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September 2, 1977

Senate Committee on Alcoholism
1016 W. 6th Avenue
Suite C
Anchorage, Alaska 99501

Dear Committee Members;

Enclosed is the material you requested on our experimental Education-Prevention program for students and Treatment program for alcohol abusers. The book, How to Control Your Drinking by Miller and Munoz is referenced in the Education-Prevention article.

If we can be of further assistance to you, let me know.

Sincerely,

Warren K. Garlington
Warren K. Garlington, Ph.D.
Professor

An Alcohol Education and Prevention Program
for College Students

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Washington State University

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Abstract

Twelve upper division college students volunteered for participation in a three component alcohol education and prevention program. Components included blood alcohol level discrimination, a ten hour mini-course in operant principles and self-management techniques related to alcohol ingestion, and a four hour audio-visual series relating to the physiological, psychological and sociological concomitants of beverage alcohol consumption. Quantity-frequency beverage alcohol consumption measures and beverage alcohol consumption rate measures were compared between baseline and two and six month follow-up intervals. Reliability data were gathered to corroborate self-report quantity-frequency data. All 12 subjects dramatically reduced both the frequency and rate of their beverage alcohol consumption by program completion. Decreases were maintained at both follow-up intervals. Importantly, decreases in frequency correlated .85 with decreases in rate. Subjects learned to discriminate their blood alcohol levels within 4 sessions. Blood alcohol level discrimination was maintained at both follow-up intervals.

Introduction

Surveys of college campuses, including Washington State University, indicate that more than 90% of the students have at least tasted an alcoholic beverage (Garlington and Krasnec, unpublished). Seven per cent report serious problems with alcohol. These students, most of whom have experimented with alcohol prior to college entrance will, for the most part, either discontinue drinking or remain social drinkers after college. A certain number, however, will be counted among the alcoholics of the nation in another twenty to thirty years. Interviews with students on this campus make it clear that most enjoy drinking for a number of reasons and see no reason to stop, even when, in some cases, their drinking is excessive. Many students who will never be labeled alcoholics or even problem drinkers, will, nevertheless, have occasional problems with over-indulgence and suffer the consequences--hangovers, DWI's, unintended quarrels and fights, just making a fool of ones self and later regret. One fraternity on campus, for example, has demonstrated a remarkable proclivity for receiving DWI's. Over the past 5 years, the collective membership of this fraternity has received an average of 5 DWI's per year.

The striking fact in attempting to review prevention approaches for young people is that, while there are many proposals and ideas, there appears to be virtually no hard data on the effectiveness of the programs. For example, a recent publication of HEW, The Whole College Catalogue about Drinking (Hewitt, 1976) describes a variety of innovative and imaginative prevention programs, but presents no data on any behavioral changes among the students involved.

The present endeavor is a project demonstration which involves both the development of a comprehensive education-prevention program and follow-up effectiveness data.

Method

Subjects

Twelve upper division college students, 6 men and 6 women, ranging in age from 19 to 24 years, volunteered for participation in this study. Prior to program participation subjects consumed a mean weekly quantity of from 4 to 36 ounces of the equivalent of 86 proof spirits. Five of the 12 subjects had previous alcohol related arrests on their records. Subjects were divided equally into two groups. Each group included 3 men and 3 women. Groups were conducted during consecutive semesters.

Procedure

Baseline

Subjects collected baseline beverage alcohol quantity-frequency consumption data prior to the beginning of treatment. For each subject, a reliability observer collected the same data. Prepared data sheets were provided to subjects and observers. Both subjects and observers were required to return data sheets to the experimenter once a week. Throughout the prevention program and follow-up intervals, subjects and observers continued to collect daily quantity-frequency data.

Blood Alcohol Level Discrimination Training

Subjects drank beer, at their own rate, in a simulated tavern. Every twenty minutes subjects were asked, individually, to describe how they felt and to estimate their blood alcohol level. Subjects then blew into a Smith and Wesson Breathalyzer, Model No. 10A, and were shown their actual blood alcohol level reading. Sessions were held twice weekly and held constant at two hours. Discrimination training was terminated when subjects' estimates were within plus or minus .01 of actual breathalyzer readings for 3 consecutive trials.

During the discrimination training sessions the bartender and a reliability observer recorded the number of ounces consumed by each subject in order to assess drinking rate. Subjects drank from beer glasses that were decoratively calibrated at two ounce intervals. Ounces were recorded in five minute time blocks on prepared data sheets. Rate was defined as number of ounces consumed divided by consumption time.

Self-Management Training

Following discrimination training subjects attended 5 two hour lectures on basic operant principles (Miller, 1975) and self-management techniques (Watson and Tharp, 1972). This lecture series was actually a mini-version of Psychology of Self-Control, a course at Washington State University developed by Brigham and DeRicco (1973). Subjects were also assigned readings and tasks from a workbook, How to Control Your Drinking (Miller and Munoz, 1976).

Education

Following self-management training subjects attended 2 two hour sessions in which materials relative to the physiological, psychological and sociological concomitants of beverage alcohol consumption were presented. The physiological component was presented by a member of the Pharmacology faculty. The psychological and sociological components were presented via audio-visual material.

Follow-up

Subjects returned for an additional two hour session at intervals of 2 months and 6 months postprogram. These follow-up sessions were conducted in the same manner as the Discrimination Training sessions except that subjects were not given feedback on actual blood alcohol readings. On the day of the follow-up sessions, subjects and reliability observers began two weeks of collecting quantity-frequency data in the same manner as in the Baseline condition.

Results

All 12 subjects dramatically reduced their drinking frequency. Two subjects, one male and one female, stopped drinking entirely (see Figure 1). Decreases

Insert Figure 1 about here

tended to occur in small increments which began with blood alcohol level discrimination. Quantity-frequency decreases were maintained at both follow-up intervals. Mean reliability between subjects and observers was 91.8% with a range from 82.6% to 99.7%.

All 12 subjects significantly decreased their consumption rate (see Figure 2). Decreases in rate, defined as the number of ounces consumed divided by con-

Insert Figure 2 about here

sumption time, tended also to occur in small decrements. In fact, decreases in rate correlated about .65 with decreases in reported frequency. Rate decreases were maintained at the 2 and 6 month follow-up intervals. Mean reliability between the bartender and observer was 98.2% with a range from 97.5% to 100%.

Subjects achieved blood alcohol level discrimination within 4 sessions. All 12 subjects maintained their discrimination at the 2 and 6 month follow-up sessions. For each subject at follow-up, every trial was within the plus or minus .01 criterion.

Discussion

Importantly, subjects did, in fact, demonstrate reduced drinking frequencies as a function of an education and prevention program. As much as six months later subjects were drinking considerably less than their baseline frequencies.

Additionally none of the subjects was arrested for alcohol related offenses. Though the results are certainly promising, long term effects cannot be assumed. Subjects have been asked to return for additional sessions at one and two year intervals. Although subjects have indicated cooperation toward this end, it is impossible to predict how many of them will actually return. It is possible, however, to collect self-report frequency data at one and two year follow-up intervals.

Perhaps the most important data generated by the present study is the direct correlation between decreases in drinking rate and decreases in reported frequency. Most alcohol research involving human subjects, particularly in terms of follow-up, relies on subject self-report. Consumption rate may give us an objective, independent measure of subjects' drinking behavior. Reduced drinking rates may appear only in a simulated tavern or only when beer is the beverage alcohol being consumed. The present study strongly indicated further research is warranted, aimed at isolating drinking rate as an indicator of drinking frequency.

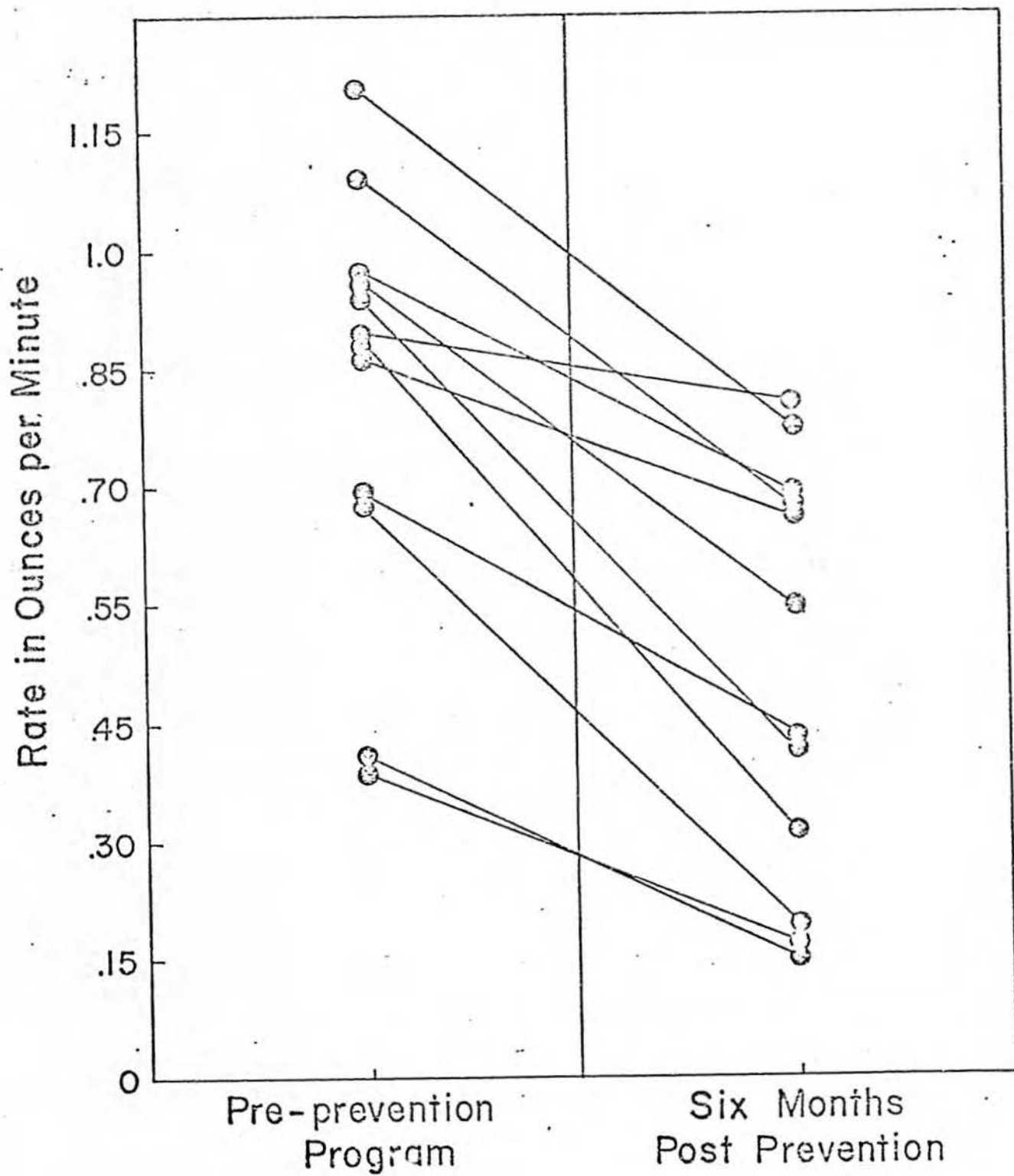
Subjects acquired blood alcohol level discrimination in 4 sessions. There were 4 trials per session. Maintenance of blood alcohol level discrimination supports Bois and Vogel-Sprott (1974). These authors found maintenance of blood alcohol level discrimination for non-alcoholics. Huber, Karlin and Nathan (1976) found that blood alcohol level discrimination, when acquired as a function of attending either to internal discriminative stimuli or to internal and external stimuli, was maintained at follow-up. Subjects in the present study employed both internal and external discriminative stimuli in estimating their blood alcohol level. Maintenance of blood alcohol level discrimination for these subjects supports Huber et al. (1976).

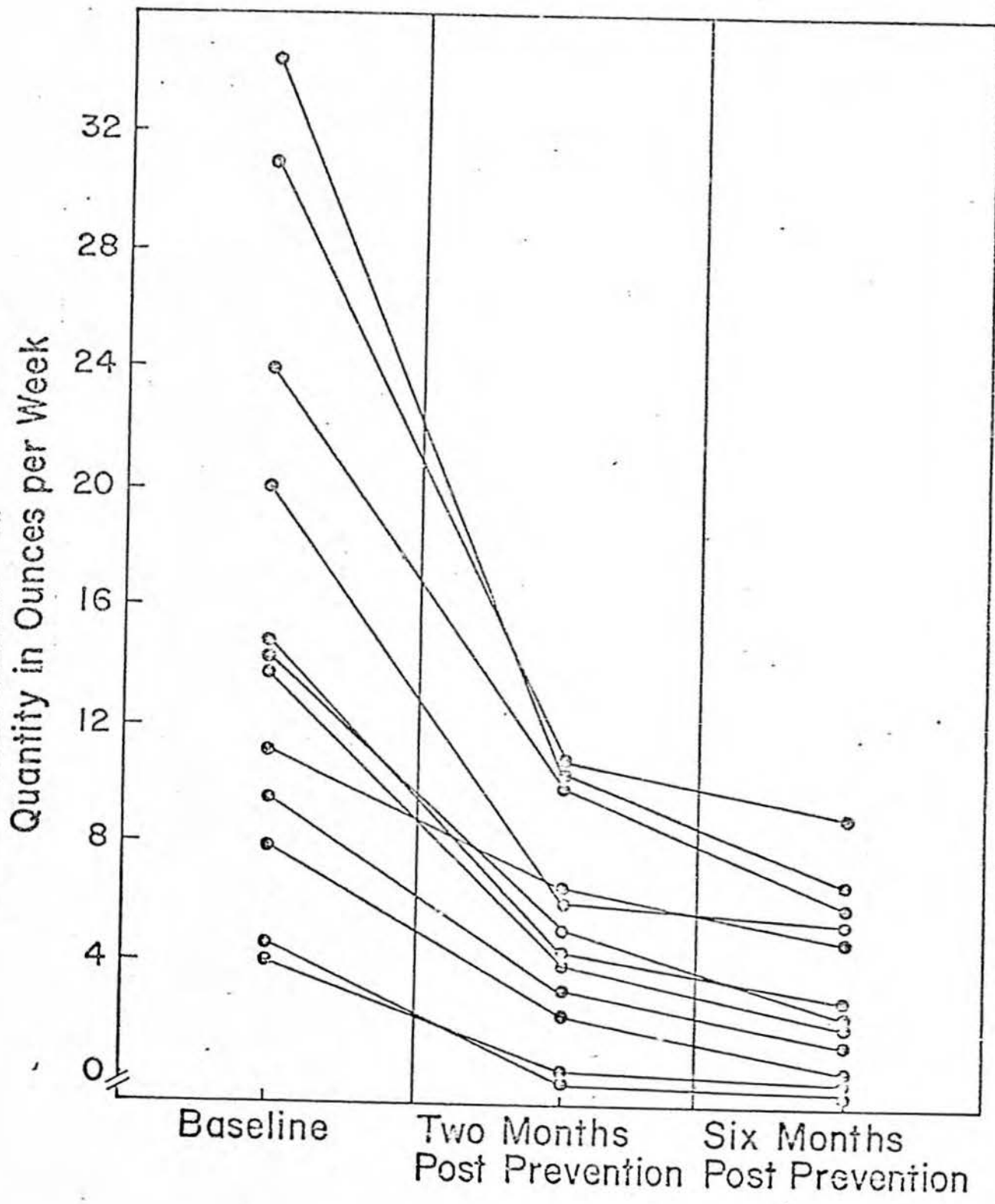
It has been demonstrated that a comprehensive education and prevention program results in reduced drinking frequency and reduced drinking rate with college

student subjects. However, more questions have been raised than answered by the present research. A component analysis, based on a multiple baseline model, should be conducted to assess the effectiveness of program components. Rate, as an independent indicator of drinking frequency should be investigated. Generalized stability of blood alcohol level discrimination should be studied. Prevention, given the results of the current study, seems a fruitful area for continued research.

Figure 1. Mean number of ounces (equivalence of 86 proof spirits) per week for 12 subjects during baseline (preprogram) and for follow-up intervals of 2 and 6 months.

Figure 2. Rate, in terms of ounces per minute, for 12 subjects during the first discrimination training session and during the 6 month follow-up session.





References

- Bois, C. and Vogel-Sprott, Discrimination of low blood alcohol levels and self-titration skills in social drinkers. Quarterly Journal of Studies on Alcohol, 1974, 35, 86-97.
- Brigham, T. and DeRicco, D., The psychology of self-control: A university course. Washington State University, 1973.
- Garlington, W. and Krasnec, M. (unpublished) A survey of drinking habits among Washington State University conducted during two academic years: 1974-1976.
- Hewitt, K. The Whole College Catalogue about Drinking. U.S. Department of Health, Education and Welfare, 1976.
- Huber, H., Karlin, R. and Nathan, P. Blood alcohol level discrimination by non-alcoholics: The role of internal and external cues. Journal of Studies on Alcohol, 1976, 37, 27-39.
- Miller, L.K. Principles of Everyday Behavior Analysis. Monterey, California, Brook/Cole Publishing Co., 1976.
- Miller, W. and Munoz, R. How to Control Your Drinking. Engelwood Hills, New Jersey, Prentice-Hall, 1976.
- Watson, D. and Tharp, R. Self-Directed Behavior: Self-Modification for Personal Adjustment. Monterey, California, Brooks/Cole Publishing Co., 1972.

*THE EFFECT OF MODELLING ON DRINKING RATE*WARREN K. GARLINGTON¹ AND DENICE A. DERICCO

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Three male college seniors were asked to drink beer at their normal rate in a simulated tavern setting. Each was paired with a confederate, also a male college senior, in an ABACA single subject design. In the baseline conditions, the confederate matched the drinking rate of the subject. Baseline and all subsequent conditions were continued in 1-hr sessions until a stable drinking rate was achieved. In Condition B, the confederate drank either one third more or one third less than the subject's baseline rate. In Condition C, the direction was reversed. All three subjects closely matched the confederate's drinking rate, whether high or low. All subjects reported they were unaware of the true purpose of the study.

DESCRIPTORS: drinking rate, imitation, modelling, matching, participant observers, recording and measurement techniques, social control, college students

Drinking among college students and other young people has only recently been studied systematically (Jessor and Jessor, 1975; Maddox, 1970; Straus and Bacon, 1953), and a number of sociologic studies suggest that an important determinant of drinking rate in young people is peer example or conforming to the drinking rate modelled by companions (Rogers, 1970). Bandura (1969) pointed out that "the behavior of models often serves merely as discriminative cues for observers in facilitating the expression of previously learned responses that ordinarily are not subject to negative sanctions" (p. 196). The prevalence of drinking on college campuses suggests that this behavior is quite acceptable (Maddox, 1970). A recent survey conducted on the campus of Washington State University (Garlington and Krasnec, Note 2) found that 84.4% of 741 students surveyed reported drinking once a month or more.

Young people report that peer drinking is the most important influence on their alcohol consumption (Kimes, Smith, and Maher, Note 3). Although these social influences on drinking rate have been reported by students and other young people, and correlational data have been obtained suggesting possible effects of one or more drinking parents acting as model for a son or daughter's drinking behavior (Kimes, *et al.*, Note 3), the only published controlled research on the direct effects of modelling on drinking is a study by Caudill and Marlatt (1975). They used what was ostensibly a wine "taste-rating" task. Each subject was paired with a confederate, and they were asked to rate the taste of each of three different wines on a number of descriptive adjectives. Subjects drinking with the High-Consumption model drank significantly more wine than subjects in either the Low-Consumption Condition or the No-Model Condition, the latter conditions not being significantly different. The subjects did not actually match the models' consumption, the High-Consumption group averaging only a little more than half of the models' consumption and the Low-Consumption group averaging almost twice as much as the models. However, modelling clearly had an effect on consumption.

¹Special thanks are due Michael Laederich, Gary Larson, and Michael Miller who served as confederates and to P. Pamela Lucido and Maria Krasnec who served as participant observers. This research was supported by WSU Grant in Aid 13B 3905 0545, from the Graduate school. Reprints may be obtained from Warren K. Garlington, Psychology Department, Washington State University, Pullman, Washington 99163.

The Caudill and Marlatt (1975) study used a group design in which subjects spent one session in the taste-rating situation, in a laboratory environment. The present study, using a single subject design, dealt with the effects of modelling over a number of drinking sessions and investigated the effect of both high- and low-consumption modelling on the same subject. Sessions took place in a simulated tavern. Subjects were told they were participating in a study of normal drinking patterns. It was hoped in this manner to approximate the natural environment and the subjects' characteristic drinking patterns over time, making it possible to examine the effect of modelled drinking rate in a more "real life" situation.

METHOD

Subjects

Three volunteer male college seniors, 23- to 26-yr old, were classified as moderate drinkers based on a quantity-frequency self report indicating they drank at least the equivalent of six ounces of pure alcohol per week, with a range of 6.75 to 18 ounces.²

Subjects agreed in writing to serve in a study of normal drinking patterns, which would involve drinking beer. The actual objectives of the study were explained to the subjects after the study was completed. Before the debriefing, subjects were asked to state their beliefs as to the purpose of the study. All said that they believed it to be a study of normal drinking, as expressed in the original instructions.

Confederate Models

Three male college seniors served as confederates and one confederate was assigned to each subject. The confederate was introduced to the subject as another student participating in the

study of normal drinking. Before beginning the study, the confederate received training in matching his drinking rate to that of another drinker and in drinking at a pre-arranged rate. Training was carried out in sessions in which the confederate practised drinking the same amounts of beer in each 5-min time interval, as the practice subject drank. The confederate also practised drinking at specified rates, in ounces per 5-min blocks. Confederates, bartenders, and observers were instructed to refrain from discussing drinking behavior during sessions. No other instructions were given pertaining to social interaction. The performance of the confederates was checked by one of the authors. All were accurate within 0.5 ounce per 5-min block by the end of training.

Environmental Setting and Apparatus

Experimental sessions were conducted in a 1.8 by 3.6 m experimental room that resembled a tavern, containing a 1.5 by 1.35 m bar, three bar stools, two tables, and a couch. Bottles of beer were stored in a refrigerator behind the bar. Twelve-ounce beer glasses were calibrated decoratively at each two-ounce interval. A Meylan clock, model J4661-60M, was used to time 5-min intervals within sessions.

Design

An ABACA reversal design was employed in which each subject served as his own control. Subjects (and confederates) were instructed to drink at their usual rate for each 1-hr session. The confederate matched his drinking rate to the subject's in Baseline 1 condition. In the first intervention, two of the three confederates then modelled a fast rate by increasing their drinking rate to one third more than the subject's Baseline 1 rate. The third confederate modelled a rate one third less than the subject's Baseline 1 rate. The second intervention reversed these conditions, *i.e.*, two confederates modelled the slow rate and the third, the fast rate. Interventions were interspersed with return to baseline and the study concluded with a return to baseline. Sessions were continued in each condition

²The 18-ounce-per-week subject reported, on further questioning, that this represented the amount consumed during the past month when he attended an unusual number of parties. Although higher than his usual drinking rate, the figure was retained, since the data for the other subjects also were based on the past month.

until stability (defined as a change no greater than ± 0.10 ounces of beer per minute for three consecutive sessions) was reached.

Participant Observers and Reliability

Two trained graduate assistants, each participating in 25% of the sessions, recorded the subjects' drinking rate along with the bartender, providing reliability data for 50% of the sessions. The observers were present on a variable schedule. They made no effort to conceal that they were recording. The instructions to subjects indicated that this was a study of normal drinking patterns, so recording was to be expected. There was no systematic change in rate during sessions where an observer was present. Both observers and bartender recorded total ounces of beer, rounded off to the nearest ounce, consumed in each 5-min period by both subjects and confederates. The observer sat on a couch at one side of the bar. During the sessions, the participant observers became part of the social interaction, talking with the subjects and confederates, but not drinking. Participation was in terms of social interaction.

Reliability was calculated by dividing the number of 5-min blocks in which agreement was reached by the number of agreements plus disagreements. Mean observer reliability was 96%. Reliability between the bartender and Observer 1 ranged from 88 to 96%, with an average of 92%, and with Observer 2, it was perfect (100%) over three subjects. During the 50% of the sessions in which reliability checks were taken, there were no 5-min blocks in which zero drinking occurred. During nonreliability sessions, there were five instances of zero consumption during a 5-min block. The bartender recorded the confederate's rate as well as the subject's rate; however, reliability was not obtained on confederate's drinking rate.

RESULTS AND DISCUSSION

Figure 1 presents rates of beer consumption for both subjects and confederates during all conditions. The last three sessions in each condi-

tion represent stability. Rate was calculated by dividing the number of ounces of beer consumed in sessions by 60 min, the total session time. Clearly, consumption was influenced by the drinking rate of the confederate.

Increases and decreases in subject consumption rates matched closely the modelled rates, with the single exception of Subject 1 during the fast rate, where he increased his rate to a point about 0.2 ounces per minute over the confederate's rate. Baseline matching was virtually identical, of course, because the design called for the confederate to match the subject during these conditions. Sessions required to reach stability decreased over conditions, suggesting an increasing influence of the confederates over the subject's drinking rate.

Modelled drinking rates dramatically influenced the subjects' rates of beer consumption. Subjects tended to match the confederates' rate, rather than generally increasing or decreasing their rates as a function of the modelled condition. The notion that drinking rates may be socially influenced is supported.

Modelling is not instantaneous. Sessions required to reach the first criterion point varied from four to nine during the first experimental condition, and from two to three for the second. Baseline stability also was achieved more rapidly for each succeeding baseline. Sessions to first criterion point varied from two to six for Baseline 1, one to four for Baseline 2, and was achieved in only one session for Baseline 3 for all subjects. A potential source of confounding does occur in the repeated-sessions design. It is conceivable that confederates responded differentially to subjects in the various phases of the study, and thus influenced rate independently of modelling effects.

The demonstration of model effects seen in this study and the Caudill and Marlatt (1975) study is only a first step in investigating the social influence of a model on a drinking companion. The repeated-measurements design used in the present study allowed the full effects of the modelling process to appear.

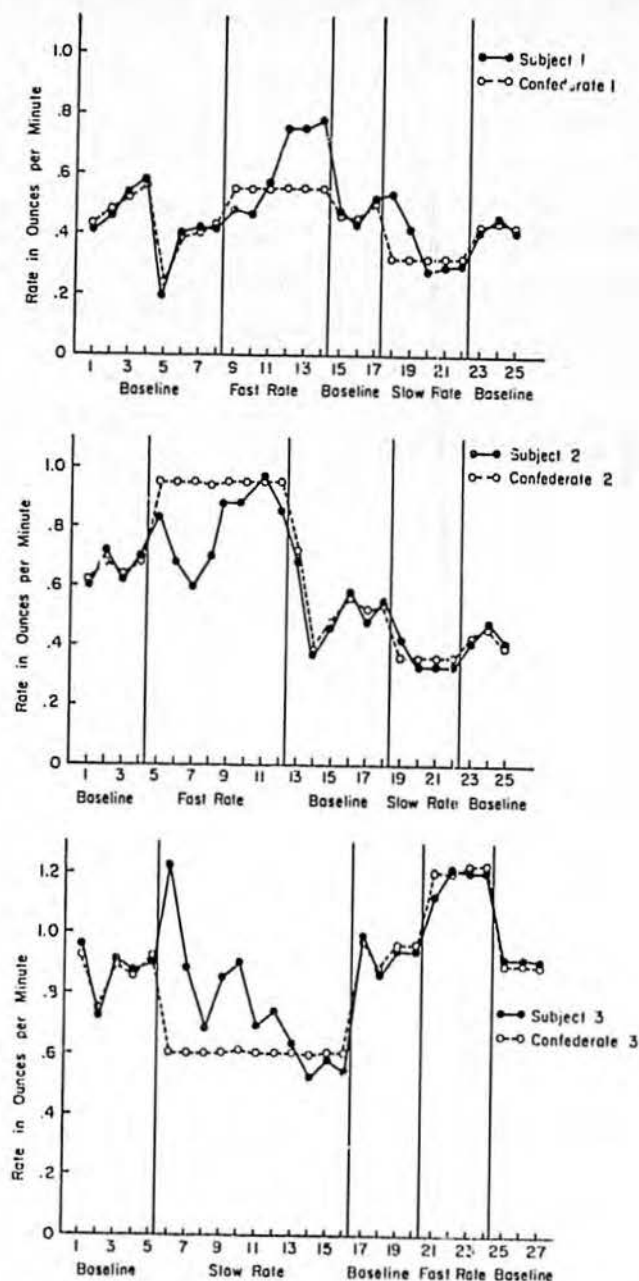


Fig. 1. Drinking rate of subjects and confederates for all baseline and experimental conditions.

A number of variables need to be investigated to provide enough information to allow the use of modelling procedures to assist drinkers to control their alcohol intake. These include initial drinking rate, *i.e.*, heavy drinkers compared to moderate drinkers, characteristics of the model (Bandura, 1969; Lippett, Polansky, and Rosen, 1952), number of models, and sex of models.

Alcoholic beverages other than beer also should be studied.

Another condition, which has practical implications, both ethically and for training drinkers in self control, is the instruction or explanation presented to the subject. In this study and in Caudill and Marlatt (1975), subjects were misinformed as to the purpose of the research. A

pertinent question is to what extent the model will influence behavior if the subject is informed that such influence is the purpose of the study? If such disclosure reduces modelling effects, it might be useful in treating problem drinkers; if it does not, it would allow a straightforward explanation to the subject without the need for subterfuge. Other clinical implications are suggested by the present results. For example, "real life" models might be trained to drink at a prescribed low rate and allowed to influence the rate of their social groups.

Modelling does seem to offer some possibilities in decreasing drinking rates, but the research programs necessary to develop practical applications are barely under way.

REFERENCE NOTES

1. Albrecht, G. L. *The assessment of Fulton County adolescents behavior, knowledge, and attitudes in relation to the legal system: A preliminary report*. Mimeographed. Cited in Albrecht, G. L., The alcoholism process: A social learning viewpoint, in P. G. Bourne and R. Fox, (Eds), *Alcoholism: progress in research and treatment*. New York: Academic Press, 1973. Pp. 11-42.
2. Garlington, W. K. and Krasnec, M. *A Survey of drinking practices of college students*. In progress.
3. Kimes, W. T., Smith, S. C., and Maher, R. E. *Alcohol and drug abuse in South Carolina*. Department of Education, Columbia, South Carolina, cited in Albrecht, G. L., The alcoholism process: A social learning viewpoint, in P. G. Bourne and

R. Fox, (Eds), *Alcoholism: Progress in research and treatment*. New York: Academic Press, 1973. Pp. 11-42.

REFERENCES

- Bandura, A. *Principles of behavior modification*. New York: Holt, Rinehart & Winston, 1969.
- Caudill, B. D. and Marlatt, G. A. Modeling influences in social drinking: an experimental analogue. *Journal of Consulting and Clinical Psychology*, 1975, 43, 405-415.
- Jessor, R. and Jessor, S. L. Adolescent development and the onset of drinking: a longitudinal study. *Journal of Studies on Alcohol*, 1975, 36, 27-51.
- Lippett, R., Polansky, N., and Rosen, S. The dynamics of power. *Human Relations*, 1952, 5, 37-64.
- Maddox, G. L. (Ed), *The domesticated drug: drinking among collegians*. New Haven: College and University Press, 1970.
- Rogers, E. M. Group influences on student drinking behavior. In G. L. Maddox (Ed), *The domesticated drug: drinking among collegians*. New Haven: College and University Press, 1970. Pp. 307-320.
- Schaefer, H. H., Sobell, M. B., and Mills, K. C. Baseline drinking behaviors in alcoholics and social drinkers: kinds of drinks and sip magnitudes. *Behaviour Research and Therapy*, 1971, 9, 23-27.
- Straus, R. and Bacon, S. D. *Drinking in college*. New Haven: Yale University Press, 1953.
- United States Department of Health, Education and Welfare. *Second special report to the U.S. Congress on alcohol & health: New knowledge*. Washington, D.C.: U.S. Government Printing Office, 1974.

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An Operant Treatment Procedure for Alcoholics

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Abstract

A three component program for out-patient alcoholics with the outcome of controlled drinking was instituted for eight subjects. Components included (1) blood alcohol level discrimination training, (2) faradic shock delivered contingent on beverage alcohol consumption beyond the .05 blood alcohol level, and (3) an avoidance paradigm whereby subjects could avoid shocks by making appropriate drinking responses. Follow-up data, with reliability, were collected at intervals of 2, 6, 12, and 18 months. Subjects dramatically reduced their drinking quantity during the punishment component. Decreases were maintained throughout the avoidance component and follow-up intervals. Decreases in rate, defined as ounces consumed divided by consumption time, correlated about .85 with decreases in reported quantity.

An Operant Treatment Procedure for Alcoholics

Denice A. Dericco and Warren K. Garlington

Washington State University

For many years total abstinence was regarded as the appropriate criterion for the successful treatment of alcoholism. It is suggested that given societal norms for social consumption of alcohol, plus the social reinforcers which maintain beverage alcohol ingestion, social drinking may serve as a realistic treatment goal. The efficacy of a social drinking criterion was clearly demonstrated by Bigelow, Cohen, Liebson, and Faillace (1972). Chronic alcoholic in-patients were placed in a choice situation in which they earned the opportunity to participate in an "enriched" environment contingent upon either moderate drinking or abstinence. Subjects overwhelmingly chose the moderate drinking alternative. Results also suggested that moderate drinking is more reinforcing than abstinence for alcoholics. Further support for the moderate drinking concept was rendered by Mills, Sobel and Schaeffer (1971) in a study which made electric shock contingent on gulping drinks, ordering straight alcoholic drinks and ordering and consuming more than three drinks. Time-out (Cohen, Liebson, Faillace and Allen, 1971), positive reinforcement (Cohen, Liebson, Faillace and Speers, 1971) and social contracting procedures (Miller, 1972) have been effectively employed to reduce drinking behavior from maladaptive to adaptive frequencies.

The present study attempts to extend treatment with a controlled drinking outcome to out-patient alcoholics.

Method

Subjects

A relatively homogeneous group of alcoholics, seven men and one woman, volunteered for participation in this program. The seven male subjects were gainfully employed. The female subject was a housewife. All subjects lived

within an intact family environment. Additionally, all subjects had participated in at least two other treatment programs prior to volunteering for the present program. Mean baseline drinking quantity was 47.5 ounces per day of the equivalent of 86 proof spirits with a range from 43.5 ounces per day to 50.75 ounces per day.

Procedure

General Procedure. The design was a case study format replicated eight times. Subjects experienced a three component treatment package. Each subject was seen individually, twice weekly, on an-out-patient basis. Sessions were held constant at two hours. Quantity-frequency data were collected daily throughout the treatment program.

Baseline. For four weeks prior to participation in the program, subjects recorded their daily beverage alcohol consumption quantity on prepared data sheets. For every subject, at least one reliability observer recorded the same data on identical data sheets. Subjects and observers returned data sheets to the experimenter once a week.

Blood Alcohol Level Discrimination. Discrimination training was similar to the method developed by Lovibond and Caddy (1970). Subjects drank their preferred beverage alcohol, at their own rate, in a simulated tavern. Every thirty minutes subjects were asked to estimate their blood alcohol level and to describe how they felt. Subjects then blew into a Smith and Wesson breathalyzer and were shown their actual blood alcohol level. Discrimination training was terminated when subjects' estimates were within $\pm .01$ of actual breathalyzer readings for three consecutive trials. Rate measures were taken during discrimination training sessions. Rate was defined as number of ounces consumed divided by consumption time.

Punishment. Once discrimination had been achieved a punishment paradigm was instituted in which electric shock was delivered contingent on drinking beyond

the .05 blood alcohol level. Subjects were required to continue drinking after the .05 blood alcohol level had been reached. Shock was delivered through a one inch stainless steel electrode and matching reference electrode powered by an Electronics Stimulator, Model CC 101. Electrodes were attached to the subject's forearm. Shock levels were set individually for each subject at the beginning of the first shock session. Starting at one milliampere (mA), the experimenter gradually increased the shock level, in steps of two mA, until the subject stated that the shock was painful. The experimenter then increased the shock level 20%. Shock level was held constant for all sessions. Twenty-five shocks per session were delivered on a variable, unexpected schedule at points in the response chain involved in drinking (e.g., holding the glass, lifting the glass to the mouth, drinking from the glass). Punishment sessions were terminated when subjects reached a stability criterion of five ounces or less of the equivalent of 86 proof alcohol consumption per day for five consecutive weeks.

Avoidance. Subjects did not blow into the breathalyzer during avoidance sessions. Electrodes were put in place at the beginning of the sessions and remained in place throughout the session. Subjects could avoid shocks by sipping rather than gulping, by ordering a mixed drink rather than a straight shot and by extending the latency between sips, in at least 10 second intervals, until five minutes was reached. Avoidance sessions were terminated when subjects reached a stability criterion of five ounces or less of the equivalent of 86 proof alcohol consumption per day for five consecutive weeks.

Follow-up. At two, six, 12 and 18 month intervals subjects returned for "booster" sessions. The discrimination training paradigm was used, except that subjects were not given feedback on actual blood alcohol level readings. Maintenance of blood alcohol level discrimination was assessed and rate measures were taken. Additionally, at each follow-up interval, subjects and observers collected quantity-

frequency data for four weeks in the same manner as in the Baseline condition.

Results

Mean reliability between subjects and observers was 92.7% with a range from .88 to 1.0. Rate measures decreased directly with decreased quantities. For seven subjects the correlation between rate and quantity-frequency was .87. During discrimination training, mean drinking rate was .917 ounces per minute. At the "booster" session, mean drinking rate was .333 ounces per minute, ranging from .300 to .367 ounces per minute. There was no difference in drinking rate between "booster" sessions. One subject attended only one "booster" session. This subject moved to another state two months posttreatment. Another subject was abstinent at treatment termination and was not asked to attend "booster" sessions since beverage alcohol consumption would have been required. This subject merely returned his data sheet to the experimenter during follow-up intervals.

All eight subjects decreased their drinking frequencies during the punishment component (see Figure 1 and 2). In fact, the criterion of +/- five ounces per day for five consecutive weeks was reached in the first five weeks of the punishment component. These treatment gains were maintained through the first five weeks, or performance criterion of the avoidance component. For one subject, exposure to the avoidance paradigm resulted in abstinence (see Figure 1, S2).

At the two month follow-up six of eight subjects were drinking five or less ounces per day of the equivalent of 86 proof spirits. The two remaining subjects (see Figure 1, S3 and S4) drank five ounces or less per day for three of the four weeks of follow-up. Four subjects completed treatment just three months ago. Three of the remaining four subjects (see Figure 1 and 2; S2, S4 and S6) were drinking at or below five ounces per day 18 months posttreatment. The remaining subject (see Figure 1; S3) was drinking at or below five ounces per day six months posttreatment. This subject completed treatment seven months ago.

The abstinent subject was not tested for maintenance of blood alcohol level discrimination. Four subjects attended one "booster" session. One subject attended two "booster" sessions. Two subjects attended four "booster" sessions. For every subject, each blood alcohol level estimate was within +/- .01 of the actual blood alcohol level reading.

Discussion

The efficacy of a controlled drinking outcome for out-patient alcoholics was demonstrated. Contingent punishment resulted in a dramatic reduction of drinking quantity-frequency. Treatment gains were maintained for as much as 18 months posttreatment.

Punishment, by definition, suppresses a response. Punishment, however, does not teach a new response. For this reason, an avoidance component was included as part of the treatment package. Behaviors such as sipping, ordering mixed drinks, and drinking slower were reinforced in order to establish new, more adaptive drinking patterns. Mills, Sobel and Schaefer (1971), isolated similar behaviors in a study which demonstrated that 13 chronic alcoholic in-patients could be taught to drink socially. It is impossible, however, to isolate the effects of avoidance in the present treatment program. The avoidance component may have been important in the maintenance of reduced drinking quantity. Additionally, reductions in drinking rate may have been a function of avoidance. In order to assess the importance of the avoidance component, a component analysis design based on a multiple baseline model is presently underway. Rate measures are being taken at every session.

Importantly, decreases in rate correlated .87 with decreases in reported quantity-frequency. Because of the difficulty inherent in self-report data, the possibility of taking an objective measure, rate, to corroborate self-report information cannot be overemphasized. Even reliability data is suspect especially

when reliability observers are spouses or roommates. Although seven subjects do not constitute a sufficient number to make any definitive statements about the correlation between quantity and rate, the suggestion is strong enough to warrant further research.

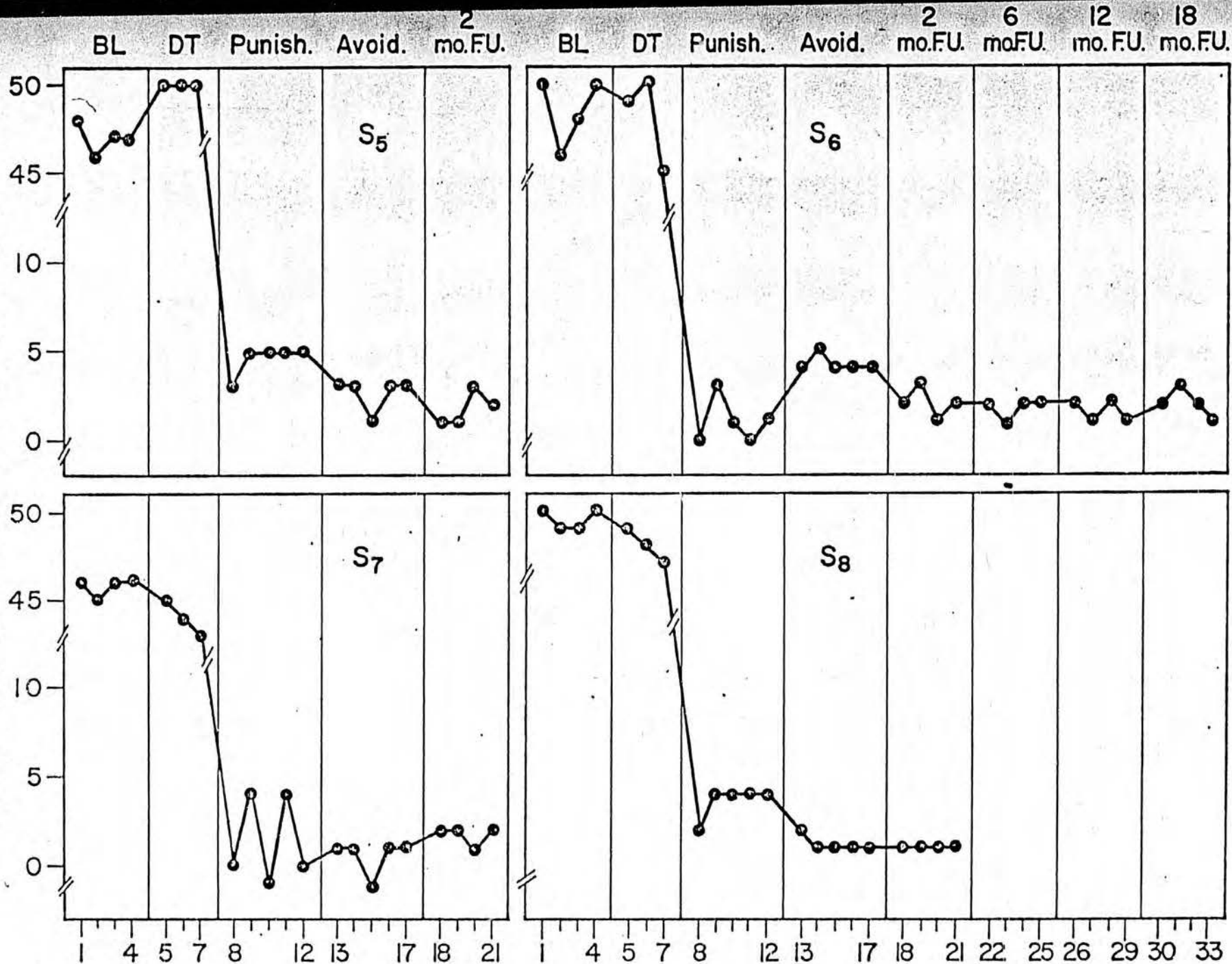
Even though dramatic reduction in both drinking frequency and rate were demonstrated, the present endeavor raises more questions than it answers. Will controlled drinking be maintained beyond 18 months? For seven subjects follow-up data will continue to be collected. Were the eight subjects representative of alcoholics? Perhaps controlled drinking is possible for only those alcoholics who are employed and have intact families or other social support.

Because the results for these eight subjects was promising, more research relative to controlled drinking is strongly indicated.

References

- Bigelow, G., Cohen, N., Liebson, I. and Faillace, L. (1972) Abstinence or moderation: Choice by alcoholics. Behavior Research and Therapy 10, 209-214.
- Cohen, M., Liebson, I., Faillace, L., and Allen, R. (1971) Moderate drinking by chronic alcoholics: A schedule dependent phenomenon. Journal of Nervous and Mental Disease 153, 434-444.
- Cohen, M., Liebson, I., Faillace, L., and Speers, W. (1971) Alcoholism: Controlled drinking and incentives for abstinence. Psychological Reports, 28, 575-580.
- Lovibond, S. and Caddy, G. (1970) Discriminated aversive control in the moderation of alcoholics drinking behavior. Behavior Therapy 1, 437-444.
- Miller, P. (1972) The use of behavioral contracting in the treatment of alcoholism: A case study. Behavior Therapy, 3, 593-596.
- Mills, K., Sobel, M., and Schaefer, H. (1971) Training social drinking as an alternative to abstinence for alcoholics. Behaviour Therapy, 2, 18-27.

MEAN FREQUENCY IN OUNCES PER DAY



DAYS

Figure 1. Mean number of ounces of the equivalent of 86 proof spirits per day for one week intervals for four subjects (S1, S2, S3, and S4) through the following conditions: Baseline (BL), Discrimination Training (DT), Punishment (Punish), Avoidance (Avoid), Two Month Follow-up (2 mon.F.U.), Six Month Follow-up (6 mon. F.U.), Twelve Month Follow-up (12 mon. F.U.), and Eighteen Month Follow-up (18 mon. F.U.).

Figure 2. Same as Figure 1 for four additional subjects (S5, S6, S7, and S8).