

## Review

### AN EVALUATION OF AVERSION AND LSD THERAPY IN THE TREATMENT OF ALCOHOLISM\*

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An effective, direct approach to the habit of drinking excessively is likely to be an important, essential component of any successful total treatment program for alcoholism.

Two direct approaches have been developed recently. One approach is known as aversion therapy and has used one of the following: apomorphine, emetine, scoline and electric shock, in an attempt to establish an aversion for alcohol. The other approach has used LSD. Both of these approaches are critically reviewed in this paper.

#### Aversion Therapy

Aversion therapy may be considered to be one of the set of therapeutic procedures labelled 'behaviour therapy'. Behaviour therapy as a class of therapies encompasses those procedures which systematically apply the principles derived from experimental psychology to the modification of abnormal behaviour. It is not intended to discuss behaviour therapy in general, but the essentials and a detailed discussion of the various procedures can be found elsewhere (7).

The aim underlying aversion therapy for alcoholism is to form a conditioned emotional response to alcohol and to establish the habit of avoiding alcohol. Two learning processes are involved—classical conditioning, i.e. learning by contiguity and instrumental conditioning. If a glass of alcohol (the conditioned stimulus CS) regularly precedes an aversive unconditioned stimulus (UCS) such as electric shock or nausea producing

drug, the alcohol (CS) will eventually come to elicit some part of the unconditioned response—UCR (fear or vomiting) originally made to the shock or drug (UCS). This first process is learning by contiguity—the contiguity in time of the CS (alcohol) and UCS (shock or drug). Once the unpleasant response (fear or vomiting) has been conditioned to the alcohol, the habit of avoiding it may be established through instrumental conditioning. For instance, turning away from the alcohol if it results in some reduction in the conditioned anxiety or nausea, will be learned as a regular response. Turning away becomes a regular learned response to alcohol because it is instrumental in reducing the learned unpleasant feeling (anxiety or nausea).

One of the most comprehensive programs of aversion therapy has been carried out at the Shadel Sanatorium in Seattle. Essentially the Shadel procedure as used by Lemere and Voegtlin (19) may be described as follows: the patient is taken to a sound-deadened room constructed with special attention to his physical comfort. The lighting is subdued except for the array of liquors spotlighted so as to command the patient's maximum attention. A large vomiting bowl is attached to the patient's chair. The patient is given an injection containing a mixture of emetine hydrochloride to induce nausea and vomiting, ephe-drine to combat any possible fall in blood pressure, and pilocarpine to produce sweating and salivation. This is followed by an oral dose of emetine contained in about 10 ounces of saline water. This additional oral emetine is intended to act as a local irritant. The purpose of the saline solution, apart from acting as a vehicle for the

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emetine, is to add an appreciable volume of easily regurgitated fluid to the stomach. Under these circumstances the patient is on the verge of nausea and vomiting before he takes any alcohol. The additional gastric irritation of even a small drink of alcohol produces nausea within less than a minute. Vomiting usually takes place within the next couple of minutes.

Soft drinks are given freely between sessions to extinguish undesirable conditioning to stimuli similar to those provided by the bottle of liquor.

The patient is given all kinds of wines and spirits during the course of the treatment. He is encouraged to swirl the beverage around in his mouth to savour to the full the olfactory and gustatory sensations involved. Lemere and Voegtlin summarized their results with 4,096 cases treated over a 13-year period as follows: "Forty-four per cent have remained abstinent since the first treatment, 60 per cent have remained abstinent for one year or longer, 51 per cent for two years or longer, 38 per cent for five years or longer and 23 per cent for 10 years or longer after their first treatment." Lemere and Voegtlin emphasize the importance of good motivation. Similar promising results—50 per cent recovery—have been reported by Thimann (35, 36) for 245 cases.

Thimann, however, gives a fairly long list of contraindications. Thus: "I.Q. markedly below 100; constitutional psychopathy; lack of intellectual or emotional ability to recognize the necessity of permanent abstinence; record of serious criminal offences committed in a state of sobriety; combination of alcohol and drug addiction; and active psychosis."

Physical contraindications which have been noted by the Shadel workers, Thimann and others who have used similar techniques include: disturbances of the cardiovascular-renal system, active tuberculosis of the lungs, active peptic ulcer and cirrhosis of the liver.

A number of other investigators have reported good results (1, 3, 12, 26, 29)

and Miller, Dvorak and Turner (23) have reported promising results with the group administration of aversion therapy. On the other hand others (9, 39, 40) have presented far less promising data.

It is well known, of course, that comparisons across studies of the effectiveness of therapeutic procedures must be done very cautiously. It is not intended to go into the general problems of the evaluation of therapy here. The problem has been discussed elsewhere in detail (7). Certainly the studies discussed so far suffer from many methodological flaws and are difficult to evaluate.

It has been suggested (13) that one of the reasons for the finding that evaluation studies of aversion therapy range from around zero to around 100 per cent success, is the difficulty of using emetic drugs efficiently. Among the problems are, 1) the difficulty of controlling the time interval between the presentation of the CS (alcohol) and the occurrence of the UCR (nausea and vomiting). This critical time interval (of the order of 0.5 seconds) between the CS and UCR is of course an extremely important one in classical conditioning<sup>†</sup>, 2) the hypnotic effect often produced by apomorphine. This hypnotic effect may be expected on the basis of experimental studies (see for instance Eysenck [10]) to make the process of conditioning a difficult one.

Because of the difficulties associated with the use of emetic drugs, Sanderson, Campbell and Laverty (27) have proposed an alternative form of aversion therapy based upon a temporary suppression of respiration. These authors have suggested that apart from the two problems connected with emetics which we have presented above, there is also the problem of the relatively low degree of trauma produced by nausea and vomiting. Though most clinicians who have worked

<sup>†</sup>It is technically more correct to talk of the time interval between the CS and the UCS rather than the UCR. It was decided to talk of the interval between the CS and UCR in the above discussion because the occurrence of the UCR (nausea and vomiting) does not occur immediately on presentation of the UCS (injection of drug). The practice of talking about the CS-UCS interval has been based on the immediacy with which a UCR usually follows presentation of the UCS.

with emetic drugs would not all consider their nauseous effects to be mild, Sanderson and his colleagues point out that the successful establishment of aversive conditioning in animals has involved the use of massive traumatising stimuli. They point out also that aversion therapy by the use of emetics does not appear to be successful unless a series of treatment sessions is given to the patient, some investigators advocating up to 40 treatments, each session taking up the most part of one day. Apart from the time consuming nature of such a procedure, there are the risks entailed by the repeated use of toxic emetics.

Sanderson and his colleagues suggest that their method of aversion therapy is superior to that of using emetic drugs because, 1) the degree of trauma is much greater, 2) the traumatic UCR has a predictable onset and a predictable course of action, 3) it is relatively free of side effects.

In their therapy the curarizing drug succinylcholine chloride dihydrate is used. This drug acts as the motor endplate of the efferent neurons serving the skeletal muscles to cause a nerve muscle depolarization. For a short period immediately after the injection of the drug the patient is totally paralyzed, unable to move or breathe.

The procedure involves inserting a hypodermic needle into a vein of the left arm and attaching a saline drip to the needle. On conditioning trials, 20 mg of succinylcholine is injected into the drip which is turned full on. As soon as the drug enters the bloodstream a characteristic change takes place in the galvanic skin response (GSR). Immediately this change occurs a bottle of the patient's favourite beverage is handed to him. As he is about to put the bottle to his lips the full effect of the drug takes hold. One of the therapists (three are involved in each treatment session) then holds the bottle to the patient's lips and puts a few drops of the drink into his mouth.

In their first paper, Sanderson, Campbell and Laverty (27) report their findings with 15 alcoholic patients treated by this method. This first study was considered by the author to be a pilot study and for a variety of reasons it was not possible to use the study to make any reliable estimate of the efficiency of the treatment. One may, however, abstract from their paper a number of important observations.

- 1) The apnea lasted for periods varying between 63 and 150 secs. with a mean of 90.4 secs. and a standard deviation of 24 secs.
- 2) For some time after the conditioning period, marked physiological disturbances were recorded—irregular heart rate, sudden muscle twitches, fluctuation of the GSR baseline.
- 3) The bottle was presented to each subject again when the patient's physiological record was stable. "The polygraph showed that presentation of the bottle caused marked changes in muscle twitch and an immediate respiratory change; neither of these had occurred in the preshock trials." The authors report that "there were remarkable changes too in facial expression. Before the shock several among the subjects had a rather bemused expression when they tasted the drink as of 'emotion remembered in tranquillity' but after conditioning they wrinkled up their faces and snorted as though an evil-tasting liquid had suddenly entered their mouths."
- 4) In three cases in which the treatment session constituted the second exposure to respiratory paralysis the conditioning was not as well established.
- 5) In some cases the aversive response to treatment was relatively weak in the days immediately following the conditioning session and it increased in strength with the passage of time.

In a later report (22) from the same group of researchers, data on drinking

TABLE I  
DATA ON DRINKING BEHAVIOUR IN THE THREE GROUPS OF THE STUDY BY MADILL *et al*<sup>22</sup>

	Treatment	Pseudo-Treatment	Placebo	Significance
Reduction in Craving				
Yes	7	12	6	$X^2 = 5.123$
No	5	3	9	
Completely Abstinent				
Yes	3	6	3	$X^2 = 1.56$
No	9	9	12	

behaviour three weeks and three months after treatment is presented for 12 alcoholics in a treatment group (the method of treatment being that described above), 15 in a pseudo-treatment group (patients in this group were injected with succinylcholine but during the paralysis no alcohol was given to them) and 15 in a placebo group (the patients experienced no paralysis but they were given the bottle and at the moment when they held it to their lips an experimenter held it there for about a minute in the same way as for the treatment group).

Although a greater proportion of subjects in the succinylcholine than in the placebo groups reported a reduction in craving for alcohol, the difference was not significant. The proportion of subjects who abstained completely from drinking for the three months following treatment was not significantly different across the three groups. The relevant data is presented in Table I.

In both succinylcholine groups there was a significantly greater frequency of generalized avoidance or aversive responses than in the placebo group. These responses included such behaviour as being upset by pictures or television commercials for alcoholic beverages. There was also a significantly greater frequency of avoidance behaviour to the beverage used as the CS in the drug group than in the placebo group. These avoidance behaviours included nausea and anxiety while drinking and sensations of breath-

lessness when first re-exposed to the beverage used as the CS.

The general conclusion of the investigators is that "The technique has some success in creating a conditioned aversive response to an alcoholic beverage; but the conditioned aversion response alone is not sufficient to produce changes in drinking behaviour which are marked enough or stable enough to recommend it as a complete treatment."

The investigators attribute part of the failure of the treatment method to the general state of increased tension seen in many patients after the administration of the succinylcholine. Drinking behaviour in these instances, despite any conditioned aversion, may have occurred to reduce the state of tension. They suggest also that in some patients drinking occurred after the treatment as an expression of hostility against the experimenters. Perhaps even more important is their observation that in the treatment procedure "... no operant response was possible when fear was evoked and, in consequence there is no positive learning of any acts incompatible with drinking."

They suggest that the treatment may be improved by combining with the aversive procedure treatment of the underlying anxiety by means of the method of systematic desensitization and by selecting patients who are more likely to benefit from the treatment. They admit, however, that there is no evidence available at present to indicate the kind of patient

who is more likely to respond to the treatment.

Clancy, Vanderhoof and Campbell (6) gave 10 mg. of succinylcholine to 25 alcoholics in a treatment procedure similar to that described above, Group A. Seventeen patients received saline, Group B. Fifty-nine patients were treated by 'conventional methods' (individual or group psychotherapy, drug therapy or a combination of these treatment methods), Group C. Twenty-two patients were in no treatment group having failed to follow through with treatment recommendations, Group D.

The follow up was carried out one year after treatment. The proportion of patients showing increased abstinence was significantly higher in Group A (88%) than in Group C (66%) or D (45%) but was not significantly higher than in Group B (70%).

Holzinger, Mortimer and Van Dusen (14) treated 23 male alcoholics with succinylcholine chloride aversion therapy. When followed up from three days to 7.5 months (average 4.2 months) only two were not drinking and another two showed reduced drinking. This, the authors note, does not differ from the base rate expectancy of recovery in their institution.

Hsu (15) has reported on the use of electric shock in the treatment of alcoholism. The patient was presented with a tray containing six 1-oz. plastic cups filled with beer, wine, whisky, milk, water and fruit juice, and was requested to drink them one by one, in any order he chose, until all six were finished. Electric shock of 2 to 5 ma. was applied to the head 0.5 to 5 sec. after the patient had finished swallowing each of the alcoholic beverages. The shock lasted 30 sec. The treatment was given daily for five days. On the fourth treatment day the patient was allowed to take five drinks of his choice out of six and on the fifth treatment day to take four of the six. This was designed to allow the patient to develop an avoidance response. A first reinforce-

ment treatment was given four weeks later and a second reinforcement six months later.

During the latter part of his study, Hsu changed the procedure. Switches were placed under the cups containing alcohol, but not under those containing non-alcoholic drinks. Lifting of the cup closed a circuit which resulted in the presentation of the electric shock.

Hsu's procedure has been described in some detail because of its novelty but it is hard to evaluate the therapy from his report. Of the 40 patients treated none of them had the initial sessions plus the two reinforcements. Only 24 patients completed the initial sessions. All of the patients were also receiving what might generally be called *milieu* therapy. No data is given on characteristics of the patients other than that they were male. More important, no data is given on the effects of the treatment on the patients' problem of alcoholism.

It is quite obvious that there is no good evidence that aversion procedures are particularly effective in the treatment of alcoholism. Because of the seriousness of the problem, however, and the absence of any other clearly effective methods of treatment, it would probably be unwise to abandon the technique without further investigation. Such investigations should satisfy as many as possible of the following conditions:—

#### 1) *Patient variables*

Detailed social, psychological and physiological data should be collected on all the patients. Variables such as employment status appear to be significantly related to recovery from alcoholism (38) and should if possible be controlled, or at least their influence on the results of the investigation should be assessed.

Not all alcoholics are the same. The possibility of individual differences in response to the aversion treatment must be considered. The danger of neglecting this is shown by the investigations of Truax (37) into the effects of psychotherapy on neurotic and psychotic

patients. Group comparisons showed no difference in recovery between the psychotherapy group and control (no psychotherapy) groups. More detailed analyses showed, however, that some of the psychotherapy patients did show a significant recovery after psychotherapy but some were significantly worse. These psychotherapeutic and psychotoxic effects of psychotherapy cancelled one another out and did not appear in over-all group comparisons.

Certain personality variables, for instance extraversion-introversion (10) and level of anxiety (34) may be related to the ease with which a person can be conditioned and would seem to be particularly worthy of further investigation. The role of anxiety is particularly important. Eysenck and Rachman (11) have reviewed evidence indicating that if neurotic behaviour is motivated by anxiety, aversive conditioning can augment rather than reduce such behaviour. Evidence in relation to brain damage should be collected. Brain-damaged patients do not appear to condition readily (10).

## 2) *Procedural variables*

Experimental studies of conditioning in animals suggest that the following principles should be taken into consideration in the application of aversion therapy:

i) The CS and the UCS must be amenable to exact control with respect to their intensity, duration, precision of onset and cessation. We have already noted that the use of emetic drugs makes control over the UCS difficult. Electric shock or scoline, in this sense, is preferable. Control over the CS with humans is not as easy as it may appear. One may present a bottle of liquor at a certain point in time, but the patient may have very vivid thoughts and images concerning liquor long before the bottle is presented. Some investigators have suggested that the CS should stand out clearly against the background so that the

patient can fix his attention on, for instance, the bottle. The effectiveness of this as a CS as against the patient's own vivid thoughts requires research attention.

ii) It is better if a number of sessions are involved to space the sessions over time rather than massing them together—a session per week, for instance, rather than a session per day.

iii) Partial reinforcement appears to be more effective with animals than does 100 per cent reinforcement. In other words, if a CS is followed by a UCS only part of the time, conditioning is more effective (16, 20). This is not always true in the conditioning of human subjects (25) but is worthy of investigation in aversion therapy.

iv) The UCS should not have a depressant effect on the central nervous system since such depressant effects weaken conditioning. We have seen that some emetic drugs have depressant effects. It may be possible to offset such effects by the use of stimulant drugs. A related problem is the effect of the alcohol itself. It is probably better to reduce the amount of alcohol that is drunk during treatment because of its depressant effect.

In general either the use of electric shock or scoline seems preferable over emetic drugs despite the naturalness of the unconditioned response of nausea when emetic drugs are used. A more natural unconditioned response may more readily be conditioned, but it is unlikely that this advantage compensates for the disadvantages of the method. With emetic drugs one also has to contend with the undesirable side effects that may occur: diarrhea—mostly mild, sinusitis, cystitis, prostatitis, and light to moderate neuromuscular disturbances. There are also the contraindications to the use of emetic drugs which are not apparently so important in relation to the use of electric shock and scoline.

On the other hand when electric shock is used, as in Eiso's (15) study, many patients drop out of treatment. In this

sense the use of scoline has the advantage since only one session is required.

In addition to the above notes on procedural variables we may mention the importance of controlling the influence of other possibly therapeutic variables. If one wishes to assess the value of a method of aversion therapy it is difficult to do so if one also gives the patient psychotherapy, *milieu* therapy, etc. The influence of an enthusiastic therapist is well-known in medicine and some attempt should be made to have the treatment administered by a responsible and competent but unconvinced therapist. Ethical problems are involved here but it would seem better for alcoholics if systematic work led to efficient therapy rather than to carry on using doubtful methods of treatment.

As always, control groups must be used so that the treatment effect can be assessed against the base rate recovery. Patients should be allotted randomly to the treatment and control groups. If at all possible some attempt at random selection of patients should be done, though this is not always easy. Thorough experimental investigation of single cases might also be employed. The method of single case experimental studies cannot be discussed here. It is discussed in detail by Chassan (4).

### 3) Follow Up

Although abstinence from drinking is the aim of all investigators, all would have to admit humbly that it is too strict a criterion to be used alone. Detailed data on the amount of drinking should be collected at intervals over long periods of time. Such follow-up studies can be expensive but, of course, without expense we may as well forget trying to obtain good therapeutic measures. It is also necessary to obtain detailed information on other aspects of the patients' behaviour apart from his drinking. Those doing the follow-up studies should not be the same as those who conducted the therapy.

Careful investigation of the behavioural, including physiological, response to the conditioned stimuli and related stimuli at intervals after treatment may also indicate the strengths and weaknesses of the particular form of aversion therapy being investigated.

### LSD Therapy

An unpublished report by the Saskatchewan Bureau on Alcoholism (28) indicated that 69 (47.6%) of 145 alcoholics improved after LSD treatment. The period under review was a five-year period 1957-1962. The time interval until follow up varied from two months to five years, "... most cases having had the last treatment from two to four years before this check was made."

Fifty of the 69 improved cases were totally dry. The remaining 19 "... have occasional relapses but contrive to try and find sobriety. Further, in some of these cases their relapses are becoming fewer and of shorter duration, e.g. one day of intoxication compared to previous bout pattern of one week; gainfully employed as compared to former chronic unemployment."

Details on the published reports of LSD therapy (32) are presented in Table II.

In order to evaluate the effects of LSD therapy with alcoholics, the base rate of improvement from alcoholism must be taken into consideration. Binder (2) reported that when his patients were followed up 19 years after an enforced abstinence of one year in a hospital, over 50% showed improvement. Cowen (8) found that 37 per cent of 68 patients followed up six years after a period of enforced abstinence of 60 days showed improvement. A glance at Table II indicates that the figures for improvement for the six studies (the study by O'Reilly and Funk (24) gives abstinence rather than improvement figures and is not included) average from 50% to 93% with a mean of 75%. This would suggest that LSD therapy is indeed a worthwhile method of treatment but caution is required. Although Jensen (17) and Jensen and Ram-

TABLE II  
STUDIES OF THE USE OF LYSERGIC ACID DIETHYLAMIDE IN THE TREATMENT OF ALCOHOLISM

Study	Sample Characteristics					Treatment Characteristics			Form of Evaluations	Outcome	
	N	Age	M	F	Duration of illness	Miscellaneous	Drug Dose	No. of Treatments		Miscellaneous	Mean gain
Smart <i>et al</i> 1966	Lysergide group = 10	Mean = 39 yrs.	9	1	"Long history of excessive and uncontrolled drinking." "... previous unsuccessful attempts at therapy."	Chosen at random from volunteers. Randomly assigned to treatment groups. Double blind. LSD group - 8/10 unemployed Ephedrine group - 4/10 unemployed Control group - 5/10 unemployed	800 µg LSD	1	All patients took part in the general treatment program of a therapeutic community. Drug patients attached to bed by belt during treatment. After drug admin. 3 hrs. psychotherapeutic interview.	6 month follow-up by 'blind' investigator % gain in weeks abstinence.	LSD 33.7% 8/10 Ephedrine 31.5% 9/10 Control 19.6% 7/10 Difference between groups not significant. Also no difference between groups in reported frequency of symptoms such as morning drinking, getting drunk on a work day, etc.
	Ephedrine group = 10	39 yrs.	10	0			60 mg Ephedrine	1			
	Control group = 10	41 yrs.	9	1			—	—			
Smith 1958	24	Mean = 38 yrs. Range = 20-63 yrs.	23	1	Mean = 12 yrs. Range = 1½-35 yrs. Lack of response to previous treatment	Difficult cases selected.	200 µg or 300 µg LSD or 0.5 gr. mescaline.	1	All patients took part in general treatment program. Prolonged interview with patient after admin. of drug. Patient never left alone.	Follow-up from 2 mos. to 20 mos. by therapist with help of AA	Much improved 6 (25%) Improved 6 (25%) Unchanged 12 (50%)
Chwelos <i>et al</i> 1959	16	Mean = 43 yrs. Range = 35-52 yrs.	Not reported	Not reported	Mean = 11.6 yrs. Range = 3-20 yrs.	Selection method not reported.	Not reported	1	Music, flowers, photos of relatives, religious discussion used.	Follow-up from 2-9 mos. by AA	Much improved 10 (62%) Improved 5 (31%) Unchanged 1 (7%)
MacLean <i>et al</i> 1961	61	Not reported	50	11	Mean = 14.36 yrs.	Difficult cases drawn from total of 492 patients.	From 400-1500 µg LSD	1	After drug admin. a professional therapeutic group remains with patient.	Follow-up from 6-12 mos.	Much improved 30 (49%) Improved 16 (26%) Unchanged 15 (25%)
Jensen 1962	LSD group = 54 Group Therapy = 17 Controls = 22	Not reported	Not reported	Not reported	Not reported	Method of selection of patients and assignment to group not reported.	200 µg LSD	Not reported	After drug admin. therapy similar to Chwelos <i>et al</i> (1954) and MacLean <i>et al</i> (1961). LSD treatment part of general therapeutic community treatment program.	Follow-up from 6-18 mos.	LSD Group Therapy Control Much improved 34 (63%) 4 (25%) 7 (32%) Improved 7 (13%) 4 (24%) 3 (13%) Unchanged 13 (24%) 9 (52%) 12 (55%)



TABLE II (Continued)

Study	Sample Characteristics					Treatment Characteristics			Form of Evaluations	Outcome	
	N	Age	M F	Duration of illness	Miscellaneous	Drug Dose	No. of Treatments	Miscellaneous			
Jensen and Ramsay 1963	LSD group = 62 Control group = 29	Mean = 39.3 yrs. Range = 24-65 yrs.	Not reported	Severe chronic cases	Severe chronic cases selected	200µg LSD	Not reported	As in Jensen (1962) Control group received individual treatment by a psychiatrist.	Follow-up from 6-18 months.	LSD Much improved 39 (63%) Improved 7 (12%) Unchanged 16 (25%)	Control 8 (27%) 4 (14%) 17 (59%)
O'Reilly and Funk 1964	68	Mean = 37 yrs. Range = 20-36 yrs.	60 8	60% had been drinking more than 10 yrs. Only 6% less than 6 yrs of drinking.	Volunteers - no psychosis. 1 married. 15 patients had had one or more previous LSD experience.	200µg LSD	55 patients 1 treatment 15 patients > 1 treatment	A graduate nurse and therapist remain during session.	Questionnaires to patients, relatives, agencies. Follow-up for 2 mos. after treatment and 2 mos. at end of follow-up period ranging from 2-34 mos. (mean 14 mos.)	Abstaining - 26 (38%)	

say (18) report only 45% and 51% improvement respectively for their control subjects, Smart and his colleagues (30) report that 90% of an ephedrine group and 70% of a control group in their study showed improvement.

There are a number of problems associated with the evaluation of LSD therapy, most of them common to the evaluation of all drug treatments, some peculiar to LSD evaluation. These problems have been discussed in detail by Smart and Storm (31) and will be briefly summarized here. To determine the effectiveness of a drug treatment:

- 1) Control groups receiving either a placebo, another form of treatment or no treatment must be used. 'Blindness' in placebo controlled studies is, of course, difficult to achieve when testing drugs with strong sensory effects such as are produced by LSD. Smart and his colleagues (30) have overcome this problem to some degree by using ephedrine with one group, some of the effects of which could be confused with the effects of LSD.
- 2) Patients must be randomly assigned to the treatment groups.
- 3) The study must be double blind. Here again, as Smith (33) argues, it is difficult to satisfy this condition with drugs such as LSD where it is usually quite obvious what drug the patient has received. The onus is on the clinical researcher, however, to find ways to overcome this problem since objectivity of evaluation must be obtained.
- 4) Objective measures or uncontaminated subjective evaluations must be used. The latter can be achieved only when the rater does not know what treatment the patient has received. The data used must be exact, and its source (patient himself, relatives, etc.) must be indicated.
- 5) Follow up should be at relatively fixed intervals after treatment. It has been shown that the numbers of alcoholics

rated 'much improved' and 'improved' varies markedly with the length of time before follow up (39).

It can be seen from Table II that only the study by Smart and his colleagues (30) satisfies these conditions and their study provides no evidence at all for the effectiveness of LSD over ephedrine or the passage of time. Since all the patients were in a general therapeutic community type program, the recovery in all the groups might, of course, have been due to this. Be this as it may, LSD has not been shown to be a superior adjunctive method of treatment to such a program.

Despite the random assignment of the patients to the three groups in Smart's study, there is one difference between the groups that is noteworthy. In the LSD group eight out of ten patients are unemployed. The figures for the other two groups are: ephedrine four out of ten, and control five out of ten. O'Reilly and Funk (24) did not find employment status to be related to recovery from treatment but Voegtlin and Broz (38), using aversion therapy, did find such a relationship. If one can say then that in eight out of ten of the LSD patients there was a negative prognostic factor, then perhaps one can argue that LSD must have been particularly effective to overcome this factor. But such speculation must be done cautiously. If the LSD treatment was of value in effecting recovery in the LSD group it was, so it seems, without the elaborate procedures introduced by some workers to produce a transcendental experience.

What makes comparison of studies such as those listed in Table II so difficult is the vagueness in most of them of the criteria of improvement. Despite the difficulties involved, drinking behaviour is a measurable response and far more precise measures of improvement could be used.

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### Résumé

L'auteur passe en revue les études que l'on a faites sur l'emploi des stimulus engendrant la répugnance, ou de la diéthylamide de l'acide lysergique dans le traitement de l'alcoolisme. Ces stimulus étaient l'apomorphine, l'émétine, la scoline et le choc électrique. Rien n'indique à l'évidence que ces méthodes sont plus efficaces que les autres, non excitantes, pour traiter les alcooliques. L'échec de ces méthodes est parfois attribuable à des modes de conditionnement défectueux. Ainsi, (1) la difficulté qu'on éprouve à régler l'intervalle entre la présentation du stimulus conditionné (SC) (alcool) et la survenance du réflexe non conditionné (RNC) (nausée et vomissements). L'intervalle critique (de 0 à 5 secondes) entre le SC et le RNC est d'une extrême importance dans le conditionnement classique; (2) L'effet hypnotique souvent produit par les drogues productrices de nausées, qui peut rendre difficile le processus du conditionnement. Cependant, même lorsqu'un réflexe de répugnance à l'alcool est bien condition-

né, il peut ne pas suffire à produire des modifications du comportement chez le buveur. Rien non plus ne vient prouver l'efficacité thérapeutique particulière du LSD.

L'auteur met en lumière la difficulté d'évaluation de la plupart des études

passées en revue et il expose les conditions minimales qui président à des études bien faites. Il propose d'accorder plus d'attention, dans la future recherche, aux variables que présentent les sujets et les modes d'administration, ainsi qu'aux méthodes de postcure.



*One sip of this will bathe the drooping  
spirits in delight beyond the bliss of  
dreams.*

*Comus*

John Milton  
1608-1674