, social drinking pattern (Davies, 1962; Mills, Sobell, and Schaefer, 1971). Reviews concerning controlled drinking indicate that approximately four to ten percent of the alcoholics treated with conventional hospital therapy practice exhibited controlled drinking at follow-up periods (Pattison, 1966; Pattison, Headley, Gleser, and Gottschald, 1968). In addition, there is direct experimental evidence to discredit the loss of control hypothesis. Such evidence suggests that controlled drinking can be a viable treatment goal for some alcoholics.

Merry (1966) specifically tested the loss of control hypothesis by giving nine alcoholics both alcoholic and non-alcoholic mixtures and had them rate the amount of craving that they experienced. Subjects were told that
they were consuming a vitamin mixture that would assist them in remaining abstinent. The alcoholic mixture, which was made to have no detectable traces of alcohol, contained vodka and fruit juice. Identical volumes of the alcoholic and non-alcoholic mixtures were presented separately for two days over a fifteen day period. On a scale from 0 to 4 (0 - no craving, 4 - profound craving), the mean craving score for the vodka mixture and the non-alcoholic mixture was .52 and .46 respectively.

Sobell, Sobell, and Christelman (1972) reviewed the data from 214 gamma alcoholics who participated in a number of their studies. These subjects, who were permitted to consume between one and sixteen ounces of alcohol at a simulated bar, could leave the hospital once they were escorted back to their living quarters. If they chose to do so, however, they were immediately discharged from the hospital. Various bars and liquor stores were located within a block of the hospital. Of the 101 subjects who were allowed to consume between one and six ounces of alcohol, only two left the hospital. Of the 113 subjects who were allowed to consume between one and sixteen ounces of alcohol, five left the hospital. These findings suggest that ingestion of a relatively small amount of alcohol did not result in an uncontrollable urge to obtain more.

The role of physiological versus expectancy factors
in the loss of control hypothesis was investigated by Marlatt, Demming, and Reid (1973). The study involved thirty-two alcoholics and thirty-two social drinkers who were told that its purpose was "to find out how sensitive drinkers were to various types of beverages not yet on the market," and that they were comparing "heavy drinkers and social drinkers to see if there is any difference between the two groups in taste perception (p. 236)." The subjects were led to believe that they would be drinking either tonic or alcohol. However, only half the subjects received the beverage they expected. Subjects were randomly assigned to four groups: 1) told alcohol/given alcohol; 2) told alcohol/given tonic; 3) told tonic/given tonic; and 4) told tonic/given alcohol. All drinks were mixed and poured in front of the subjects, except in the beverage deception conditions. The subjects were given what they thought were three different name-brand beverages, and then took the taste rating test. Amount of beverage consumed, sip rate, and amount per sip were determined for each subject.

Results showed that the significant determinant of total alcohol consumption for both alcoholics and social drinkers was the expectancy of the content of the drink (i.e., both groups drank more beverage when told it was alcohol than they did when told it was tonic). In addition, alcoholic sip rates declined throughout the procedure. According to loss of control hypothesis, the actual content of the beverages
would have been the strongest determinant of consumption levels, with increased consumption rates as time progressed.

As a result of these studies, abstinence was no longer considered the only treatment goal. Some of the advantages of controlled drinking over total abstinence as a treatment goal include: still having access to the social reinforcers of a social drinker (e.g., parties, bars and other social activities) and the possibility of having more alcoholics undergo treatment given the prospect of partial abstinence (O'Leary and Wilson, 1975).

One of the first clinical applications of controlled drinking was conducted by Lovibond and Caddy (1970). Thirty-one experimental subjects and thirteen randomly selected control subjects were first trained to discriminate their blood alcohol levels (BAL) from 0 to 0.08%. Description of the feelings associated with different blood alcohol levels were presented. Subjects were asked to consume several drinks, and then to estimate their BAL. Actual BAL measurements were taken within fifteen to twenty minutes of the subject's estimate.

All subjects were instructed in the principles of behavioral analysis, stressing that self-control should be exercised in those situations which will most likely elicit excessive drinking. Co-operation from the alcoholics' wives were elicited in providing positive reinforcement for continued sobriety and time-out for inebriety.
During the following phase, both groups were exposed to the use of electric shock. For subjects in the experimental group, each time their BAL exceeded 0.065%, an electric shock was administered. They were given their preferred drink at a rate that would cause their BAL to rise to 0.065% in one and a half hours. During this time the estimate and feedback procedure continued. They were then required to have at least one additional drink. The frequency, duration, and intensity of the shock, as well as the point in the drinking sequence in which shock occurred, varied from trial to trial. Subjects received from thirty to seventy shocks during the sixteen weeks of treatment.

For the control group, shock was administered prior to reaching a BAL of 0.065%, and at random intervals thereafter (except within a two minute period prior to drinking and a three minute period following drinking). The same number of shocks were occasioned as in the experimental group.

By the second week of treatment, 61% of the control group dropped out. Consequently, these subjects were not included in the analysis. The attrition rate, for the experimental groups, was 10%. At the end of discrimination training, estimate error rarely exceeded plus or minus .01%. Results at the end of treatment showed that 75% were considered successes (i.e., exceeding 0.07% one to two times a week); and 14% slightly improved (i.e., drinking only...
slightly less). Follow-up data was gathered by phone and interviews. However, the drop out rate was so high that it renders any analysis meaningless.

In an ad lib drinking situation, Mills, Sobell, and Schaefer (1971) attempted to establish controlled drinking with thirteen male chronic alcoholics by shocking them if they did not drink in a controlled fashion. Using information from a previous study (Schaefer, Sobell, and Mills, 1970), controlled drinking was defined as having a preference for mixed drinks, sipping rather than gulping drinks, and ordering a limited number of drinks (three). Treatment involved fourteen experimental sessions, each lasting a maximum of two hours. When a subject violated one of the three criteria, shock was administered from the moment he touched the glass until the moment he released it. Results indicated a decreasing trend in the occurrence of all inappropriate drinking behaviors over the duration of the experiment. Such control over punishment in the natural environment is quite rare, and no specific attempt was made to secure it in this experiment. However, these findings indicate that social drinking skills can be taught to the chronic alcoholic.

Schaefer (1972) conducted a twelve month follow-up of these subjects and compared them with a no treatment control group. All subjects were classified as belonging to one of the following categories: mainly abstinent (ten days completely
abstinent in a two week period), mainly controlled drinking (six ounces a day or less than ten ounces on any two consecutive days), and mainly incarcerated (in jail or hospital most of the year for alcohol abuse). Ten out of the original thirteen experimental subjects, and eleven out of the eleven control subjects were available for reliable follow-up. The number of subjects classified in each category for the experimental and control groups were as follows: abstinent - three and two, controlled drinking - four and zero, excessive drinking - two and six, and incarcerated - one and three respectively. These results indicated that the controlled drinking training procedure had generalized to some extent in the natural environment.

A more sophisticated method to establish controlled drinking in the alcoholic involves the use of a broad spectrum approach to treatment. This approach is characterized by breaking down complex problems into separate behavioral components (e.g., conditioned anxiety responses, excessive behaviors, deficit behaviors, lean reinforcement schedules), that are each amenable to change through a variety of techniques combined in therapy.

The most thorough and comprehensive broad spectrum approach involving controlled drinking was conducted by Sobell and Sobell, (1972). An attempt was made to individualize treatment goals, to directly change excessive, inappropriate drinking behaviors, and to deal with behavioral
deficits by offering alternative methods of reacting to those stimulus situations which elicit excessive drinking.

Seventy gamma alcoholics were given a choice of treatment goals: abstinence or controlled drinking. However, only those individuals who requested controlled drinking, and who had considerable social support in the natural environment (e.g., stable marriage, good job) could pursue this goal. Subjects were then randomly assigned to an experimental or control group within their choice of treatment. Four groups were formed: non-drinking/experimental, non-drinking/control, controlled drinking/experimental and controlled drinking/control. Control groups received conventional hospital treatment (i.e., group therapy, AA meetings, and chemotherapy), and the experimental groups received seventeen behavioral sessions, in addition to the conventional hospital treatment.

The seventeen treatment sessions contained several components: videotaped confrontation, alcohol education, shock avoidance, artificial failure experience, and stimulus control procedures. In the videotaped sessions, up to sixteen ounces of alcohol were freely available in the simulated bar-home environment, and subjects are videotaped as they became drunk. The tapes were replayed and contrasted with tapes of them while sober.

During the shock avoidance sessions for the non-drinking subjects, a shock was administered on a VR 2 schedule for
ordering any type of drink. If one was ordered, the drink was served and the subject was shocked from the moment he touched the glass until the time he released it. For the controlled drinking subjects, shock was administered on a VR 2 schedule if they: 1) ordered straight drinks; 2) gulped rather than sipped their drinks; 3) ordered a drink within twenty minutes of the previous one; and 4) ordered more than three drinks.

During the six stimulus control sessions, each subject was instructed to conduct his own behavioral analysis of the situations most likely to elicit excessive drinking in the natural environment, to generate and evaluate several possible alternative responses to these situations, and to then role play them. The researchers concluded that these sessions were primarily responsible for the behavior changes which later occurred.

Results for the fifteen non-drinker/experimental subjects revealed that each subject ordered approximately four drinks throughout the thirteen drinking sessions. However, 44% of the drinks were ordered on probe days, (i.e., when the punishment contingency was not in effect). The number of drinks ordered decreased over time. For the twenty controlled drinking/experimental subjects, a mean of 27.8 drinks per subject were ordered throughout all sessions. Twenty-eight violations occurred for ordering drinks less than twenty minutes apart, nineteen of which occurred on probe days;
twenty-one violations occurred for ordering more than three drinks, seventeen of which occurred on probe days; and twenty-nine violations occurred for gulping drinks, twenty of which occurred on probe days. Subjects never ordered straight drinks. It was quite unlikely that a conditioned aversion developed because subjects received on the average only 1.5 shocks throughout the experiment. It was more likely that the threat of the shock was significant in reducing the number of violations.

A major emphasis of the study was to obtain extensive and reliable follow-up data. The experimenters went to great lengths to keep in contact with all subjects and to have all data verified. The following information was obtained during each follow-up contact: 1) number of drunk days -- consumption of more than ten ounces of alcohol a day, or any more than two consecutive days in which between seven and nine ounces were consumed; 2) number of controlled drinking days -- consumption of six ounces of alcohol or less a day; 3) number of abstinent days; and 4) number of abstinent days resulting from an alcohol related arrest or hospitalization. Various adjunctive measures were also collected, such as vocational status, and an evaluation of general adjustment by collaterals.

For the first year follow-up (Sobell and Sobell, 1973), the percentage of time spent on the various criteria for the controlled drinking/experimental group and the controlled
drinking/control group, respectively, was as follows: abstinent -- 45% and 25%, social drinking -- 25% and 9%, drunk -- 14% and 49%, and incarcerated -- 15% and 14%. The percentage of time spent on the various criteria for the non-drinking/experimental group and the non-drinking/control group, respectively, was as follows: abstinent -- 65% and 32%, social drinking -- 3% and 6%, drunk -- 13% and 39%, and incarcerated -- 16% and 21%.

Adjunctive measures indicated that group differences for general adjustment were significant between respective experimental and control groups. Although statistical significance was not achieved for vocational status, more experimental subjects rated themselves as improved than in their respective control groups.

In the second year follow-up (Sobell and Sobell, 1975), the percentage of time spent on the various criteria for the controlled drinking/experimental groups and the controlled drinking/control groups, respectively, was as follows: abstinent -- 62% and 36%, social drinking -- 22% and 5%, drunk -- 12% and 49%, incarcerated -- 0% and 10%, and unaccounted for -- 4% and 0%. The percentage of time spent on various criteria for the non-drinking/experimental group and the non-drinking/control groups, respectively, was as follows: abstinent -- 62% and 42%, social drinking -- 4% and 2%, drunk -- 21% and 38%, incarcerated -- 7% and 9%, and unaccounted for -- 6% and 7%. No adjunctive measures
were reported.

These findings overwhelmingly indicate that this individualized behavioral treatment program was successful in establishing a stable social drinking pattern with gamma alcoholics. It should be noted, however, that the treatment was designed to accommodate only certain individuals, that is, those who had considerably more environmental support.

In a pilot study, Stricker, Bigelow, Lawrence, and Liebson (1975) combined a variety of techniques to establish moderate drinking with three chronic alcoholics. Phase One involved the behavioral analysis of significant personal and environmental determinants of excessive drinking for each subject, relaxation training, and alcohol education. Phase Two included a supervised drinking experience without any aversive contingencies. Specific guidelines for controlled drinking were given the opportunity to practice them. Phase Three involved five sessions of blood alcohol discrimination training, and Phase Four involved an in vivo drinking experience—at an open bar party given by the hospital conducting the study. Collaborative data from the alcoholics' wives on the mean number of drinks per day consumed prior to treatment, during treatment, and at the six month follow-up period were 10.1, 0.05, and 4.2, respectively for subject 1, 7.5, 1.4, and 3.8, respectively for subject 2; and 8.3, 3.4, and 7.9, respectively for subject 3.
This moderate drinking program seems to have been effective for two out of the three subjects.

In a similar study, Miller (1975) combined several treatment techniques in emphasizing the training of alternate behaviors to alcohol abuse with a young veteran having a short history of alcohol abuse. The sequence of treatment phases was as follows: teaching social drinking skills, teaching self-management skills, rearranging consequences of drinking, and teaching social skills. The training of social drinking skills, (e.g., to make mixed drinks, to take small sips, to increase the time between sips, and to limit the amount of alcohol consumption), was introduced in a multiple baseline fashion. The training of self-management skills involved teaching the subject to rearrange his environment so that excessive drinking would be less likely to occur. Changing antecedent events (e.g., amount of liquor in the house, engaging in an incompatible behavior when feeling the need for a drink), and consequences of drinking (e.g., charting the number of drinks consumed, the number of sips, and the amount of alcohol in each drink) were emphasized. The contingency management phase involved setting up reinforcers, (e.g., a special meal, or increased affection), usually dispensed by the subject's wife, contingent upon abstinence or controlled drinking. Social skills training involved teaching the subject to refuse drinks when under social pressure. Situations in which the patient was...
frequently faced with such social pressure were role played and videotaped.

Evaluation data for the controlled drinking skills training indicated that when treatment was introduced for each behavior sequentially, the number of straight drinks decreased, the amount per sip decreased, the time between sips increased, and the total amount consumed decreased. The amount of alcohol consumed at home was recorded by the subject's wife during baseline, treatment, and four month follow-up. The subject drank approximately fifty-five ounces of beer daily during baseline and the first two weeks of treatment. However, the subject never drank more that the thirty-two ounce limit following the second week. It should be noted that controlled drinking was established, but the subject had a relatively short history of abusive drinking, was happily married, and had a good job and social life.

In a less direct approach to treatment, Miller and Hersen (in press) chose to modify interactional patterns of an alcoholic and his wife in order to decrease excessive drinking. The couple was first taught adaptive social skills, and then was given the opportunity to practice them under controlled conditions. A behavioral contract was written to make sure that the skills learned would be practiced in the natural environment. The following skills, which were derived from an assessment of direct observations

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interviews, a twenty minute videotaping of the couples' interaction, and tape recordings of their conversations at home, were taught: 1) the ability to express themselves directly, and to solve problems more efficiently; 2) to increase the number of positive interactions; 3) to decrease interactions concerning negative past events; and 4) to decrease the use of coercion and nagging as a means of getting what they wanted from the other. A behavioral contract was also established in which the husband agreed to become abstinent, to talk more frequently about his feelings, and to take his wife out more often. In turn, the wife agreed to decrease her nagging about her husband's drinking, to sit and watch television with her husband more often, and to engage in more pleasant conversation. Contracts were written once a week specifying one to two behavioral goals. Self-reports from both husband and wife indicated that the husband abstained from alcohol for a nine month period, and that their marital relationship had improved greatly. A videotaping of an interaction prior to treatment termination, and direct observations at follow-up contacts indicated an increase in positive interactions, the use of more efficient problem solving skills, and a decrease in the use of nagging and coercion. Although the marital counseling was probably no sufficient in itself to establish sobriety, "it served as a valuable strategy within a total treatment program (p. 9)."
DISCUSSION AND IMPLICATIONS

In general, objective assessment measures have enabled researchers to reliably evaluate a wealth of previously reported information whose validity was open to question. Empirical analysis of alcoholics in the prolonged laboratory drinking experiments has contributed to our knowledge of the drinking and social behaviors of the alcoholic, the role of expectancy and placebo factors in the efficacy of electrical aversion therapy, the effects of differential reinforcement on excessive alcohol consumption, and the validity of the loss of control hypothesis.

Direct observation of alcoholics within the laboratory setting indicates that different reinforcement schedules produce different drinking patterns, and physiological and social correlates. Although studies of this nature have no direct treatment implications, they contribute to our understanding of different characteristics of the disorder. Additional areas that may be worthwhile to investigate are the sleeping patterns, food intake, and emotional status of the alcoholic, and the interaction of these drinking correlates with different cultural, and socio-economic variables. Reliable and objective methods in assessing these areas need to be improved, however.

Outcome studies involving electrical aversion therapy
have been hampered by lack of control groups (Hsu, 1965; Blake, 1965), the use of unreliable assessment procedures (Hsu, 1965; Blake, 1965; Vogler, Lunde, Johnson and Martin, 1970), and high attrition rates (Hsu, 1965; Vogler, Lunde, Johnson, and Martin, 1970). The objective assessment of electrical aversion therapy reveals that this procedure does not substantially suppress excessive alcohol consumption even within the controlled laboratory setting. Consequently, very little generalization of these effects are expected in the natural environment. Additionally, the lack of consistent differences between treatment and control groups in terms of alcohol intake reduction, indicates that the efficacy of this procedure is more related to placebo and expectancy factors than to the conditioning process itself. Consequently, the continuation of this ineffective procedure is unwarranted.

A detailed behavioral analysis of the significant determinants of excessive drinking has only recently been initiated. There is some experimental evidence to suggest that interpersonal stress elicits excessive drinking, that alcoholics increase the amount of social interacting when drunk, and that alcoholics respond more to internal rather than external cues before drinking. Additional research is needed, however, in order to fully define what situations tend to elicit excessive drinking. Once these situations have been identified, then possible alternative behaviors
can be taught during therapy. Some of the common behavioral deficits, which may precipitate excessive drinking, involve assertive, relaxation, marital, and vocational skills.

Systematic manipulation of a variety of consequences to excessive drinking have been employed both in the laboratory, and in the natural environment. The use of time-out from an enriched environment, social interactions, marital, social, vocational, and recreational reinforcers in conjunction, and the use of behavioral contracts have been effective in reducing heavy drinking. Successful clinical applications of contingency management procedures require precise control over the implementation and withdrawal of rewards and punishments. A useful tool in providing such control is the behavioral contract. The contract will maintain itself as long as the reinforcers remain equally potent for both parties involved. In addition, a therapist's skillful negotiation is needed. The maintenance of therapeutic endeavors rely on the amount of reinforcement in the natural environment. Hunt and Azrin's (1973) use of a wide variety of potent reinforcers contingent upon abstinence provides a good framework to ensure maintenance.

Direct experimental evidence discrediting the loss of control hypothesis (Merry, 1966; Sobell, Sobell, and Christelman, 1972; Marlatt, Demming, and Reid, 1973) initiated the interest in controlled drinking as a viable treatment goal. The results of Sobell and Sobell's (1972) comprehensive
study indicates that a stable controlled drinking pattern can be established with some alcoholics. The successful controlled drinkers in this study did not, however, represent the typical alcoholic. These subjects were screened before the experiment, and only those with considerable environmental support could pursue this goal. Future research should include establishing criteria to predict which subjects are capable of controlled drinking.

One of the essential components of behavior therapy is the objective evaluation of therapeutic gains. Currently, ad lib drinking, and blood alcohol level measures provide the optimal means of assessing drinking behavior in the laboratory, and in the natural environment, respectively. Reliable assessment procedures need to be developed, however, in measuring the effects of therapy on the marital, vocational, and emotional status of the subject. This would provide a complete evaluation package to eventually match up subject characteristics with specific treatment programs.

In addition, evaluation of treatments should include longer term follow-up. Only a few studies provide information concerning therapeutic effectiveness after the first year. It would seem beneficial to specify just how long treatment gains continue for each treatment method in order to fully evaluate its effectiveness.
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