
AN EVALUATION OF THE CONDITIONED AVERSION METHOD OF
TREATING ALCOHOLISM AND OF INDIVIDUAL DIFFERENCES IN
RESPONSE TO SUCH TREATMENT

by

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Science.

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I hereby declare that the Thesis embodies
the results of my own special work, and
that it has been composed by myself.



CONTENTS

	Page
Preface	ix
INTRODUCTION	1
1. THE EXTENT OF THE PROBLEM	5
2. THE EFFECT OF ALCOHOL	16
3. THEORIES OF ALCOHOLISM - I	24
4. THEORIES OF ALCOHOLISM - II	28
5. THE AVERSIVE CONTROL OF BEHAVIOUR	43
6. AVERSION THERAPY FOR ALCOHOLISM: A REVIEW	54
7. THE THERAPEUTIC PROCESS: RATIONALE AND METHOD	69
8. RESULTS AND DISCUSSION	89
9. THE EXTRAVERSION HYPOTHESIS	104
10. GSR CONDITIONING AND THE EXTRAVERSION HYPOTHESIS	111
11. NEUROTICISM AND THE EXTRAVERSION HYPOTHESIS	125
12. SOME THEORETICAL AND PRACTICAL CONSIDERATIONS	133
 <u>APPENDICES</u>	
1. JELLINEK ESTIMATION FORMULA	140
2. ADDITIONAL PSYCHOMETRIC DATA	146
3. ILLUSTRATIVE CASE STUDIES	162
REFERENCES	169

LIST OF FIGURES

	Page
1. Apparatus for Studying Escape Behaviour.	48
2. Illustrating the Speed of Learning an Escape Response.	49
3. Curve of Response Rates in Recovery from Punishment.	51
4. Sex Distribution of Cases on Secondary Diagnosis: Organic Brain Damage.	75a
5. Curve Illustrating Strong Conditioned GSR.	116a
6. Curve Illustrating Weak Conditioned GSR.	116b
7. Curve Illustrating Paradoxical Conditioned GSR.	116c
8. Diagram of the Cat's Brain to Show the Location of the Ascending Reticular Formation.	135a
9. Summary Diagram Illustrating Some of the Afferent and Efferent Pathways of the ARS.	135b
10. Schematic Diagram of the Major Connections to and from the Ascending Reticular System.	135c
11. Schematic Diagram Illustrating Individual Differences in Level of Aspiration Variables: GDS and JDS.	161

LIST OF PLATES

	Page
1. View of the Conditioning Cubicle from S's End.	83
2. View of the Conditioning Cubicle from the Experimenter's End: Showing Shock Unit (right) and GSR Unit (left).	84
3. View of the Conditioning Cubicle from S's End: Illustrating Position of Electrodes, and Red and Green Lights.	86
4. Illustrating Apparatus for Aversion Condition- ing to the Smell of Alcohol.	100
5. Illustrating Apparatus for Aversion Condition- ing to the Smell of Alcohol in Operation.	101
6. Model of the Cambridge Triple Tester and Rear View of Box with Electric Counter (left).	157

LIST OF TABLES

	Page
1. Indicating the steady increase in admissions of patients with a diagnosis of alcoholism or alcoholic psychosis to Scottish Mental Hospitals in recent years.	11
2. Indicating the increase in the number of admissions for alcoholism to mental hospitals in England and Wales during a four-year period.	11
3. Showing the trend towards more mental hospital admissions for alcoholism in Eire.	12
4. Estimated alcoholism-rates for various countries.	13
5. Estimated prevalence of alcoholism in various countries (R. Popham, 1958).	14
6. Sex distribution and mean age of subjects in the Relaxation-Aversion and Aversion-only samples respectively.	70
7. Distribution of subjects in Social Class (by Occupation).	70
8. Mean percentile scores and standard deviations for a male and female sample of alcoholic admissions on P. M. and M. H. V. respectively.	71
9. Chronicity of drinking in years.	72
10. Average stay in hospital during the current admission.	73

	Page
11. Distribution of subjects according to primary diagnosis.	74
12. Mean number of sessions and average time per subject on progressive relaxation training.	77
13. Mean number of sessions and average time per subject on aversion therapy.	88
14. Six months' follow-up of 37 cases on relaxation-aversion therapy.	92
15. Six months' follow-up of 25 cases on electrical aversion therapy.	93
16. Twelve months' follow-up of 37 cases on relaxation-aversion therapy.	93
17. Twelve months' follow-up of 17 cases on electrical aversion therapy.	94
18. Comparison of follow-up result with various studies.	97
19. Distribution of subjects on the E scale of the MPI.	106
20. Distribution of subjects on the N scale of the MPI.	107
21. Comparison of a sample of hospitalized alcoholics with the quota sample on the MPI.	107
22. Breakdown in terms of sex differences on the E and N scales respectively.	108
23. Results at six months' follow-up: introversive and extraversive alcoholics.	109

	Page
24. Results at twelve month' follow-up: introversive and extraversive alcoholics.	109
25A Distribution of subjects in the three GSR categories.	117
26. The relationship between GSR and outcome at twelve months' follow-up.	118
27. The relationship between GSR conditioning and organic brain syndrome.	120
28. The relationship between extraversion and organic impairment.	121
29. Mean percentile scores on P. M. and T-H, data on age, for groups in concept formation experiment: males.	148
30. Mean percentile scores on P. M. and T-H, data on age, for groups in concept formation experiment: females.	148
31. Significance values of differences between T-H means.	149
32. Data for a male and female alcoholic sample on T-M-K stress indices and on the N scale of the MPI.	152
33. Percentile scores for a sample of alcoholic in-patients on P. M. and T-M-K.	154
34. Level of aspiration data for samples of alcoholic and normal subjects on the Cambridge Triple Tester.	158

35. 't' and 'p' values for groups of subjects compared on GDS and F variables in level of aspiration experiment. 159
36. Mean aspiration scores for subjects scoring at the extremes (± 1 SD) on the E scale of the MPI. 160

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INTRODUCTION

Purpose

The research is concerned with the evaluation of electrical aversion conditioning in the treatment of alcoholism and with the measurement of individual differences in response to such treatment. The technique to be described in this study demonstrates a particular instance of the psychotherapeutic approach which is based upon principles of learning and goes under the generic term: Behaviour Therapy.

Behaviour Therapy

A study of behaviour and of the factors that control behaviour is the domain of experimental psychology. Much of the fundamental work in this field has been done on animals. In recent years, however, experimental psychology, and especially the experimental psychology of learning, has extended its boundaries to undertake directly a more extensive laboratory and clinical investigation into the learning and conditioning processes at the human level, and how these processes influence behaviour. These lines of investigation have been most relevant to the understanding of the neuroses and behaviour disorders, and to the evaluation of those psychotherapeutic techniques based upon the principles of learning, commonly called "behaviour therapy". Behaviour therapy constitutes new ways of looking at and tackling certain kinds of human problems encountered in the setting of psychiatry and clinical psychology. It is based on a scientifically formulated theory; already a wide variety of techniques has developed while the clinical evidence of therapeutic effectiveness has been steadily accumulating.

Research Setting

The study was carried out in the Hospice Unit of the Crichton Royal Hospital, Dumfries, Scotland. This is a psychiatric hospital of 1,160 beds, sub-divided into several units; each unit is under the direction

of a consultant psychiatrist and is, to a large extent, autonomous as regards such matters as medical care, treatment and rehabilitation programmes. The Hospice Unit consists of 68 beds, with accommodation for an equal number of male and female patients. It functions as an acute admission unit for Sections IV and V patients under the National Health Service, that is, those who pay a fee towards their hospital care. Patients are accommodated mainly in individual rooms. Although all categories of psychiatric disorders are admitted to the Unit over the years it has become well known for its specialization in the active treatment of alcoholism and handles about one-third of the annual alcoholic admissions to the hospital. There is an emphasis on abreactive psychotherapy and such techniques as CO₂, Methedrine, D-lysergic acid diethylamide tartrate (LSD 25) abreaction are used. Additionally, detoxication by means of a prolonged period of drug-induced narcosis is standard for those alcoholics who are in need of it on admission.

The professional staff consists normally of a consultant psychiatrist, two registrars and a clinical psychologist. A charge nurse and sister are allocated permanently to the male and female wards respectively, while junior members of the nursing staff are on temporary placement, usually of three monthly duration.

Subjects

Subjects for the investigation were drawn from male and female alcoholic admissions to the Hospice Unit during the period of the research. Two samples have been collected. These consist of (a) an experimental sample of 37 subjects, defined as the Relaxation-Aversion Group and (b) a control sample of 25 subjects, defined as the Aversion-only Group. Further details with regard to such variables as age, sex, intelligence, and clinical features of the groups will be given in a later section of this report.

Clinical Research

Interest in a systematic investigation of electrical aversion therapy

for the treatment of alcoholism arose from the encouraging therapeutic response obtained in a small number of patients treated by a technique out of which the procedure to be described in a later section developed. It was recognized at the time that to achieve general acceptance as one of the methods of treating alcoholism with possible advantages over other approaches, the technique was in need of methodological refinements, a more rigorous theoretical frame of reference and an extended period of investigation.

While the approach has now reached a stage in its development where its usefulness as a treatment regime has been demonstrated, there will, no doubt, be the need for further improvements in the light of recent advances in experimental psychology, in research into behaviour therapy and in clinical knowledge regarding the treatment and general problem of alcoholism. In short, it is felt that the technique is, for the time being, best regarded from an experimental viewpoint rather than as a fully evolved clinical tool. It may even be that this critical way of integrating clinical psychological research, especially of a psychotherapeutic kind, into clinical practice is a useful working maxim. This will help to ensure that the standard of clinical or applied research aspires always to the level of that of laboratory experimentation.

Of course, it is recognized that the subject and other variables encountered in the clinical setting are not as easily brought under strict experimental discipline as is possible in the laboratory. One obvious factor is that the subject usually is a patient not a volunteer for a laboratory experiment. Problems of interdisciplinary communications, too, may present difficulties, inhibiting research progress. Even in the day to day affairs of a psychiatric clinic this is more than the statement of a problem by the psychiatrist and the writing of a report based upon tests and interviews by the psychologist. At the level of research activity the problem of communication and dangers of semantic confusion can be even more acute; for one party with his rigidly defined hypothesis and all the rigmarole of experimental design and the other with his clinical jargon and medical responsibilities are not infrequently

strange wayfaring companions.. Therefore, before any integrated attack on a mutual problem can properly get underway the clinical psychologist and the psychiatrist must, sooner or later, come to grips with the level at which they will communicate.

Undoubtedly, the problems of applied research are many; but it is not the intention here to list them in detail; rather attention will be turned, in the next chapter, to a consideration of the extent of the problem of alcoholism.

THE EXTENT OF THE PROBLEM

1. The Nature of Alcohol

With a few exceptions alcohols are made up of carbon, hydrogen and oxygen; all are intoxicating if taken in sufficient amounts. There are many kinds of alcohol: butyl alcohol, methyl alcohol, ethyl alcohol, and others. The least dangerous of all alcohols from the point of view of human consumption is ethyl alcohol; it is the alcohol present in all alcoholic beverages: distilled spirits, beer, wine, and so on. In this study the term alcohol will mean "ethyl alcohol".

A few minutes after the intake of alcohol hardly a cell of the human body is free from it and no other food item taken by mouth acts as swiftly as alcohol does. According to Lolli (1960) "this is one of the many reasons for its great appeal, especially to individuals who, impulsive by nature, want quick action to satisfy their emergent needs. The swift action of alcohol is matched by its intensity, even with relatively low concentrations in the blood stream. Although the "surface action" of alcohol call for higher concentrations - 25 to 30 per cent. - in order to affect the linings of the mouth or the stomach, the action through the blood stream occurs at much lower levels. There is hardly a person who does not show signs of intoxication with blood-alcohol concentrations above 0.15 per cent."

As a general rule, an individual can metabolize approximately one gram (1.25 cc) of pure alcohol per hour and per each 10 kilograms of his body weight ($\frac{1}{24}$ of a fluid ounce per hour per each 22 pounds of body weight). But people do not drink undiluted alcohol. Alcoholic beverages are usually labelled as so many degrees proof. The degree of proof in any given beverage is twice the per cent. of alcohol per volume; thus a 70 per cent. proof whisky, for instance, contains 35 per cent. alcohol by volume. The degree of proof is a residue of time gone by. Prior to devising more accurate methods, spirits were

tested by moistening gunpowder with them. Gunpowder would burn if the spirits contained not less than 50 per cent. alcohol. This was "proof" of their value.

The following formula (Lolli, 1960) expresses the relationship between the amount of any alcoholic beverage an individual is able to burn per hour, per each 22 pounds of his weight. The formula applies to healthy individuals who are reasonably close to the ideal weight for their height.

Formula:

$$\frac{W}{5(P)} = V$$

in which, W is the weight of the individual in pounds; P is the per cent. of alcohol by volume in a given beverage; V is the amount, in ounces, of a given beverage that the individual can burn in one hour.

Attention will now be turned more specifically to the topic of alcoholism.

2. Classification and Definition

There is hardly an area to do with the topic of alcoholism that is not a source of doubt and controversy; aetiology, prevalence, treatment and, not least of all, definition. Of course there is no lack of systems of classification (W.H.O. 1952) nor dearth of definitions (Jellinek, 1960; Diethelm, 1955; Glatt, 1964); but their very plurality distinguish them as being not entirely satisfactory. Some definitions stress the medical criteria, others the social factors, and so on. Most of the existing classifications have failed to achieve general agreement either because they are entirely descriptive; or presuppose views on the aetiology of alcoholism which are not shared by more than a minority of students of alcoholism. The World Health Organization Alcoholism Sub-Committee (1952) attempted a system of classification which aims on the one hand to avoid begging aetiological questions and on the other to avoid becoming involved in detailed discrimination on a symptomatic basis. They

proposed the following system of classification:

1. Irregular symptomatic excessive drinkers.
2. Habitual symptomatic excessive drinkers.
3. Addictive drinkers (Alcohol addicts).

Alcoholics fall within the two latter groups while the first category defines excessive drinkers. Excessive drinking is defined as "any form of drinking which in its extent goes beyond the traditional and customary 'dietary' use, or the ordinary compliance with the social drinking customs of the whole community concerned, irrespective of the aetiological factors leading to such behaviour and irrespective also of the extent to which such aetiological factors are dependent upon heredity, constitution, or acquired physiopathological and metabolic influences." (W.H.O., 1951, 1952). Alcoholism is defined as follows:

"Alcoholics are those excessive drinkers whose dependence upon alcohol has attained such a degree that it shows a noticeable mental disturbance or an interference with their bodily and mental health, their interpersonal relations, and their smooth social and economic functioning; or who show the prodromal signs of such developments. They therefore require treatment." (W.H.O., 1952).

The distinguishing feature between habitual symptomatic excessive drinkers and alcohol addicts is the "loss of control" shown only by alcohol addicts. "Loss of control" is described by Jellinek (1952, 1960) as follows ".....drinking of alcohol starts a chain reaction which is felt by the drinker as a physical demand for alcohol". Keller (1960) has put it in the following terms, "whenever an alcoholic starts to drink it is not certain that he will be able to stop at will."

Diethelm (1955) has criticised the definition of alcoholism recommended by the W.H.O. Sub-Committee on the grounds that it does not differentiate the types sufficiently to offer a satisfactory basis for a far-reaching investigation of aetiological factors. Similarly, he has argued that the three stages in the classificatory system accepted by the Sub-Committee cannot be supported in its rigid form by scientific evidence. But the

fact that the classification proposed by W.H.O. was qualified by the conscious attempt on their part to avoid begging aetiological questions and to becoming involved in detailed discrimination on a symptomatic basis indicated the ad hoc nature of their definition and of the Sub-Committee's alertness to its limitations. As Diethelm's own approach to the problem embraces physiological and constitutional factors as well as evidence from cultural anthropology and sociology, the most that can be said from a general point of view is that the topic continues to elude unification under any single generally accepted definition; and the definition put forward by W.H.O., if only by virtue of the frequency with which it is repeated by students of alcoholism, remains the most generally accepted one in clinical practice. An operational definition of alcoholism for the purpose of this study will be given in a later chapter.

3. Prevalence

In recent years there has been a growth of interest in the problem of alcoholism among workers in the field of medicine and the social services, as well as among members of the community at large. The World Health Organization Expert Committee on Mental Health (W.H.O. 1951) has pointed out that in many countries, the public-health authorities have been slow to recognize the extent and seriousness of the problem of alcoholism. A similar point has also been emphasized by other agencies at a national level, such as the British Medical Association (1965). Nevertheless, as Glatt (1964) has remarked, the situation is a far cry from conditions depicted 200 years ago by Hogarth, whose "Gin Lane" was peopled by crowds of undernourished drunks, or from those which led Cruickshank 100 years ago to attack the ravages brought about by "The Bottle". Today, alcoholism is generally accepted as an urgent problem, with medical, psychological, economic and sociological implications.

There are many difficulties in the way of making a reliable assessment of the extent of the problem in any community. As recently as 1965, a Sub-Committee of the Standing Medical Advisory Committee of the Scottish

Home and Health Department (H.M.S.O. 1965), briefed to consider and report upon health services for the treatment and rehabilitation of alcoholics, stated as follows; "We found ourselves unable to make a reliable estimate of the number of alcoholics in Scotland at the present time".

Some of the difficulties in the way of arriving at a reliable estimate of the incidence of alcoholism in any particular country have been outlined by the W.H.O. Expert Committee on Mental Health, Alcoholism Sub-Committee (W.H.O. 1951). They include:

1. The extreme variation in social drinking customs and habits in different countries.
2. Variation in the types of alcoholic beverages consumed, and in the average level of consumption in different populations. For example, the average drinking patterns of the rural inhabitants of the wine-producing areas of France would be quite different from those of the rural inhabitants of districts in Scotland, say, where beer and whisky are more readily available.
3. Differences in the influence of the social milieu on drinking habits between one country and another.
4. Variations in the level of alcohol consumption between different socio-economic groups. The Committee observed that in some countries a higher alcohol consumption is to be found chiefly in the higher socio-economic groups; whereas in others consumption is at its highest at the lower end of the socio-economic structure.

They concluded that no easy generalizations can be made about drinking habits, alcohol consumption, and the disorder of alcoholism. It is difficulties such as those outlined above that add piquancy to the recent observation of Dr. A. Fouquet (1965) that alcoholism as it is known in France is not the loss - of - control alcoholism familiar to Anglo-Saxon cultures.

Another obstacle in the way of arriving at an accurate assessment of the incidence of alcoholism in a community arises from the fact that a good many alcoholics never come to the notice of community services.

The Sub-Committee of the Standing Medical Advisory Committee, mentioned above (H.M.S.O. 1965), stated in their report that even those most closely in touch with the community - family doctors, ministers and social workers - reported that they were frequently unaware of alcoholics in their district unless some social, medical or legal crisis brought them to their notice. The unreliability of mortality statistics also presents further difficulties: "Certification of death from acute and chronic alcoholism is notoriously unreliable, as physicians are generally reluctant to embarrass families through certification of the death of a family member from this cause. Furthermore, as vitamin and hormone treatments of these diseases become more widely used, deaths from these causes tend to decrease. The trend of death from these causes reflects largely the trend of treatment". (W.H.O. 1951).

In spite of these many difficulties, however, policies for the treatment, rehabilitation, and public care of alcoholics in any given country require at least an approximate knowledge of the number of alcoholics in the country. Besides, part of the general concern about alcoholism is the belief that alcoholism in the community is increasing. The belief has been summarized in the following terms: "the balance of probabilities is that people are drinking more, more of them are behaving in an anti-social manner because of their drinking, more are dying of cirrhosis of the liver and more are suffering from alcoholism" (H.M.S.O. 1965).

The belief that alcoholism is on the increase in the United Kingdom is supported by data published in the report on health services for the treatment and rehabilitation of alcoholics (H.M.S.O. 1965). The data contained in Tables 1, 2 and 3, taken from the report, show that in each country the number of admissions to mental hospitals for alcoholism and the proportion of such admissions to total admissions have increased in recent years, and that in both Ireland and Scotland the increase in the proportion greatly exceeds the general increase in the total admissions to mental hospitals during the same period.

Table 1. Indicating the steady increase in admissions of patients with a diagnosis of alcoholism or alcoholic psychosis to Scottish mental hospitals in recent years

Year	Alcoholic Admissions	Total Admissions	Percentage of Total Admissions
1959	921	12,592	7.3
1960	1,091	12,892	8.5
1961	1,350	13,686	9.9
1962	1,617	14,724	10.9

These figures show that the proportion of alcoholic admissions to total admissions increased by almost 50 per cent. in the four-year period while the number of total admissions rose by less than 18 per cent. These figures do not include the number of alcoholic admissions to psychiatric units in general hospitals during the period.

Table 2. Indicating the increase in the number of admissions for alcoholism to mental hospitals in England and Wales during a four-year period.

Year	Alcoholic Admissions	Total Admissions	Percentage of Total Admissions
1959	2,044	105,742	1.9
1960	2,480	114,552	2.0
1961	Figures for the whole year are not available		
1962	3,690	156,758	2.4

Table 3. Showing the trend towards more mental hospital admissions for alcoholism in Eire

Year	Alcoholic Admissions	Total Admissions	Percentage of Total Admissions
1959	404	11,742	3.4
1960	502	12,555	4.0
1961	714	12,964	5.5
1962	785	14,428	5.4

The increase in the proportion of alcoholic admissions to total admissions over the period was almost 60 per cent. compared with an increase of less than 24 per cent. in the number of total admissions.

A formula devised several years ago by the late Dr. E.M. Jellinek (Appendix 1) of Yale University, U.S.A., has been widely used to estimate the incidence of alcoholism. Table 4, based on the Jellinek formula (W.H.O., 1951) gives an estimate of the prevalence of alcoholism for various countries. The compilers of the table have pointed out that no arbitrary principles entered into the selection of the countries for which estimates have been made; rather, these estimates are only for those countries for which recent basic material could be obtained. The estimates in the fourth column apply to the number of alcoholics who, in consequence of prolonged heavy alcoholic excess, have developed either bodily or mental disorders incumbent upon such excess.

Table 4. Estimated alcoholism-rates for various countries

Country	Year	Adults as percentage of total population	Estimated number of alcoholics		
			with complications		with and without complications
			Total	per 100,000 adults	per 100,000 adults**
Switzerland	1947	69.8	50,000	1,590	2,385
Chile	1946	52.7	43,000	1,497	1,500
France	1945	70.6	375,000	1,420	2,850
U.S.A.	1948	66.0	952,000	988	3,952
Australia	1947	67.5	34,300	671	1,340
Sweden	1946	71.7	30,800	646	2,580
Denmark	1948	67.4	13,500	487	1,950
Italy	1942	63.3	135,800	476	500
Norway	1947	70.2	8,400	389	1,560
Finland	1947	64.2	8,800	357	1,430
England & Wales	1948	72.0	86,000	278	1,100 ^{***}

* Varying ratios of "alcoholics with complications" to "all alcoholics" have been assumed on the basis of discussions with experts for the various countries, except for the U.S.A. for which the ratio of 1 : 4 is well established.

** While the estimate of "alcoholics with complications" for England and Wales is probably reliable, the estimate of "all alcoholics" in these countries is hardly better than a guess.

The data contained in Table 5, compiled more recently by Dr. R. Popham of the Ontario Alcoholism and Drug Addiction Research Foundation (Glatt, 1964) are comparable to those given in Table 4.

Table 5. Estimated prevalence of alcoholism in various countries (R. Popham, 1958).

Country	Alcoholics per 100,000 population (20 years and over)	Year
France	5,200	1945
U.S.A.	4,360	1955
Chile	2,960	1950
Sweden	2,580	1946
Switzerland	2,100	1953
Denmark	1,950	1948
Canada	1,890	1956
Norway	1,560	1947
Finland	1,430	1947
Australia	1,340	1947
England & Wales	1,100	1948
Italy	700	1954

Not only does the incidence of alcoholism vary from country to country, but so also does the ratio of male alcoholics to female alcoholics. In the U.S.A. for example the male/female ratio has been put at 7 : 1; in Norway 23 : 1; in Switzerland 12 : 1; and in England 2 : 1 (Bowman and Jellinek, 1941). In all probability these ratios do not hold true for the 1960's. In the United States, for instance, more recent figures for hospital admissions for men and women with a diagnosis of alcoholism reports a male/female ratio of 4 : 1. (American Psychiatric Association, 1965).

According to figures published in the Scottish Health Bulletin (1964) the admission rate to mental hospitals in Scotland for alcoholism among men, is nearly seven times higher than in England and Wales. For women the rate is five times higher. (Morrison, 1964).

Vallance (1965) has suggested that the rise in admission rates cannot be taken as indicative of a rise in prevalence; on the contrary, it may be that they reflect other changes, such as the attitude of the patients towards the acceptance of treatment, the attitude of the family doctor towards referral, and the availability of hospital beds. But this is not a strong argument against the belief that alcoholism is increasing in Britain; for one thing, persistent criticisms of the available facilities for tackling the problem of alcoholism and of the attitude towards alcoholism (W.H.O. 1952; B.M.A., 1965; H.M.S.O., 1965; Thimann, 1965) have been aimed at the very lack of the facilities and attitudes put forward by Vallance as possible explanations of the rise in admission rates. "In very few countries are the physician, the nurse, or the medical social worker given any adequate education on the subject of alcoholism during their basic training.....it is not surprising, therefore, that the bulk of the medical and nursing profession in most countries is ill-equipped to advise on the clinical problems of alcoholism" (W.H.O., 1951).

THE EFFECT OF ALCOHOL

Investigations into the effect of alcohol on the behaviour of organisms - animal and human - may be grouped into three categories as follows:

1. Experiments into the effect of alcohol on the performance of normal organisms, in which some specific cognitive or motor response, such as problem solving or reaction time is affected. Experiments such as those reported by Sidman (1955), Stebbins, Lundin and Lyon (1960) Spitler and Trubit (1965), fall into this category.
2. Experiments on the effect of alcohol in alleviating behavioural disturbances, in animals, produced under laboratory conditions. Such laboratory produced behavioural disturbances go under the general term: "experimental neurosis" and the use of alcohol to relieve these disturbances is known as "experimental alcoholism". The experiments of Masserman and Yum (1946), Smart (1965), Conger (1951, 1956), and to a certain extent that of Myers (1960), fall into this category. While accepting that the relief by alcohol of experimentally induced neurotic manifestations in animals represents a close approach to alcoholism, the World Health Organization Expert Committee on Alcohol (1954) have pointed out that important features of alcoholism are not represented in such experimental situations. An example is the fact that the preference for alcohol does not persist after resolution of the conflict.
3. Investigations concerned with the behaviour of individuals who have had a long history of excessive use of alcohol, that is alcoholics. The literature on this field of research is extensive. It has been largely influenced by interest in research into organic brain damage and cognitive deficits resulting from alcoholism or the concomitants of alcoholism,

such as nutritional deficiencies (Kessel and Walton, 1965). Investigators have been concerned with such phenomena as intellectual impairment, conceptual deficits, field dependence and other aspects of impaired cognitive and perceptual functions. These areas have attracted the attention of such workers as, Jellinek and McFarland (1941), Wechsler (1958), Karp, Witkin and Goodenough (1965), Witkin, Karp and Goodenough (1959), Bailey, Hustmeyer and Kristofferson (1961), Carpenter et al. (1961), Fitzhugh, Fitzhugh and Reitan (1960, 1965), Talland and Kasschau (1965).

Alcohol and Performance

With regard to experiments of the first type, Sidman (1955) investigated the effects of alcohol on timing behaviour. Rats were first trained to press a lever to receive a drop of water as reinforcement. After the initial training, the animals were required to wait a period of 21 seconds before responding in order to get the reinforcement. If the animals did not respond within a critical period, that is, if the response was too short or too long, the reinforcement was withheld. After training in this technique the rats were able to make fairly accurate temporal discriminations, with delay of response time clustering between 18 to 21 seconds on a number of trials. When the rats were given injections of 3 ml. of a 20 per cent. ethyl alcohol solution, Sidman found a decline of about 50 per cent. in the response rate. However, apart from depressing the response rate alcohol, at that concentration, had little effect on the timing behaviour.

Stebbins, Lundin and Lyon (1960) have studied the effect of alcohol upon reaction time in the white rat. The animals were trained to discriminate between light and dark. Once they had learned this simple discrimination they were trained to press a lever within three seconds after the onset of light. Successful lever pressing led to a food award. The animals were not rewarded for any responses made after the lapse of three seconds. The light was turned off for thirty seconds between presentations. After the animals' lever pressing response had settled

down to about 1.5 seconds from the onset of the light, they were injected with two to three millilitres of a 20 per cent. ethyl alcohol solution, alternating with injections of a saline solution which acted as control in the measure of differences in reaction time. The results showed that while the alcohol injections had only a slight effect on the number of lever pressing responses, it significantly increased the time they took to react to the light.

At the human level, Spitler and Trubitt (1965) in a report of an experiment to measure the effect of alcohol on driving, found that with a blood alcohol concentration estimated by breath-analysis at 0.03 per cent. one subject experienced a 30 per cent. impairment of judgment of distance. Another subject in the experiment with a blood alcohol concentration of 0.18 per cent. demonstrated an over-all impairment of 20 per cent. in all the tests, which included reaction time, motor co-ordination, visual function and attention. The most significant impairment caused by alcohol, found among the 10 subjects taking part in the experiment, was inability to make constant and rapid judgments coupled with proper motor co-ordination.

Conflict and Experimental Neurosis

The suggestion that neurotic disturbances among human beings stem from conflict is based, on the one hand, upon psychoanalytic theory, supported by case studies, which holds that unresolved and repressed conflicts originating in infancy are the primary determinants of neurosis (Munroe, 1957; Berelson and Steiner, 1964; Ford and Urban, 1964). However, the psychoanalytic hypotheses are still largely untested in the laboratory. On the other hand are experiments in which the experience of conflict originates in conditioning procedures, in the laboratory, so designed as to induce a disturbance of behaviour, or "experimental neurosis", in lower animals. An experiment by J.B. Watson (1920) is illustrative of a similar process operating at the human level, in the case of a 9 months old boy, Albert, as the experimental subject.

Pavlov (trans., G.V. Anrep, 1927) was the first to report upon

neurotic behaviour in animals, produced by experimentally generated conflict. A dog was confronted with a difficult discrimination learning situation in which a positive food reward always followed the presentation of a circle in a series of trials but never an ellipse. However, as the ellipse approximates closer to the shape of the circle, the animal is finally faced with a stimulus at an intermediate point on the circle-ellipse continuum such that the opposing responses are evoked in more or less equal strength and frequency. Pavlov found that when the ellipse with ratio of semi-axis 9 : 8 was reached performance became fluctuating and finally became considerably worse, or the response disappeared altogether. "At the same time the whole behaviour of the animal underwent an abrupt change. The hitherto quiet dog began to squeal in its stand, kept wriggling about, tore off with its teeth the apparatus for mechanical stimulation of the skin, and bit through the tubes connecting the animals' room with the observer, a behaviour which never happened before. On being taken into the experimental room the dog now barked violently". (pp. 290 - 91).

Wolpe (1958) has reported at length on his own work in the production of "experimental neurosis" in cats and has made use of his experimental findings in the formulation of his theory and technique of psychotherapy by reciprocal inhibition. Yates (1962) has reviewed the major theories of conflict along with a number of the important studies in this field of experimental psychology. Among the major theories is that of the Gestalt oriented psychologist, Kurt Lewin (1935). Lewin's theory of conflict, together with its translation into behaviouristic terms by N.E. Miller (1944, 1951, 1959) and his co-workers, has been the source of considerable experimentation.

Lewin (1935) has defined three types of conflicts as follows:

1. Approach - approach conflict. In this kind of conflict the person "stands between two positive valences and is required to choose between them." (Yates, 1962).
2. Approach - avoidance conflict. The contingency for such a conflict

is one in which the person is faced with a situation, or object, which has both positive and negative valences and he is required to choose between them; that is, the person is both attracted toward and repelled by the same object.

3. Avoidance - avoidance conflict. This type of conflict occurs when the person is caught between two negative valences. For example, when the threat of punishment is used to move a child to do a task he does not want to do.

Lewin has represented these constructs schematically in a number of ways and has applied them to an interpretation of the psychological conditions of reward and punishment. Yates (1962) has pointed out that Lewin's concepts of approach and avoidance are translatable, in effect, into the behaviouristic language of discrimination learning, the line taken by Miller and his associates as pointed out above. Lewin's theory of conflict is pertinent to the learning theory description of the development of alcoholism and is exemplified by studies of "experimental alcoholism" such as those outlined below.

Masserman and Yum (1946) have reported on the production of behavioural disturbances in cats by the use of noxious stimulation. They first trained cats to open a box in order to obtain food. Then the animals were subjected to blasts of air in the face, or electric shocks, whenever they opened the box; in this way the previously established feeding response was disrupted and a variety of behavioural disturbances in the experimental cage appeared, following upon the precipitation of the conflict experience. These have been reported as agitation or immobility, vocalization, refusal of food and, on presentation of the previously learned feeding signal, crouching, trembling, mydriasis, and other signs of anxiety. Outside the experimental cage some animals became excessively timid, while others became aggressive toward their cage mates or toward humans. The behavioural disturbance was relieved when the cats were given mild doses of alcohol by injection. A significant feature of the experiment is that before the development of the phobic avoidance reaction the cats regularly preferred to be fed on plain milk rather than milk

containing 5 per cent. alcohol. Under the phobic condition they developed a preference for the 5 per cent. solution of alcohol. Finally, with the extinction of the phobic reaction preference for the alcohol disappeared.

Similarly, Smart (1965), in an experiment designed to measure the effects of alcohol on conflict and on avoidance behaviour in cats, found that the cats that were given alcohol exhibited significantly fewer ($P < .05$) neurotic behaviours than did a control group of animals that were given dextrose.

The condition created by the Masserman and Yum experiment was essentially an approach - avoidance conflict, in which the effect of alcohol was to initiate a reduction in the fear or anxiety which motivated the avoidance behaviour. This line of thought has been taken up experimentally by Conger (1956) and will be further elaborated in later sections of this report, when the learning theory account of the aetiology of alcoholism is discussed.

In another context, Myers (1960) has reported that rats will learn to prefer a solution of alcohol and water to plain water if they are raised on the alcohol diet for a period of time, providing that the solution does not exceed a critical strength. Rats raised on a five per cent. solution showed the preference for the mixture while rats raised on a 20 per cent. solution showed a greater preference for plain water.

Experiments such as those of Masserman and Yum (1946) and Smart (1965) seem to offer parallels to an understanding of the development of alcoholism in a person who finds in alcohol relief from the stresses and conflicts of daily life; and opens the way for a learning theory approach to the definition of alcoholism as a learned habit. In that reported by Myers (1960) can be perceived a tentative explanation in the case of the social drinker whose 'taste' for alcohol, nurtured on social responses over time, may be in danger of pathological escalation.

Alcoholism and Cognitive Deficits

Experiments of the third type, that is, those that are concerned with the psychological effects of brain damage induced by alcoholism, are important guides to the design of treatment programmes for alcoholism, including the selection of patients for psychotherapy. In the first place there is the question of the impairment, whether it is reversible or not (Maller, et al. 1960); in the second place, there is the question of the effect of brain damage on the cognitive efficiency of the alcoholic, as this has a bearing on his ability to manage his daily life no less than his ability to respond to and benefit from psychotherapeutic treatment.

Where conditioning therapy is involved these studies are of further importance in so far as the hypothesis that brain damage tends to produce extraverted behaviour patterns holds true. That is, brain damage leads to an increase in inhibitory potentials, a quality more in evidence among extraverts (Eysenck, 1957, p. 145). According to this hypothesis individuals with organic brain pathology, by virtue of their susceptibility to an increase in inhibitory potentials, condition slowly, or poorly, and extinguish rapidly compared with subjects whose inclination lies in the direction of an increase in excitatory potentials, that is introversion. If the theory holds true, then alcoholics in whom organic brain impairment is identified should be regarded as poor candidates for conditioning therapy.

Maller et al. (1960) have analysed the correlation between the cerebral lesions revealed by encephalography and the varying degrees of chronic alcohol intoxication in 37 patients. All the lesions could be detected in the encephalograms; they varied from ventricular asymmetries to extensive hydrocephalus and marked cortical atrophy, and appeared to be due to metabolic disturbances produced by the chronic intoxication with ethanol products. The lesions may be reversible if the cellular alterations are not too profound. Some correlations have been found between the duration of the intoxication, the profession and life of the patient, repeated disintoxication and cortical and subcortical changes.

Bennet, Mowery and Fort (1960) have also recognized a stage of reversible organic cerebral changes before irreversible deterioration sets in, in the course of chronic addictive alcoholism. Alcoholic brain disease is usually classified as (1) acute, characterized by delirium tremens, intoxication and hallucinosis, which is reversible, and (2) a chronic, irreversible stage which is characterized by organic dementia and Korsakoff psychosis. The stage defined by Bennet and his associates is described as the intermediate brain syndrome, characterized by severe personality disturbances and intellectual impairment. Of 81 alcoholics studied by them 64 (79%) had abnormal EEG's, most of which subsequently reverted to normal after long periods of abstinence. Organic damage was indicated by psychological tests; and personality changes included rationalization, lack of insight, infantile behaviour, pathological lying. Physiological reactions included blackouts, hangovers, withdrawal symptoms, cirrhosis, and so on. The implications for treatment were as follows:

1. Persistence of abnormal EEG's emphasizes the need for treatment of organic features before brain damage becomes irreversible.
2. After improvement of organic features the patient is ready for psychotherapy.
3. The patient under hospital supervisory control must stop all use of alcohol.

It is of interest to note that these features of alcoholism and its treatment have been recognized by the consultant psychiatrist, Dr. W. McAdam, and his clinical team, working in the Hospice Unit of the Crichton Royal Hospital, Scotland. Indeed, the prolonged period of drug-induced narcosis mentioned in the introductory chapter of this report was designed for the very purpose of detoxication and arrest of organic brain damage. In general, there is need for integration of findings in this area of psychological research with treatment approaches to alcoholism.

THEORIES OF ALCOHOLISM - I

There is no one psychiatric disorder underlying alcoholism; and, in terms of personality structure, there is nothing unique about the alcoholic. In any representative sample of the alcoholic population it will be possible to identify a whole range of personality types, however defined: the immature, the self-indulgent, the introvert, the extravert. The view has been put forward that "anyone can become an alcoholic, if he works at it hard enough". Similarly, as Kessel and Walton (1965) have commented, "Many and varied influences combine to generate alcoholism. There is no single cause. No one factor is sufficient by itself. Social, psychological and physical factors have all operated to produce the established alcoholic" (p. 80).

It would appear that in trying to unravel the complex problem of alcoholism it not infrequently happens that the three variables of definition, personality and aetiology tend to be thrown together in such a way as to obscure rather than to clarify the problem. McCord and McCord (1959) have observed that the difficulty in disentangling cause and effect has been the major obstacle in research on the nature of alcoholism. Another source of difficulties lies in the fact that since the problem of alcoholism touches on such aspects of communal life as medicine, psychology, sociology and religion, definitions and causal explanations tend to vary with the agency making them.

Clinebell (1963) argues that one of the significant factors in the aetiology of alcoholism is the vain attempt of the person to satisfy deep religious needs by means of alcohol. In another study, investigating the family background of a large sample of alcoholics, de Lint (1964) found that members of the psychotic and alcoholic population are far more likely to have experienced the early loss of parents than in the population at large, and that parental deprivation may be more frequently a factor in the development of alcoholism in females than in males.

The following quotation (Glover, 1955) is perhaps representative of the psychoanalytic position: "Assuming.....that we have chosen a case of only moderate severity..... The early stages of the analysis lead almost invariably to the uncovering of genital (castration) anxieties, and the more positive phases of Oedipus conflict. The function of the drug as an elixir to combat different types of sexual inhibition, is apparent at both conscious and unconscious levels. And since the transference is at first mildly positive, a certain reduction of the intensity of the addiction may ensue. This comes to a halt when the unconscious homosexual barrier is reached, and attention must then be turned to the ego-resistances, which will be found to depend mainly on pre-genital guilt systems, covering a marked amount of pre-genital sado-masochism. In most cases evidence of pathogenic introjection makes its appearance, although where projective mechanisms predominate these are not so easy to detect". (p. 214).

The quotation from Glover is intended to give the flavour of the psychoanalytic approach to the development and treatment of alcoholism. To appreciate fully the implications of this approach would mean a fairly comprehensive discussion of the theory and technical language of psychoanalysis. Such an analysis would be out of context in this study.

An appreciation of the difficulties inherent in the problems of unravelling the aetiological question is gained from discussions put forward by such students of alcoholism as Jellinek (1960); Diethelm (1955); McCord and McCord (1959, 1960). Of these, the research reported by McCord and McCord is of special significance, by virtue of the fact that it is the first reported study in which it was possible to study some of the hypothesized causes of alcoholism before the disorder set in. Other authorities who have commented on the origins of alcoholism concentrated on alcoholics "after the disorder had taken control of their bodies and minds."

The work originated from a longitudinal study of 650 boys selected from two cities in Massachusetts for intensive investigation in an

experiment on the prevention of delinquency. Half of the sample were judged to be "maladjusted" by criteria set by teachers and social workers; half were judged to be normal. The task of the analysis was to investigate the relationship between the adult adjustment of the subjects and their early lives: familial relationships, childhood physical conditions, social environment and personalities. A systematic follow-up study of the adult adjustment of the boys was initiated in 1956, some of the subjects having by then attained the age of 30 years. Those among the original sample who had become alcoholics were compared with those who had not become alcoholics on a number of variables said to have some bearing on the development of alcoholism.

For the purpose of the study alcoholism was measured, operationally, in terms of community records. Those men whose chronic drinking had caused problems sufficiently severe to bring them to the attention of the "official" community were defined as alcoholics; that is, those who had been arrested two or more times for public drunkenness, or had been committed to a mental hospital with a diagnosis of alcoholism, or had sought treatment for alcoholism through Alcoholics Anonymous, mental health clinics or community committees on alcoholism, were classified as alcoholics. By these criteria 29 of the subjects were defined as alcoholics. These subjects were compared with a control group of 158 non-deviant subjects; that is, neither criminals nor alcoholics.

The McCords examined theories of alcoholism under three headings: physiological, psychological, and sociological. They found no support for some of the widely held views on the aetiology of alcoholism. They summarized their conclusions in the following terms:

Before the onset of the disorder, the alcoholics did not differ from the control population in nutritional or glandular functioning. As a group, the alcoholics were, in childhood, no more disturbed by inferiority feelings, oral tendencies or homosexual urges than the controls, but they may have been more "self destructive". Certain ethnic groups, the

American middle class, and perhaps American culture itself, produced a tendency towards alcoholism. Conflict in familial attitudes about drinking may also have contributed to alcoholism.

The most important variables in the childhood background that were listed as correlating with alcoholism were: (1) Maternal alternation between affectionate and rejecting attitudes; (2) maternal deviance, e.g., alcoholism, promiscuity; (3) paternal antagonism; (4) paternal escapism; (5) an "outsider" in conflict with parental values; (6) absence of high demands on the child by the parents. They hypothesized that such forces developed strong desires to be dependent but that this disposition is incompatible with the self image in the stereotype of the American male as an independent, courageous, and resolute individual. Drinking resolves this conflict of forces acting on the individual.

In spite of its unique nature, it would perhaps be unwise to generalize from this study about the genesis of alcoholism; for one thing the size of the alcoholic sample was too small to allow for adequate sub-groupings for the purpose of drawing reliable statistical inferences. The study, however, does serve to illuminate the force of conflict experiences as a precipitant of maladaptive behaviour.

THEORIES OF ALCOHOLISM - II

Reinforcement Theory

The primary notion of a reinforcement theory of learning is that the learning of a stimulus-response connection requires the presence of some sort reward or reinforcement. In turn, reinforcement is defined in terms of drive-reduction. The description of the development of alcoholism within the framework of a reinforcement theory of learning is only one aspect of the application of the theory to behaviour. More generally, the theory also applies to the description of personality development. A survey, therefore, of the concept of personality from this point of view will serve to orient the discussion towards its more specific application to the aetiology of alcoholism, to the behaviour of the alcoholic and to the design of therapeutic procedures.

Historically, the systematic study of personality is of relatively late development and followed a course somewhat independent of the older established field of experimental psychology. It arose as part of the clinical tradition of observation, beginning with such French physicians of the nineteenth century as Charcot and Janet. Charcot, Janet, and the line of physicians extending from Sigmund Freud, Breuer, Jung and Adler, were particularly interested in the study and treatment of abnormal personalities and, in the early days, more especially the common disorder of the time, hysteria. The first really systematic approach to the study of personality from a psychological standpoint began with Freud and the psychoanalytic school. Freud's work in this direction was intended as an effort to understand the basic nature of man as well as those deviations of behaviour which are designated as abnormal, or psychopathological. Most of the early personality theorists, therefore, were physicians working in the psychiatric field who combined their theories of personality with the practice of psychotherapy as a means of treating mental disorders, particularly the neuroses. At the same time, the nucleus of an alternative

approach was created by I.P. Pavlov, the nineteenth century Russian physiologist, in his work on the conditioned reflex and his theory of cortical functions in relation to behaviour.

Maher (1964) has pointed out that personality psychology has changed during the past two or three decades. This change has been marked by a move away from theorizing on the grand scale and toward a more disciplined concern with obtaining empirical answers to manageable hypotheses. To this end, research in personality has turned increasingly to the more formal methods of psychological investigation, from the study of the single case history to the use of controlled experiments in the laboratory.

When we ask the question, what is personality we are immediately confronted with the problem of description and definition. Allport (1937, 1961) has made a most exhaustive survey of definitions of personality, beginning with the etymology of the word "persona", which originally denoted the theatrical mask worn in Greek, and later, Roman drama. The concept of persona was later extended to mean external appearance, not the true self, and became embodied in the personality theory of C.G. Jung (1923, 1940) See also, Fordham (1953); Munroe (1957).

The varieties of definitions of personality have been conveniently classified under the four headings of omnibus, integrative, hierarchical and adjustmental (Lundin, 1961). The learning theory approach to personality falls into the adjustmental class of definition in which the emphasis is on characteristics or behaviours which enable a person to exist in his environment and to keep his equilibrium or psychological homeostasis. When these endeavours fail the person ends up with what may be called a maladjusted personality.

Learning Theory and Personality

Lundin (1961) has argued that there is no reason to assume that the study of personality poses any new problems peculiar to itself, as most personality theories do. He describes the psychology of personality as "that branch of the general field of learning which studies in particular

those processes most significant to human adjustment. Among others, these include: how learning operates in early development, the importance of motivation, the effects of aversive conditions, conflicts and its consequences (maladaptive behaviour, neuroses, and psychoses), and the role of learning in therapy" (p. 6).

This orientation places great emphasis on the function of reward, or reinforcement, in the control of behaviour. Largely influenced by the work of B.F. Skinner (1938, 1948, 1953, 1959), the reinforcement theory approach has attracted a great amount of experimental interest. Another influence on the experimental study of personality within the framework of modern learning theory has been the substantial work of H.J. Eysenck (1947, 1952, 1957, 1953).

The learning theory emphasis follows from the simple proposition that the greater part of man's behaviour is learned and learning involves certain lawful relationships which needs to be understood. But although our behaviour may be lawful, each one of us develops under a different set of environmental conditions ; hence as adults, we end up with a unique kind of behaviour equipment, acquired over a long period of maturation and acculturation. The unique behaviour patterns are made up of the behaviour peculiar to the individual and constitute his personality. This line of reasoning is not refuted by the evidence that there are biological foundations for behaviour which are set at conception (some of us are destined to be taller or shorter, bright or dull, blonde or brunette); the fact remains that a great deal of the individual differences among people arise out of the different histories of development each person has had. Therefore, the process of behaviour acquisition is important not only for an understanding of normal development, but for an understanding of certain kinds of disturbances in behaviour, such as the neuroses. "Personality is that organization of unique behaviour equipment an individual has acquired under the special conditions of his development". (Lundin, 1961).

The study of personality also implies a consideration of the fact

of individual differences in response repertoire. The importance of taking this fact of individual differences into account in personality research has been argued by Eysenck (1966); neglect of it not infrequently gave rise to disappointing experimental results.

Alcoholism and the Reinforcement Theory of Learning

Principles of learning have been used to account for the development of alcoholism (Conger, 1956; Kingham, 1958; Kepner, 1964; Blake, 1965 1966). Clinical and experimental observations indicate that alcohol operates to reinforce behaviour. In moderate amounts alcohol acts as an effective stimulant to verbal and social behaviour; after a few drinks a person may feel excited, assertive, talkative or sexually stimulated; in this way alcohol is reinforcing; through experience the drinking response becomes learned.

Beyond these considerations we find that when an organism is placed in a situation where anxiety is aroused, the reinforcing effects of alcohol appear to be all the more powerful. This has been shown in the case of animal experiments by Masserman and Yum (1946); Smart (1965); Conger (1956). Similarly, at the human level not only does alcohol act to reduce the behavioural manifestations of anxiety, "but, if taken in large enough amounts, it can allow a complete escape from aversive circumstances when the degree of intoxication reaches a state of delirium or even stupor." (Lundin, 1961, p. 360). Thus, for an already disturbed person, alcohol provides a temporary escape from his symptoms, as well as offering a means of avoidance of the events that incite his symptoms.

Kingham, (1958) has defined alcoholism as resulting from a learned pattern of "blitz" or uncontrollable drinking, used by the individual to reduce a disturbance of psychological homeostasis. According to this definition an almost infinite variety of emotional conditions may cause a disturbance of psychological homeostasis, frustration, fear, loneliness, anxiety, depression,even states of "intense happiness, elation, and the like". The notion of alcohol as a learned habit is also implied by Mayer-Gross, Slater and Roth (1954). "We have spoken of

alcoholic addiction, but it is well to remember that alcohol is not a drug of addiction in the strictest sense, as are, for instance, morphine, heroin, cocaine and pethidine. Regular consumption over a prolonged period leads in the alcoholic to no tendency to withdrawal symptoms on abstinence, however sudden, as it does with these other drugs. However, like nicotine, the tendency to habit-forming with alcohol is very strong; and once the habit is ingrained, it can only be resisted and cut short by exceptional personalities" (p. 334).

While following a learning theory approach to the description of alcoholism, Kingham's definition is of limited application to the clinical concept of alcoholism as covered by the definition put forward by the World Health Organization Expert Committee on Alcoholism (W.H.O. 1952). Not all alcoholics are "blitz" drinkers. This kind of drinking behaviour fits more closely the type of alcoholic described by Kessel and Walton (1965) as the compulsive alcoholic. This is a variety of alcoholism occurring in people who, "once they have started to drink, cannot stop but must go on until all their money is spent or their supplies are finished or until accident or unconsciousness supervene." (pp. 85-86). Thus, exclusion of the notion of "blitz" drinking widens the operational status of the definition; for the purpose of this study the definition is modified to state that alcoholism results from a learned habit of uncontrollable drinking which is used by the individual in an effort to reduce a disturbance in psychological homeostasis.

The emphasis on uncontrollable drinking is in keeping with Jellinek's (1960) concept of "loss-of-control" alcoholism, the quality which marks off the alcoholic from the non-alcoholic. It is also in line with the idea of "alcohol addiction" as described by Mayer-Gross, Slater and Roth (1954).

The Drive - Reduction Hypothesis

It has been stated that the basic assumption of a reinforcement theory of learning is that the learning of an S - R connection is contingent upon the presence of some sort of reinforcement or reward; and that

reinforcement, such as food, or water, leads to drive reduction. That is, learning takes place because responses are followed by positive or negative reinforcements. More schematically, for learning to take place there must be (a) a drive, either primary, such as hunger, thirst, sex, or a learned drive, such as fear; (b) a cue, i.e., a distinctive stimulus in the environment which becomes a sign of reinforcement; (c) a response, either a motor act or an internal psychological event as a thought, image or fantasy; and (d) a reinforcement, either a reward which is a positive reinforcer and results in a tendency to repeat the act, or a punishment which is a negative reinforcer and results in a tendency to produce avoidance behaviour. (Kepner, 1964).

In a maze learning experiment, for example (Kingham, 1958) the learning paradigm would be as follows:

1. Drive: that is food deprivation in a rat, say.
2. Cue: food smell, acting as a discriminating stimulus (S^D).
3. Response: running maze and eating.
4. Reinforcement: reduction of the hunger drive.

Applied to alcoholic behaviour the paradigm would be as follows:

1. Drive: disturbance of homeostatic condition.
2. Cue: alcoholic beverage.
3. Response: "blitz" drinking pattern.
4. Reinforcement: return to homeostasis.

By constant repetition the drinking pattern becomes firmly stamped in as the dominant response in a hierarchy of possible responses to a disturbance of psychological homeostasis. Its emergence as the dominant response is explained by the notion in reinforcement theory that a sudden reduction in a strong drive acts as a reinforcement of behaviour leading to that reduction. (Dollard and Miller, 1950; Miller and Nessen, 1952).

Further evidence from studies in "experimental alcoholism" will add to a clarification of the drive-reduction line of thought.

Conger (1956) has conceptualized the experiments of Masserman and Yum (1946) in terms of an approach - avoidance conflict, in which the effect of alcohol is to facilitate a reduction in the fear drive which motivates avoidance behaviour. He has conducted a number of experiments to test certain hypotheses derived from the work of Masserman and Yum. The first experiment was an attempt to see whether results similar to that of Masserman and his colleague could be obtained with rats in a simple approach - avoidance conflict situation. "The animals were trained to approach the distinctively lighted end of a straight line alley to secure food and were then thrown into an approach - avoidance conflict by giving them an electric shock at the goal. They were then given intraperitoneal injections of either alcohol or water. Five minutes after a control injection of water the rats would not approach the food - shock end of the alley; after an injection of alcohol they ran up to get the food." (p. 298).

Of further clinical interest in this direction is an experiment by Bailey and Miller (1952), cited by Conger, in which they obtained similar results in cats with the same sort of experimental approach, using barbiturates, such as sodium amytal, instead of alcohol. One not infrequently encounters the alcoholic who is also a barbiturate addict.

Another experiment by Conger set out to determine more specifically how alcohol affected each of the competing tendencies involved in the conflict. "Did the alcohol act primarily to strengthen approach responses based on hunger or to weaken avoidance responses based on fear?" (p. 298). An approach tendency was created in one group of rats by training the hungry animals to run down an alley to eat food. An avoidance tendency was created in a second group by giving them electric shocks at the place of eating instead of food. The place of eating was made distinctive by a light. The strength of the tendencies to approach and avoid was measured by the animals' pull against a calibrated spring when it was temporarily restrained. Half the animals in each group were treated

under control conditions and half under the influence of alcohol. Conger found that the alcohol produced very little difference in the pull of the hungry animals towards food and a marked decrease in the pull of the frightened animals away from the place where they had been shocked on previous trials. Before alcohol, the avoidance is stronger than approach; after alcohol the avoidance is weaker than approach. Both avoidance and approach groups of animals received equal dosages of alcohol.

The evidence suggests that the primary reason for the resolution of the approach - avoidance conflict in Conger's first experiment was that alcohol facilitates a reduction in the avoidance response motivated by fear, thereby allowing the animal to approach the goal and eat. These and other experiments carried out by Conger led him to conclude that alcohol produces a differentially greater decrease in the learned drive of fear which motivates avoidance, while having little effect upon the primary drive of hunger which motivates approach; in fact, one of the drives most vulnerable to alcohol is anxiety.

Functional Autonomy

It has been stated that drinking is learned because it is reinforced; that alcohol is used to reduce anxiety or to avoid anxiety. Nevertheless, as drinking continues a point is reached where it is more punishing than rewarding, socially and personally. This follows from the knowledge that drinking progresses through the phases of social drinking, excessive drinking and alcoholism. (W.H.O., 1951, 1952). The alcoholic stage is marked by such clinical signs as feelings of guilt about drinking along with loss of the ability to control the amount drunk, remorse, reduction in interests, drop in work efficiency, absenteeism, the onset of periods of amnesia, although the individual is apparently aware of events at the time, surreptitious drinking, pre-occupation with the available supply of drink, loss-of-control, and other signs, which have been conveniently summarized by Kessel and Walton (1965). In this way, a stage is reached when alcohol begins to generate its own unique disturbances of personal well-being; and to this extent drinking is no longer adjustive but aversive.

It may even be that because of its pervasive nature at this stage drinking has ceased to be related to the reduction of any specific or identifiable disturbance of psychological homeostasis beyond that which it generates in its own right.

This aspect of alcoholism is somewhat akin to Allport's (1935, 1961) concept of "functional autonomy". Functional autonomy refers to any acquired system of motivation in which the tensions involved are not of the same kind as the antecedent tensions from which the acquired system develops. In other words, "what at first was desired merely as a means to something else, comes at last from habit to be desired for its own sake." (Allport, 1961, p. 229). Allport seeks support for the functional autonomy hypothesis in the notion of self maintaining neural circuits. "A familiar term in modern neurological theory is feedback. It refers to the fact that the end-situation (a response) sends return neural impulses to the brain. These return-impulses discharge in the open pathways, and thus tend to maintain in a circular fashion (or slightly modified fashion) the system that is operating.....what we do not know is how permanent such a system may be. All that we can say at present is that self-maintenance seems to be a basic neural property and offers some basis for the concept of functional autonomy." (p. 246).

The Aversive Nature of Alcoholism

The clinical signs and symptoms of alcoholism make it clear that the disorder generates aversive consequences. Yet the alcoholic is unable to stop himself drinking even though, in effect, his behaviour is punishing rather than rewarding. This is the "neurotic paradox", stated by Mowrer (1948) as behaviour that is self perpetuating and at the same time self defeating. Another problem has to do with the differential effect of alcohol on people. In some individuals alcohol has a warming effect, it excites and stimulates while in others the concomitant behaviour and emotional effect may be depressive or anti-social. Kessel and Walton (1965) have also raised the point that although psychological theories clarify our understanding of the alcoholic by defining how the

past is transferred to the present and influences a person's manner of dealing with current situations, they do not explain exactly why one individual and not another becomes an alcoholic.

Thus, the student of alcoholism is faced with these three issues: (1) the self-perpetuating/self-defeating nature of alcoholism; (2) the differential effect of alcohol on individuals; and (3) why one individual and not another becomes an alcoholic.

1. The Neurotic Paradox

The effect of punishment and deprivation on the organism as well as the influence of avoidance response in maintaining maladaptive behaviour intact go some way towards explaining the neurotic paradox.

The self-defeating aspect of alcoholism is the sense of shame, guilt, remorse and other aversive sentiments experienced by the alcoholic after a drinking bout. The two features of punishment to be noted are, (1) punishment that is delayed is not as effective as immediate punishment, and (2) punishment tends not to extinguish behaviour.

The aversive consequences of alcohol excess is usually delayed, the hangover next morning leading to absenteeism, the wife's attitude, the feeling of guilt. Kamin (1959) has investigated the effect of delay of punishment on the extinction of avoidance behaviour in rats. The results indicated that where the punishment was delayed for intervals varying between 10, 20, 30 and 40 seconds more trials were needed to achieve the criteria of extinction than where the punishment was immediate. Vogel-Sprott and Banks (1965) and Banks and Vogel-Sprott (1965) have investigated the effect of punishment on behaviour among alcoholics and non-alcoholics. The results from these experiments suggest that (a) punishment delayed by 30, 60 and 120 seconds was less effective than immediate punishment in suppressing a rewarded response; and (b) that punishment was less effective in suppressing the responses in alcoholics than in non-alcoholics.

Positive reinforcement, we have noted, builds up the tendency for certain responses to be repeated; negative reinforcement, or punishment, as Skinner (1953) puts it, "is designed to tear them down." (p. 182). The current view, however, is that punishment does not extinguish behaviour

but only suppresses it.

This is a revision of Thorndike's Law of Effect (Hilgard, 1958) which in its original meaning stated that reward or positive reinforcement strengthens the learning of the rewarded behaviour, whereas punishment, or negative reinforcement, reduces the tendency to repeat the behaviour leading to punishment. On the contrary experiments (Hilgard and Marquis, 1961) have yielded data showing that the effects of reward and punishment are not equal and opposite. Instead, "under conditions in which symmetrical action is possible, rewards appear to be much more powerful than punishment."

In the case of the alcoholic, the aversive consequence of drinking is likely to be temporary or merely suppressive in so far as it acts to inhibit drinking; moreover its effect is further weakened by the fact that the punishment is delayed, most likely by several hours, rather than immediate. Also, we have seen that, for him, drinking has become the habitual response to a disturbance of his well-being and that uncontrollable drinking comes, in time, to be itself a source of disturbance of this equilibrium; yet, knowing no other way, he seeks relief in further drinking.

In addition, looked at in the light of a deprivation hypothesis, another feature is that if alcohol acts as a habit-forming drug creating a state of need, then the drive-reducing power of alcohol increases as a function of hours of deprivation. Therefore, while the alcoholic may resolve to stay away from drink, he eventually reaches a point in the deprivation process when he can abstain no longer.

Wolpe (1958) has stated that unadaptive, neurotic responses necessarily have a state of drive as antecedent. This drive is automatically reduced by the retreat of the organism from the anxiety-producing stimulus, or by any other means that removes the organism from the action of the stimulus. This reduction in anxiety drive interferes with the extinction of the neurotic behaviour. Wolpe cited an animal experiment by Farber (1948) to demonstrate his point. "Each time a neurotic cat was passively removed from the experimental cage, anxiety drive was reduced and this reinforced

the neurotic responses."

By a similar argument the resistance to spontaneous remission of phobic anxiety in humans has been explained by Eysenck (1965a) Eysenck and Rachman (1965). The theory here is that in dealing with the anxiety-provoking situation by avoidance behaviour the person is positively rewarded, to the extent that he experiences a reduction in the distressing autonomic conditions supporting the neurosis; at the same time this does not act toward extinction of the neurosis.

The persistence of avoidance behaviour has been demonstrated in numerous animal experiments on avoidance conditioning. Sidman (1953, 1955a, 1960) has examined this phenomenon extensively. In one series of experiments rats were trained to press a lever as the avoidance response. A shock was delivered to the animal through the grid floor of the cage at regular intervals unless the lever was pressed. Each time the animal pressed the lever, a timer that controlled the shock was reset, delaying its onset for 20 seconds. It was possible therefore for the animal to avoid the shock indefinitely, as long as the lever was pressed before the 20 seconds were up. As conditioning progressed the experimenter observed an increase in the rate of lever pressing from its initial level of near zero. A stable rate of lever pressing was finally established and maintained "as high as 17 responses per minute over a 20 hour period" in some animals. This rate was far in excess of that necessary to avoid the shock; and with such a high rate hardly any shocks were actually received by the animals over this period of time.

Another conspicuous observation was that lever pressing became the dominant response; the animals tended to eliminate all other forms of behaviour, such as walking around the cage, grooming, sniffing about, and so forth. Under these conditions avoidance behaviour became very persistent and resistant to extinction. A parallel to this phenomenon is the alcoholic's preoccupation with the available supply of drink and his high rate of consumption in a drinking bout compared with the ordinary social drinker - the man who drinks double whiskies while his companions take singles.

2. The Differential Effect of Alcohol

No doubt, some of the explanation of the variability in the effect of alcohol from one individual to the next, or even within the same individual at different times, can be found in (a) the social context in which drinking takes place and (b) individual differences in response to the ingestion of alcohol; for unique physiological and psychological factors in such individual circumstance must in some way determine his behaviour as alcohol begins to inhibit the controlling action of higher brain function upon lower centres.

Conger (1956) has put forward a number of explanations of the differential effects of alcohol on individuals. One of these states that in different individuals, or in the same individual at different times, fear might motivate the inhibition of a great variety of different responses. In these circumstances, reduction in the fear will release whatever response has been inhibited. This single effect will produce different results depending on the different tendencies that have been inhibited, as for example, aggression, erotic behaviour, dependency reaction, and so forth. (p. 203).

3. Some Persons Do Not Become Alcoholics

The reinforcement hypothesis suggests ways of examining the criticisms raised by Kessel and Walton (1965). To reiterate, each time the alcoholic-in-the-making experiences relief or pleasure from drink the drinking response is reinforced and the tendency to repeat the act is strengthened, becoming eventually the dominant drive-reducing response. Seen as an exercise in problem solving, like a cat in a Thorndike puzzle box, the individual hits upon alcohol as the response that is appropriate to the relief of his tensions. Other responses drop out because they have not been as effective or powerful as liquor. By the same reasoning it can be stated that the barbiturate addict hits upon sodium amytal as his panacea, the phobic reaction type progressively withdraws from his or her environment and finally becomes bed-ridden. Regarded in this light the issue dwindles to the rank of a pseudo-problem, for no more can be said than that in the field of maladaptive behaviour individuals learn different ways of

coping with the conflicts incited by their particular situations. The learning may be fortuitous and in some ways not unlike the stereotyped routine displayed by pigeons in a situation where food was made available at fixed intervals no matter what the birds did in the experimental cage. If one bird was circling when the reward was made available, circling became established as the behaviour associated with reinforcement, if another bird was bowing at the time then that behaviour got stamped in. (Hilgard and Marquis, 1961). Skinner (1959) has coined the term "superstitious behaviour" for this kind of routine.

Stimulus Generalization and Gradient of Reinforcement

Such other terms in learning theory as stimulus generalization and gradient-of-reinforcement add to the meaningfulness of the interpretation of alcoholism in this framework. Through the process of stimulus generalization the cues associated with drinking can become stimuli which trigger the drinking response in the alcoholic. For instance the addict motoring past a favourite country pub thinks how good a glass of beer would taste; or officiating at a rugby match he reminisces on the joys of days of yore, the pint and the ribald moments; or the alcoholic wife at her cocktail party, dispensing drinks to guests, is tempted to try one herself.

The gradient-of-reinforcement principle offers an explanation of the behaviour of the man who continues to drink even when his drinking brings him into conflict with his environment: his employer, his wife, his friends. The principle states that immediate rewards are more reinforcing than delayed ones. Thus, it may be that "the immediate reduction in anxiety more than compensates for the punitive attitudes of the man's wife the next morning," says Conger (1956, p. 303). That is immediate reward is more powerful in sustaining behaviour than delayed punishment in extinguishing it. Another effect of the principle is that responses that are farthest away from achievement of the goal and therefore less useful tend to disappear. For instance, the cat in the Thorndike puzzle box learns to get quickly to the correct response, eliminating all other

unhelpful responses; similarly the alcoholic becomes impatient with his social drinking colleagues, so he nips over to another bar for a quick one or two while they sit around and nurse their drinks, indulging in inconsequential repartee.

Finally, it is likely that the need to tease out the variety of drive patterns and social dynamics that are particularly important among various kinds of alcoholics, male/female differences for example, will emerge as one of the more challenging lines of investigation in an account of alcoholism based upon modern learning theory.

THE AVERSIVE CONTROL OF BEHAVIOUR

The purpose of this chapter is to survey some of the ways of controlling behaviour by conditioning methods as an introduction to the more specific application of conditioning procedures to the treatment of alcoholism.

In recent years there has been a very marked and profitable growth in research activities within the discipline of clinical psychology. The learning theory orientation has contributed a great deal to this tempo, an indication of which is seen in the numbers of new publications by learning theorists working in the field of psychiatry and clinical psychology. Among the most important publications are those by Wolpe (1958); Eysenck (1960, 1965a, 1965b); Eysenck and Rachman (1965); Wolpe, Salter and Reyna (1964); and Franks (1964). In addition, a new journal, Behaviour Research and Therapy, has provided since 1963 a forum for the discussion of theory, techniques and problems within the learning theory frame of reference, with special emphasis on the study and treatment of maladaptive behaviour (neuroses and behaviour disorders).

Objections to Conditioning Methods

We will not be concerned here with the controversy between theorists of different schools about the relative merit of one system of psychotherapy or theory of personality as compared with another. Discussions of this nature have been well taken up by such writers as Eysenck (1961, 1965a); Rachman (1963); Beech (1963); Wolpe, Salter and Reyna (1964); Mowrer (1964); Costello (1963); Urban and Ford (1964), and others, on behalf of one side or other of the controversy. More broadly, the notion of manipulating behaviour by overt conditioning techniques has probably given rise to more objections and emotive responses in the hearts of not a few members of contemporary society, lay and professional, than any other method of behaviour modification. The objections appear to find their source in a philosophical bias which has not yet come to terms with the

ways of science, in the belief that the scientific control of human behaviour threatens the freedom of the individual and even the fundamental tenets of democratic institutions.

Commenting on the threat to freedom, Skinner (1953) observed that, "Science had developed unevenly. By seizing upon the easier problems first, it has extended our control of inanimate nature without preparing for the serious social problems which follow.....If we can observe human behaviour carefully from an objective point of view and come to understand it for what it is, we may be able to adopt a more sensible course of action.....If we are to enjoy the advantages of science in the field of human affairs, we must be prepared to adopt the working model of behaviour to which a science will inevitably lead. But very few of those who advocate the application of scientific method to current problems are willing to go that far" (pp. 5-6).

To come nearer the point, if the objections to the application of scientific knowledge to the manipulation of human behaviour were to be pushed to their logical limit, then not only would such ways of controlling behaviour as that involved in the interrogation of unwilling subjects, such as prisoners-of-war (Biderman and Zimmer, 1961) be strongly refuted, but so also would that important area of medical and psychological practice known as psychotherapy. The end point would be that the frontiers of scientific methodology would be pushed back by the onslaught of ethical and metaphysical arguments of doubtful logical integrity.

Ways of Controlling Behaviour

Learning has been defined by Hilgard (1958) as "the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the changes in activity cannot be explained on the basis of native response tendencies, maturation, or temporary states of the organism (e.g., fatigue, drugs, etc.)" Changes in behaviour of the sort we call learning range from the simplest modifications of the simplest organisms, to the most impressive contributions of human intelligence. It ranges from the development of a variety of

skills, the awareness of social values, to pathological maladjustment.

Conditioning is a form of learning which ideally occurs in carefully controlled laboratory situations. It includes two sub-varieties called classical and instrumental conditioning. Traditionally, conditioning has been subsumed under the more general term learning (Hilgard and Marquis, 1961).

One class of operations serve to control behaviour by means of rewards or positive reinforcements; another class of operations acts aversively to control behaviour. We are concerned here with those operations that act aversively to control behaviour. The procedures involved have been classified by such writers as Lundin (1961), Church (1963), Hilgard and Marquis (1961). They are generally defined as Escape, Avoidance, Punishment and Anxiety training. Each of these four procedures is defined operationally and "although in any chain of activity, they may be interrelated, it is nevertheless possible to distinguish them for the purpose of behavioural analysis." (Lundin 1961, p. 210). Though the procedure for each of these methods may differ all four make use of an aversive stimulus, such as electric shock, to control and modify behaviour.

1. Escape

The escape procedure is one in which the aversive stimulus is present and the response terminates it. That is, in escape conditioning a response is strengthened by the removal of the aversive stimulus. It is one type of instrumental or operant conditioning.

Paradigm: $S_1 \xrightarrow{\quad} S_2$
(Aversive stimulus) (Appropriate response)

An experiment by Mowrer (1940) illustrates how the escape response is established. Mowrer placed rats which had never before experienced electric shock in an experimental chamber equipped with an electric grid floor. Electric shock was delivered at a gradually increasing intensity beginning at a subthreshold level until a maximum was reached at the end of 2.5 minutes

After the first minute, until which time the shock was apparently subliminal, changes began to appear in the animals' behaviour. These changes began with minor agitated activities, the behaviour becoming more and more agitated as the intensity of the shock increased. This behaviour included jumping, squealing, biting the grill, climbing the walls of the chamber and running about. The requirement of the experiment was that the animals learned the response of pressing a pedal at one end of the experimental chamber. This response terminated the shock until the next trial. Mowrer found that on the first trial the animals took from 3 to 6 minutes to make the required escape response. The time was considerably reduced in subsequent trials and by the tenth trial, random responses characteristic of the earlier trials were eliminated and the appropriate response became prompt and specific.

The effects of electric shock on escape behaviour by varying both the strength of the shock stimulus and the length of the shock-free period (the reinforcement) between trials have been investigated by Dinsmoor and Hughes (1956). They found that when a high current was used as the aversive stimulus the animals responded much more promptly to terminate the shock during the first 100 trials, as compared with a low current.

To test the reinforcement variable, that is, the length of time that the shock was turned off after each response, animals (rats) were placed in a high current and a low current group. The periods free from shock for each group varied by 5, 10, 20 and 40 seconds. It was found that changes in the speed of responding was a function of the length of the shock-free period. For the high current group the latency of response declined as a function of the interval up to 20 seconds; while for the low-current group the latency of response declined as a function of the interval up to 40 seconds. Also, at the various intervals free from shock, the high-current group always showed shorter latencies than the low-current group. The experiment indicated that the strength of response in escape conditioning of this nature is related to the intensity of the

aversive stimulus as well as the amount of reinforcement, defined as the length of the period free from shock from one trial to the next.

As is the case in classical conditioning, in escape conditioning a previously neutral stimulus, when paired with the primary aversive one, can take on a conditioned reinforcing function in a manner similar to positive reinforcement. The paradigm then becomes:

$$S_1 \longrightarrow S_2 \longrightarrow R_t$$

in which S_1 , the neutral stimulus, is defined as the secondary negative reinforcer; S_2 is the primary negative reinforcer; and R_t is the appropriate response.

Miller (1948) has demonstrated experimentally how a previously neutral stimulus (S_1) takes on the function of a conditioned negative reinforcer (S^{-R}) and operates like a primary aversive one (S_2) to control behaviour.

Rats were placed in an apparatus containing two compartments (Figure 1). One compartment was painted white the other black. Electric shock delivered through the grid floor was administered in the white compartment. At first, the animals, placed in the white compartment had their retreat to the black, non-shock, compartment blocked off; in this way they could not escape the shock. Next they were allowed to escape to the safety of the black compartment. After 10 trials they were again put into the white compartment but no shock was applied. They promptly made for the black compartment. The procedure was then modified so that the rats could escape from the white compartment only by turning a small wheel above the door to the black compartment. No shocks were delivered during this stage of the experiment. Figure 2 shows the speed with which they learned the new escape response. Later, when the wheel was made inoperative, they learned to press a lever in order to escape to the black compartment, again without the use of further shocks. The white compartment had taken on an S^{-R} function operating to condition the escape behaviour.

Fig. 1. (By permission of Lundin, 1961)

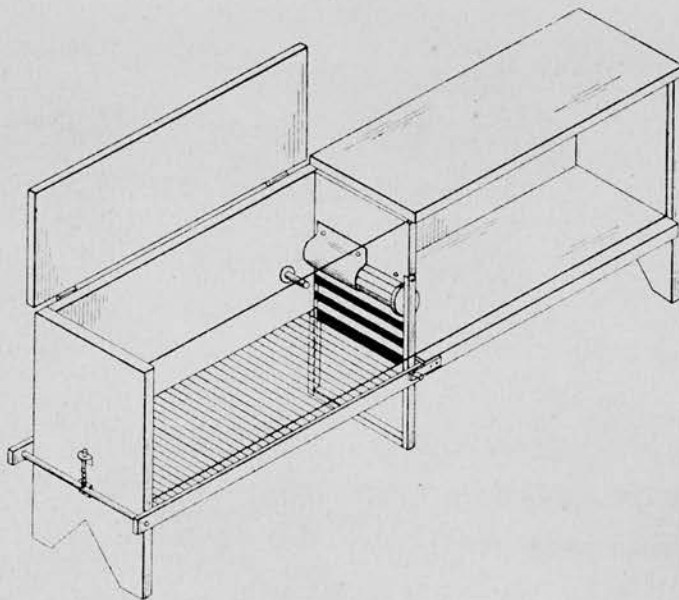


Fig. 16. Apparatus for studying escape behavior with a conditioned negative reinforcer. The left compartment is painted white and contains a floor grid from which an electric shock is delivered. The right compartment is painted black. The rat escapes from the left to the right by operating the door mechanism on the wall in between the two compartments. (From N. E. Miller, Studies of fear as an acquirable drive. I. Fear as motivation and fear reduction as reinforcement in the learning of a new response. *Jour. Exp. Psychol.*, 38, 1948, pp. 89-101; Fig. 1, p. 90)

The escape conditioning procedure is basically the one that has been employed in this study as the basis for aversion treatment of alcoholism.

2. Avoidance Training

The avoidance procedure is one in which the aversive stimulus is absent and the response prolongs its absence. That is, in the avoidance situation, the subject learns to make a response that prevents the onset

Fig. 2. Speed of learning an escape response. (By permission of Lundin, 1961)

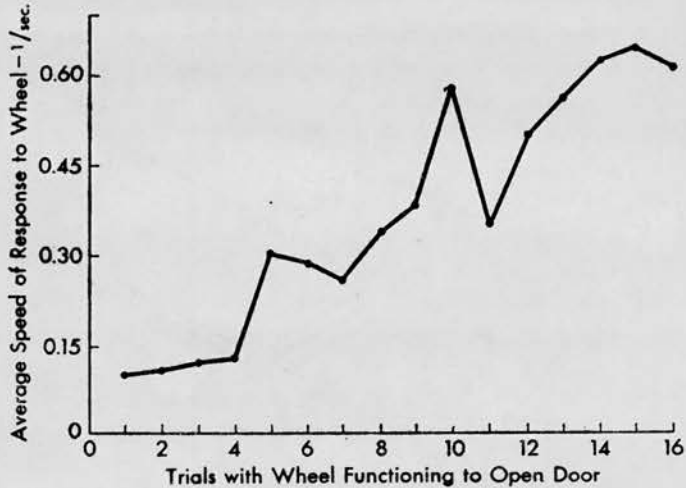
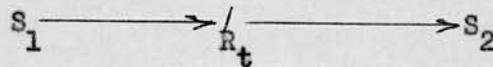


Fig. 17. After shocking in the white compartment (see Fig. 16) without opportunity to escape, the wheel was made to operate and rats were allowed to escape to the right (black) compartment by rotating the wheel which opened the door. The curve represents the average speed of response to the wheel for the first 16 trials. Note that as trials continued and the conditioned negative reinforcer lost its function, the time per trial increased. (From N. E. Miller, *Studies of fear as an acquirable drive*, *Jour. Exp. Psychol.*, 38, 1948, pp. 89-101; Fig. 2, p. 94.)

of an aversive stimulus.

Paradigm:



in which S_1 is an initially neutral stimulus; R_t is the appropriate response, such as lever pressing, which prevents the onset of S_2 , the aversive stimulus.

For an avoidance response to take place there is always some kind of

discriminating stimulus (S^D) that has to come into operation as a result of prior learning. S^D acts as a warning signal and acquires its discriminative function because of its previous association with the aversive stimulus; in other words S^D also becomes a conditioned negative reinforcer (S^{-R}).

The experimental procedure for establishing an avoidance response has already been discussed. (Ch. 4.) (Sidman, 1953, 1955a, 1960).

3. Punishment

The punishment contingency is one in which the aversive stimulus is absent and the response produces it. In punishment, the effect of the aversive stimulus is to depress the behaviour when it is presented, rather than to strengthen or extinguish it.

Paradigm:

$$R \longrightarrow S^{-R}$$

in which R is a response already in operation at some degree of strength through prior reinforcement. S^{-R} is an aversive stimulus contingent upon the occurrence of R.

The punishment paradigm has been illustrated by Estes (1944); Skinner (1938, 1953) and others. The Estes and Skinner experiments also demonstrated the effect of punishment in depressing rather than extinguishing behaviour. (Figure 3).

4. Anxiety

In anxiety training a neutral stimulus is followed by one that is aversive and the contingency is such that the subject can do nothing to avoid or escape from the aversive stimulus.

Paradigm:

$$S_1 \longrightarrow S_2$$

in which S_1 is the neutral stimulus and S_2 is the aversive stimulus. As is the case in escape conditioning, the S_1 can take on the function of a

Fig. 3. (By permission of Lundin, 1961)

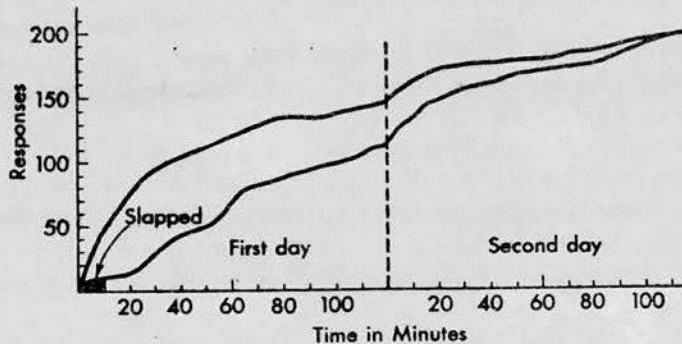
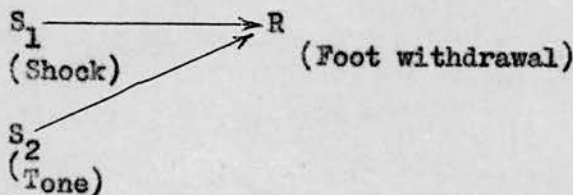


Fig. 19. Curve of response rates in recovery from punishment. The two curves are from groups of four rats, each with the same experimental history. Both curves show response rates during extinction. All responses made by one group (lower curve) were slapped during the first 10 minutes of extinction. Note that for the punished group, the rate is depressed but eventually recovers to the same total number of extinguished responses as the nonpunished group. (From B. F. Skinner *The behavior of organisms*, New York: D. Appleton Century Co., Inc. Copyright, 1938. By permission of Appleton-Century-Crofts, Inc., p. 154.)

conditioned negative reinforcer (S^{-R}); also some of the consequences of such a pairing will involve respondent, that is, Pavlovian, behaviour. The paradigm then resembles that for Pavlovian or classical conditioning:



For the operation to be properly identified as anxiety training, as Lundin (1961) has pointed out, the temporal separation between the two stimuli must be of sufficient duration to allow the behavioural change to occur.



An essential feature of the anxiety procedure is the inevitability of the aversive stimulus. If the organism can do something to terminate the aversive stimulus, the process then becomes avoidance or escape conditioning and not anxiety training. While it is probably more accurate to conceptualize the anxiety response in terms of changes in autonomic activity brought about by the aversive experience rather than in behavioural terms, it is nevertheless possible to demonstrate the anxiety effect behaviourally.

Estes and Skinner (1941) have measured anxiety conditioning by means of the effects on the response rate in rats in a positively reinforced situation. They trained the animals to press a bar for a food reward on a fixed interval schedule of 4 minutes. The S_1 S_2 sequence was introduced after this response was well established. S_1 was a tone of 5 minutes duration sounded continuously before the S_2 , a brief electric shock, was delivered through the grid floor of the experimental chamber. Care was taken that the bar pressing response was not immediately followed by shock, otherwise this would be a punishment contingency. As the experiment progressed through successive pairings of the two stimuli, the observers noted a marked depression in the rate of bar pressing during the interval between S_1 and S_2 , followed by an increase in the rate after the appearance of S_2 , the shock. Extinction of the anxiety reaction was by means of presenting the tone alone for a prolonged period of time. The response rate was depressed when the tone was first introduced in the extinction trials, but increased as no shock followed. It was noted, too, that this extinction of the anxiety response was only temporary, for on later occasions the depression in the rate of responding occurred, indicating that the effects of the anxiety had not completely extinguished.

Some psychologists, for example, R.M. Church (1963), would employ the term punishment to account for all conditioning procedures that act aversively to control behaviour. However, it is doubtful whether the tendency to classify all these procedures under a simple definition adds

much by way of clarification of the methodological problems; for one thing, by using one member of a class of operations to represent all the categories comprising that class leads to certain logical complications, at least.

Alcoholism

Where conditioning techniques have been used in the treatment of alcoholism interest has been in the class of stimuli that operate aversively to control behaviour, for example apomorphine therapy. In the present study electric shock has been used as the aversive stimulus. (Blake 1965, 1966). In the chain of activities making up the conditioning procedure (described fully in chapter 7), two paradigms may be distinguished: a behavioural component is evident in one aspect of the procedure; while in the other the method relies upon arousal within the autonomic nervous system for demonstration of its effect. The behavioural component entails conditioned reinforcement of an escape response, with the paradigm:

$$S_1 \longrightarrow S_2 \longrightarrow R_t$$

in which, S_1 the neutral stimulus is the smell-taste complex experienced by the subject in the act of sipping his drink; S_2 , electric shock, is the primary aversive stimulus and R_t , the response that terminates the shock is the act of spitting out the alcohol. The second component, which relies on the evocation of an autonomic response, follows the formula for Pavlovian conditioning, with the familiar paradigm:

$$CS \longrightarrow UCS \longrightarrow R$$

in which, CS is the smell-taste complex experienced by the subject in the act of sipping the alcohol; UCS, an electric shock, and R is the autonomic response. The change in autonomic activity is measured by GSR. The definition of R in terms of changes within the autonomic nervous system has its rationale in Pavlov's neural theory of excitation and inhibition. (Hilgard and Marquis, 1961; Eysenck, 1957; Gantt, 1964).

AVERSION THERAPY FOR ALCOHOLISM:

A REVIEW

Only in the past decade or so has there been any sustained interest on a wide scale in the application of learning and conditioning principles to a study of personality development, to psychopathology, and to psychotherapeutic issues, though from the 1920's onwards there have been sporadic flurries of activity in work of this nature. Watson and Rayner (1920) demonstrated the learning of a fear response in an eleven-month-old boy; while M.C. Jones (1924) applied deconditioning techniques to eliminate a fear of a white rat in a boy of three years. Before it had been treated this fear had generalized to rabbits, a fur coat, feather, cotton wool, and other furry-like objects.

Conditioning methods have been used with considerable success in cases of enuresis (Mowrer, 1938; Lovibond, 1963; Coote, 1965) and in a wide variety of neurotic and behaviour disorders (Wolpe, 1958; Lazarus, 1963; Eysenck 1960, 1965; Rachman, 1965); and with variable success in cases of alcoholism, (Kantovorich, 1934, Voegtlin and Lemere, 1942; Lemere and Voegtlin, 1950; McGuire and Vallance, 1964; Raymond, 1964; Lazarus, 1965; Sanderson et al, 1963; Madill et al, 1965; Blake, 1965, 1966; Hsu, 1965).

In the main, conditioned aversion treatment of alcoholism has relied on the Pavlovian formula for conditioning which runs as follows:

CS ———→ UCS ———→ R

in which CS is alcohol, UCS a noxious stimulus and R the aversive response. Formerly the UCS has always been a chemical agent, such as emetine or apomorphine, but there has been a trend latterly towards experimentation with electric shock as the UCS.

Chemical Aversion

At the outset conditioned aversion therapy was used almost exclusively for the treatment of alcoholism, more recently, however, it has been applied mainly to the management of sexual disorders. (Blakemore et al, 1963; Rachman, 1961; Feldman and MacCulloch, 1965; McGuire and Vallance, 1964). Apomorphine, a drug with a strong emetic effect, which induces nausea and vomiting when injected subcutaneously or intramuscularly into the patient, has acted as the aversive stimulus in aversion treatment of alcoholism. It appears that apomorphine aversion has been used with fair regularity following the published reports of Voegtlin and Lemere (1942). For the most part, however, with the exception of the work of Voegtlin and his associates and a few others, there does not seem to have been any serious attempt to subject the technique to the rigorous discipline of conditioning procedures. Also, though its use is widespread relatively little has been published on the treatment of alcoholism by aversion therapy. In the United States, Bowman (1962, 1963) in his contribution to a review of recent psychiatric progress was able to cite only one study in connection with the treatment of alcoholism by aversion therapy. In Britain, Rachman (1965) reviewing recent progress in aversion therapy generally cited one study only, that of McGuire and Vallance (1964), which consisted of seven cases.

In a review of the literature Franks (1958) remarked that much of the treatment of alcoholics lacks a clearly formulated rationale even when the therapy claims to be in accord with the principles of classical conditioning. Taking the concept of psychotherapy broadly, this lack of clear formulation is unlikely to be peculiar to the treatment of alcoholism; rather it ranges over the whole field by and large. A persistent theme in the criticism of psychotherapeutic techniques is that the procedures surrounding them lacks scientific clarity, are unverified and often contradictory; as Ford and Urban (1963) observed, they "reflect a kind of folklore".

Though the majority of the reports on conditioned aversion treatment of alcoholism have relied on apomorphine or some other chemical substance as the UCS, there is a number of serious and methodological difficulties inherent in this form of treatment. From the methodological point of view these have to do with (1) the sequential relationship between the events that are important in Pavlovian conditioning, namely, CS, UCS and R, and (2) the time intervals between the appearance of the various stimuli (CS, UCS) and the response (R). These crucial relationships are often overlooked or regarded as of minimal importance by clinicians who practice conditioning therapy. In a comment on the principles of aversion conditioning Franks (1963) observed that "some clinicians advocate giving the alcohol after the patient reaches the height of nausea. This, of course, is backward conditioning (since the unconditioned stimulus of the apomorphine or the emetine is preceding the conditioned stimulus of the alcohol) and backward conditioning, if it occurs at all, is at best tenuous." (p.522). On the question of the time interval which elapses between presentation of the various stimuli, experimental work has established that intervals in excess of 0.5 sec. between CS and UCS take us into the region of delayed conditioning with weak and tenuous results.

Zavyalov (1963) found the latent period of vomiting after administering apomorphine to a group of subjects to be approximately 6 minutes. The latency was reduced to an average of 2 minutes in a study of 36 subjects when zinc sulphate (0.3 - 1.0 g.) was combined with apomorphine; and to 1.8 minutes in a study of 17 subjects when copper sulphate (0.15 - 0.3 g.) was combined with apomorphine. The sulphates were also found to increase the number of vomiting attacks per trial as well as to slow down the adaptation of the vomiting centre to apomorphine during treatment. With this improvement in the latency period Zavyalov found that the conditioned response was attained after a smaller number of combinations in subjects treated by apomorphine plus sulphate than in subjects treated by apomorphine alone.

Another feature of the study appears to be that Zavyalov concentrated on vomiting as the UCR. This is in contrast to the approach of Voegtlin and his co-workers at the Shadel Sanatorium in Seattle, U.S.A. (Voegtlin and Lemere, 1942; Lemere and Voegtlin, 1950). In their method nausea rather than vomiting was focussed upon as the UCR. In this way, the subject was brought to the verge of nausea after 30 to 60 seconds of a hypodermic injection of a mixture of emetine, ephedrine and pilocarpine plus an oral dose of emetine. While the technique still partakes of the qualities of delayed conditioning the time relationships and the response selected for reinforcement are an improvement on that of Zavyalov. Raymond (1964) has shown that it is the feeling of nausea rather than the act of vomiting that is the important event which influences the acquisition of an avoidance response to alcohol.

Conditioned reflex therapy of the apomorphine type appears to be the contemporary approach to treatment of alcoholism in the Soviet Union, according to a report by Efron (1965) of a recent visit to that country. Efron observed that, in general, Russian psychiatrists are of the opinion that most Russian alcoholics are not neurotics and, presumably, do not need deep-probing psychotherapy; rather the search is for the kind of noxious stimulus that provokes the most marked reaction, something like *Lycopodium* (a species of ground pine) which "shakes up the whole organism and thus affords the best conditioning." Success rate for conditioned reflex therapy claimed in three centres visited by Efron was reported at 30 to 40 per cent. abstinent after 2 years and about 20 per cent. after 5 years. In their study of over 4,000 alcoholics treated at the Shadel Sanatorium, Lemere and Voegtlin (1950) reported 60 per cent. abstinent after two years and 38 per cent. abstinent for periods between 5 to 10 years. Twenty-nine per cent. of the original sample relapsed and were treated a second time. An over-all abstinence rate of 51 per cent. was quoted for the total sample for a follow-up period of 13 years.

Franks (1963) has hypothesized that improvements effected by apomorphine aversion technique are achieved "not by conditioning as such

but by the traumatic effects of the whole situation." There is, he says, "good laboratory evidence to suggest that pseudoconditioning or increased sensitivity may take place in many apparently orthodox conditioning situations and that merely the presentation of the noxious unconditioned stimulus on its own, without any pairing of unconditioned stimulus and conditioned stimulus whatsoever, could make a person respond adversely to an originally non-aversive stimulus." A study by Madill et al (1965) goes some way toward confirming the pseudoconditioning hypothesis and clinical observation of the effect of apomorphine therapy in the milieu of the present study has encouraged the speculation in favour of a sensitization hypothesis. On this basis apomorphine treatment has been used as a prelude to electrical aversion conditioning, the formulation being that the sensitization achieved by a short course of apomorphine treatment should act to facilitate further aversion to alcohol by means of the more accurate method of electrical aversion conditioning. A small number of cases has been treated by this method with encouraging results, both in terms of its effect in motivating the alcoholic to think more constructively about his addiction and its associated problems and in terms of the improvement in his behaviour as assessed at follow-up interviews. Though hardly beyond the stage of clinical hunches the apomorphine-electrical aversion combination impresses as a promising approach to the treatment of alcoholism and one which would repay the effort of rigorous investigation. A point of particular interest is the sensitization or arousal phenomenon produced by a drug whose action on the organism is generally regarded as hypnotic. This is not unlike the paradox of alcohol as a stimulant to social behaviour while being a physiological depressant. Of course it may be questioned whether it is the apomorphine as such that is responsible for the sensitization phenomenon or whether it is due to the prolonged deprivation (food and rest) process that is inherent in apomorphine treatment. (Malmo, 1962) has discussed the experimental evidence in favour of increased activation as a function of the degree of deprivation.

Apomorphine therapy is an arduous undertaking for the clinician and meticulous attention to detail is required if the best results are to be obtained. There is more likely to be a lack of appreciation for the proper methodology where it is resorted to as a final measure; or where the attitude of the therapist or of the milieu within which it is conducted is one of scepticism and doubt; so that it is hardly surprising under such circumstances if the results are poor. It has been asserted that training the patient to become abstinent is no cure and aversion treatment is merely a method of rendering the addict abstinent while psychotherapy and other means of support are initiated (Edlin et al. 1945). Even if this is so, it does not preclude attention to proper methodology.

There are, too, difficulties of a medical kind inherent in the effect of the drug upon the organism. Quinn and Nabney (1965) have reported on the hypnotic and other effects, such as ketosis, hypotension and confusional states, resulting from the use of apomorphine as the aversive agent in conditioning therapy for alcoholism. Also, individual differences in reactivity as such add to the problems of planning and controlling treatment. Individuals are likely to vary in the speed and extent of their reaction to the various drugs; moreover, the same person may react differently to the same quantity of drug on different administrations.

Sanderson, Campbell and Laverty (1963) have experimented with a technique of one-trial learning for conditioned aversion to alcohol. The subject is given an intravenous injection of 20 mg. succinylcholine chloride dihydrate; as a result he experiences a paralysis and suppression of respiration of from 60 to 90 seconds duration. During this period alcohol is presented to the patient. Sanderson and his associates have reported that of 12 patients who experienced this treatment "a majority subsequently exhibited signs of aversion and anxiety to all alcoholic beverages and even to the suggestions of alcoholic beverages". This group of workers has extended the investigation of the technique. In a second study (Madill et al., 1965) as in the first report, the UCS was defined as a paralysis and suppression of respiration, induced by the succinylcholine chloride

injection; the CS was the subject's habitual alcoholic beverage. For the purpose of the experiment, 45 subjects were randomly allotted to one of 3 groups as follows:

1. Conditioning: CS-UCS associated.
2. Pseudoconditioning: UCS alone.
3. Placebo: CS alone.

Before and after treatment a record of five variables was made. These included respiratory rate, heart rate, electrocardiogram, muscle tension and GSR. Also, the duration of apnoea and ratings of the degree of fear as well as the speed of the onset of fear were determined. Assessment of the effect of treatment was by comparing the subjects' drinking and other aspects of behaviour for a period of 3 months before and 3 months after treatment.

The main findings from the experiment were summarized as follows:

1. The mean length of apnoea in the two UCS (succinylcholine) groups ranged from 12 to 166 and 17 to 164 seconds respectively, not significantly different.
2. The mean ratings of degree of fear and speed of onset of fear showed that the two groups treated with the UCS expressed fear more strongly and more quickly than did the placebo group.
3. There was no relationship between length of apnoea and degree of fear. This suggested that the critical factor in the traumatic event was not the duration but the onset of apnoea.
4. The rate of spontaneous fluctuation of the GSR diminished in all three groups. Heart rate fluctuation and breathing rate increased significantly ($P < .001$) in the UCS groups and decreased in the placebo group. This is taken as an indication of the anxiety generated by the traumatic event.
5. Follow-up interview data revealed that all groups developed a generalized anxiety response during the period immediately following treatment; consequently it cannot be assumed that a general anxiety was a consequence of the treatment.

6. Some subjects in all groups experienced a reduction in craving for drinks, complete abstinence for 3 months, and worse hangover when drinking; but there was no significant difference in the behaviour of the three groups toward drink.

7. Generalized avoidance response ($P < .01$) and avoidance of the beverage used as CS ($P < .05$) were found significantly more often in the two UCS groups than in the placebo group.

8. All together, other results from the study did not indicate any significant improvement in any one group over the other.

A further point about this form of treatment is that, as with apomorphine therapy, it encounters the weaknesses inherent in delayed conditioning. That is, the latency of the onset of apnoea (UCS) is not within the strict control of the experimenter and is subject to individual fluctuation. As reported "S's in the conditioning group were given the bottle of beverage within 10 sec. of the onset of the UCS; when well timed the patient was in the act of tasting when apnoea began." It appears, too, to partake of the quality of backward conditioning with UCS (apnoea) preceding CS (the presentation of alcohol).

Another objection to the method was that "Sanderson, Campbell and Laverty apparently did not give all of their potential patients a frank explanation of the nature of the treatment which they were to undergo." (Rachman, 1965). There are good grounds, Rachman argued, for recommending complete candour in describing the nature of the treatment which is being offered to patients in all circumstances. Turner and Solomon (1962), for example, found that in experiments on avoidance conditioning the nature of the instruction and explanation given to subjects were of considerable importance in determining the speed of conditioning. Certainly, the subject who is given a frank explanation of the aims and nature of the treatment he is to undergo is placed in a more operant situation, where his active participation in the process of therapy is enlisted, unlike the more passive role of the subject who undergoes the classical, Pavlovian, type of manipulations, such as those entailed in

succinylcholine therapy. The active participation of the patient in conditioned aversion therapy, which is an unpleasant experience, should go some way towards circumventing the resistance of the aggressive subject who, as Wallerstein (1957) observed, rebels against it and tries to defeat its purpose. In addition, the phenomenon of pain-elicited aggression (Rachman, 1965a) is one that has to be considered and resolved, either by working out ways of reducing its occurrence or of harnessing it as a source of positive motivation in the subject as a way of promoting progress in therapy.

An example was a male subject of thirtyseven years who was treated by relaxation plus electrical aversion therapy. After his third day in aversion training he summed up his attitude by remarking that up to that point he had been doing his best to resist treatment and was blind to the fact that the staff was doing what they could to help him. Up to that point arousal from the aversion experience had shown itself behaviourally in increased irritability, restlessness and tension. From that point onward he became more communicative and friendlier in his attitude towards the staff; he reported feeling considerably more at ease with himself and confident in the future. The reduction in aggressive behaviour was also shown in the quality of his behaviour in the aversion setting, he took it more calmly, acted as if his threshold for pain-elicited electric shock had increased and his escape response (See chapter 7) was noticeably less violent. Before admission to hospital he had been in the habit of threatening his employees with a shotgun and his wife would have accepted his permanent hospitalization as a chronic alcoholic with relief. He has been abstinent for over three years and his marital, social and business adjustments have been quite successful.

Another example was the reaction of a 26 year old male patient on electrical aversion therapy alone. His was easily the most overt expression of anger observed by the therapist of all the subjects he had encountered in this form of treatment. He felt like "breaking up the place". His later reflections were: "I can't be angry with the man

(the therapist) he's only doing his job; or the drink, since it can't touch me if I don't touch it; so it must be me." Conceptualizations of this quality is not infrequent among alcoholics on this form of treatment. Clearly, it is a way of harnessing the aggression as a source of positive motivation in orienting the patients' attitude toward his drinking, increasing his desire for treatment and as a positive influence toward breaking the alcoholic habit. As one patient put it on follow-up interview: "I have gone through a structural change in my thinking."

Electrical Techniques

Electric shock has been extensively used as the primary negative reinforcer in psychological experiments, both with animal and human subjects. Until recently, however, it has been less widely used in clinical practice. Rachman (1965) has summarized the more recent reports on electrical aversion therapy for a variety of disorders, including alcoholism. Electrical aversion conditioning has a number of practical advantages over chemical techniques while at the same time avoiding the undesirable side effects, such as those mentioned by Quinn and Nabney (1965) which are a possibility in chemical aversion. Of particular importance from the point of view of conditioning theory is the hypnogenic action of apomorphine which inhibits conditioning. (Franks, 1960, 1963; Franks and Trouton, 1958; Trouton and Eysenck, 1960).

Electrical techniques are simpler, more easily controlled and avoid the problem of the timing and sequential relationships between CS, UCS and R. In this way conditioning procedures that are not readily available to chemical methods can be used. These include (1) the use of different types of operations - Pavlovian conditioning or operant techniques such as avoidance and escape conditioning; (2) control over the response selected for reinforcement; (3) unique investigation of conditioning in different sensory modalities - sight, taste, smell. Equally, because of the more rigorous experimental approach, it is easier to devise and use objective measures of conditioning and therapeutic

progress. For example, making use of GSR and other methods of measurement such as those reported by Marks, Rachman and Gelder (1965), Feldman and MacCulloch (1965) MacCulloch, Feldman and Pinshoff (1965), for the measurement of response to treatment for fetishism-masochism and homosexuality. In brief, electrical techniques of aversion conditioning have opened the way for clinical application of the substantial findings in the psychology of learning, conditioning, motivation and other areas of experimental psychology.

There have not been many published reports on electrical aversion therapy for the treatment of alcoholism. The most recent publications include McGuire and Vallance (1964); Hsu (1965); Lazarus (1965) and Blake (1965, 1966).

McGuire and Vallance (1964) reported on a basically Pavlovian technique applied to 7 cases. The period of follow-up for this small sample was brief; therefore, apart from its influence in stimulating activity in this aspect of behaviour therapy, little can be said about its therapeutic value at this stage. Lazarus (1965) described a detailed case study of the treatment of alcoholism by what he outlined as 'broad-spectrum-behaviour-therapy.' The approach emphasizes the need for a wide and all-embracing reconditioning attack on the problem. While recognizing that alcoholism may be a symptom of organic brain disease, or a manifestation of an underlying psychosis, the approach refers more specifically to the treatment of alcoholics in whom features like psychosis, psychopathy, mental retardation and brain damage have been reliably excluded. The main features embraced by this treatment approach are as follows:

1. Specific steps to ensure that the patient regained his physical well-being.
2. Active measures to break the compulsion (aversion therapy and 'anxiety-relief' conditioning).
3. Diagnostic tests and interviews to evaluate the interaction of the patient and his social environment, with special attention to specific stimulus antecedents of anxiety.

4. Elimination of the anxiety-response habits by counter-conditioning procedures, desensitization therapy, assertive training, behaviour rehearsal, hypnosis.

5. Enlisting the co-operation of the patients' spouse who was also afforded the benefits of behaviour therapy.

Hsu (1965) reported a method in which the subject is presented with a tray containing 1 oz. plastic cups filled with beer, wine, whisky, milk, water, fruit juice, and is instructed to drink them one by one. Within 0.5 to 5 seconds of swallowing each of the alcoholic beverage the subject receives an electric shock (2 to 5 ma) of 30 seconds duration through a pair of electrodes placed above the ear. Treatment is daily for 5 days; the patient is discharged on the sixth day and advised to return in 4 weeks for a 2-day reinforcement sessions and again in six months. Of the 40 subjects in the sample 24 completed the initial course of treatment and 16 completed both the initial and first reinforcement sessions. The rationale for this treatment is based on the immediate punishment of a rewarded drinking response. Hsu pointed out that the alcoholic drinking pattern follows the sequence : drinking - satisfaction - punishment; but that the satisfaction is immediate while the punishment is delayed and therefore not associated with drinking. In the treatment-setting no reward but pain follows the drinking, thereby giving the alcoholic a new learning experience.

While the actual procedure employed by Hsu appears to be open to certain methodological criticisms the paradigm is a sound one. Studies on the suppressing effect of punishment on a rewarded response and on a delay-of-punishment gradient have been published by Vogel-Sprott (1965); Vogel-Sprott and Banks (1965); Banks and Vogel-Sprott (1965).

One of the difficulties in aversion therapy for alcoholism is that of how to handle the taste-response, or more accurately the accumulation of alcohol in the system during a conditioning session, as in Hsu's study. Ethyl alcohol is known to have an anaesthetic effect on the central nervous system and as such inhibits conditioning. Therefore, to avoid the depressant influence of the drug in cases where the subject is allowed to

swallow the alcohol both the length of the conditioning session and the number of trials per session will, of necessity, need to be brief. This may mean that the optimum number of trials per session necessary to establish an effective CR may not be achieved. McGuire and Vallance (1964) made use of smell rather than taste as the sensory modality in which conditioning was carried out. Lazarus (1965) employed a learning approach in which the subject could avoid tasting the alcohol altogether. In the method reported by Blake (1965) the subject spat out the alcohol as an escape response. Apart from the problems arising out of the patient being allowed to swallow the alcohol, Hsu has not defined the CS precisely. A good many activities are in progress in the act of swallowing a drink of alcohol; presumably the one that is most recent in this process is the most likely to be associated with the UCS (shock). This may be any of a number of feeling states, sensory experiences, motor or muscle activity. On the other hand, if alcohol is defined as the CS then it and not its effects ought to be made more conspicuously so by being the centre of focus (i.e. the CS) before the act of swallowing takes place.

Placing the electrodes, through which the electrical stimulation is administered, above the ear raises the question of the neurophysiological effects of electrical stimulation in the brain areas. Many years of experimentation with electro-convulsive therapy in the treatment of psychiatric disorders, such as psychotic depression, has still not brought us much nearer to an acceptable theory of the neurophysiology of ECT. It seems ill-advised, therefore, to enter this uncertain field without the backing of a sound rationale and experimental evidence. Empirically, the effect of putting the electrodes on the head may be to induce some kind of 'superstitious thinking' in the subject which may enhance his responsiveness to treatment; that is, the brain, being, as it were, the centre of man's universe, the patient may come to believe in the efficacy of the treatment regardless of its real worth scientifically. But the fact that only 60 per cent. of the 40 subjects in the study completed the initial 5-day treatment indicates that some aspect or other of the treatment must have had a strong rejecting influence to cause such a high drop-out rate.

Of 62 subjects treated by the writer, where the electrodes were placed on the forearm or back of the hand three withdrew from treatment after it had started; while none of them gave the unpleasantness of the treatment as the reason for their withdrawal, it is likely that this could have been the real motive.

One possible reason for the 60 per cent. withdrawal in Hsu's sample could have been the long duration of the UCS (shock), 30 seconds. This could mean that the therapeutic environment as a whole, and not alcohol specifically, took on the qualities of a noxious stimulus, generating avoidance behaviour to the total situation in a high proportion of the patients. Madill et al. (1965) have noted that it is not the duration but rather the onset of the UCS that is important. Similarly Dinsmoor and Hughes (1956) have pointed out that while the speed of responding in escape conditioning, for example, is a function of the force of the shock, the importance of shock is not necessarily in its force nor in the length of its duration but in the fact of its occurrence. There seems, then, to be experimental evidence in favour of an aversive stimulus of shorter duration than the 30 seconds employed by Hsu. It may even be that a short strong shock would be more acceptable to the person than a weak one of longer duration.

Finally, there is the question whether the punishment contingency is the best one to apply in this kind of work. Apart from the evidence that the normal action of punishment is to suppress rather than extinguish a response (Skinner, 1938), it appears that it is less effective in suppressing the response of alcoholics than non-alcoholics (Vogel-Sprott and Banks, 1965). Church (1963) has reviewed the major approaches to conditioning by aversive control. The method of avoidance conditioning has been extensively investigated by Sidman (1960) over a number of years and found to exert a strong influence in modifying and maintaining a response; while Solomon and Brush (1956), Feldman and MacCulloch (1965) have examined the advantages of anticipatory avoidance learning over other methods of conditioning by aversive control. The procedure for this study has been

defined as escape training (Blake, 1965). This process will be described in the next chapter.

THE THERAPEUTIC PROCESS:
RATIONALE AND METHOD

As explained in the introductory chapter the main purpose of the research is to compare two groups of alcoholics treated by different methods both of which are based upon contemporary learning and conditioning principles. The first group receives training in progressive relaxation (Jacobson, 1938; Wolpe, 1958) before going on to electrical aversion conditioning while the second group is treated by electrical aversion conditioning alone.

Apart from comparing the samples for outcome on each of the two therapeutic regimes, response to therapy will also be examined in relation to the personality dimension of introversion-extraversion on the one hand and on GSR measures of conditioning on the other. As regards the role of individual differences in the assessment of results, Eysenck (1966) has observed that "the root of the difficulties and disappointments found in psychological research, as well as the cause of the well-known difficulties in duplicating results from one study to another, lies in this neglect of individual differences".

Subjects

The Relaxation-Aversion sample contains thirtyseven subjects. There are twentyfive in the Aversion-only group. Limitation of time and other considerations prevented the collection of larger numbers in the respective groups.

Age and Sex Variables

Table 6 gives the sex distribution and mean age of subjects in the respective samples.

Table 6

Category	No.	Relaxation-Aversion		No.	Aversion-only	
		Mean (yrs.)	S.D.		Mean (yrs.)	S.D.
Men	27	47.37	8.00	20	50.25	8.20
Women	10	45.25	6.00	5	47.80	10.60
Both	37	46.78	7.57	25	49.76	8.79

The mean ages for these groups are not conspicuously different from those reported by other workers. McAdam (1964) in a long term follow-up of 406 alcoholics reported a mean age ranging from 44.97 to 50.76 in his various outcome categories. Vallance (1965) found a mean age of 44 years (S.D. 9.6 years) in a follow-up of 68 male alcoholics admitted to the Psychiatric Department of a general hospital in Glasgow.

Social Class (by Occupation)

As will be seen from Table 7 subjects belonged predominantly to socio-economic classes one and two of the Registrar General Classification (1960). Women were classified either according to their husbands occupation or their own as appropriate.

Table 7. Social Class (by Occupation)

Class	Number in each category		Total	%
	R-A Group	A Group		
I	15	4	19	30.64
II	19	15	34	54.84
III	3	6	9	14.52
IV & V	-	-	-	-
TOTAL	37	25	62	100

Intelligence

Hospital admissions are tested routinely on the Standard Progressive Matrices and Mill Hill Vocabulary Scales. (Raven 1958, 1960). Table 8 gives the means and other data for a sample of alcoholic admissions to the Hospice Unit, from which the two groups in the study were drawn.

Table 8. Mean percentile scores and standard deviations for a male and female sample of alcoholic admissions

Category	No.	Progressive Matrices		Mill Hill Vocabulary	
		Mean	S.D.	Mean	S.D.
Men	71	83.28	17.49	79.46	19.23
Women	32	74.48	17.64	67.32	19.95

Chronicity

It is generally accepted that the alcoholic is a poor witness to the severity of his drinking. For the purpose of estimating the chronicity of alcoholism, alcoholic drinking is defined as "drinking of an order which introduces social, economic and domestic disruption with behavioural and personality changes in a setting of compulsive drinking, that is, loss of control." Table 9 gives the mean duration of alcoholic drinking as estimated (a) by the patients themselves and (b) by the psychiatrist in charge of the case, for each of the two groups.

Taking the two samples together 17 per cent. of the 47 men estimated the chronicity of their drinking at 10 years or more; the psychiatrist's rating, based on the case history as well as reports from sources other than the patient himself, such as his physician or a relative, classified 46.8 per cent. as having a history of alcoholism of not less than 10 years standing. Of the 20 female subjects one only reported a history of alcoholism of 10 years or more; the psychiatrist rated four of them (20%) as having a chronicity of not less than 10 years. This finding supports the general belief in the unreliability of the alcoholic's

Table 9. Chronicity of drinking in years

Category	No.	Self-estimate		Doctor's estimate	
		Mean	S.D.	Mean	S.D.
<u>R-A Group</u>					
Men	27	4.7	3.21	8.52	3.99
Women	10	2.7	2.05	9.50	4.20
<u>A. Group</u>					
Men	20	5.0	4.40	7.75	6.37
Women	10*	4.2	3.37	5.30	1.73

* Includes 5 cases treated by abreactive psychotherapy plus aversion conditioning that are not included in the experiment for the purpose of follow-up.

testament as to the severity of his problem.

Previous Hospitalization for Alcoholism

Of the 47 men in both samples taken together 18 (38%) had no previous hospitalization for alcoholism. The remaining 29 (62%) averaged 2.94 previous hospitalizations, with a range of 1 to 6. Excluding the 5 female subjects not partaking in follow-up 33 per cent of the rest (15) had no previous hospitalization for alcoholism. The mean of previous hospitalizations for the 10 others was 2.21, with a range of 1 to 7. There is no significant difference between the sexes for either the percentage or number of previous hospitalizations.

Length of Current Hospitalization

Table 10 gives data for the mean duration of stay in hospital during the current admission. Differences in the mean duration of stay between the groups was due partly to the additional period taken up in relaxation training for the Relaxation-Aversion group.

Table 10. Average stay in hospital during the current hospitalization

Category	No.	Mean (wks.)	S.D.
<u>R-A Group</u>			
Men	27	12.85	9.81
Women	10	12.90	8.95
Both	37	12.86	9.59
<u>A. Group</u>			
Men	20	9.75	4.62
Women	5	10.80	6.14
Both	25	9.96	4.98

Clinical Features

The samples consist of cases with varying degrees of prognostic "goodness" as defined by such writers as Mindlin (1959), Glatt (1964a) and Vallance (1965). In a two-year follow-up of alcoholics treated by group psychotherapy Glatt observed, "One-third of our patients could be classified as psychopaths; results among whom were very bad - whereas among the non-psychopaths the results were much better, to a statistically 'highly significant' degree. Statistical evaluation of the results separately for psychopaths and the non-psychopaths showed further that men did better than women and - largely because of the greater prevalence of these factors among non-psychopaths - older age, high intelligence, sustained marriage relationships, and better occupational status, were further indicators of a favourable prognosis."

Good prognostic signs put forward by Vallance (1965) were "first admission to hospital of a patient with good previous personality who is married and still living with his wife and who is willing to accept after-care either through attendance at the Out-Patient Department or in the fellowship of Alcoholics Anonymous."

An investigation currently under way by Dr. J.B. Rae at the Crichton Royal Hospital, suggest that the outcome of treatment may be seriously influenced by the personality of the alcoholic's wife. A man married to a woman with high anxiety and dependency scores on the M.M.P.I has a better chance of recovery in contrast to the man whose wife obtains an elevated score on the psychopathy factor. Table 11 gives the primary diagnostic classification as given by the psychiatrist for all male and female subjects in the research. The neurotic category contains those patients with anxiety states, reactive depression, phobic anxiety and other dysthymic disorders. Under psychopathy/character disorder are those patients with (a) constitutional personality disorder, (b) severe neurosis presenting as pseudo-psychopathy, (c) hysterical personality.

Table 11. Distribution of subjects according to primary diagnosis

Diagnosis	Cases		Total	%
	Male	Female		
1. Neurosis	19	12	31	50
2. Psychopathy/ Character Disorder	22	3	25	40
3. Schizophrenia	2	-	2)	
4. Epilepsy	2	-	2)	10
5. No diagnosis	2	-	2)	
	TOTAL	47	62	100

Subjects are additionally classified according to the presence or absence of organic pathology, which may be temporary or permanent, i.e. residual on discharge. In the temporary impairment group are those subjects who have had at least one attack of delirium tremens, transient hallucinosis, and alcoholic psychosis, which improves with treatment.

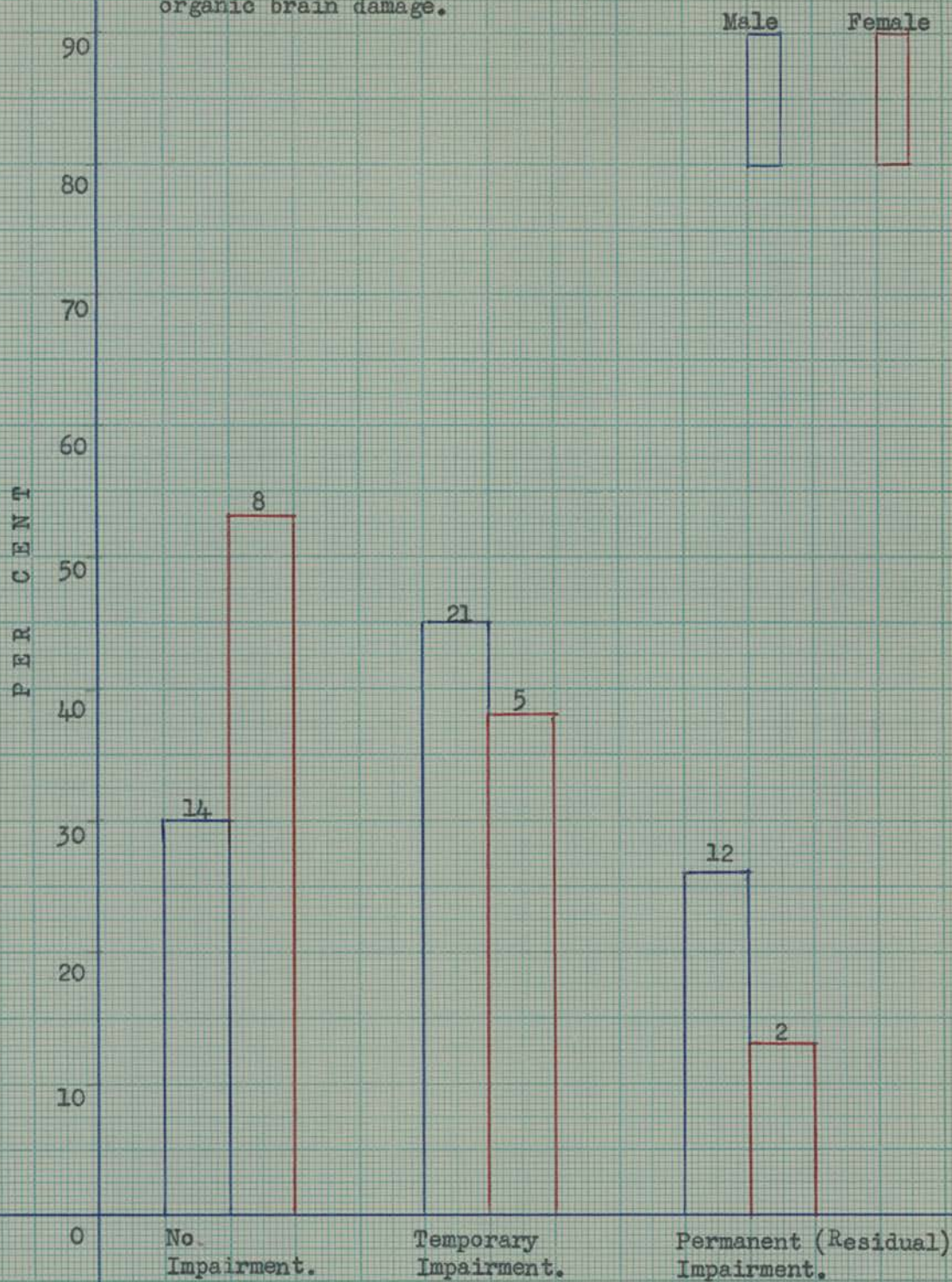
In the permanent category are those with such symptomatology as Korsakoff syndrome, epilepsy, cerebro-arteriosclerosis, alcoholic psychosis with (apparently) irreversible intellectual impairment. Other organic complications diagnosed in the group included gout, peripheral neuritis, asthma and chronic bronchitis. In addition to medico-clinical investigation the electroencephalogram (EEG) and psychometric examination are used in assessing the degree of impairment. Three individuals (2 males and 1 female) had made attempts at suicide and a further three (1 male, 2 females) were barbiturate addicts in addition to being alcoholics. Figure 4 gives the sex distribution of cases for the secondary diagnosis of organic impairment.

Subjects were not specially selected for the study; rather all the cases that were made available were accepted. An attempt at one stage of the investigation (during the collection of the Aversion-only group) to allocate admissions to the research on a rota system did not quite succeed for a variety of clinical reasons. A number of cases found their way into one or other of the two groups who would not have undergone abreactive psychotherapy in any case; which, as pointed out earlier is the standard form of treatment in the Unit. This was particularly so of the Relaxation-Aversion group which was the first to be collected. This procedure was justified on the strength that because the research was therapy-oriented clinical judgment and responsibility had to guard against submitting individuals to treatment procedures whose efficacy had not been thoroughly established by results over an adequate period of time on a reasonable number of cases.

The interval between admission and the start of active treatment varies according to the physical and mental condition of the patient on admission. The degree of intoxication, vitamin deficiency, delirium tremens, intellectual impairment, and other complications, all affect the speed with which active therapy can be initiated. Such measures as detoxication and other necessary medical care, psychiatric and psychological examination of the patient, are taken before he commences therapy.

For subjects in the Relaxation-Aversion group the therapeutic

Fig. 4. Sex distribution of cases on secondary diagnosis: organic brain damage.



Note: Number at the top of each column is the actual number in each category.

programme consists of three phases:

1. Training in progressive relaxation.
2. Motivation arousal.
3. Aversion conditioning.

Relaxation Training

Training in progressive relaxation follows the principles described by Jacobson (1938). Jacobson observed that "a behavioural component of the neurosis is undesirable muscular tension. It seemed then that if a person could train his perceptions to recognize initial signs of the build up of excessive muscular tension and then train his muscles to relax voluntarily, he would have in his hands a tool for combating neurotic difficulties whatever their sources."

The subject is trained in the perception of tenseness in muscle groups throughout the whole body - toes, feet, calves, legs, thighs, abdomen, chest, shoulders, including the facial muscles, brows, eyes, eyelids, cheeks and forehead, as well as the muscles of the jaws, tongue and palate.... To sharpen his perception of muscle activities he is given the analogy of the tenseness that develops in various muscles when one is at the dentist. By refining his perceptions of extensor and flexor movements of the muscles he learns to relax them progressively until a state of deep relaxation is achieved.

Objective criteria for successful relaxation are set forth as follows.

1. Observation of the regularity and force of respiration.
2. Visual observation of the flaccidity of muscle groups.
3. Increasingly slow response or failure to respond to interruption.
4. The sleepy-eyed appearance of the individual after successful relaxation.
5. The vacuous appearance of the eyes once the subject has learned to relax them while open together with relaxation of the facial musculature which makes the face appear expressionless.
6. Slow emergence from the relaxation.

Table 12 gives data for relaxation training for 37 individuals in the Relaxation-Aversion group. A relaxation session lasts approximately 20 minutes. The whole relaxation-aversion programme takes up an average of five hours per subject.

Table 12. Showing the mean number of sessions, standard deviation and average time per subject on progressive relaxation training.

Categories	No.	Mean		Average time	
		Session	S.D.	(minutes)	S.D.
Men	27	11.48	4.05	225.70	73.63
Women	10	14.70	4.96	278.80	120.05
Both	37	12.35	4.55	240.05	91.69

The Rationale for the Combination of Relaxation and Aversion

Unadaptive anxiety drive causes a disturbance of psychological homeostasis and excites the drinking response. Progressive relaxation is designed to inhibit the unadaptive anxiety; while aversion conditioning aims at the extinction of the alcoholic habit, regardless of whether or not the habit is driven by underlying anxiety.

It may be objected, on the grounds that relaxation reduces drive, that there is a fundamental incompatibility in the combination of progressive relaxation with aversion conditioning in a single therapeutic regime. The argument is that as a result of relaxation the organism is entering the conditioning situation in a state of low drive whereas an optimum drive-level is essential for effective learning and conditioning to take place. This argument is supported by the proposition that the behaviour of an organism in any situation is determined in part by its drive-state at the time, and that the strength and quality of performance increases as drive increases. This is the theoretical position taken by

Hull, Spence and other drive theorists. (Logan, 1959; Gwynne Jones, 1960). The only qualification to the proposition that the quality of performance increases as drive increases is in the operation of the Yerkes-Dodson law (Hilgard and Marquis, 1961) which specifies an optimum drive-level for the most adequate performance; when this optimum level is exceeded, drive then has a disruptive effect on performance. The psychological theory of an optimum drive-level has its parallel in neurophysiology in the concept of an optimum activation-level and its relation to performance as shown by the following paradigm, activation being the function of the ascending reticular formation (Malmo, 1962).

Paradigm:

Activation level	Low	Moderate	High
Expected performance level:	Low	Optimal	Low

The hypothesis that relaxation reduces drive is a reasonable one; it may also be hypothesized that a noxious stimulus, such as electric shock, acts to increase drive, or arousal level. Immediately we are faced with measuring one against the other. These are clearly defined hypotheses that ought to be amenable to experimental verification. For example, an hypothesis could be formulated to state that the arousal generated by the noxious stimulus in a subject who is in a state of low drive leads to a quicker and stronger CR acquisition as a function of the impact of a strong noxious stimulus, such as electric shock, than the CR achieved by a subject who is already in a state of high drive, to the same stimulus. Given the operational definition of the important parameters involved, this is a testable hypothesis. Any difficulties in the way of setting up an experiment to test it would arise from the fact that drive theory, in spite of its long history, is still in a state of uncertainty as regards such matters as the definition and nature of drive itself, the existence of drive stimulus and its function in relation to drive, and how drive operates to influence behaviour. (Hilgard and Marquis, 1961; Hebb, 1958; Eysenck, 1957).

Observation of the behaviour of subjects in the aversion setting after they have had relaxation does not indicate that it differs in any particular way from that of subjects who enter the conditioning experience without prior relaxation. It is felt that a more objective measure than clinical hunches of the subjects' behaviour in response to the conditioning experience with or without the benefit of relaxation would refute the objection.

Moreover, the treatment programme incorporates an arousal phase which intervenes between the relaxation and conditioning stages of treatment. Motivation arousal is intended to push the person toward taking an active and positive interest in overcoming his disorder and to help him in combating the often encountered denial and understatement of the problem which is a familiar clinical experience of those who work with the alcoholic. If it also serves the purpose of circumventing the possible influence of relaxation upon the subjects' drive-readiness for aversion conditioning, so much the better.

The grounds for the use of relaxation added to aversion training finds its justification in the opinion that a high proportion of alcoholics are suffering from an underlying neurosis. Thimann (1965) considers that in his experience 70 % of alcoholics suffer from mild neurotic reactions, the remaining 30 per cent. being comprised of severe neurotic and psychotic categories. Interestingly enough, Thimann's view also supports the functional autonomy theory put forward in an earlier chapter as the final state of the disorder of alcoholism in some cases. This is evident from his statement that alcoholism at some stage changed from a symptom of underlying pathology to an autonomous secondary disease of addiction independent of the original pathology.

Wolpe (1958) has defined neurotic behaviour as "any persistent habit of unadaptive behaviour acquired by learning in a physiologically normal organism"; anxiety is "usually the central constituent of this behaviour, being invariably present in the causal situation." Neurotic anxiety is sometimes defined in terms of conditioned autonomic drive. This is a useful operational definition; it clarifies the function of progressive

relaxation in reinforcing parasympathetic at the expense of sympathetic activity; and, in fact, this is the mechanics of Wolpe's (1958) psychotherapy by reciprocal inhibition. A qualification to Wolpe's definition of neurosis takes the line that under certain circumstances neurotic symptoms may also result from failure to learn an adaptive response (Eysenck, 1960). A common example of this type is enuresis. In general the group of symptomatologies that come under the heading of psychopathy and behaviour disorders fall into this category. In some quarters this would include alcoholism as well, the alcoholic being generally classed as a psychopathic personality. Since most of human responses to the environment is learned, it may be that the failure to learn one set of adaptive responses is saying no more than that the person has learned another set of (unadaptive) responses that are opposed to the acquisition of the unlearned adaptive responses. If this is the case, the argument is circular and Wolpe's definition stands without need of qualification.

The indications for an approach such as relaxation-aversion therapy for certain kinds of disorders has been recognized by such writers as Eysenck (1960); Metzner (1963); Lazarus (1965) and Kepner (1964). "It is likely that aversion therapy by itself will be found useful in only a limited and carefully selected number of cases; it is possible that it will be found useful in many more cases if it can be combined with treatment by reciprocal inhibition. In this way, both the motor habit which is the primary symptom, and the autonomic habit which is the sustaining symptom can be treated simultaneously, and the evil consequences of exacerbation of anxiety drives avoided." (Eysenck, 1960, p. 277). Metzner (1963) has argued that although the electrical aversive stimulus may evoke a response that is incompatible with the drinking behaviour to be extinguished, the result may not be a permanent solution; for there is the possibility that the conditioned aversion response may become extinguished while the drive, fear or anxiety, that motivates the drinking may remain unaltered. Therefore, aversion conditioning "is only likely to be successful either (a) where the alcohol no longer reduces any

drive, except what is self-generated, or (b) where the anxiety is simultaneously being extinguished by other methods."

The Reinforcing Qualities of Progressive Relaxation

A person experiences the reinforcing effect of progressive relaxation as he learns to inhibit reciprocally, conditioned sympathetic activities (anxiety, fear) of the autonomic nervous system with parasympathetic responses, such as a slow, regular respiratory rate. As the alcoholic approaches the criteria for successful relaxation he is taken off such drugs as tranquillizers and night sedation and encouraged in the active use of relaxation to inhibit undue tensions and to induce natural sleep. When this is achieved, the effect is to increase his self-confidence as well as confidence in the therapy; this in turn, acts to reinforce his motivation for treatment and cure. An example is a female alcoholic, aged 51, who had a history of night sedation dependence lasting for almost 30 years. "All my married life." She was weaned from the night sedation habit after training in progressive relaxation and at 12 months follow-up reported sleeping naturally and well; more importantly, she had ceased to worry about not being able to get off to sleep without the knowledge that her regular dosage was at least by her bedside.

Motivation Arousal

It is a common observation that most alcoholics are not highly motivated for treatment. The absence of a positive attitude toward treatment expresses itself in a variety of ways: in defensive thinking about drinking (Bell, 1965); procrastination (Glancy, 1961); selective forgetting (Greiner, 1961); and the frequently encountered denial of alcoholism (Moore and Murphy, 1961). The possibility that some of the negative sentiments expressed by the alcoholic may stem from the long term effect of alcoholism rather than being inherent in his nature should not be overlooked.

Motivation arousal aims at encouraging the patient to look squarely

at the fact of alcoholism and at the many social and psychological problems associated with the disorder. The arousal phase is introduced when the subject has achieved competence at relaxation and is ready to go on to the aversion stage of treatment. He is instructed while in the relaxed state, to think about his drinking and the problems associated with it for him. After a minute or so he is brought out of his relaxation and questioned about his conceptualizations; the information he reports is recorded and fed back to him for further conceptual activity at the next session. The arousal session is conducted daily for three or four days and immediately precedes the first session of aversion conditioning of the day. It has been observed that some subjects become agitated at this experience, lose the calm of relaxation, burst into tears, and express sentiments of shame, guilt, loss of self-esteem, drinking to avoid conflicts in daily life, and so on. Others report nothing. Individual differences in response to motivation arousal may be a useful predictor of the likely outcome of treatment.

Electrical Aversion

Aversion conditioning is carried out in relation to the smell and taste of alcohol. The subject sits at one end of a table (7 x 4 x 2.5 ft.) the top of which is boxed in on three sides to a height of 2 feet. The side panels extend beyond the edge of the table at the patient's end and so cut off his view sideways. This arrangement serves the purpose of reducing extraneous visual stimulation. Plate 1 gives an indication of the view from the patient's end of the table. A one-way vision screen, 20 inches square, in front of the experimenter who sits at the opposite end of the table, is fitted into the framework of the box arrangement. This is intended to inhibit distracting verbal and other expressive exchanges between the subject and experimenter. Also it isolates the subject from the operations of the experimenter when manipulating the apparatus for delivering shock, shown on the right in Plate 2.

Plate 1. View of the Conditioning Cubicle from S's End.

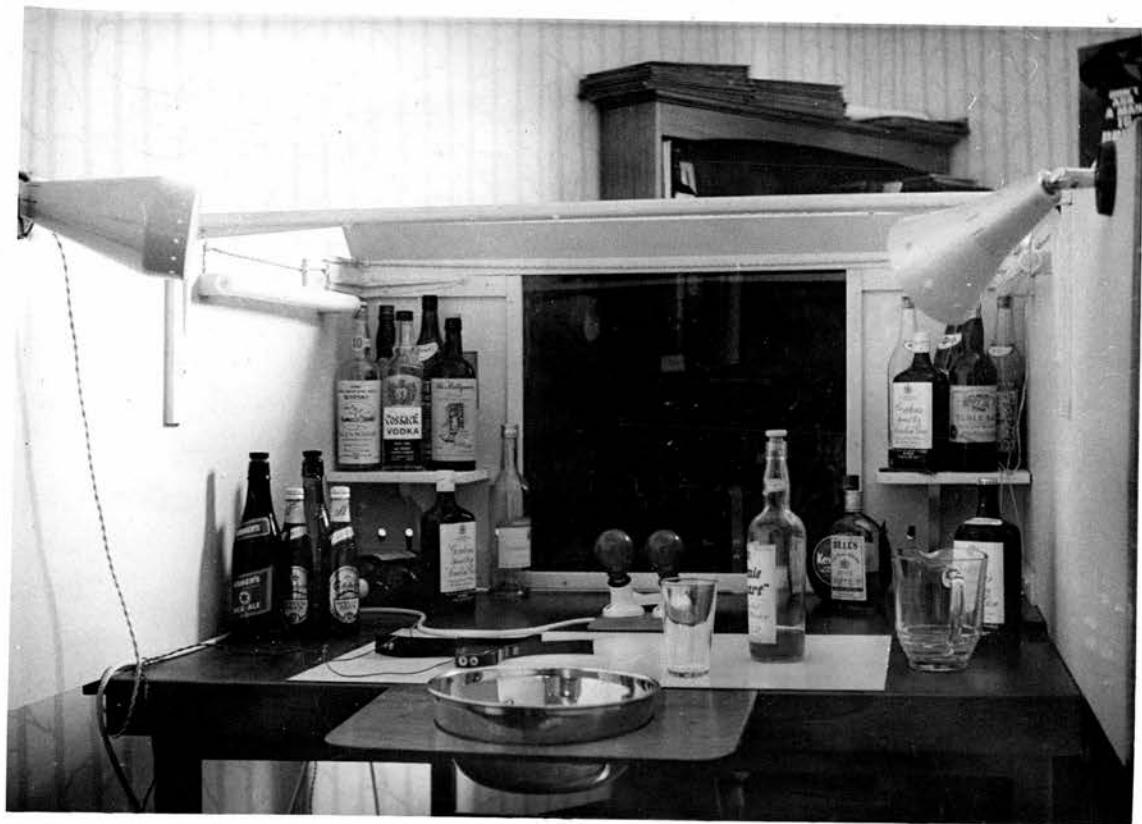
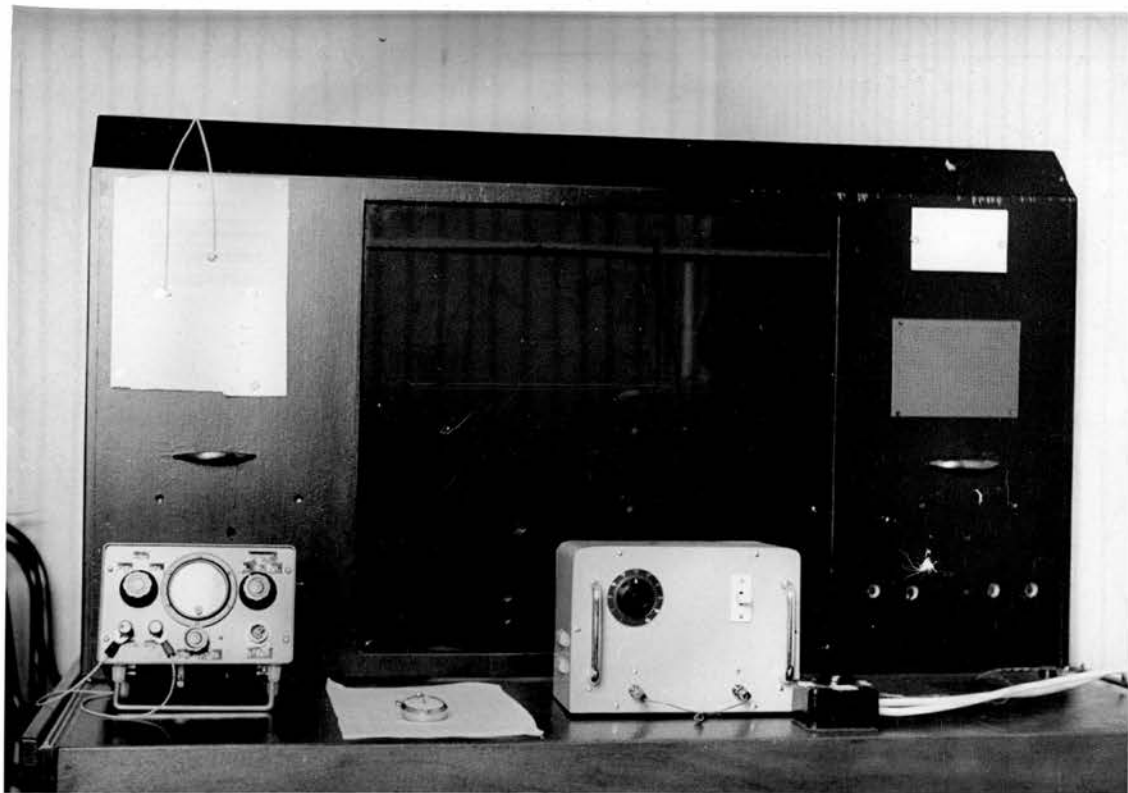


Plate 2. View of the Conditioning Cubicle from the Experimenter's end: Showing Shock Unit (right) and GSR Unit (left).



Apparatus

Electrical stimulation is delivered by means of two brass electrodes, 0.5 of an inch in diameter, attached to the forearm and/or back of the subject's hand. (Plate 3). The position of the electrodes varies from session to session. Electrode jelly is not used. The circuit and components of the apparatus for delivering shock is essentially the same as the McGuire box (McGuire and Vallance, 1964), with a maximum output that is well beyond the tolerance of the subject, though the actual strength of shock for most subjects is generally substantially below the maximum output.

Instructions

The concept of alcoholism as a learned habit is explained to the patient. He is told that the aim of aversion therapy is to help him to break the alcoholic habit, (a) by changing his perception of alcohol and (b) that by blocking the drinking response he will have solved one problem, drinking, and will then be free to turn his energies to new and more productive ways of dealing with whatever conflicts [that] may underlie his drinking. He is told that the treatment is unpleasant, that the shock comes from a battery operated unit and not from the mains. He is also told that it is left to him whether he chooses to go through with treatment or not. Where the individual shows reluctance to undergo aversion therapy, it is usually left to the doctor in charge of the case to encourage and persuade him to do so. Of over 80 alcoholics admitted to the Unit who were offered this form of treatment three only [have] discontinued therapy after it had begun and very few, two in the writer's experience, have refused outright to commence treatment at all.

Method

The subject is supplied with a glass, a jug of water and a bottle of his habitual alcohol, though, for practical reasons not necessarily his favourite brand. He is instructed to mix his drink according to taste. The majority of individuals in the study have been either gin or whisky drinkers and are usually amenable to a mixture of whisky and water or gin

Plate 3. View of the Conditioning Cubicle from S's end:
Illustrating position of Electrodes, and Red and Green
Lights.



and water. He is instructed to take a sip of alcohol but not to swallow. One sip is defined as a trial. The subject controls his rate of sipping during a session, though in order to avoid massed trials the experimenter may have to intervene with instructions to the subject to keep his sipping to a rate of not more than one per minute.

A shock of increasing intensity, starting randomly about the threshold reported by the subject in a pre-conditioning test to be unpleasant, is delivered on the sip. The intensity of the shock increases until S spits out the alcohol (into a bowl provided, Plate 1), as he had been instructed to do, as a signal to have the shock terminated. This is defined as an escape trial. Partial reinforcement on a schedule randomized around a 50 per cent. ratio is used. On non-reinforced trials S spits out the alcohol in response to a signal from the experimenter; this is a green light from an electric bulb, 25 w, which stands on the floor of the cubicle in front of the subject, shown in Plates 1 and 3. Most subjects quickly learn the escape response and ejects the alcohol with the same eagerness and force on non-reinforced trials as on ones that are reinforced by shock; this behaviour continues even when the green light has ceased to be presented for a series of consecutive non-reinforced trials. He also reduces the latency between the onset of shock and the escape response, the response becomes immediate within a very few trials, even to low intensity shocks; in this way he avoids the excessive build up of the noxious stimulus.

A red light (one of the two shown in Plates 1 and 3), defined as a discriminative stimulus (S^D) precedes reinforced trials in a number of aversion sessions; S^D is used in relation to GSR to give an indication of the strength of conditioning. The method will be described in a later chapter. An aversion session consists of approximately 10 trials; sessions are spread over 4 to 6 days. Table 13 contains information for the two samples in the study.

Table 13. Showing the mean number of sessions, standard deviation and average time per subject on aversion therapy for the two groups.

Categories	No.	Mean Session	S.D.	Average time (minutes)	S.D.
<u>R-A Group</u>					
Men	27	12.63	4.62	70.70	31.44
Women	10	19.30	8.65	100.40	53.15
Both	37	14.43	6.68	78.73	40.73
<u>A. Group</u>					
Men	20	10.95	2.80	75.35	55.87
Women	5	8.40	4.41	79.00	70.03
Both	25	10.44	3.35	76.08	58.99

Patients are usually discharged from hospital within a few days of the final aversion session and advised to return in one month's time for the first of a series of follow-up interview.

RESULTS AND DISCUSSION

Evaluating the Effect of Therapy

The simple necessary criterion for evaluating the effect of conditioned aversion therapy is that the alcoholic should remain abstinent. This follows logically from the thesis behind conditioning as a procedure for modifying behaviour and the assumption that in the particular instance conditioning has taken place. However, because conditioning is subject to the process of extinction once the reinforcing stimulus has been withdrawn, such a criterion means no more than that the person should remain abstinent for as long as conditioned aversion continues to operate at some strength. In any case, the therapist hopes for more than just temporary abstinence; his aim is to help the alcoholic to achieve a permanent state of sobriety and social adjustment.

The final strength of the CR (aversion) is partly a matter of individual differences in response to conditioning; the amount of over-learning that has occurred also influences the persistence of the CR. In practice, control over the process of therapy is often governed by such considerations as time, cost and the degree of co-operation from the patient; so that conditioning therapy may more often than not stop short of the desirable number of sessions that are necessary to ensure a considerable degree of over-learning and hence a greater resistance to extinction.

Nevertheless, seen as a therapeutic process with wider aims than limited abstinence, it is intended that the drinking response will be inhibited by conditioned aversion for long enough to allow the individual to experience the positive reinforcing effects of sobriety, such as improved marital relationships, and to reorientate his aspirations towards total recovery. In other words one aims at a generalization of the therapeutic effect in which a shift from the aversive consequences of

alcoholism to the rewarding effects of sobriety is experienced. Indeed, to the extent that successful subjects tend to demonstrate a general improvement after therapy, with adjustment in the areas of work efficiency, improved social relationships, marital and family adjustments, some such generalization does take place. This makes Knight's (1941) criteria for evaluating the effect of psychotherapy equally applicable to alcoholics treated by conditioning techniques. They include:

1. Symptomatic improvement.
2. Increased productiveness.
3. Improved adjustment and pleasure in sex.
4. Improved interpersonal relationships.
5. The ability to handle ordinary psychological and reality stresses.

Of course, not all of these criteria are applicable to every case and emphasis must be placed on symptomatic improvement.

Pattison (1966) has argued that, in the treatment of alcoholism, the commonly used criterion of success, abstinence, may be a grossly misleading measurement of improvement since abstinence may be maintained at the expense of total life functioning, as in some Alcoholics Anonymous abstainers; abstinence may also be followed by personality deterioration. He also cited several studies to illustrate that return to normal drinking occurs in a significant portion of treated alcoholics. While there may be a need for a clearer definition of the relationship of abstinence to therapy, nevertheless, when used in conjunction with other criteria of successful treatment, such as those of Knight, described above, it remains a useful objective measurement of the aim of therapy. At this stage of our knowledge of alcoholism and its treatment, the fact that some treated alcoholics return to social drinking is not sufficient to make return to social drinking the aim of therapy.

In this study, evaluation of the effect of therapy is by means of follow-up interviews, clinical assessment by the psychiatrist and independent reports from the patient's physician, spouse or relative.

Re-test on certain items in the psychological battery offers another source of measurement of improvement.

Follow-up

In order to accommodate the time-table of the research, the minimum follow-up period was set at 12 months. Subjects were requested to return to the hospital at the end of one month after discharge and at three monthly intervals thereafter. In addition to providing for the assessment of progress, follow-up interviews supply a kind of after-care function. The importance of after-care in the rehabilitation of the alcoholic has been suitably emphasized by Glatt (1964). Four outcome categories are defined: abstinent, improved, relapsed and others. The first category includes those individuals who are known to have been abstinent during the period of follow-up. Abstinence is assessed by the person's own testimony as well as reports from other individuals closely associated with him, spouse, relative, physician or even another patient with whom he may have established some fellowship during their period of hospitalization together. But even on his own testimony alone clinical experience has shown that the non-abstinent alcoholic is not difficult to discover. In the improved group are those individuals whose drinking is now of a social nature (one case) and appears to be in no danger of pathological escalation, or those whose drinking throughout the period of follow-up has been substantially reduced compared to their former level of drinking and general maladjustment, as recognized at the time of admission. The relapsed group contains subjects who have reverted to their former level of drinking, with no noticeable adjustment in other areas, or those who have had at least one further period of hospitalization for alcoholism since discharge but did not rejoin the group for further aversion therapy. In the fourth category are those subjects who opted out of treatment after it had begun, those who have been lost to follow-up or those where no reliable information as to their drinking and general adjustment since discharge is available. Three subjects opted out of treatment, one male in the Relaxation-Aversion group,

and one male and one female in the Aversion-only group.

Results

The thirtyseven cases in the Relaxation-Aversion group and 17 of the twentyfive cases in the Aversion-only group had completed the scheduled twelve-months' follow-up at the time of making this assessment. Tables 14 to 17 give the breakdown of results for the two groups at six and twelve months' follow-up respectively. For all the 54 subjects who have completed a minimum of twelve months' follow-up 30 (56%) were classed as abstinent (21) or improved (9). Two male subjects have died from heart disease: the first, in the Relaxation-Aversion group had been abstinent for 13 months the second, in the Aversion-only group, had been abstinent for 6 months.

Table 14. Six months' follow-up of thirtyseven cases treated by relaxation-aversion therapy

Outcome	Cases		Total	%
	Male	Female		
1. Abstinent	14	6	20	54
2. Improved	2	1	3	8
3. Relapsed	7	3	10	27
4. Others	4	-	4	11
Total	27	10	37	100

Table 15. Six months' follow-up of twentyfive cases treated by electrical aversion therapy alone

Outcome	Cases		Total	%
	Male	Female		
1. Abstinent	9	3	12	48
2. Improved	3	-	3	12
3. Relapsed	4	1	5	20
4. Others	4	1	5	20
Total	20	5	25	100

Table 16. Twelve months' follow-up of thirtyseven cases treated by relaxation-aversion therapy

Outcome	Cases		Total	%
	Male	Female		
1. Abstinent	12	5	17*	45.95
2. Improved	3	2	5*	13.51
3. Relapsed	8	3	11	29.73
4. Others	4	-	4	10.81
Total	27	10	37	100

* Includes 3 subjects (1 M, 2 F) relapsed, readmitted for further relaxation-aversion therapy and have been abstinent or improved for 12 months since last discharge.

Table 17. Twelve months' follow-up of seventeen cases treated by electrical aversion therapy alone

Outcome	Cases		Total	%
	Male	Female		
1. Abstinent	3	1	4	23.53
2. Improved	4	-	4*	23.53
3. Relapse ^e	4	1	5	29.41
4. Others	3	1	4	23.53
Total	14	3	17	100

* Includes one subject who has been readmitted for reinforcement sessions during follow-up.

Sex Differences

It is a widely held opinion that women alcoholics respond less well to treatment than men. Glatt (1964) reported a better prognosis among men than among women. Pemberton (1966) in a follow-up study of fifty female alcoholics suggested a cultural explanation for the malignancy of alcoholism in women; in that heavy drinking among women is less acceptable socially than among men, consequently women alcoholics tend to be more markedly secret drinkers than men. Furthermore, considering the social taboo on boozing among women, alcoholism among women may be a response to a more severe psychological disturbance than is the case among men. A conspicuous difference in the behaviour of male and female in-patient alcoholics noticed by the writer and by other members of the Hospice staff is that whereas the male patients tend to come together in spontaneous groups on the basis of sharing a common problem, alcoholism, and discuss this problem openly, this is not the case among women alcoholics. Where they do form social groups it is not usually in the knowledge that they share a common problem; rather they tend to keep their alcoholism a secret and it is usually a "discovery"

when they learn the facts about one another.

Of the 47 men and 15 women in the present study 49% and 60% of the men and women respectively were abstinent at six months' follow-up. When the subjects in the improved category are included the ratio becomes 60% to 67% in favour of the women. At twelve months' follow-up 54% and 62% of a sample of 41 men and 13 women respectively were found to be either abstinent or improved. This relationship between sex and outcome contradicts the general view and the findings of such workers as Glatt (1964) and Pemberton (1966). It could be an artefact of the disparity in numbers between the male and female groups.

Discussion

In a follow-up study of 62 alcoholics, Kendall and Staton (1965) reported that sex, age, duration and age at onset of excessive drinking, marital status, type of beverage, pattern of drinking, drinking environment, social class, history of delirium tremens or alcoholic hallucinosis, and attitude toward drinking did not show any correlation with outcome. In a long term follow-up of over 400 male alcoholics treated in the Hospice Unit, Dr. W. McAdam did not find any significant relationship between outcome and such variables as body build, intelligence, marital status and severity of drinking prior to admission. A significant relationship was found between outcome and diagnostic categories with neurotics doing better than psychopaths or patients with organic brain impairment. Glatt (1964) also reported that psychopaths did significantly less well than non-psychopaths. Pemberton (1966) found that patients without physical complications, such as organic brain impairment, and those who had active treatment of whatever sort did better than those with physical complications or those who had no active treatment or had refused treatment. In the present study the relationship between outcome and such psychometric variables as extraversion and GSR will be taken up in a separate chapter.

Comparison with other Studies

Walton (1961) and Pattison (1966) have made the point that follow-up

studies of the treatment of alcoholism have been so heterogeneous that few reliable conclusions can be drawn about either treatment results or methods; for example, different types of patients may be involved, uniform follow-up procedures are seldom adopted. The data given in Table 18 illustrate some of these points. As regards the type of subjects, for instance, those in the Vallance (1965) and Blake (1965) samples cluster in different social classes (by occupation). An important point to bear in mind in comparing reports from different centres undertaking treatment of alcoholism is not to exaggerate the importance of variables that do not contribute to the outcome of treatment. On the other hand, with the possible exception of organic brain damage we are by no means certain of the generality of variables which do or do not contribute to outcome.

The way in which patients are selected for treatment is clearly important in the evaluation of results. In the Walton (1961) sample of 180 alcoholics a further 105 patients "presented during the year were not admitted, but alternative disposition or treatment arranged." Walton reported that application for admission from patients in distant towns have been seldom accepted. In the setting of the present study, on the contrary, patients were admitted from all over Britain and it would have been impossible to exclude patients from the study using Walton's criterion. Another feature, as in the report by Rossi (1963), is that cases that have been treated and subsequently lost to follow-up are excluded from the original sample in the assessment of results. However justifiable this procedure may be it gives an inaccurate picture of the effect of treatment. In some studies, such variables as age, intelligence, sex differences, treatment regime, the definition of terms such as "sober", "abstinent", "improved", and even the outcome of treatment may be inadequately reported.

It is often stated that in the treatment of alcoholism one-third can be expected to recover, i.e., remain abstinent, another third will improve and a third will remain unimproved. This estimate seems pretty near the

Table 18. Comparison of follow-up results

Study	Treatment	Follow-up (years)	No.	Abstinent	Results (%) Improved
1. Lemere & Voegtlin (1950)	Apomorphine Aversion	14	5000	51	-
2. Monnerot (1963)	Apomorphine/Disulfiram	.5 - 1	338	23.7	16.6
3. Robson (1965)	Ectlectic	-	155	-	50
4. Rossi et al (1963)	Lectures/Group and Individual Psychotherapy	1.75	149	9.4	30.2
5. Vallance (1965)	"First Aid Management"	2	68	<5	25
6. Wilby & Jones (1962)	Medical and Casework	1.5	706	37.5	68.3
7. Walton (1961)	Group Psychotherapy and Community Care	1	180	48.3	14.4
8. Glett (1961, 1964)	Group Psychotherapy and After Care	2	94	33	33
9. Blake (1965)	Relaxation-Aversion (Electrical) Therapy	1	25	52	-

mark. An analysis of nine studies taken at random from the literature gave a mean for abstinence and improved of 32.8% and 30.1% respectively. It would seem, therefore, that in terms of current achievements in the treatment of alcoholism and in spite of the difficulties in the way of making accurate comparisons between reports from different centres an abstinence rate of 40 per cent. or more over a two to three year follow-up constitutes a "good" result. To this extent, allowing for the limited period of follow-up, the results obtained in this study are encouraging. Besides, it is felt that with further experimental refinements to the technique the results could be improved upon in future.

Improving the Technique

Some of the factors that are instrumental to the acquisition of a strong conditioned response and in strengthening its resistance to extinction are already built into the present method. They include partial reinforcement on a random schedule; the value of partial versus continuous reinforcement in increasing the resistance to extinction has been discussed by Humphries (1939) and extensively investigated over the years by Skinner and his associates in the United States (Ferster and Skinner, 1957). McClelland and McGowan (1953) have demonstrated that variability in the amount of reinforcement during training enhances the resistance to extinction of a secondary reinforcer. In this method the primary negative reinforcer (shock) varies randomly in strength from trial to trial. It may be, too, that techniques of conditioned aversion other than the escape formula applied in the present study may prove to be more efficient in the treatment of alcoholism. The method of anticipatory avoidance learning (Solomon and Brush, 1956) currently being investigated by Feldman and McCulloch (1965) for the treatment of homosexuality may provide an effective alternative. An improvement on the escape formula itself, described as avoidance-escape conditioning has been tried out on 8 subjects who are not part of the sample in the present study.

The method has the advantage of adding to the operant nature of the escape procedure and of eliminating the need for the green light signal (previous chapter) from the experimenter on non-reinforced trials. The eight subjects in this group have had a mean follow-up period of less than six months at the time of preparing this report; it is planned to carry out a fuller investigation of this modified technique on a larger sample of subjects in due course.

A start has also been made to isolate olfaction for special attention. The apparatus shown in Plate 4 and demonstrated in Plate 5 is used for conditioned aversion to the smell of alcohol. It permits accurate control of the time interval as well as the sequential relationships between CS, UCS and R, in which CS is the smell of alcohol, UCS is the aversive stimulus (electric shock) and R the aversive response. The apparatus can be adapted to both classical and operant conditioning approaches though the classical formula has been the one used in its initial trials.

The apparatus consists of a drum, 13 inches in diameter, with accommodation for six test tubes, each of 3 cm. internal diameter and 10 cm. deep. The drum sits on the spindle of a mains driven Shaded-pole, 220 volt. A.C., 50 cycle, geared motor with a speed of 3 r.p.m. A lid of smooth formica surface, $\frac{3}{16}$ " thick, resting on four poles, covers the drum. An aperture 2.5 cm. in diameter is cut into the lid such that it fits directly above any of the 6 test tubes distributed around the edge of the drum. The edges of the test tubes project about 0.5 cm. above the upper surface of the drum and press slightly against the underside of the lid and in this way seals off the smell from the contents in other test tubes except the one that is exposed under the aperture. Usually only two smells are used, the CS (alcohol) and a neutral smell such as orange. One end of a rubber tube, 1 cm. internal diameter and 24 inches long, is fitted into the aperture cut in the lid of the drum while an oxygen inhaler is attached to the other. A tiny rubber balloon (a finger stall) attached to a short plastic tube fits

Plate 4. Apparatus for Aversion Conditioning to the Smell of Alcohol.

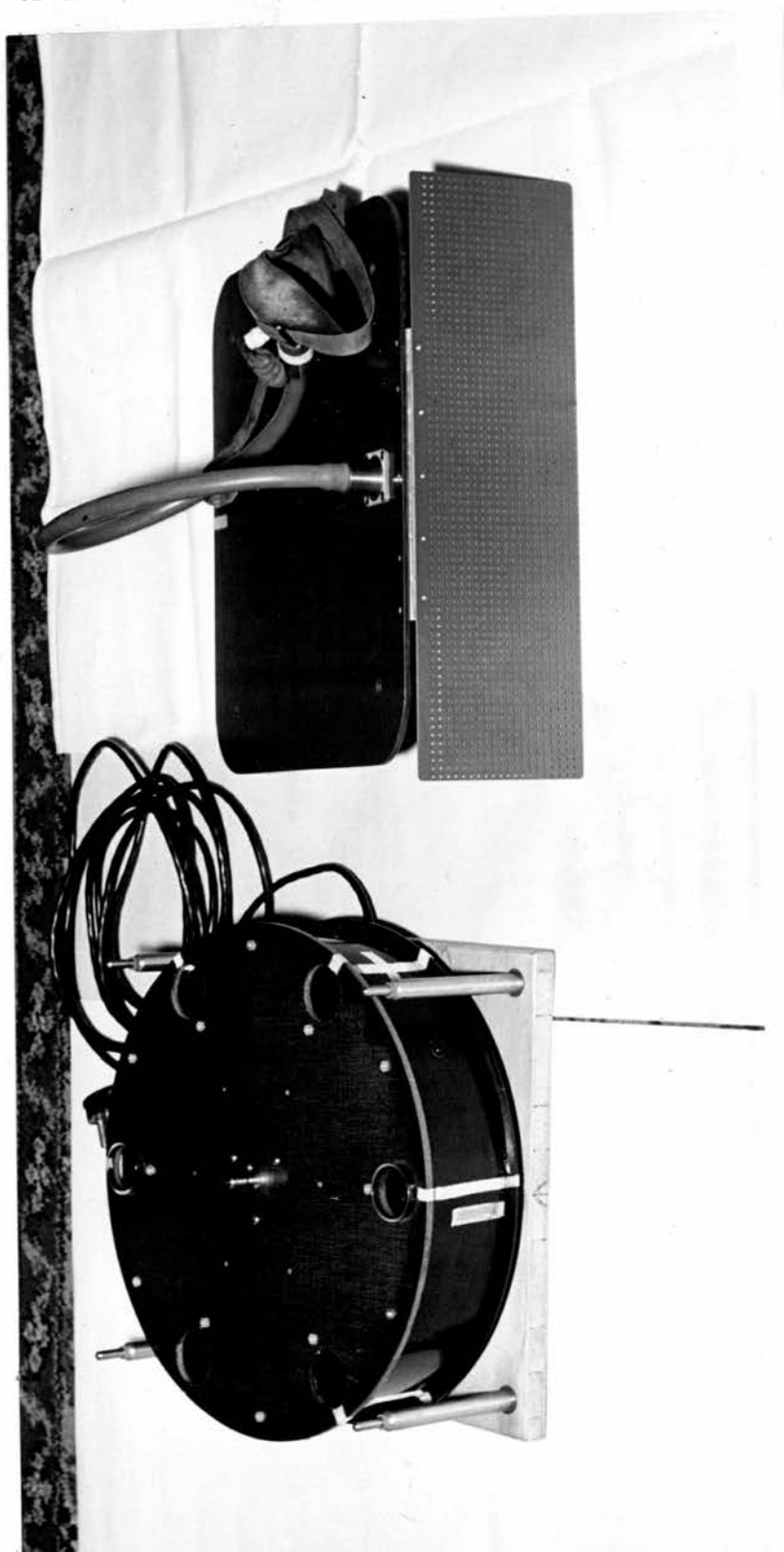
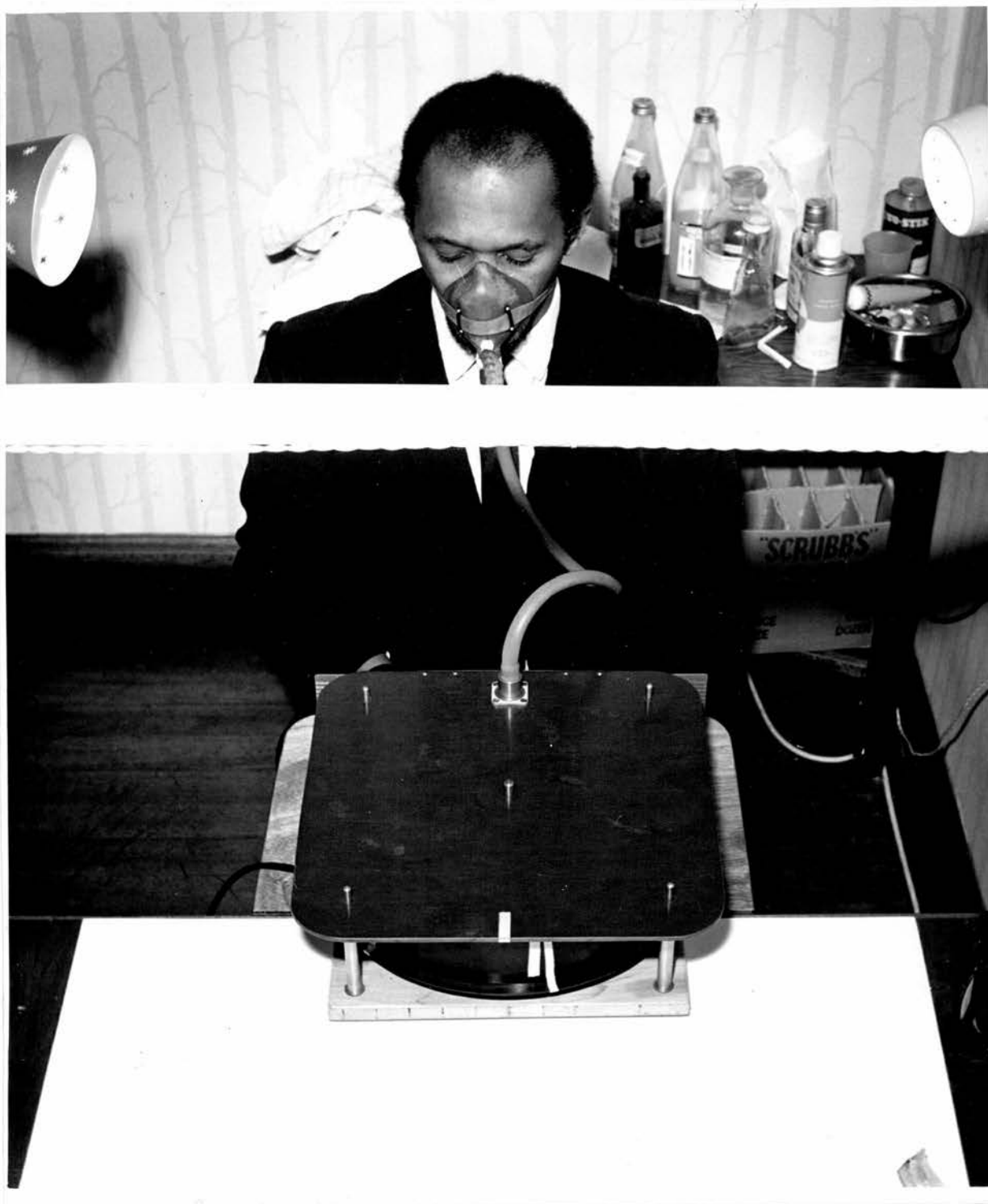


Plate 5. Illustration of Apparatus for Aversion Conditioning to the Smell of Alcohol in operation.



into a hole in the front of the inhaler. With the inhaler in position, covering the lower part of the face S is obliged to breathe through the rubber tube. An adequate supply of air for normal breathing is ensured by the space between the lid and the upper surface of the drum when there is not a test tube exposed beneath the aperture.

Inflation and deflation of the rubber balloon gives information about S's breathing. The experimenter, who sits facing the subject, controls the stopping and starting of the drum by means of an on-off switch and is able to expose the CS beneath the aperture by bringing the appropriate indicator (vertical markings on the side of the drum, Plates 4 and 5) into alignment with a fixed point on the lid of the drum. The front of the drum is covered so that S cannot tell other than by smell when the CS or other stimuli^{US} is exposed beneath the aperture. The UCS (shock) is of about 3 seconds duration and is delivered on inhalation as indicated by the deflation of the balloon fitted into the inhaler. A conditioning session lasts for 10 minutes and consists of 5 trials on a fixed interval schedule of 2 minutes between trials. The session is kept short in order to avoid any possible discomfort arising from the patient's having to sit for too long with the inhaler in position. So far the technique has been used in conjunction with treatment by apomorphine aversion on the hypothesis that the apomorphine phase of treatment acts to sensitize the patient and therefore prepares him for a greater responsiveness to the more accurate technique of conditioned aversion to the smell of alcohol. The hypothesis is yet to be tested rigorously. Nevertheless, the apparatus is quite suitable for independent use.

A further way of possibly influencing the responsiveness of the alcoholic to electrical aversion conditioning is by the use of a central stimulant. Methylphenidate (Ritalin) has been used on the periphery of the research in association with electrical aversion. The makers of the drug describe it as a central nervous system stimulant with an action intermediate between caffeine and the amphetamines. Administered by

slow intravenous injection a dosage of 20 mg. has been shown, on clinical observation, to increase arousal effectively and the alcoholic's responsiveness to conditioning.

Taking all these possible experimental modifications into consideration, the opinion that the method reported here can be made more effective in terms of treatment outcome seems a reasonable one and worth pursuing in any future extension of the research.

Conclusion

Examination of the results obtained show that 59.46 % of the Relaxation-Aversion sample compared with 47.06 % of the Aversion-only sample were classified as either abstinent or improved at twelve months' follow-up. Though the difference is not statistically significant and may be attenuated by the smallness of the Aversion-only sample at twelve months' follow-up, the indications are that with an unselected sample of in-patient alcoholic admissions the relaxation-aversion approach to treatment is superior to electrical aversion conditioning alone. These results lend support to the hypothesis that in the treatment of alcoholism there is a need to extinguish the drive, fear or anxiety, that motivates the drinking response while tackling simultaneously the habit of alcoholic drinking by conditioned aversion therapy. As an approach within the framework of learning and conditioning theory the overall abstinent-improvement rate of 56 per cent. obtained by the experiment stands in fair comparison with published reports of other studies, whatever the type of treatment. In addition, the approach has the advantage of methodological clarity over many other approaches to the treatment of alcoholism, it lends itself to objective evaluation of progress, is easily replicated and has the chance of further development along experimental lines.

THE EXTRAVERSION HYPOTHESIS

The importance of describing the major patterns of behaviour in human subjects has been an outstanding preoccupation among psychologists. In pursuit of this aim, the concept of introversion-extraversion has become almost the most pervasive in theories of personality. It has attracted the attention of psychologists with widely divergent orientations such as Jung (1923), Klopfer et al (1954), Cattell and Warburton (1961), Cattell (1965), and Eysenck (1957). Probably because of the wide interest it has attracted, the definition of extraversion has been one of the major issues confronting personality theorists who work with the construct. Carrigan (1960) has observed that "virtually every analysis which has produced an extraversion-like factor has also yielded factors identifiable with some aspect of adjustment. The latter factors, known variously as ego-strength, general adjustment, neuroticism, anxiety, etc., appear to be essentially independent of E-I". Nevertheless, the concept has become almost exclusively the main dimension of personality against which to compare and interpret human behaviour. Eysenck and his co-workers at the University of London have made a special study of the extraversion hypothesis from the standpoint of the learning theorist; and it is in regard to this special treatment of the topic that the ensuing discussion will proceed.

Although Pavlov (1927) described conspicuous individual differences in the conditioning performance of animals, it is only within recent years that interest in the problem of conditionability and personality has received sustained attention from experimental psychologists. The two main theories that have given rise to this considerable activity have been those of Hull (1943, 1952) and of Eysenck (1947, 1957). Working with certain notions from the theory of learning originally advocated by Hull and modified in the light of more recent developments, Eysenck (1957) has formulated the only comprehensive theory of personality from which it is possible to make explicit predictions concerning individual

differences in conditionability. His theory proposed that most of the variance in personality functioning can be accounted for by three independent dimensions, namely, psychoticism, neuroticism and introversion-extraversion. The dimensions that are of interest to this investigation are those of neuroticism and introversion-extraversion.

Neuroticism is identified with "the general emotional lability of a person, his emotional overresponsiveness, and his liability to neurotic breakdown under stress. Extraversion, as opposed to introversion, refers to the outgoing, uninhibited, sociable proclivities of a person." (Eysenck, 1959).

In seeking to integrate learning theory and likely neurophysiological mechanisms that account for the personality differences between introverts and extraverts, Eysenck (1957), in an extension of Pavlov's theory of cortical processes, has formulated a Postulate of Individual Differences based on the concept of cortical excitation and inhibition. A second postulate, the Typological Postulate, is derived from the first. The essence of these postulates is that individuals in whom excitatory potentials are generated quickly and strongly, and in whom inhibitory potentials are generated slowly and weakly, will tend to be introverted in personality; such people should form conditioned reflexes quickly and strongly, and extinguish slowly, and, in case of neurotic breakdown, they will tend to develop dysthymic disorders. Conversely, individuals who generate weak excitatory potentials slowly and who generate strong inhibitory potentials quickly, tend to be extraverted in personality; such people should form conditioned reflexes slowly and with difficulty, and extinguish quickly; they tend to develop hysterical-psychopathic disorders in the case of neurotic breakdown.

Dysthymic disorders are characterized by such syndromes as anxiety reaction, reactive depression, phobic states and obsessive-compulsive conditions.

Eysenck (1959) has standardized a 48-item questionnaire, the Maudsley Personality Inventory (M.P.I.) which is designed to give a

measure of the two personality dimensions of Neuroticism and Extraversion. Each of these two dimensions is measured by means of 24 questions. A short form of the M.P.I., consisting of two scales of six items each, taken from the longer version of the test, is also available. The M.P.I. has recently been superseded by the Eysenck Personality Inventory (E.P.I.) (Eysenck and Eysenck, 1964). Table 19 gives the distribution of a sample of 108 alcoholic in-patients on the E scale of the M.P.I. As defined by the test, extraverts are those whose score is above the standardization mean of 24.91; introverts are those whose score falls below the mean. There was no significant difference between the sexes for extraversion.

Table 19. Distribution of alcoholic subjects on the Extraversion scale of the M.P.I.

Category	Male (%)	Female (%)	Total (%)
Introverts	41 (55)	16 (47)	57 (53)
Extraverts	33 (45)	18 (53)	51 (47)
Total	74 (100)	34 (100)	108 (100)

Table 20 gives the distribution for the same sample on the N scale of the test. Neurotics are defined as those whose scores lie above the standardization mean of 19.89. Again, the difference between the male and female groups for scores on the N scale was not statistically significant.

Table 20. Distribution of alcoholic subjects on the Neuroticism scale of the M.P.I.

Category	Male (%)	Female (%)	Total (%)
Neurotic	48 (65)	24 (71)	72 (67)
Non-neurotic	26 (35)	10 (29)	36 (33)
Total	74 (100)	34 (100)	108 (100)

The means and standard deviations for the sample on the E and N scales are shown in Table 21. These are compared with data from the standardization sample.

Table 21. A comparison of a sample of hospitalized alcoholics with the Quota sample on the M.P.I.

Category	No.	Extraversion		Neuroticism	
		Mean	S.D.	Mean	S.D.
Quota sample	1,800	24.91	9.71	19.89	11.02
Alcoholic sample	108	23.71	9.64	23.53	10.99

Table 22 gives the breakdown in terms of sex differences on the two dimensions measured by the M.P.I.

Table 22.

Category	No.	<u>Extraversion</u>		<u>Neuroticism</u>	
		Mean	S.D.	Mean	S.D.
Male	74	23.5	9.52	22.72	10.96
		+0.92		+1.06	
Female	34	24.18	9.89	25.29	10.86
		+0.96		+1.05	

It will be noticed that there is little variation between the two groups on either of these measures. The tendency for hospitalized alcoholics as a group to be less extraverted and more emotionally labile than normals on the M.P.I. has been shown more clearly in the recently published manual of the E.P.I. (Eysenck and Eysenck, 1964; Table 5).

Extraversion and Outcome

From the theory it would be predicted that introversive alcoholics would do better than extraversive alcoholics in response to therapy based on conditioning principles. The Relaxation-Aversion and Aversion-only samples together make up a group of 62 subjects. In the analysis of results in terms of the M.P.I. these samples will be treated as one. When they are dichotomized on the basis of their deviations from the standardization mean of 24.91 on the M.P.I., thirtythree subjects (26 M, 7 F) were classified as introverts and twentynine (21 M, 8 F) as extraverts. The mean E score for the introversive group was 16.58 (S.D. 6.25) and the mean N score was 25 (S.D. 10.84). The mean E score for the extraversive group was 32.34 (S.D. 5.02) and the mean N score was 20.9 (S.D. 9.61). Taking the group separately, fiftyseven per cent. (21) and fortyeight per cent. (12) of the Relaxation-Aversion

and Aversion-only group respectively were classed as introverts. The outcome at six months' follow-up for the 62 S's taken together is shown in Table 23.

Table 23. Results at six months' follow-up for introversive and extraversive alcoholics as classified by the M.P.I.

Results	<u>Introverts</u>		<u>Extraverts</u>		<u>Total</u>	
	No.	(%)	No.	(%)	No.	(%)
1. Abstinent & Improved	18	(55)	20	(69)	38	(61)
2. Relapsed	8	(24)	7	(24)	15	(24)
3. Others	7	(21)	2	(7)	9	(15)
Total	33	(100)	29	(100)	62	(100)

Fiftyfour of the 62 S's had completed the schedule twelve months' follow-up period at the time of analysing these results. The outcome for this group is given in Table 24.

Table 24. Results at twelve months follow-up for introversive and extraversive alcoholics as classified by the M.P.I.

Results	<u>Introverts</u>		<u>Extraverts</u>		<u>Total</u>	
	No.	(%)	No.	(%)	No.	(%)
1. Abstinent & Improved	13	(43)	17	(71)	30	(55)
2. Relapsed	9	(30)	7	(29)	16	(30)
3. Others	8	(27)	-	-	8	(15)
Total	30	(100)	24	(100)	54	(100)

Analysis of the data given in Table 24 reveals that the extravertive subjects have responded significantly better ($P < .05$) to treatment than the introvertive subjects. This result contradicts the prediction from the theory. The level of significance would not be regarded as sufficiently exacting, however, to be accepted as a reliable refutation of the extraversion hypothesis; moreover, the significance disappears when subjects in the third outcome category, "others", are excluded from consideration. The ratio remains strongly in favour of the extraverts when the Relaxation-Aversion and Aversion-only groups are examined separately. Seventyfive per cent. of the extraverts in the Relaxation-Aversion sample were either abstinent or improved at twelve months' follow-up, compared with 48 per cent. of the introverts. In the Aversion-only sample 62 per cent. of the extraverts and 33 per cent. of the introverts respectively were either abstinent or improved at twelve months' follow up.

Before discussing these findings in the light of a general theory of individual differences in conditionability and of the test, the M.P.I. used in classifying subjects into the various categories, an analysis of the GSR responses obtained from a number of subjects in the sample may clarify and add to the meaningfulness of the results reported in this chapter.

GSR CONDITIONING AND THE EXTRAVERSION

HYPOTHESIS

The purpose of GSR measures was to give some evidence of conditioned aversion to alcohol and to investigate individual differences in response to conditioning. The galvanic skin response (GSR) measures changes in arousal in the human organism by recording the resistance afforded by certain parts of the body to the passage of a minute electric current through the surface of the skin, such as the palm of the hand. The electrical resistance of the skin depends upon some aspect of activity of the sweat glands. The sweat-gland activity produces increased permeability of the cell membrane, which results in a polarization change, and thus a change in electrical resistance. The reciprocal of resistance, i.e., conductance, appears to be the better unit of measurement of the physiological processes involved (Duffy, 1962). Units of measurement commonly employed have included percentage change in resistance, change in conductance, the square root of conductance change, and log conductance change. Little rational guide is available on the question of the appropriate unit of measurement. The general opinion seems to be that no one unit of measurement has any marked advantage over the others. (Lovibond, 1964; Martin, 1964; Eysenck, 1956).

The GSR is one of the two most popular conditioning procedures with human subjects, the other being eyeblink conditioning. Over the years, Martin (1960a, 1960b, 1962, 1963a, 1963b) has studied the topic of GSR conditioning extensively and has described the parameters that are important to work of this nature (Martin, 1964). On the whole, the technical difficulties in apparatus design and so on have been overcome and a number of reliable instruments are available. The problem of subject variables on the other hand has not yet been satisfactorily resolved. One of the outstanding problems is the question of the extent

to which conditioning is mediated by the subject's central state of arousal or by changes in resistance at the periphery (Martin, 1960a; Malmö, 1962; Corteen and Blackman, 1965; Duffy, 1962). Another problem is that of knowing whether the behaviour observed in a conditioning experiment is a function of true conditioning or rather the result of reflex sensitization or pseudoconditioning.

1. Central or Peripheral?

In an experiment on GSR conditioning (CS, a dim light; UCS, a 110 db tone) Martin (1960a) found that the level of skin resistance, which was measured continuously throughout the conditioning procedure, correlated negatively and significantly with the number of CR's given by the subjects. Two explanations of this result were considered: the first, that conditioning relates to level of arousal and the second that an increase in threshold at the periphery during high resistance influenced the non-occurrence of CR's. Martin cited reports by Kleitman (1939) and Richter (1926) in support of the view that palmar skin resistance varies with the level of sympathetic nervous system activity and with the subject's central state of arousal. She also cited evidence from Davis (1930) and Davis et al (1955) in support of the hypothesis that the end organs may be modulating the measurement of neural impulses. Corteen and Blackman (1965) have proposed that the GSR may best be thought of as a peripheral manifestation of a sensitizing or orienting response which is basically facilitated by a cortically controlled centre in the nostral part of the non-specific reticulo-thalamic system. Although the problem remains unresolved, it is an issue which may be investigated independently, without necessarily affecting the role of GSR as a measure of CR magnitude and of its occurrence in experiments on the conditioned reflex.

2. Pseudoconditioning

This apparent conditioning does not depend on the formal pairing of CS and UCS. Rather, what is described as "reflex sensitization" is the

phenomenon that accounts for any conditioned response that is elicited by the CS. Sears (1934) was able to elicit apparent CR in goldfish using a light as the CS and an electric shock as the UCS. "On testing the light before training he found it to cause the fish to swim excitedly. He adapted out this original response to light and then gave a series of isolated shocks - not paired with the light. The shocks "pepped up" the fish so that they again responded to the light, or even to a vibrating stimulus." That is, the shock sensitized the appropriate protective reflexes so that any sudden stimulus would call them out. A strong stimulus (UCS) such as an electric shock delivered well above threshold may sensitize its natural response so that almost any other stimulus will trip off the same response. (Woodworth and Schlosberg, 1955).

Martin (1962) placed normal male subjects into six experimental groups: three conditioning and three pseudoconditioning. S's were assigned to the six groups on the basis of two factors, (1) the number of GSR's given to a series of 10 light stimuli (CS), and (2) basal skin resistance during this period. The groups were matched for these measures. Subjects in each of the conditioning or pseudoconditioning divisions received one, three, or five UCS trials, a tone (paired with CS or UCS alone). Thus the sequence of the schedule (Table 25) was 10 light stimuli - UCS (tone) - 10 light stimuli.

Table 25. (By courtesy of Martin, 1962).

		<i>Conditioning</i>		
Group 1 C	19	10 light stimuli	$\left\{ \begin{array}{l} 1 \text{ paired trial} \\ \text{(light + tone)} \\ 3 \text{ paired trials} \\ 5 \text{ paired trials} \end{array} \right\}$	10 light stimuli
Group 3 C	19			
Group 5 C	18			
		<i>Pseudoconditioning</i>		
Group 1 PsC	19	10 light stimuli	$\left\{ \begin{array}{l} 1 \\ 3 \\ 5 \end{array} \right\}$	tone (unpaired) 10 light stimuli
Group 3 PsC	19			
Group 5 PsC	18			

Martin found that the conditioning groups together gave significantly more responses than the pseudoconditioning groups during the final lights; that the effect of different numbers of UCS trials was more clear-cut between pseudoconditioning groups; and that Autonomic Liability Scores to a single UCS correlated significantly with the number of GSR's to both light series only in the conditioning groups. The findings are interpreted as showing that the probability of occurrence of a GSR to a weak stimulus is increased after several intense stimuli, i.e., reflex sensitization takes place.

The instrument used for the measurement of galvanic skin response in this study is the same in design as that described by Taylor (1962); it is shown on the left in Plate 2, page 84. The instrument was used originally in a study of the amount of emotion experienced by a motorist in different road and traffic conditions. It is a portable transistorised unit, power being supplied by internal batteries. The main components of the instrument are the input circuit, an oscillator, an A.C. amplifier, and the output and feedback control circuits. A constant voltage is applied to a potential divider formed by the resistance between the electrodes on the skin, and a very much lower resistance in series with it. No adjustments are required during measurement. A meter, calibrated in microamperes, gives direct indication of responses in units of percentage change of conductance. It can be pre-set to register changes from zero to five, ten or twenty per cent.

Subjects

GSR data were collected on 46 subjects in the study. Of these, five had not completed the schedule twelve months' follow-up at the time of analysing the data and one had died within nine months of discharge from hospital.

Procedure

In the method described by Taylor (1962) the GSR electrodes were fitted by means of rubber cups to the tips of the index and second fingers

of the right hand. In the present study, silver electrodes, 1 cm. in diameter, were placed at the base of the fourth finger and base of the thumb and held fast by elastoplast strips. Contact areas were cleaned with methylated spirits. The electrodes were coated with ordinary electrode jelly.

The patient was told that the purpose of the GSR was to measure his level of autonomic responsiveness and that this information, added to the data collected from the other psychological tests would assist the doctor and psychologist to understand his problem in an objective way. The procedure resembles somewhat that employed by Martin (1962), described above, in that GSR was taken to two series of 10 light stimuli. The formula was as follows:

1. 10 red lights.
2. Three sessions of 10 trials each, 15 of the 30 trials were associated with shock (light/alcohol-shock) and were distributed randomly among the other 15, non-reinforced, trials.
3. 10 red lights.

The three stages of the operation may be stated as follows:

10 red lights - $(S^D/S_1 \longrightarrow S_2 \longrightarrow R_t)$ - 10 red lights.

in which, S^D , the red light, acts as a discriminative stimulus or warning signal; S_1 is the secondary negative reinforcer, i.e., the smell-taste complex experienced by S in the act of sipping the alcohol; S_2 is the primary negative reinforcer (electric shock); and R_t is the escape response, i.e. the spitting out of the alcohol. The three stages of the operation are separated by gaps of several hours or, in the case of 1 and 2, days.

The patient sat at the appropriate end of the conditioning cubicle, facing a holder containing a red 25 w. electric bulb, one of the two shown in Plate 3. After he had settled down the first series of 10 red lights, each of about 2 seconds duration, was presented at intervals

of ten to fifteen seconds. This interval allowed time for the subject to settle down after each response, and for the needle on the instrument panel to return to zero. S's response to the 10 light stimuli provides a GSR adaptation curve. Stage two is introduced on the second day of aversion conditioning; that is the red light is associated with alcohol and shock for three sessions while the patient is going through the actual therapeutic procedure. The last of the three sessions takes place at 9 p.m. Twelve hours after the last session the subject is exposed to the second series of 10 red lights, under the same conditions as the first.

The unit of measurement was simply the mean conditioned response amplitude to the ten light stimuli. As a function of the light-shock pairing it was predicted that the mean response amplitude to the second light series would be greater than the first. This relationship was found in a majority of cases. Responses were treated empirically; that is, a response was not defined as a percentage change from a basal level, as described by Taylor (1962). The reason for this was that the instrument was a reliable measure of percentage changes only for the response of subjects whose resistance fell within the range of 20 to 60 k. As the actual resistance for each patient in the sample had not been determined it seemed more accurate to define responses as simple units of change from a basal level rather than as percentages. Since concern was with changes in GSR within the same individual from one session to the next this approach seems empirically sound. Responses were recorded at the 5 per cent. setting and their amplitude read off directly from the meter on the instrument panel.

Three categories of (GSR) conditioned responses were defined on the basis of the difference between the means of the two light series.

1. A Strong GSR. Where the mean (M2) of the second light series was found to be significantly greater than the mean (M1) of the first series was defined as a strong response. The minimum level of significance for this purpose was set at the .05 level of confidence.

FIG. 6. Weak GSR. Subject: 51-year-old male, neurotic-extravert
(N = 30 : E = 30) Abstinent 12 months.



116
FIG. 7. Paradoxical GSR. Subject: 39-year-old male dysthymic with epileptic syndrome
(N = 26, E = 20) Abstinent 12 months



2. A Weak GSR. Where M2 was greater than M1 but not significantly so was defined as a weak response.
3. A Paradoxical GSR. This was found where M2 was less than M1; that is, CR was not manifested.

Figures 5 to 7 illustrate each of these relationships in the case of three different subjects. Inference was drawn from the type of (GSR) response to the possible strength of conditioned aversion to alcohol.

GSR and the Extraversion Hypothesis

Subjects were classed as introverts or extraverts on the basis of the deviation of their scores from the standardization mean of the E scale of the M.P.I. On this basis 23 of the 46 subjects in the GSR sample were classed as introverts and 23 as extraverts. The mean E score for the introverts was 16.13 (S.D. 6.63) and the mean N score was 21.96 (S.D. 10.67). The mean E score for the extraverts was 32.22 (S.D. 4.55) and the mean N score was 19.26 (S.D. 10.14). Table 25A gives the distribution of subjects in each of the three GSR categories.

Table 25A.

GSR Category	Introverts		Extraverts		Total	
	No.	(%)	No.	(%)	No.	(%)
1. Strong	10	(44)	9	(39)	19	(41)
2. Weak	4	(17)	10	(44)	14	(31)
3. Paradoxical	9	(39)	4	(17)	13	(28)
Total	23	(100)	23	(100)	46	(100)

While there is little difference, numerically, between introverts and extraverts in the strong category, when the strong and weak categories are taken together a markedly higher percentage of extraverts (83%) than

introverts (61%) produced positive conditioned GSR's. The difference, however, does not reach the .05 level of significance.

GSR and Outcome

It would be expected that subjects with positive GSR's would do better on follow up than those in the Paradoxical category. Generally, this has been the case. The results for the 40 S's who have completed twelve months' follow-up are shown in Table 26.

Table 26. The relationship between GSR and outcome at twelve months' follow-up

	GSR Category	Outcome			Total
		Abstinent & Improved	Relapsed	Others	
1.	Strong	11	3	2	16
2.	Weak	9	2	3	14
3.	Paradoxical	3	6	1	10
	Total	23	11	6	40

Taking the 34 S's in Table 26 for whom definite follow-up information is available, (that is excluding those in the category "others") and assigning them to two GSR categories, positive (strong plus weak) and paradoxical, a significant ($P < .05$) relationship between GSR and outcome is obtained, applying Yate's correction (Garrett, 1959) for small sample statistics to the Chi-square calculation. There is no significant difference in outcome between subjects in the strong and those in the weak GSR category.

Discussion

It would have been predicted from the theory that introversive subjects would produce the better conditioned response and therapeutic outcome as compared with extraversive subjects. The results obtained in this study contradict the prediction. The prediction as regards

individual differences in strength of conditioning has been supported by experiments reported by Franks (1956, 1957) and Vogel (1960, 1961). In contrast Becker and Matteson (1961) found no significant relationship between extraversion and GSR conditioning. Lovibond (1964) has pointed out that though recent studies of conditioning (eyeblink and GSR) in relation to the E scale on the M.P.I. have mostly produced relationships in the direction predicted by Eysenck, few of the correlations have reached statistical significance. Franks (1965) has summarized some of the difficulties inherent in the study of personality in relation to conditioning in his comment that while "there is some evidence to suggest that, under certain circumstances, normal introverted individuals are better conditioners and are slower to extinguish than extraverted, and that introverted neurotics are better conditioners than extraverted. The evidence is far from conclusive; furthermore, the generality of these results to reflexes other than the eyeblink, and possibly the galvanic skin reflex, remains to be established. Even when these two responses are considered, it is not adequately known how much the relationship is masked by other variables such as motivation, the subject's attitude, and the intensities and relationships of the various stimuli concerned. Nevertheless, it is apparent that there are wide individual differences in conditioning and that these are at least partially related to other personality factors." (p. 151).

Clinical Features

An examination of the clinical structure of the sample in the present investigation may clarify some of the issues raised by these results.

The main features in this respect are (1) the possible effect of temporary or permanent organic brain damage on conditioning and on response to aversion therapy, (2) the nature of the distribution lost to follow-up or who had opted out of treatment as these relate to E-I and (3) the influence of neuroticism as measured by the N scale of the M.P.I., on conditioning and outcome.

1. Organic brain damage

Eysenck (1957) has hypothesized that "brain damage leads to an increase in inhibitory potential, both temporal and spatial," (p. 145); and that the behaviour of the brain-damaged and of patients who have had leucotomy operations performed on them changes in the direction of greater extraversion (p. 32). If this is so, then subjects with organic brain damage should show the same conditioning patterns as extravertive individuals in whom there is no demonstrable evidence of organic brain damage. Eysenck cites reports by Gantt (1950) and Reese et al (1953) as offering supportive evidence in favour of this deduction from the hypothesis. Table 27 gives the relationship between GSR categories of conditioning and organic brain damage as classified in chapter seven.

Table 27. The relationship between GSR conditioning and organic brain syndrome.

GSR Category	Organic Brain Damage			Total
	Permanent	Temporary	None	
1. Strong	2	6	11	19
2. Weak	-	7	7	14
3. Paradoxical	7	3	3	13
Total	9	16	21	46

Analysis of the data contained in Table 27 gives a Chi-square value of 13.04, with 4 df, this shows a significant relationship ($P < .02$) between GSR conditioning and organic brain syndrome. This finding supports the hypothesis put forward by Eysenck (1957) that such individuals should condition poorly compared with non-impaired persons. The support for the hypothesis at this stage of the analysis is specific to persons with brain impairment of an organic nature, who may be described as pseudo-extraverts, whether it supports the general extraversion hypothesis is another matter. Of twentyfive subjects in the GSR sample (Table 28,

categories 1 and 2) diagnosed as suffering from some degree of impairment on admission, 11 (6 with permanent damage), i.e., 44%, were introverts as measured by the M.P.I. and 14 (2 with permanent damage), i.e. 56%, were extraverts. The mean E score for the introverts was 17.36 (S.D. 6.33). The mean E score for the extraverts was 31.57 (S.D. 4.03).

Table 28. The relationship between extraversion and organic impairment

	Organic Category	Introverts	Extroverts	Total
1.	Permanent	6	2	8
2.	Temporary	5	12	17
3.	None	12	9	21
	Total	23	23	46

Statistical analysis of the data in Table 28 did not show any significant relationship between introversion-extraversion and organic impairment.

One possible prediction from the theory would be that if brain damaged persons shift toward extraversive behaviour patterns, then this change would be recorded in a majority of cases by such a test as the M.P.I. which is designed to measure extraversion. To test this prediction it would have been necessary to have examined such persons on the measure before the onset of brain damage. Such data are of course not available. Another prediction from the theory would be that because of their poor response to conditioning procedures a high relapse rate would occur among alcoholics with organic brain syndrome who are treated by conditioned aversion therapy. Of the eight subjects with permanent impairment (alcoholic psychosis, Korsakoff syndrome and epilepsy) two, the epileptics, were assessed as abstinent or improved at twelve months' follow-up; five

had relapsed and one was lost to follow-up. This small sample was comprised of 6 introverts and 2 extraverts; both of the sober subjects were classified as introverts on the M.P.I. While the indications favour the prediction from the theory no real reliance can be placed on results from so small a sample.

Twentythree of the 25 S's with a diagnosis of permanent or temporary impairment had completed twelve months' follow-up at the time of making the assessment. Fourteen of these (61%) were classed as either abstinent or improved. Five of the fourteen (36%) and 9 (64%) were classed as introverts and extraverts respectively, on the M.P.I. The foregoing analysis suggests that as far as the comparison between introversive and extraversive alcoholics goes, the presence of organic impairment does not modify the general results obtained in this study; for, while a higher percentage of extraverts than introverts were diagnosed as manifesting some form or other of organic brain impairment on admission, extraverts still did better than introverts on follow-up. The only possible attenuating circumstance is that alcoholics with a diagnosis of permanent brain damage do badly on conditioning therapy and there were more introverts (6) than extraverts (2) in the permanent brain damaged category (Table 28).

2. Cases lost to follow-up

Eight cases, as shown in Table 24, page 109, fell into the category "Others", that is, subjects who were either lost to follow-up or had opted out of treatment. All were introverts. When these cases were excluded from the sample of 54 S's, shown in the Table, for the purpose of comparison of follow-up at twelve months, 59 per cent. of the introverts and 71 per cent. of the extraverts respectively were classed as either abstinent or improved. Cases lost to follow-up cannot therefore be taken as a source of serious bias in favour of the extraverts.

3. Neuroticism

The question of the possible effect of neuroticism on outcome is one

of wide clinical and theoretical implications within the learning theory framework; it will therefore be taken up as a subject for special discussion in the next chapter.

The Measurement of Conditioning

Turning now to the topic of the technique of measuring conditioning there remains the question of (a) whether real or pseudoconditioning had occurred and (b) if real conditioning did occur is it reasonable to infer from data observed in GSR that conditioned aversion to alcohol had taken place?

As regards the first question it may be argued that by taking the GSR measurements to the two series of red lights in the same setting as the actual conditioning process it is possible that some degree of reflex sensitization was facilitated. If so, this is an error of procedure, even though the formula fulfilled the requirements for proper conditioning to take place. The matter could be clarified by further experimentation. One way would be simply to take the GSR measurements to the two light series in a neutral setting, entirely away from the conditioning environment. Or a neutral stimulus, such as a green light, that has not been associated with shock, could be added and GSR's to both series of light stimuli in a before-and-after-conditioning contingency compared. A pseudoconditioning experiment along the lines of Martin (1962) could also be carried out; this would help to verify the validity of the inferential approach to the measurement of conditioned aversion to alcohol.

On the question of inferring conditioned aversion to alcohol from GSR to the red light stimuli it is argued that since the light, partaking of the role of a warning signal (S^D) and the smell-taste complex of alcohol (S_1) were both associated with S_2 (shock) then any change in autonomic response shown by the GSR to S^D would have been shown by GSR to S_1 if this measure had been possible. Against this may be set the possibility that individuals may not respond equally to (conditioned) stimuli presented simultaneously to different sensory modalities: sight in the case of the light and smell-taste in the case of alcohol. For

this reason it would have been better to eliminate the inferential process altogether and make a continuous record of GSR throughout the aversion session directly to alcohol. These are topics for future experimental verification. While the GSR technique in the present study may be open to critical comment it did, nevertheless, give some indications of individual differences in response to conditioning procedures in a therapeutic setting. This kind of objectivity is welcomed in work of this nature. The way is now open for refinements in the technique, aimed at improving its reliability-validity as a measure of conditioning and of progress in therapy in a veridical manner.

Summary of Results

The important points that have emerged so far as regards individual differences in the response of alcoholic in-patients to conditioning procedures are:

1. Extraversive alcoholics do better on follow-up than introversive individuals ($P < .05$).
2. Extraverts produced a higher percentage of positive conditioned GSR's than introverts.
3. A significant relationship exists between outcome at twelve months' follow-up and the quality of GSR response, subjects with positive GSR's doing better than those with paradoxical GSR's ($P < .05$).
4. A significant relationship was found between conditioned GSR and organic brain syndrome ($P < .02$); S's with a diagnosis of organic brain impairment being poor conditioners.

NEUROTICISM AND THE EXTRAVERSION

HYPOTHESIS

Before examining the relationship of neuroticism, as measured by the M.P.I. to the extraversion hypothesis and to conditioning theory in general, it will be of value to clarify first of all the relationship between the two terms, "neurosis" and "neuroticism".

Neurosis

Nowadays, the terms "neurosis", "psychoneurosis", and "neurotic reaction" are used synonymously to refer to a functional disorder of psychogenic origin. Contemporary opinion tends to regard neurosis as a learned process of maladaptive behaviour. In the theoretical system of Dollard and Miller (1950), for example, the neurotic situation is defined as characterized by misery, stupidity and symptoms. "When these are judged to be present, the label neurosis becomes appropriate.... Misery is represented as the subjective consequent of conflict. Stupidity describes the ineffective and maladaptive responses the neurotic employs because he is unable to identify the source of his difficulty and cannot come up with appropriate responses by which to resolve it...." (Ford and Urban, 1964, p. 245). Symptoms result from fear and are maintained because of their ineffectiveness in reducing the intensity of fear, even though they may lead to future difficulties and conflicts for the individual.

Neurosis is not only generally characterized by personal discomfort and discordant interpersonal relationships, it also gives rise to a wide range of other symptoms. The principal ones among them are, anxiety, feelings of depression, obsessions, compulsions, feelings of irritability, hypersensitivity, unreasonable doubts and psychogenically determined physical ills. (Coville, Costello and Rouke, 1960).

Neurotic disorders are identified according to the symptomatology that dominates the disorder, for example, anxiety, obsessive-compulsive, phobic, depressive and conversion reactions. They usually require treatment by psychological or medical means. Psychotherapy of one form or another is generally agreed among clinicians to be the preferred treatment, though drug therapy is also extensively used with satisfactory results.

Neuroticism

Neuroticism is a technical term in Eysenck's (1947, 1952, 1957) theory of personality. The background to the construct and its operational status has been discussed at length by Eysenck (1952). Neuroticism is one of Eysenck's three orthogonal dimensions of personality, the others being psychoticism and extraversion-introversion. It refers to "the general emotional lability of a person, his emotional over-responsiveness, and his liability to neurotic breakdown under stress." (Eysenck, 1959). It is "closely related to the inherited degree of lability of the autonomic nervous system", in contrast to extraversion which is described as "closely related to the degree of excitation and inhibition prevalent in the central nervous system," with the possibility that the excitation-inhibition balance may also be mediated by the ascending reticular formation. (Eysenck and Eysenck, 1964). Neuroticism as measured by the N scale of the M.P.I. (or the E.P.I) is a term with purely operational meaning, the test being used to distinguish a person's degree of disposition to "neurotic breakdown under stress", in brief his neurotic disposition along the stability-instability continuum.

Neuroticism and Conditioning

In Eysenck's theory introversion is characterized by strong conditionability relative to extraversion; there is no correlation between neuroticism and conditionability. The general theory has been outlined in the Dynamics of Anxiety and Hysteria (Eysenck, 1957) and its relation to certain constructs originally defined by Hull (1943) discussed. Some of

the important constructs in Hull's system such as I_R (reactive inhibition) and $S^E R$ (excitatory potential) have been integrated into Eysenck's theory with some degree of alteration in meaning. (Eysenck, 1962).

In contrast, Spence's (1963) theory, also influenced by Hull's work, proposes that the higher emotional reactivity of the anxious person acts like other drives in increasing reaction potential during conditioning; therefore, there is a predictable relationship between the degree of manifest anxiety and level of conditioning. Taylor (1956) has stated the aspects of Hullian theory that are of relevance to the relationship between conditioning and anxiety as follows: "According to Hull, all habits (H) activated in a given situation, combine multiplicatively with the total effective drive state (D) operating at the moment to form excitatory potential (E). $E = f(H \times D)$. Total effective drive in the Hullian system is determined by the summation of all extant need states, primary and secondary, irrespective of their relevance to the type of reinforcement employed. Since response strength is determined in part by E, the implication of varying drive level in any situation in which a single habit is evoked is clear; the higher the drive, the greater the value of E and hence of response strength. Thus in simple, non-competition experimental arrangements involving only a single habit tendency, the performance level of high drive subjects should be greater than that for low drive groups".

Thus, using notions derived in the most part from different aspects of Hullian theory, Eysenck (I_R) and Spence (D) have put forward two different hypotheses concerning the relationship of individual differences in conditionability. Experiments have been found to support Eysenck's hypothesis (Franks, 1956, 1957); (Vogel, 1960, 1961) while at the same time refuting Spence's. On the other hand, Spence (1963) has summarized a number of studies showing significant relationships between conditioning and manifest anxiety (D). A feature of nearly all such studies is the use of questionnaires as a measure of extraversion and anxiety. Lovibond (1964) has observed that it is likely that questionnaire studies of

personality in relation to conditioning have reached the limit of their fruitfulness and it would now seem advisable to concentrate research effort on the development of other methods of measurement, such as rating scales, used in conjunction with objective tests of the behaviour to be measured.

Franks (1957), using a sample of 55 normal subjects found a correlation between conditioning and E score on the M.P.I. of -0.46 for acquisition and -0.34 for extinction. In an earlier experiment, Franks (1956) found that dysthymics conditioned at a higher level than hysterics. He failed to find any relationship between conditioning and neuroticism in either of his groups. Vogel (1960, 1961) working with both alcoholic and normal subjects obtained significant differences ($P < .005$) in GSR conditioning between introverts and extraverts as measured by the E scale of the M.P.I. She also obtained (Vogel, 1960) a significant relationship, ($P < .05$) between neuroticism as defined by the N scale of the M.P.I. and conditioning performance. This contradicts Eysenck's theory of no relationship between neuroticism and conditioning. However, Vogel, (1961) has tested the hypothesis that when differences in neuroticism scores are controlled in alcoholic and non-alcoholic groups, the conditioned GSR is elicited in fewer trials and is more resistant to extinction in introversive than in extraversive subjects. Covariance analyses were performed to adjust the conditioning scores for any influences attributed to score differences on N in the two groups. Vogel found a significant relationship between the degree of extraversion as measured by the E scale of the M.P.I. and both the acquisition and extinction of the conditioned response. Alcoholic and non-alcoholic did not differ either in mean extraversion scores or in mean rate of establishing and extinguishing the CR. She also found that subjects who failed to display conditioning within the maximum number of training trials allowed had extraversive test scores. These results are consistent with Eysenck's extraversion hypothesis. In Vogel's work, as in the present study, subjects were classified as introverts or extraverts on the

strength of their simple deviation from the standardization mean on the E scale of the M.P.I.

A study by Field and Brengelmann (1961) found no significant relationship between eyeblink conditioning and either extraversion and anxiety. Becker and Matteson (1961) have examined the relationship of anxiety and extraversion to GSR conditioning, using subjects who score at the extremes on tests of anxiety and extraversion. The tests used were Cattell's Anxiety (A) and Guilford's Rhythymia (R) scales respectively. Cattell's anxiety scales (16PF, Forms A and B) correlate .34 and .53 with N on the M.P.I. Becker (1959) found a correlation of .79 between Guilford's R and Eysenck's E in a sample of 80 college male subjects. Using a tape recorder, a list of 104 words spaced by 5 second intervals was twice presented to S. The word "repeat" occurred 20 times on this list and was followed immediately by a shock of one second duration on 12 of the trials. GSR recordings were made at the beginning, in the middle, and at the end of both series of trials. Two different measures of conditioning were used. The first was simply the mean conditioned response amplitude. The second was a criterion score based on the number of trials on which the conditioned response was one-half or greater than the preceding unconditioned response. The experimenters argued that conditioned response amplitude is clearly a measure of reaction potential ($S^E R$) and thus is appropriate in testing Spence's theory. The criterion measure, on the other hand, eliminates sources of variation in the conditioning score which could not be logically a function of reactive inhibition. The greatest such source might be called general autonomic reactivity, which should be related to Hull's D (drive) but not to I_R (reactive inhibition). "A significant positive relationship was found between anxiety and conditioning. No significant relationship was found between extraversion and conditioning when either the conditioned response amplitude measure was used or (more appropriately) when a criterion-type conditioning measure was used." The results while supporting Spence's drive hypothesis fail to support Eysenck's extraversion theory, in spite

of the fact that extreme scoring groups were selected for the experiment.

Farber, Spence and Bechtoldt (1957) have also found a positive relationship between eyeblink conditioning and anxiety-drive as measured by the Taylor Manifest Anxiety scale (M.A.S.). They did not find any relationship between conditioning and extraversion as measured by Guilford's Rhathymia (R) scale. Eysenck (1959) has reported a correlation of .77 between the M.A.S and the N scale of the M.P.I. The scale also correlated -.35 with E on the M.P.I. This at once raises doubt about the validity of the results obtained in conditioning experiments where the relationship between conditioning and anxiety-drive on the one hand and conditioning and extraversion on the other forms the basis of the hypothesis to be tested.

Eysenck (1962) has criticised experimental work purporting to verify the Spence-Taylor hypothesis relating conditionability to scores on the Manifest Anxiety Scale on the grounds that the test correlates with both neuroticism and extraversion. He explained that "When correction is made for attenuation due to unreliability of the scales, it can be shown that scores on the M.A.S. can be predicted fairly exactly from scores on the M.P.I., the Neuroticism scale contributing some 80% and the Extraversion scale (reversed) contributing less than 20%. The Spence-Taylor notion of anxiety as a drive seemed to identify their predictions of higher conditionability with the dimension of neuroticism; the writer's theory would account for their findings in terms of the (small) introversion content of the M.A.S. We thus have two clearly different predictions, relating 'conditionability' respectively to neuroticism or to introversion; work done on the M.A.S. is largely irrelevant in this connexion as this scale partakes of both these orthogonal dimension." (p. 300).

The situation, however, remains uncertain as regards the M.P.I. itself, for "although E and N are conceptualized as being orthogonal vectors, i.e. uncorrelated and independent dimensions of personality, small negative correlations have usually been found with the M.P.I. Typically these would be between -0.1 and -0.2 for normal groups, ranging

up to -0.4 with neurotic groups." (Eysenck and Eysenck, 1964). In the sample of 108 alcoholics (74 men and 34 women) reported in chapter 9 a correlation of -0.20 was obtained; that for the male group was -0.09 and for the female group -0.45. This supports the range reported by Eysenck. McGuire, Mowbray and Vallance (1963) found a correlation of -0.32 in a sample of 151 psychiatric patients comprised of various diagnostic categories. They also found a significant sex difference in this connection with an r of -0.44 for males ($P < .001$) and an r of -0.18 for females (N.S.). Analysis of their data led the writers to reject Eysenck's explanation of the correlation between N and E found by themselves and others in terms of response set. They concluded that the M.P.I. appears to have no value as a clinical tool but rather should be left as it stands for use only with normal subjects in such fields as market research and personality investigations. Another point they made was that since psychoticism is orthogonal to neuroticism in Eysenck's theory psychotics should be able to gain normal scores on the N scale of the M.P.I. On the contrary, they found that their psychotic groups along with their neurotics all had abnormal scores for N on the test. This has been explained by Eysenck (1960a) as a neurotic reaction in non-neurotic individuals under the stress of their psychotic illness. McGuire and his co-authors argued that even if this were the case the practical result is that the M.P.I. cannot discriminate psychotics from neurotics. Court (1965) has reported similar abnormal scores for anxiety on Cattell's 16 PF (Form A) questionnaire, for a sample of acute schizophrenics and for patients showing abnormal temporal lobe activity on the EEG. This scale correlates .34 with the N scale of the M.P.I. (Eysenck, 1959).

Taking the present study, if neuroticism is positively related to conditionability then it would be expected that subjects in the category of strong GSR conditioning, as described in chapter ten, would have a higher mean score on the N scale of the M.P.I. than those in the Paradoxical GSR category. The mean N score for 19 subjects (10 introverts and 9

extraverts) in the strong GSR category was 23.58 (S.D. 11.83) and their mean E score was 24.74 (S.D. 11.12). There were 13 subjects (9 introverts and 4 extraverts) in the paradoxical GSR category. These had a mean N score of 17.85 (S.D. 8.65) and a mean E score of 21.77 (S.D. 8.13). While the difference in the N scores between the two groups was in the direction predicted it was not of statistical significance. It would require groups of subjects who score at the extremes on N and E, along the lines employed by Becker and Matteson (1961) to investigate this relationship thoroughly; such groups are not available in adequate numbers in the present study.

It remains as a general point that in the light of recent criticisms the findings regarding the M.A.S. and M.P.I. as measures of conditionability have left the claims made on behalf of either hypotheses in the Eysenck-Spence controversy in doubt. The crucial experiment is yet to be performed, though that by Becker and Matteson (1961) has gone some way towards a proper evaluation of the issue. Eysenck (1962) has recognized that the results obtained by these workers may lead to a reappraisal of the conclusion that neuroticism does not contribute to conditionability whereas introversion does.

SOME THEORETICAL AND PRACTICAL CONSIDERATIONS

This final chapter will discuss the topic of the existence of a general factor of conditionability and that of the relationship between the neurological concept of arousal and the psychological concept of drive.

Conditionability

Franks (1965) has outlined the basic areas in which problems require solution as (1) that of the existence of a general factor of conditioning, or perhaps a small number of group factors, possibly one pertaining more to the central nervous system and one pertaining more to the autonomic nervous system; (2) whether it is legitimate to refer to a person's conditionability, "a concept for which there may be no practical utility if, in any specific situation, much of the variance taken up by a person's conditioned response performance is specific to the situation" (p. 151). Eysenck (1962) has summed up the situation thus, "clearly, the search for a satisfactory conception of 'conditionability' and its relation to personality variables is only at the beginning; it may be surmised that the outcome will throw important new light, not only on personality development and breakdown, but also on the very concept of conditioning itself." (p. 304).

Eysenck's theory of individual differences in cortical excitation postulates a general factor of conditionability; in fact, it could be said that this postulate is more fundamental to the theory than the proposition covering excitation-inhibition balance, the introversion-extraversion dimension of personality and the relationship that exists between excitation and extraversion. By this is meant that the arguments which may be employed to relate cortical excitation with conditionability is likely to be a more direct approach, based purely on neurological propositions, compared with the deductive process that is necessary first

to link the personality dimension of extraversion with the excitation construct and then with conditionability.

Arousal, Drive and Behaviour

Anxiety as a drive occupies a central position in Spence's approach to the application of learning theory to problems of personality. Eysenck (1960a) on the contrary, does not look upon anxiety as a drive; rather, it is regarded as a conditioned fear reaction. This arises from the notion that "Neuroticism is conceived as an inherited autonomic over-reactivity, while introversion is characterized by strong conditionability.....hence anxiety as a conditioned fear reaction appears most frequently in dysthymics, i.e. neurotic introverts". (p. 21).

Claridge and Herrington (1963) investigated Eysenck's hypothesis that the performance differences, on objective tests, between hysterics and dysthymics arise because of variations in the degree of extraversion present in these groups. While factor analytic studies indicated that the proposition was partly true, an additional factor present suggested that hysterics and dysthymics also differ in drive level. This could be linked to the clinical fact that neurotic types differ in their level of anxiety, the "belle indifference" which characterizes the hysteric for example. These experimenters proposed that increases and decreases in anxiety level in neurotics caused a shift in excitation-inhibition balance, which in Eysenck's theory underline introversion-extraversion; if so, then the state of E-I balance in dysthymics and hysterics was no longer entirely predictable from their respective degrees of extraversion. To obtain an independent measure of excitation-inhibition balance, a method of measuring sedation threshold, making use of the effect of intravenous Sodium Amytal as a simple test of attention was applied to groups of normals, hysterics and dysthymics. The results showed that the three groups were significantly differentiated, with dysthymics and hysterics occupying, respectively, the upper and lower extremes. The pattern of correlations with measures of extraversion, anxiety and neuroticism supported the hypothesis that differences between hysterics

and dysthymics could not be explained entirely in terms of extraversion.

The fact that Eysenck has recognised the possibility that the excitation-inhibition balance may to some extent be mediated by the ascending reticular formation (Eysenck and Eysenck, 1964) opens the possibility that advances in neurophysiological research may make it necessary to modify the personality theory of extraversion which is at present based upon the concept of cortical excitation-inhibition. Certainly, the ascending reticular system (ARS) and its activating function has provided drive theorists with a neurological peg on which to hang their psychological construct.

"The reticular formation is a core of tissue which runs centrally through the entire brainstem.....(Figs. 8 and 9). It is surrounded by ascending and descending tracts as well as by the motor and sensory nuclei of the cranial nerves. Posteriorly, the reticular formation is continuous with the cell bodies that make up the core of the spinal cord and extends anteriorly into the hypothalamus and the central part of the thalamus. The term reticular formation describes the microscopic appearance of this region when the thin cross-sections of the brainstem are stained so that the fibers can be seen." (McCleary and Moore, 1965). "One of the most striking characteristics of the reticular formation is the great number of sensory fibers that feed into it. Nerve fibers from all the sensory systems transmit nerve impulses to the ARS. Afferent pathways from receptors in the skin and muscles arrive in the ARS either by tracts ascending from the spinal cord or by offshoots (collaterals) from sensory axons destined to connect higher up in the brain" (p. 26). (Fig. 10). It would appear that the ARS "exert generalized control over neocortical activity" by a system of diffuse projection via the thalamic regions. "Whether or not the ARS is maintaining a high enough level of arousal in the neocortex helps to determine whether you are awake or asleep" (p. 29); thus, a drowsy subject is low, an alert subject is high on arousal.

Furieux (1961) has suggested that arousal (drive) level varies with

Fig. 8. (By permission of McCleary and Moore, 1965)

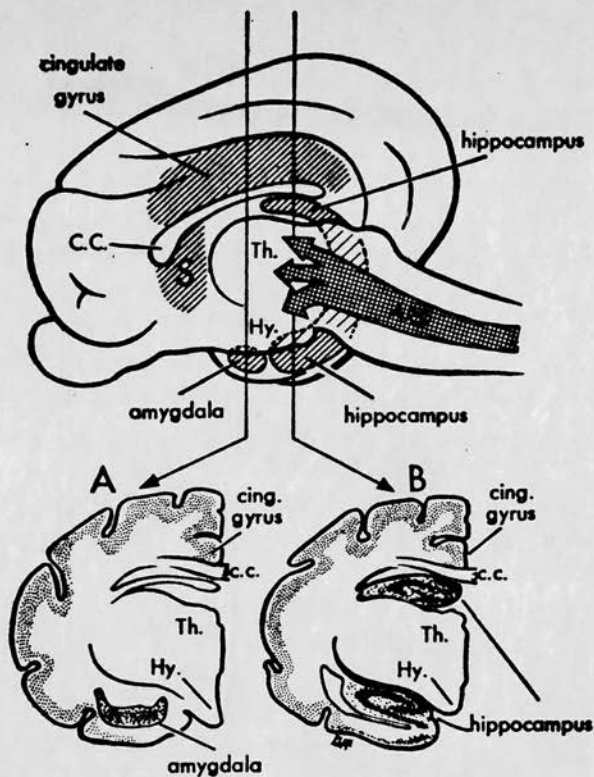


FIGURE 2-6. Diagrams of the cat brain to show the location of the ascending reticular formation, the hypothalamus and some of the major structures in the rhinencephalon. At the top is a medial view of the brain after it has been split lengthwise between the two cerebral hemispheres. It can be compared directly with C of Figure 2-3 and is also the same view as that of the amphibian brain shown in Figure 2-4. Diagrams A and B are cross-sections through the half-brain shown at the levels indicated by the vertical lines in the top drawing. The cross-hatched area represents the approximate position of the ascending reticular formation (ARS) as it extends upward through the brainstem. The diagonally hatched areas represent the major rhinencephalic structures that make up the limbic lobe. While the cingulate gyrus and the septal area (S) are midline structures, the hippocampus and amygdala are located deeper inside the cerebral hemisphere, as shown in A and B. ARS = ascending reticular system; c.c. = corpus callosum (a heavy elongated fiber bundle that runs between the two cerebral hemispheres); cing. gyrus = cingulate gyrus; Hy. = hypothalamus; S = septal area; Th. = thalamus.

Fig. 9. (By permission of McCleary and Moore, 1965).

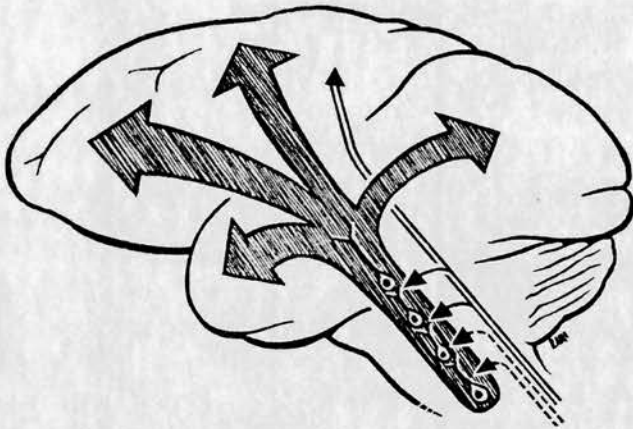


FIGURE 4-1. Summary diagram illustrating some of the afferent and efferent pathways of the ascending reticular system (ARS) superimposed on the brain of a monkey. The ARS (shaded area) is composed of short neuron chains up through the core of the brainstem to the thalamus and longer, thalamo-cortical projection fibers that fan out diffusely over the neocortex. The solid black lines in the dorsal brainstem represent specific sensory pathways, on their way to the cortex, that send collateral branches into the ARS. As shown by the dashed arrows, some fibers in the specific sensory systems feed their sensory input exclusively into the brainstem reticular formation. (Modified from D. B. Lindsley, "Attention, consciousness, sleep and wakefulness." In John Field, H. W. Magoun, and V. E. Hall, eds., *Handbook of Physiology, Section I: Neurophysiology*, Vol. III. Washington, D.C.: American Physiological Society, 1960. Pp. 1553-1593.)

Fig. 10. (By permission of McCleary and Moore, 1965).

Selected Subcortical Structures

27

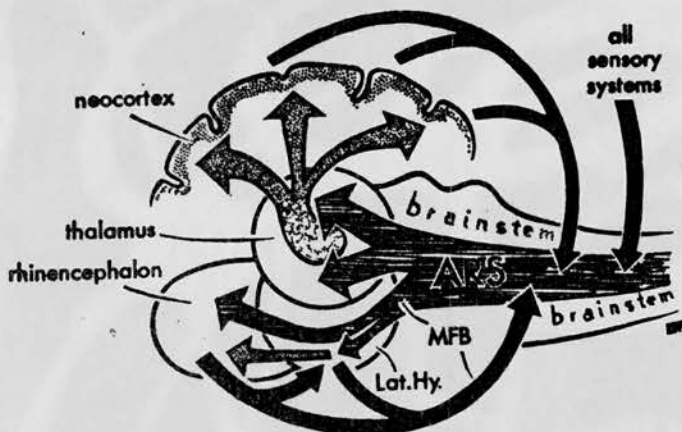


FIGURE 2-7. Highly schematic diagram of the major connections to and from the ascending reticular system (ARS). As also indicated in Figure 2-6, the ARS ascends in the core of the brainstem. It makes connections with cell bodies in the thalamus and the lateral hypothalamus, as well as sending some fibers through the lateral hypothalamus directly into various structures in the rhinencephalon. As shown by the stippled arrows, some parts of the thalamus in turn diffuse the influence of the ARS over the neocortex while some cells in the lateral hypothalamus send fibers into rhinencephalic structures for the same purpose. Shown schematically by the arrows are the three major sources of sensory input to the ARS: from all the sensory systems of the body, from the neocortex, and from the rhinencephalon. The fibers of the ventral portion of this system (interconnecting the ARS, the lateral hypothalamus, and the rhinencephalon) are carried in the important medial forebrain bundle. ARS = ascending reticular system; Lat. Hy. = lateral hypothalamus; MFB = medial forebrain bundle.

the nature of the stimulus which excites the arousal and that individual differences along the introversion-extraversion dimension influences the level of arousal to any given stimulus. He observed, for instance, that "it is entirely consistent with the known characteristics of the extravert to assert that he has a strong and continuing not to attend to stimuli associated with the activities of other people, and that the situations which lead him to enter states of high-drive are predominantly interpersonal in character. "For example, in a situation such as a test of suggestibility to hypnosis, by nature of its interpersonal qualities, the subject who is more extraverted will produce the greatest amount of drive."

The implications of this line of thought is that conditioning may be related to introversion-extraversion not necessarily because of individual differences in cortical excitation-inhibition, but to the extent that introversive and extraversive individuals are differentially aroused as a function of the environmental stimulation to which they are required to react. This is in line with the Claridge-Herrington hypothesis above. Moreover, it opens the way to the formulation of behaviour modification hypotheses with greater emphasis on the concept of activation. It is also a way of explaining, at least partially, the contradictory results obtained in conditioning experiments from the various laboratories. It may be, for instance, that under laboratory conditions where interpersonal parameters are less important the introvert produces the better results while in a therapeutic situation the interpersonal factor is of considerable importance and under these circumstances arousal in the extravert is facilitated but not so in the introvert by virtue of his relative lack of enthusiasm for interpersonal contact, drive is therefore lower and hence the strength of learning and conditioning is affected.

Beech (1963) and Schafar and Jaffe (1965) have argued that motivation receives insufficient emphasis by exponents of behaviour therapy in spite of the extensive body of knowledge that has accumulated

over the years in this area of psychological research and of its intimate relationship with the psychology of learning. Indeed, Beech extended his criticism to embrace the neglect of cognitive factors as well as the "great deal of work that has been carried out by social psychologists investigating the conditions relevant to changes and modifications of attitudes, belief and values," for, "in so far as the disorders of behaviour can be construed as, or involve, abnormalities of attitude and the like, then these procedures would be relevant." In reply to these criticisms it may be said that behaviour therapy is a young and growing science; and although the inventory of verifiable human responses may be considerable (Berelson and Steiner, 1964, have published a catalogue of findings in this respect) coming from widely scattered fields of psychological theory as they do, it will take time and effort to integrate them into a unitary science of behaviour. But that a start has been made to meet Beech's criticism is indicated by a comment by Rachman (1966) in his review of a recent publication (Research in Behaviour Modification by L. Krassner and L. P. Ullmann): "One point which emerges very clearly from the book is the enormous (and previously underplayed) power of social reinforcement. Again and again one comes back to the omniscient influence of people on people." (p. 145).

But to return to the main theme, the terms "activation" and "arousal", used synonymously, have recently occurred with increasing frequency in psychological literature. Duffy (1962) has described activation as referring to variations in the excitation of the individual as a whole, as indicated roughly by any one of a number of physiological measures, such as GSR, EEG, muscle tension, cardiovascular measures and others. Activity of all sorts, whether covert or overt, requires the release of energy. "Attending and thinking, as well as locomotion and manipulation, can be shown to involve increased release of energy, or a higher degree of activation." The level of activation of the organism is defined as "the extent of release of potential energy, stored in the tissues of the organism, as this is shown in activity or

response. The level of activation is, rather, the extent of release of the stored energy of the organism through metabolic activity in the tissues." (Duffy, 1962, p.18).

Malmo (1958, 1962) considers the concept of activation to be similar in principle to the concept of drive (D), without the steering component drive stimulus (S_D), in Hull's system. Drive as conceived by Hull (1943) is a nonspecific state of the nervous system to which all the specific needs of the organism contribute. (Hilgard, 1958). That is, the release of energy originating in the organism's metabolic processes, in and of itself, is directionless and may serve any of a variety of motivational objectives (Hebb, 1955; Hilgard and Marquis, 1961). The statement in Hull's system that drive (D) activates habit strength (S^H_R) into reaction potential (S^E_R), i.e. the strength of the tendency to respond, is expressed by the formula:

$$S^E_R = D \times S^H_R,$$

which means that a habit of given strength will yield responses of greater or lesser magnitude depending upon the level of drive operating at the time the response is evoked (Hilgard, 1958, p.133). Without the activating influence of D on S^H_R there could be no response. The ascending reticular system (ARS) and its activating function provides a convenient neural model for the mediation of D; at the same time, it carries certain implications for the cortical theory of excitation-inhibition balance which may lead to a reconsideration of Eysenck's theory of personality and conditionability.

The Measurement of Arousal (Drive) and Conditioning.

From the foregoing discussion on the nature and function of the ARS it may be inferred that a person's ability to process sensory data constructively and efficiently is, in part, a function of the level of arousal that is generated in the particular situation. The level of arousal also varies with the nature of the stimulus which excites it (Furieux, 1961). Some clinicians hold that the persistent abuse of

alcohol over many years finally affects the alcoholic's ability to process information consistently and constructively. Experiments on perceptual, logical and other cognitive abilities tend to confirm this opinion (Bennett, Mowery and Fort, 1966; Jellinek and McFarland, 1940; Pritchard, 1966). As verbal material forms a large part of the sensory input of most people one of the effects of such a deficit in the case of the hospitalized alcoholic will be his relative inability to benefit fully from the psychotherapeutic dialogue, which adds to the difficulty in treating alcoholism by straightforward psychotherapy. The problem could be the basis of a testable hypothesis. It is mentioned in passing to indicate the importance of the concept of arousal and its measurement to problems in clinical psychology and personality research.

Constructs such as "activation", "arousal" and "drive" being inferred states of the organism, cannot be classified as either stimulus or response; that is they do not fit into the S-R formula; rather they share the status of intervening variables (Hilgard, 1958; MacCorquodale and Meehl, 1948), to be thought of as part of O in the S-O-R formula (Woodworth and Schlosberg, 1955). Of the various indicators of changes in the level of arousal the one that has concerned us in this study has been the GSR. As a measure of changes in arousal it is ideal for experimental work that is formulated within the S-O-R framework. Its value as a clinical and research tool is likely to increase with advances in knowledge of the ARS and its influence on behaviour on the one hand and in the further development of objective approaches to the modification of maladaptive behaviour by psychotherapeutic techniques such as behaviour therapy on the other.

In conclusion, while this study set out to answer certain specific questions on the nature of electrical aversion therapy for the treatment of alcoholism, and has to some extent succeeded in its purpose, it has also raised a good many other questions on which to focus future research activity. This is a time-honoured cliché but nonetheless true of research activities whatever the field of interest.

APPENDIX 1

JELLINEK ESTIMATION FORMULA

Policies for the public care of alcoholics in any given country require at least an approximate knowledge of the number of alcoholics in that country. Obviously even a sample census is hardly feasible in most countries, although some small-scale censuses have been undertaken in the early 1930's in some parts of Germany, and more recently a complete census was taken in a small rural area of Denmark.

In the absence of actual counts, some method of estimating must be worked out. It is customary to gather statistics on:

- (1) reported deaths from acute and chronic alcoholism
- (2) deaths from cirrhosis of the liver
- (3) first admissions or "all" admissions for alcoholic psychosis to mental hospitals
- (4) arrests on charges of drunkenness, and
- (5) admissions to general hospitals for concomitant diseases of chronic alcoholism.

Certification of death from acute and chronic alcoholism is notoriously unreliable, as physicians are generally reluctant to embarrass families through certification of the death of a family member from this cause. Furthermore, as vitamin and hormone treatments of these diseases become more widely used, deaths from these causes tend to decrease. The trend of deaths from these causes reflects largely the trend of treatment.

As to first admissions to mental hospitals, this information is missing in many countries and frequently only the "all" admissions are known, irrespective of repetitions, and furthermore the diagnostic standards vary not only from country to country but from hospital to hospital in any given country. The standards of diagnosis may also change within the course of time. The statistics of admissions to general hospitals for diseases of chronic alcoholism are vitiated through multiple admissions whose extent is unknown. Arrests for

drunkenness are particularly unsuitable as an index of alcoholism as only the number of arrests is known, but not the number of different individuals, and secondly, the policy for arrests for drunkenness may change within the course of a few months in any given city.

Even under the very best conditions, the above statistics could supply knowledge of not more than a fraction of the alcoholic population.

In an effort to arrive at an estimation formula for the USA (in 1940), Dr. E.M. Jellinek, at that time of the Yale Institute for Alcohol Studies, assumed that if the percentage contribution of alcoholism to a specific cause of death (estimate number 1), not subject to marked trends of improvement in treatment, could be established, and furthermore if from reliable autopsy material it were possible to determine:

(1) the relative incidence of that disease in the autopsy sample of the alcoholic population (estimate number 2), and

(2) the relative incidence of death from this cause among those alcoholics in whom this disease was present (estimate number 3)

it would be possible to estimate from these three points of orientation the number of alcoholics with complications alive in any given year.

Let \underline{d} be a disease, respectively a cause of death, in which the percentage contribution of alcoholism is known. Let D stand for the total number of reported deaths from the disease \underline{d} .

P = percentage of deaths from disease \underline{d} attributable to alcoholism

C_1 = percentage of alcoholics with complications suffering from some degree of the disease \underline{d} (determined from autopsy material)

C_2 = percentage of deaths from that disease among alcoholics with complications who suffered from some degree of the disease \underline{d}

$K = \frac{C_1 C_2}{100}$ i.e., percentage of deaths from disease \underline{d} among all alcoholics with complications alive in a given year, irrespective of whether or not they suffered from some degree of the disease \underline{d}

A = total number of alcoholics with complications alive in any given year

Then:
$$A = \frac{P D}{K}$$

The limitation to alcoholics with complications is imposed by the fact that the constants C_1 and C_2 are found from autopsies performed on alcoholics who were hospitalized because of some alcoholic disease.

The treatment of cirrhosis of the liver has not undergone any radical changes within the past 50 years except - more recently - on an experimental basis, and thus trends in deaths from cirrhosis of the liver do not reflect treatment trends, although a slight effect of improvement in general nursing care may enter.

In analysing the trends for:

- (1) deaths from all causes in the USA from 1900 to 1945
- (2) deaths from tuberculosis for the same period
- (3) deaths from various heart diseases
- (4) deaths from several diseases of old age
- (5) deaths from various diseases of the digestive organs
- (6) deaths from venereal diseases, and
- (7) deaths from cirrhosis of the liver,

it was found that the trend of deaths from cirrhosis of the liver formed a unique pattern. From 1900 to 1915 deaths from cirrhosis of the liver showed a parallel slight decrease to deaths from all causes, but from 1915 to 1920 there was an extremely sharp drop which was followed by a consistent rise which became more pronounced starting in 1933 and became particularly marked after 1940.¹

It must be noted that beginning with the year 1915 more and more States of the USA adopted Prohibition and that because of the war emergency the population supported the law-enforcement agencies. In 1920 national Prohibition became effective. In the period 1915-20 Prohibition was so effective that alcoholic-beverage supply became greatly restricted and processes of alcoholic diseases in many alcoholics became arrested.

¹ The portion from 1900 to 1940 is shown in a diagram in: Jellinek, E.M. ed. (1942) Effects of alcohol on the individual. Vol. 1: Alcohol addiction and chronic alcoholism, New Haven, p. 287.

After 1920, when the population did not support the law-enforcement agencies any more, bootleg activities produced an adequate supply at least for those who had become dependent upon alcohol. In 1933 Repeal became effective and the supply of alcoholic beverages soon reached a normal level. Since no other cause of death shows a trend similar to the trend of deaths from alcoholism, it is reasonable to assume that the decreases and increases in this cause of death are contingent upon diminished and increased accessibility of alcoholic beverages. From the analysis of this time trend, the percentage contribution of alcoholism to death from cirrhosis of the liver may be computed.

If the assumption that the trend is contingent upon varying degrees of excessive use of alcoholic beverages should be valid, it would follow that deaths from cirrhosis of the liver under the age of 20, i.e., when alcoholism as a contributory cause must be largely excluded, should not show the trend which is followed by deaths from this cause at all ages. Deaths from cirrhosis of the liver below the age of 20 were analysed separately and only random variation around a horizontal line was found. This, of course, greatly supports the initial assumption. The trend was analysed separately for each of the 48 States of the USA for males and for females separately, as well as for whites and non-whites, and the same trend was found in all cases, but of course on different levels. Jellinek therefore felt justified in computing from these trends the percentage contribution of alcoholism to the total of deaths from cirrhosis of the liver. For males in the USA this was found to be 51.5% and for females 17.7%.

Tabulations of comparative autopsy data for nearly 100,000 alcoholics with complications and an even larger number of non-alcoholics have been published in scattered papers from all parts of Europe and the USA.

From a welding of these extensive data it appears that the relative incidence of cirrhosis of the liver among alcoholics with complications is approximately 9% (less than 1% among non-alcoholics) and of these 9% approximately 7.7% die in any given year from this cause. Thus, the percentage of death from cirrhosis of the liver among all alcoholics with

complications alive in a given year, irrespective of whether they suffer from that disease or not, is: $\frac{9 \times 7.7}{100} = 0.694$

In estimating the number of alcoholics with complications in the USA in any given year, $P = 51.5$ for males and 17.7 for females, while K is taken as 0.694 . The constant K may probably be taken as 0.694 for all countries, as it is based on international material in which the variation was at a minimum, but P will no doubt show variation from country to country. In such countries as Switzerland and France, certification of death from cirrhosis of the liver always means Laennec-cirrhosis, that is unquestionably alcoholic cirrhosis, and therefore in those countries $P = 100\%$. In the USA other conditions of the liver than Laennec-cirrhosis are diagnosed as "cirrhosis of the liver" and the above percentages apply. In tropical countries parasitic cirrhosis frequently enter into the certification of death from cirrhosis of the liver and this is true of many other countries with underdeveloped hygienic conditions. It is therefore imperative to determine P for each country from a thorough analysis of trends as well as from a knowledge of various conditions of the liver which enter into the certification of death from cirrhosis of the liver before the formula can be applied in the estimation of the total number of alcoholics alive in any given year in a given country. In the estimates tabulated in Annex 1, K was taken as 0.694 , but P has been taken at various values by approximate inspection of the primary data.

The estimates pertain to alcoholics with complications only. Further estimates must be made for the total number of alcoholics with and without complications. For the USA it is fairly well established that only 25% of all alcoholics suffer from complications and therefore the total is gained by multiplying by 4 the estimated number of alcoholics with complications. In other countries, such as Chile, probably all alcoholics suffer from complications, while in other countries such as Switzerland the ratio may be $2 : 1$, and according to private communications and checks with local estimates the ratio in Scandinavian countries seems

to be the same as in the USA. This ratio, too, must be the object of future investigations.

ADDITIONAL PSYCHOMETRIC DATA

This appendix will include brief discussions and summaries of results obtained from the following tests in the psychological battery used in the study.

1. The Trist-Hargreaves. (Concept formation)
2. The Trist-Misselbrook-Kohs'. (Stress tolerance)
3. The Cambridge Triple Tester. (Level of aspiration)

As presented here they are intended as an outline of future areas of inquiry which may add to our understanding of the behaviour of the alcoholic, in guiding psychotherapeutic activities, and in assessing changes in behaviour after treatment.

1. Analysis of Conceptual Thinking Among Alcoholics.

Interest in the alcoholic's ability to handle tests of concept formation and logical reasoning developed as a result of the appearance of conspicuous discrepancies between the scores obtained by some patients on the Progressive Matrices and Trist-Hargreaves tests. Semeonoff and Trist (1958) reported a correlation of .5 ($p < .01$) between these two tests. It would be expected, therefore, that persons achieving high grades on the Matrices would ~~achieve~~ achieve equivalent scores on the Trist-Hargreaves. In practice this has not been consistently so; while a low score on the Matrices was invariably followed by a low score on the Trist-Hargreaves, a high score on the Matrices did not guarantee an equivalent score on the Trist-Hargreaves.

The Trist-Hargreaves (T-H) is a performance test consisting of twelve wooden pieces. Six of the pieces are square and six are circular. Three of each kind are "solid" and three are "hollow", i.e., with a centre hole of appropriate shape. Each piece has the flat surface painted in one colour and its edges in another; hollow pieces

have their inner edges painted the same colour as the outer edges. The task consists of two parts, (I) sorting into groups and (II) constructing pairs according to some demonstrable relationships. In carrying out these logical operations the subject is required to manipulate three variables, namely shape, colour and integrity, i.e., solid or hollow. A full description of the test and method of administration is given by Semeonoff and Trist (1958). The T-H is a test of concept formation.

The Progressive Matrices (P.M.) (Raven, 1960) is a non-verbal test of intelligence constructed in accordance with Spearman's theory of intelligence, that is, the education of correlates and relationships. The test consists of 60 individual problems. Each problem consists of a matrix, a design, from which part has been removed. The subject is required to examine the design and decide which of several pieces given is the correct one to complete the matrix. The 60 problems in the test are divided into five sets, A, B, C, D and E of twelve problems each. The problem in each set becomes progressively more difficult, also each succeeding set is more difficult than the previous one. The test can be administered timed or untimed with separate norms for either form. Raw scores can be converted into grades; there are five grades, Grade I embracing the top 5%; each grade has a corresponding percentile rating. The untimed version of the test was used in this experiment.

It was decided to test the hypothesis that a deficit in the perception of information among alcoholics accounted for the discrepancy between P.M. and T-H scores. To test this assumption the T-H was administered to two groups of alcoholics under different conditions of administration. Data were also available from a control group of normal subjects, comparable in age, sex, social class (by occupation) and intelligence, and also from a sample of university students, mainly psychology undergraduates (Pritchard, 1966). The test was administered to one group of alcoholics, defined as the No-information group, and the two groups of normal controls by the usual procedures for administration; that is, the subjects were not given any special information

about the test before tackling the task, they were merely invited to examine the pieces and encouraged to pick them up and turn them over. The second group of alcoholics, defined as the Information-group, was given detailed information about the test prior to tackling the task; the experimenter pointed out the number of pieces in the set and the three important variables of shape, colour and integrity. The subjects were told that they needed all this information in performing the test and were to bear it in mind. Tables 29 and 30 contain information in respect of male and female S's in the various groups.

Table 29. Mean percentile scores on P. M. and T-H and data on age for the male groups.

Category	No.	Matrices		Trist-Hargreaves		Age	
		Mean	S. D.	Mean	S. D.	Mean	S. D.
<u>Alcoholics:</u>							
1. N. I. Group	44	82.80	18.39	44.89	28.18	48.57	8.50
2. I. Group	27	84.07	15.87	55.37	24.20	45.67	9.73
3. Control	17	84.59	19.86	59.82	21.93	44.80	8.74
4. Students	10	-	-	85.00	9.82	22.20	2.68

Table 30. Mean percentile scores on P. M. and T-H and data on age for the female groups.

Category	No.	Matrices		Trist-Hargreaves		Age	
		Mean	S. D.	Mean	S. D.	Mean	S. D.
<u>Alcoholics:</u>							
1. N. I. Group	19	72.89	18.23	33.58	24.33	45.42	5.80
2. I. Group	13	77.00	16.35	52.15	24.97	48.50	7.58
3. Control	9	89.56	11.77	54.77	30.13	44.40	8.34
4. Students	12	-	-	87.33	12.38	22.58	3.88

In line with expectation from the hypothesis the Information-group did better than the No-information group on the T-H. However, neither group did as well as the control group who did the test under normal conditions of administration. Table 31 gives the significance values of comparison between means for the alcoholic and control groups, not including the student sample.

Table 31. Significance values of difference between T-H means, based on data given in Tables 29 and 30.

Category	t Value	df	Significance
<u>Men:</u>			
N. I. / Inf.	1.604	69	N.S.
N. I. / Con.	1.963	59	N.S.
Inf. / Con.	-	-	N.S.
<u>Women:</u>			
N. I. / Inf.	2.116	30	$p < .05$
N. I. / Con.	2.488	29	$p < .02$
Inf. / Con.	-	-	N.S.

The student sample did significantly better ($p < .01$) in comparison with all other groups. Though scores on the Matrices were not available for the students it is known that undergraduates would normally be among the top 10% on the test. The wide differences between the scores obtained by the students, who had a mean age of twenty-two years, in comparison with the scores of the other groups suggest that performance on the T-H is susceptible to age. Apart from the age factor, however, comparison of the performance of the Information and No-information alcoholic groups favours the conclusion of a deficit in perceptual ability in the alcoholic when faced with a task of the nature of the T-H. That this deficit may involve a problem of retention of information as well is also a possibility.

Pritchard (1966) has investigated the hypothesis that alcoholics, as a group, suffer from a deficit in the ability to carry out logical operations relative to non-alcoholics. The Watson-Glaser Critical Thinking Appraisal test (W-G) (Watson and Glaser, 1952), a verbal test of logical reasoning, was administered to a group of alcoholic and normal subjects. The groups were matched for age, sex, social class (by occupation) and intelligence. There were 26 S's in each group. The writer has found a correlation of .597 \pm .09 ($p < .01$) for a heterogeneous sample of 51 subjects between the T-H and W-G. Pritchard found no significant difference between the groups on the test. In a further analysis she found a significant difference between the group of normal controls and a sample of university students ($p < .01$) and between the students and the alcoholic group ($p < .01$). These results taken in conjunction with those from the T-H data suggest that apart from age the deficit often observed in alcoholics when tested on cognitive tasks such as tests of concept formation and logical reasoning of the performance type is due in part to a relative inability to organize perceptual information effectively. Thus, in any psychometric investigation of the logico-cognitive ability of the alcoholic account should first be taken of his perceptual behaviour, i.e., how he organizes information, and of his ability to retain information as these skills may be affected independently of any deficit in reasoning and logical efficiency.

Individual Differences in Stress Tolerance.

Individual differences will affect the way in which stressful situations are handled. The Yerkes-Dodson law states that an excessively high level of drive decreases efficiency (Hilgard and Marquis, 1964). A similar hypothesis relating the neurological concept of activation to performance has been put forward by Malmö (1962). The personality dimension of neuroticism, conceived of as an inherited autonomic over-reactivity, refers to a person's liability to neurotic breakdown under stress (Eysenck, 1959; 1960a). The N scale of the MPI has been designed

to measure neuroticism or vulnerability to neurosis. From the foregoing statements it is possible to deduce the hypothesis that scores on the N scale of the MPI should correlate significantly with scores on a test of tolerance for stress; and since neurotics are characterized by high (anxiety) drive, then, by virtue of the operation of the Yerkes-Dodson law, which relates drive to performance, such a correlation would be in the negative direction.

A difficulty in the way of testing this hypothesis, however, is the fact that "despite an increasing general interest in stress situations in recent years, no satisfactory 'stressor' metric has yet been achieved. Thus, in most instances experimental results can be examined only for general consistency with the theory and not for detailed validation." (Gwynne Jones, 1960).

A version of the Kohs' Block Design test, the Trist-Misselbrook-Kohs (T-M-K), has been adapted as a measure of tolerance for stress in the present study. The T-M-K is normally a performance test of intelligence and is "designed in such a way that it might act as a learning situation." (Semeonoff and Trist, 1958). "To this end the problems are grouped into distinct series, each introducing a new principle combined with a progression of difficulty." The material consists of 24 Kohs' Blocks of standard pattern, five boards, one used for demonstration, painted with designs to be copied by the subject using a given number of blocks. Separate scoring norms for a test and immediate re-test administration of the task are available. Each board is timed. Adapted as a test of stress tolerance, however, the situation is so structured on the first administration of the test as to lead the subject to behave as if he is engaged on an untimed task. On the second administration speed of performance and not just accuracy is emphasized as essential to achieving a good score on the test. The subject is also told that having just had practice on the task he was expected to achieve a better score this time. A stop watch is placed conspicuously in clear view of the subject; he is told the time value of the board he is about to attempt and that

he will be checked off verbally at intervals of 10 seconds. On board A, for example, with a time limit of 90 seconds, he would be warned as follows: "Ten seconds gone, eighty to go....seventy seconds to go.... sixty....twenty seconds to go....ten...." and so on.

Raw scores are converted to percentile scores according to the available norms for the test. The subject's stress index, expressed to the nearest whole number, is calculated from the percentile scores by means of the following formula:

$$\frac{\text{re-test}}{\text{test}} \times 10.$$

Thus, a person scoring at the 50th. and 60th. percentiles on test/re-test respectively would achieve a stress index of 12; while someone whose corresponding scores were at the 50th. and 25th. percentiles would achieve a stress index of 5. Table 32 gives data for a male and female alcoholic sample on T-M-K stress indices and on the N scale of the MPI.

Table 32.

Category	No.	Stress Index		MPI: N Scale	
		Mean	S. D.	Mean	S. D.
Men	55	11.91	7.99	21.78	10.71
Women	22	6.45	5.47	23.00	10.75
Both	77	10.35	7.76	22.13	10.74

The distribution of scores for the male sample was positively skewed, similarly for the women, with medians of 10 and 5.5 respectively. The index of skewness for the men was 0.72, that for the women was 0.52. (Garrett, 1959). Taking the data as it stands, however, the men responded significantly better to stress testing than the women ($p < .01$). As there is little difference between the groups on mean N scores on the MPI this difference cannot be attributed to a higher anxiety drive among the women which makes them more intolerant of stress than the men. Even defining stress tolerance operationally by means of the T-M-K, rather

than as indicated by scores on the N scale of the MPI, (i.e., stress tolerance is what the T-M-K measures) it may still be misleading to accept the difference between the groups as a true indication of differential tolerance for stress between male and female hospitalized alcoholics. For one thing, the test has a high loading (.54) on spatial-mechanical ability (k:m) (Seseonoff and Trist, 1958, p.107) and it may be that women in general do not handle material of this nature as well as men. Another point is that norms for the test were obtained from a highly intelligent male sample; about 70% of the sample were above the mean of the general population. It may be, therefore, that the discrepancy is due partly to differences in spatial-mechanical ability between men and women and partly to the nature of the standardization of the test.

Pearson's product-moment correlation between N scores on the MPI and T-M-K stress indices for both groups together was -0.05. This is an insignificant correlation which is far from supporting the hypothesized relationship between neuroticism and tolerance for stress. The correlation between the two tests for the male sample was -0.1, that for the female +0.22. In order to examine the relationship between the two tests more closely, extreme scoring groups from the male sample on the T-M-K were compared for mean neuroticism scores on the MPI. A high tolerance group consisted of 9 individuals whose stress indices were 1 standard deviation or more above the mean for the male sample; while a low tolerance group whose stress indices were 1 S.D. or more below the mean consisted of 11 subjects. The mean N score for the high tolerance group was 18.82 (SD, 9.02) and that for the low tolerance group was 24 (SD, 13.24). These scores are consistent with the prediction from the hypothesis though the difference between them is not statistically significant.

A problem encountered in using the T-M-K in this manner, as with its original use as a test of intelligence, is that there is insufficient headroom in the test to allow a superior performance on the first appli-

ication to improve on the second. Semeonoff and Trist (1958) have suggested that below the 90th. percentile of the general population this difficulty is unlikely to arise. One male subject was excluded from the present sample for this reason. He scored at the 86th. and 99th. percentiles on test/re-test respectively. His stress index of 12 was regarded as unreliable compared with a similar index obtained by someone who scored at the 27th. and 32nd. percentiles on test/re-test respectively, for example. As indicated (Table 33) by the mean percentile scores for both administrations of the T-M-K it appears that this problem will not arise very often among hospitalized alcoholics, particularly in view of the fact that the subjects participating in the experiment were of high intelligence as shown by scores on the Progressive Matrices.

Table 33. Percentile scores for samples of alcoholic in-patients on P. M. and T-M-K.

Category	No.	P. M.		T - M - K			
		Mean	S. D.	Test		Retest	
				Mean	S. D.	Mean	S. D.
Men	56	84.18	16.86	31.78	17.40	33.26	25.36
Women	22	77.27	16.69	23.27	15.59	15.05	17.35
Both	78	82.23	17.10	29.44	20.26	28.25	24.80

Semeonoff and Trist (1958, p.106) reported a correlation of .62 between P. M. and T-M-K (test) and a correlation of .59 between P. M. and T-M-K (re-test). It would have been expected, therefore, that the mean percentile scores for the male alcoholic sample at least would have been much higher than that which was actually obtained. A likely explanation of the discrepancy between P. M. and T-M-K scores for the alcoholics is that whereas the Matrices scores are corrected for age, scores on the T-M-K are not. Moreover, the T-M-K was standardized on a somewhat younger sample than the present group of alcoholics whose mean age for men was 47.95 years (SD, 9.59 years) and for women 45.55 years (SD, 8.08 years). However, the discrepancy does not invalidate its

use as a test of stress tolerance since a person's stress index is independent of his position on the percentile scale, except for someone who makes a very high score on the first administration of the test and maintains his form on re-test under stress conditions.

At this stage, the best use of the test is in the individual case where it gives an indication of the direction rather than an absolute value of the person's tolerance for stress. As a general test for this purpose it would need to be re-standardized on a more representative sample of the general population than that represented in the existing norms, special considerations being given to correction for age and sex. In addition, it would be desirable to validate the test as a measure of stress tolerance against independent criteria in order to establish its claim to measure this aspect of behaviour. Clinical experience with the test, however, indicates that it has some empirical validity as such a measure.

3. Individual Differences in Level of Aspiration.

The phenomenon of level of aspiration "represents a prediction by an individual of his own achievement in some definite future task, and it employs as residual, a knowledge of his past performances, and perhaps of the performances of others." (Allport, 1955). Two people of equivalent ability in certain spheres may nevertheless vary in the goals they set and in the value they place on their ability. One may set his goals very high while the other may under-rate himself. These methods of integrating ability, achievement and the goal a person sets himself at any given time are important in interpreting the way he responds to the world around him: family, work, competition, and other areas of social interaction. (Eysenck, 1947, 1952). In an analysis of level of aspiration as a characteristic of personality, three parameters have been selected for study.

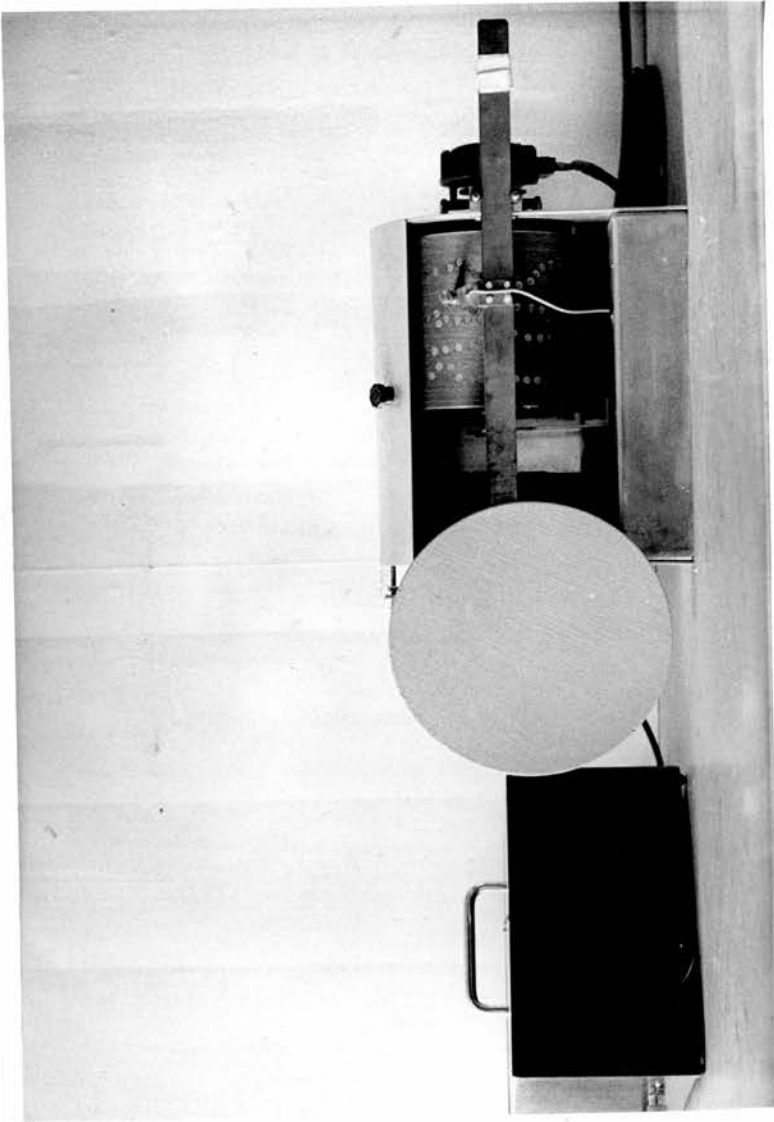
1. The person's judgment of his past performance.
2. His prediction of his future performance under conditions where he has a knowledge of his past performance.
3. The degree of flexibility with which he shifts his prediction of future achievement in relation to a knowledge of his past performances.

The task selected for measuring level of aspiration is the Cambridge Triple Tester (Plate 6), an adaptation of the pursuit-meter. "The apparatus consists of a brass drum carrying an ivory cover, rotating towards the subject. The ivory cover is marked out as a helical "road" with holes punched in it. A "vehicle" in the form of a bronze ball moved sideways on a rack is steered along this road by a steering wheel. The purpose is to keep the ball on the line of holes; each "hit" is scored on an electric counter." (Eysenck, 1947, p.129).

The technique of level of aspiration testing follows closely that outlined by Eysenck (1947). The subject is acquainted with the task and is allowed two practice trials on the apparatus. A trial lasts for one minute, the time taken for the drum to make two complete revolutions. After the first test trial the subject is asked to give a numerical estimate of the score he expects to make on his next trial. This is his aspiration score. He then performs the task and is asked to give a numerical estimate of how well he thinks he has done. This is his judgment score. Underestimation of past performance gives a negative score, overestimation a positive one. Next, the subject is told what his actual score was and is asked to estimate how well he will do next time. This procedure is repeated until ten judgment and ten aspiration scores are obtained. The scores obtained from this data corresponding to the three parameters described above are:

1. The mean judgment discrepancy score (JDS). This is the mean of the sum of differences between the subject's performance score and his judgment score for each of the 10 trials.
2. The mean goal discrepancy score (GDS). GDS is based on the difference between actual performance score on trial X and the aspiration score for trial $(X + 1)$; it is positive if the aspiration is higher than the

Plate 6. Model of the Cambridge Triple Tester; Rear view of Box with Electric Counter on left.



preceding performance score, and negative if it is lower.

3. The Index of Flexibility (F). Flexibility is defined as a tendency to shift the level of aspiration as a function of knowledge of actual past performances and of their relationships (positive or negative) to aspiration scores. F is simply the sum of all shifts in aspiration score from trial to trial; this does not take into account the direction of changes which occur in aspiration scores in relation to corresponding performance scores. The F score may range from zero to nine.

Data concerned with each of these main scores for samples of alcoholic and normal subjects are given in Table 34. Test of significance of difference between means was carried out, the results are shown in Table 35. As there were no significant difference between any of the groups on JDS data for this variable ^{are} is omitted from the Table.

Table 34. Level of aspiration data for samples of alcoholic and normal subjects on the Cambridge Triple Tester.

Category	No.	J. D. S.		G. D. S.		Flexibility	
		Mean	S. D.	Mean	S. D.	Mean	S. D.
<u>Alcoholics:</u>							
Men	40	17.87	3.96	28.64	8.56	4.60	2.33
Women	24	17.99	6.48	26.45	6.31	5.12	2.09
Both	64	17.91	5.05	27.82	7.84	4.80	2.26
<u>Normals:</u>							
Men	23	17.33	2.50	26.31	5.58	5.65	1.86
Women	33	15.53	4.80	22.58	5.12	6.39	1.58
Both	56	16.27	4.11	24.12	5.62	6.09	1.73

Table 35. " t " and " p " values when groups are compared on GDS and F.

Variable	Comparison	t Value	df	p Value
GDS	Alcoholic men vs Normal men	1.17	61	N. S.
	Alcoholic women vs Normal women	2.55	55	p < .02
	Alcoholics vs Normals	2.93	118	p < .01
	Alcoholic men vs Alcoholic women	1.09	62	N. S.
	Normal men vs Normal women	2.58	54	p < .02
F	Alcoholic men vs Normal men	1.85	61	N. S.
	Alcoholic women vs Normal women	2.61	55	p < .02
	Alcoholics vs Normals	3.47	118	p < .01
	Alcoholic men vs Alcoholic women	0.92	62	N. S.
	Normal men vs Normal women	1.60	54	N. S.

Subjects were also compared on these three measures in an attempt to investigate individual differences in introversion-extraversion as measured by the MPI. Subjects who scored at the extremes (± 1 SD) on E were selected for comparison. From a total sample of 80 male subjects (40 alcoholics, 17 non-alcoholic in-patients and 23 normals) 16 introverts and 19 extraverts were obtained whose scores deviated by at least one SD from the standardization mean of 24.91 (SD 9.71) on the E scale of the MPI. The mean E score for the introverts was 9.69 (SD 3.57) and that for the extraverts was 38.26 (SD 2.67). Six of the 16 introverts had scores on the N scale of the MPI that were 1 SD or more above the mean for the scale and could therefore be termed extreme dysthymics; by a similar criterion four of the 19 extraverts could be classified as extreme hysterics or neurotic extraverts. Of a sample of 70 women (24 alcoholics, 13 non-alcoholic in-patients and 33 normals) 11 introverts and 12 extraverts were obtained whose scores on the E scale of the MPI deviated by not less than 1 SD from the mean for the E scale. The mean E score for

the introverts was 10.64 (SD 3.55); for the extraverts it was 37.62 (SD 2.20). Table 36 contains information for the groups on the three level of aspiration scores under discussion. Except for that between the female groups on JDS ($p < .05$) no significant differences emerged between introverts and extraverts on these level of aspiration parameters.

Table 36. Mean aspiration scores for subjects scoring at the extremes (± 1 SD) on the E scale of the MPI.

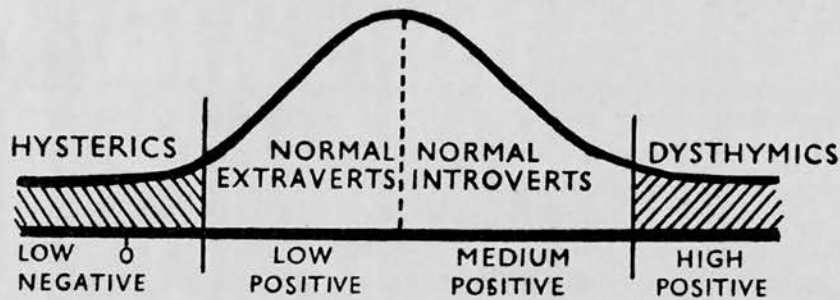
Category	No.	J. D. S.		G. D. S.		Flexibility	
		Mean	S. D.	Mean	S. D.	Mean	S. D.
<u>Men:</u>							
Introverts	16	14.95	5.21	27.62	5.43	5.36	1.45
Extraverts	19	18.11	2.90	30.55	10.11	4.35	2.25
<u>Women:</u>							
Introverts	11	12.20	6.83	19.50	6.62	5.45	1.78
Extraverts	12	17.03	2.81	24.22	4.73	6.50	1.89

Conclusions.

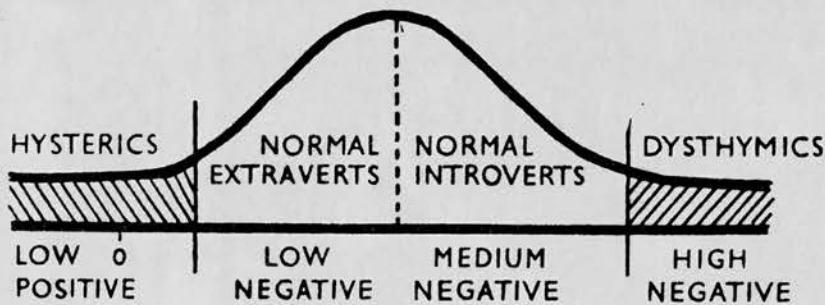
Analysis of level of aspiration scores obtained by hospitalized alcoholics and by normal controls show that as a group alcoholics are inclined to strive after higher goals than normals, the difference between the two groups being significant at the .01 level of confidence. Also, alcoholics are significantly more rigid in their goal-setting compared with normal individuals ($p < .01$). The data further suggest that normal males strive after higher goals than normal females ($p < .02$). An interesting study would be to compare the goal-setting and flexibility behaviour of alcoholics with their ability to withstand stress. The difference between alcoholics and normal controls raises the question of the nature of the relationship between level of aspiration and alcoholism. No significant difference appeared between introverts and extraverts on any of the level of aspiration variables, with the single exception

of that between female introverts and extraverts on JDS. The indications, however, are that both male and female extraverts tend to overestimate their performance and goals relative to introverts; this contradicts expectations from the extraversion hypothesis (Eysenck, 1947) as indicated schematically in figure 11. The importance of these trends for the extraversion hypothesis is a topic for future investigation.

Fig. 11. Schematic diagram illustrating individual differences in level of aspiration (GDS & JDS) (By permission of Eysenck, 1962).



Goal Discrepancy Scores.



Judgment Discrepancy Scores.

Figure 18

ILLUSTRATIVE CASE STUDIES.

Case 1. This 39-year-old patient was admitted to hospital two years ago in a state of delirium tremens. The wife of a hotel owner she assisted in the running of the business, being responsible for catering arrangements and the cocktail lounge. She had been married for fifteen years and had five children. Her husband was himself a heavy drinker; he showed little sympathy for his wife's alcohol problem, in fact he encouraged her drinking. The patient's mother, a person of strong religious views, was described as a source of conflict, being constantly involved in her domestic affairs. She had no previous hospitalization for alcoholism and assessed the chronicity of her drinking at 23 months; the psychiatrist estimated it at 7 years. She was at the 80th and 63rd percentiles on the Matrices and Mill Hill Vocabulary tests respectively and at the 70th percentile on the T-H. There were no signs of cognitive deficit due to alcoholism in her test profile. The MPI classified her as an extravert, with scores of 4 and 34 on N and E respectively. A stress index of 6 indicated a low frustration tolerance. Her stay in hospital lasted for six weeks.

She was treated by relaxation-aversion therapy, receiving 13 relaxation and 12 aversion sessions. Her GSR index of conditioning was positive but weak. At the same time her response to conditioning showed marked behavioural disturbance, beginning with failure to spit out the alcohol due to panic, then an inability to pick up the glass of alcohol or snatching at it in fear. "I'm not afraid of that (shock), I just don't want to touch it." This behaviour persisted even after a long series of non-reinforced trials and was very quickly re-established whenever it showed signs of extinguishing. She relapsed and was re-admitted to the Unit within four months of discharge. Her second admission lasted nine weeks and the treatment was repeated. She was also re-admitted for a 2-day reinforcement session four months after her second discharge and

has been abstinent since. She has become more assertive in her behaviour towards her husband and mother and, generally, has exhibited a greater self-assurance and zest for life than she previously possessed. Re-test on the MPI two years after her first admission showed a considerable increase in emotional lability, with a score of 38 on the N scale compared with a previous score of 4. Her score on the E scale remained stable, 32 on re-test. This increase in N score, classifying her as a neurotic extravert, in the face of an apparent successful adjustment over a period of fourteen months since her last reinforcement session was unexpected.

Case 2. This 37-year-old sales representative had had two previous admissions for alcoholism prior to coming to the Unit. He had also been a member of Alcoholics Anonymous. Both himself and the psychiatrist put the chronicity of his drinking at three years, excessive drinking starting soon after a gastrectomy. He was 10 years married and felt that his drinking might lead to the break-up of his marriage. He also gave the impression of being an incorrigible liar. He was at the 78th and 63rd percentiles on P.M. and M.H.V. respectively and at the 20th percentile on T-H. The P.M./T-H discrepancy suggested some kind of cognitive deficit. The MPI classified him as a dysthymic with scores of 32 and 4 on the N and E scales respectively. He had 14 sessions of progressive relaxation and 14 of conditioned aversion. GSR was positive but not significant. He was discharged after 17 weeks in hospital. He relapsed within two months and was re-admitted. Further relaxation-aversion treatment failed to help him and he sought admission to another hospital in due course.

Case 3. This 44-year-old professional man was on holiday when he was admitted to the Unit in a state of delirium tremens. He has had two previous periods in hospital for alcoholism, lasting four and eight weeks respectively. His current hospitalization lasted eleven weeks and included a prolonged period of narcosis. He had been married for

twenty years, put his alcoholism at 3 years and felt that it had not affected his domestic, social or work relationships. The psychiatrist estimated his chronicity at ten years or more. He had remained abstinent for 9 months after his second hospital admission. He was at the 92nd and 95th percentiles on P.M. and M.H.V. respectively and at the 73rd on T-H. The MPI classified him as an introvert with scores of 12 and 24 on the N and E scales respectively. He achieved a stress index of 1.25, dropping dramatically from the 40th to the 5th percentile on test/re-test. He was treated by relaxation-aversion therapy, having 9 sessions of progressive relaxation and 14 of conditioned aversion. His GSR was in the Strong category ($p < .01$). He has been abstinent during the whole period of follow-up, two years, and has made a good overall adjustment. Re-test on the MPI showed a drop in neuroticism score from 12 to 2 and an increase in E score to 32. Re-test on the T-M-K ten months after discharge gave him a stress index of 10, which is a remarkable improvement on his first performance.

Case 4. This 57-year-old company director was admitted to the hospital fifteen months ago, his second hospitalization for alcoholism. He also gambled heavily. He had been encouraged to seek treatment for alcoholism by his doctor, brother and bank manager, but he also seemed well-motivated for treatment in himself. He stated the history of alcoholism as two years, the psychiatrist put it at fifteen. His diagnosis was that of character disorder with alcoholic psychosis. He was separated from his wife and lived alone. He was at the 78th and 80th percentiles on P.M. and M.H.V. respectively but below the 10th on T-H; this suggested some degree of cognitive deficit, probably as a function of alcoholic psychosis. He had an N score of 22 and an E score of 30 on the MPI and a stress index of 8, classifying him as extraverted with a marginal tolerance for stress. He was treated by electrical aversion therapy, having 8 sessions of conditioned aversion treatment. His GSR was positive

but not significant. Discharged after eleven weeks in hospital he joined A.A. for a time but gave up after the death of his sponsor. He has been abstinent for 14 months, has moved into lodgings, enjoys bowls, golf, gardening and reading and considers sobriety a pleasure. Re-test on the MPI showed a drop in N score from 22 to 14; he remained extraverted with a re-test score of 34 on the E scale.

Case 5. This 43-year-old housewife had a history of alcoholism of 6 years standing according to the psychiatrist's estimate; she herself put it at 3 years. She had been married for 21 years at the time of admission. Her husband, who ran a wine and spirit business, was also an alcoholic with several hospitalizations for the disorder. She had experienced delirium tremens and was diagnosed as suffering from Korsakoff psychosis and peripheral neuritis on admission. She had had previous admissions for alcoholism but was vague about their number, dates and duration. Her current admission to the Unit lasted for 23 weeks, a second one later lasted for 6 weeks. She achieved an I.Q. of 108 on the Full Scale of the Wechsler Adult Intelligence Scale (W.A.I.S.) and was at the 43rd percentile on the T-H. Her general level of intellectual function showed no conspicuous deficit associated with brain damage. On the Wechsler Memory Scale, however, she had difficulty with such items as immediate recall, associate learning, reproduction of designs from memory and orientation, achieving a memory quotient (M.Q.) of 84, which is much lower than her score on the W.A.I.S. The MPI classified her as a normal extravert (N=14, E=38); she also had a stress index of 14 which was well above the mean for the group. A marked deficit in recent memory ability and the physical signs of peripheral neuritis were the main evidence of abnormality. Her behaviour in the ward was characterized by cheerfulness and an apparent indifference to her disabilities.

She was treated by electrical aversion therapy, receiving nine sessions of aversion conditioning. Her GSR was in the Paradoxical category. She failed to learn or to retain the sequence of operations that were required of her during the conditioning process and even went

to the length of writing them down. The instructions had to be rehearsed at each session. She was re-admitted to the Unit two months after discharge and has had regular periods of admissions to other hospitals during the eighteen months since her first admission to the Unit.

Case 6. This patient, aged 39 years and mother of three children, was admitted to the Unit eighteen months ago, under pressure from her G.P. and her husband, a professional man. She had been married for eleven years and described herself as undomesticated and not really suitable for marriage; neither was her husband in her opinion. The husband spends nearly all his evenings at his club, drinking, returning home late at night. The sexual relationship "has not worked out well at all." She had had no previous hospitalization for alcoholism before coming to the Unit. Diagnosed as neurotic, the psychiatrist assessed her history of alcoholism as 5 years; she herself put it at two years, estimating the daily consumption as half-a-bottle of whisky. She also drank beer at times. She had once joined an A. A. group but gave up after 5 or 6 attendances. She drank herself to sleep at nights and drank in the morning to stop the shakes.

She was at the 65th and 63rd percentiles on P.M. and M.H.V. respectively and at the 57th on T-H. She had a stress index of 2, falling from the 50th to the 11th percentile on test/re-test. Scores of 14 and 25 on the N and E scales of the MPI classified her as non-neurotic and no more introverted than extraverted. She remained in hospital for 8 weeks and was treated by electrical aversion therapy, receiving 14 conditioned aversion sessions. Her GSR was in the Strong category ($p < .025$). Similarly her behaviour in the aversion setting showed marked evidence of conditioning. There were traumatic pauses. "Does everyone behave like I do... I just can't bring myself to taste it..." The morning following her fifth session she reported pouring herself a glass of lemonade at bed time, "I took a sip and got a shock... I jumped and put it down... I felt good, the treatment must be sinking in." Several months

later she reported being unable to drink alcoholic beverages as well as lemonade.

She has been abstinent since discharge eighteen months ago. The marital situation has not improved with sobriety; she has contemplated leaving her husband but has hesitated for the children's sake. MPI re-test scores six months after discharge showed an increase in N score from 14 to 27 and a drop in E score from 25 to 19, so that she is now classified as a dysthymic. While she has remained abstinent during the whole period of follow-up, she reported a tendency towards irritability and tension and is inclined to lose her temper more quickly than before. More recently she has been put on a supportive dose of Valium, which is a tranquilliser.

Case 7. This 47-year old engineer worked in a distillery. He was admitted to the Unit 20 months ago. The psychiatrist estimated the chronicity of his drinking as ten years, the patient put it at four. He is a bachelor and lived at home with his father, also an alcoholic. He reported a daily consumption of at least two bottles of whisky. "I couldn't even cut it down let alone stop it without having the shakes." He has experienced delirium tremens and was diagnosed as suffering from anxiety depression. He was at the 95th and 92nd percentiles on P.M. and M.H.V. respectively and at the 60th percentile on the T-H. There were no signs of cognitive deficit in his protocol. He was classified as an extravert, with scores of 12 and 30 on the N and E scales of the MPI respectively and achieved a stress index of 20 which is well above the mean for the group. Behaviourally he gave the impression of being a very anxious person; though this was not borne out by either his stress index or neuroticism score on the MPI. Admitted in a state of severe intoxication he underwent a period of prolonged narcosis and was later treated by electrical aversion therapy. He received 13 sessions of conditioned aversion with occasional reinforcement sessions at the outset of follow-up. His GSR index of conditioning was weak though he showed a spontaneous remission of conditioned GSR at a significant level one month after discharge. His

hospitalization lasted for 24 weeks and he has had regular follow-up interviews over the past 14 months. At one stage he was put on abstem, a drug which reacts violently with alcohol, as a deterrent to drinking; however, he refused to continue this regime and has been drinking moderately at a social level throughout most of the period of follow-up, so far, with no signs of a pathological escalation in his drinking. Re-test on the MPI leaves his scores comparable with those of his previous test with scores of 11 and 28 for N and E respectively. He changed his employment after discharge and now lives away from home.

REFERENCES

- ALLPORT, F. (1955) Theories of Perception and the Concept of Structure. John Wiley & Sons Inc., New York.
- ALLPORT, G.W. (1935) Personality: a psychological interpretation. Henry Holt & Co., New York.
- ALLPORT, G.W. (1961) Pattern and Growth in Personality. Holt, Rinehart & Winston, New York.
- AMERICAN PSYCHIATRIC ASSOCIATION (1965) The alcoholic rehabilitation program of Wyoming State Hospital. J. of Hospital and Community Psychiatry, 16 (10) 283-285.
- BAILEY, C.J. and MILLER, N.E. (1952) Effect of sodium amytal on behaviour of cats in an approach-avoidance conflict. J. comp. physiol. Psychol. 45, 205-208 (Cited in Conger, 1956).
- BAILEY, W., HUSTMEYER, F. and KRISTOFFERSON, A. (1961) Alcoholism, brain damage and perceptual dependence. Quart. J. Stud. Alc. 22, 387-393.
- BANKS, R.K. and VOGEL-SPROTT, M. (1965) Effect of delayed punishment on an immediately rewarded response in humans. J. exp. Psychol. 70, 357-359.
- BECKER, W.C. (1959) Cortical inhibition and extraversion-introversion. (Cited in Becker & Matteson, 1961).
- BECKER, W.C. and MATTESON, H.M. (1961) GSR conditioning, anxiety and extraversion. J. abnorm. soc. Psychol. 62, 427-430.
- BEECH, H.R. (1963) Some theoretical and technical difficulties in the application of behaviour therapy. Bull. Brit. Psychol. Soc. 16, 25-33.
- BELL, R.G. (1965) Defensive thinking in alcohol addicts. (Cited in Quart. J. Stud. Alc. 26, 714.)
- BENNETT, A.E., MOWERY, G.L. and FORT, J.T. (1960) Brain damage from chronic alcoholism: The diagnosis of intermediate stages of alcoholic brain disease. Amer. J. Psychiat. 116, 705-711.

- BERELSON, B. and STEINER, G. (1964) Human Behaviour: An Inventory of Scientific Findings. Harcourt, ^Brace and World Inc., New York.
- BIDERMAN, A.D. and ZIMMER, H. (1961) The Manipulation of Human Behaviour. John Wiley & Sons, Inc., New York.
- BLAKE, B.G. (1965) The application of behaviour therapy to the treatment of alcoholism. Behav. Res. Ther. 3, 75-85.
- BLAKE, B.G. (1966) Alcoholism: special techniques of therapy. Discovery 27, 44-47.
- BLAKEMORE, C.B. et al. (1963) Application of faradic aversion conditioning in a case of transvestism. Behav. Res. Ther. 1, 26-35.
- BOWMAN, K.M. (1962) Review of psychiatric progress 1962: alcoholism. Amer. J. Psychiat. 119, 649.
- BOWMAN, K.M. (1963) Review of psychiatric progress 1963: alcoholism. Amer. J. Psychiat. 120, 669-671.
- BOWMAN, K.M. and JELLINEK, E.M. (1941) Alcoholic mental disorders. Quart. J. Stud. Alc. 2, 312-390.
- BRITISH MEDICAL ASSOCIATION (1965) Panel discussion on alcoholism, B.M.A. Swansea. Brit. med. J. 2, 220.
- CARPENTER, J.A. et al. (1961) Alcohol and higher order problem solving. Quart. J. Stud. Alc. 22, 183-222.
- CARRIGAN, P.M. (1960) Extraversion-Introversion as a dimension of personality. Psychol. Bull. 57, 329-360.
- CATTELL, R.B. (1965) The Scientific Analysis of Personality. Penguin Books, London.
- CATTELL, R.B. and WARBURTON, F.W. (1961) A cross-cultural comparison of patterns of extraversion and anxiety. Brit. J. Psychol. 52, 3-15.
- CHURCH, R. (1963) The varied effects of punishment. Psychol. Rev. 70, 369-402.
- CLANCY, J. (1961) Procrastination: A defence against sobriety. Quart. J. Stud. Alc. 22, 269-276.

- CLARIDGE, G.S. and HERRINGTON, R.N. (1963) Excitation-inhibition and the theory of neurosis: a study of the sedation threshold. In: Experiments with Drugs (Ed: H.J. Eysenck) Pergamon Press, London.
- CLINEBELL, J.H. (1963) Philosophical-religious factors in the etiology and treatment of alcoholism. Quart. J. Stud. Alc. 24, 473-488.
- CONGER, J.J. (1951) The effects of alcohol on conflict behaviour in the albino rat. Quart. J. Stud. Alc. 12, 1-29.
- CONGER, J.J. (1956) Reinforcement theory and the dynamics of alcoholism. Quart. J. Stud. Alc. 17, 296-305.
- COOTE, M.A. (1965) Apparatus for conditioning treatment of enuresis. Behav. Res. Ther. 2, 233-238.
- CORTEEN, R.S. and BLACKMAN, A.R. (1965) Skin conductance change and sensory discrimination. Brit. J. Psychol. 56, 431-437.
- COSTELLO, C.G. (1963) Behaviour therapy: Criticisms and confusions. Behav. Res. Ther. 1, 159-162.
- COURT, J.H. (1965) Anxiety among acute schizophrenics and temporal lobe patients. Brit. J. clin. Psychol. 4, 254-258.
- COVILLE, W.J., COSTELLO, T.W. and ROUKE, F.L. (1960) Abnormal Psychology. Constable & Co. Ltd., London.
- DAVIS, R.C. (1930) Factors affecting the galvanic reflex. Arch. Psychol. 115, 5-64. (Cited in Martin, 1960a).
- DAVIS, R.C. et al. (1955) Autonomic and muscular responses, and their relation to simple stimuli. Psychol. Monogr. 69, No. 20 (Cited in Martin 1960a).
- de LINT, JAN E.E. (1964) Alcoholism, birth, rank and parental deprivation. Amer. J. Psychiat. 120, 1062-1065.
- DIETHELM, O. (1955) Etiology of Chronic Alcoholism. Charles C. Thomas, Springfield, Illinois, U.S.A.
- DINSMOOR, J.A. and HUGHES, L.H. (1956) Training rats to press a bar to turn off shock. J. comp. physiol. Psychol. 49, 235-238.

- DOLLARD, J. and MILLER, N.E. (1950) *Personality and Psychotherapy*. McGraw-Hill Book Co. Inc., New York.
- DUFFY, E. (1962) *Activation and Behaviour*. John Wiley & Sons, Inc., New York.
- EDLIN, J.V. et al. (1945) Conditioned aversion treatment in chronic alcoholism: preliminary report of 100 cases. *Amer. J. Psychiat.* 101, 806-809.
- EFRON, V. (1965) Notes from a visit to the Soviet Union: Treatments and studies of alcoholism; education about alcohol; drinking in Georgia. *Quart. J. Stud. Alc.* 26, 654-665.
- ESTES, W.K. (1944) An experimental study of punishment. *Psychol. Monogr.* 47, 1-40.
- ESTES, W.K. and SKINNER, B.F. (1941) Some quantitative properties of anxiety. *J. exp. Psychol.* 29, 390-400.
- EYSENCK, H.J. (1947) *Dimensions of Personality*. Routledge & Kegan Paul, London.
- EYSENCK, H.J. (1952) *The Scientific Study of Personality*. Routledge & Kegan Paul, London.
- EYSENCK, H.J. (1953) *The Structure of Human Personality*. Methuen & Co. Ltd., London.
- EYSENCK, H.J. (1957) *The Dynamics of Anxiety and Hysteria*. Routledge & Kegan Paul, London.
- EYSENCK, H.J. (1959) *Manual of the Maudsley Personality Inventory*. University of London Press, London.
- EYSENCK, H.J. (1960) *Behaviour Therapy and the Neurosis*. Pergamon Press, Oxford.
- EYSENCK, H.J. (1960a) Classification and the problem of diagnosis. In *Handbook of Abnormal Psychology*. Basic Books, New York.
- EYSENCK, H.J. (1961) Psychoanalysis-myth or science? *Inquiry* 4, 1-15. Oslo University Press.
- EYSENCK, H.J. (1962) Conditioning and personality. *Brit. J. Psychol.* 53, 299-306.

- EYSENCK, H.J. (1965a) *Fact and Fiction in Psychology*. Penguin Books, London.
- EYSENCK, H.J. (1965b) *Experiments in Behaviour Therapy*. Pergamon Press, Oxford.
- EYSENCK, H.J. (1966) *Personality and experimental psychology*. Bull. Brit. Psychol. Soc. 19, 1-28.
- EYSENCK, H.J. and EYSENCK, S.G.B. (1964) *Manual of the Eysenck Personality Inventory*. University of London Press Ltd., London.
- EYSENCK, H.J. and RACHMAN, S. (1965) *The Causes and Cures of Neurosis*. Routledge and Kegan Paul, London.
- EYSENCK, S.B.G. (1956) An experimental study of psychogalvanic reflex responses of normal, neurotic and psychotic subjects. *J. Psychosom. Res.* 1, 258-272.
- FARBER, I.E. (1948) Response fixation under anxiety and non-anxiety conditions. *J. exp. Psychol.* 38, 111-131. (Cited in Wolpe, 1958).
- FARBER, I.E., SPENCE, K.W. and BECHTOLDT, H.P. (1957) *Emotionality, introversion-extraversion, and conditioning*. (Cited in Becker & Matteson, 1961).
- FELDMAN, M.P. and MACCULLOCH, M.J. (1965) The application of anticipatory avoidance learning to the treatment of homosexuality. 1, Theory, technique and preliminary results. *Behav. Res. Ther.* 2, 165-184.
- FERSTER, C.B. and SKINNER, B.F. (1957) *Schedules of Reinforcement*. Appleton-Century Croft Inc., New York.
- FIELD, J.G. and BRINGELMANN, J.C. (1961) Eyelid conditioning and three personality parameters. *J. abn. soc. Psychol.* 63, 517-523.
- FITZHUGH, L.C., FITZHUGH, K.B. and REITAN, R.M. (1960) Adaptive abilities and intellectual functioning in hospitalized alcoholics. *Quart. J. Stud. Alc.* 21, 414-423.
- FITZHUGH, L.C., FITZHUGH, K.B. and REITAN, R.M. (1965) Adaptive abilities and intellectual functioning in hospitalized alcoholics: further considerations. *Quart. J. Stud. Alc.* 26, 402-411.

- FORD, D.H. and URBAN, H.B. (1964) *Systems of Psychotherapy*. John Wiley and Sons, Inc., New York.
- FORDHAM, F. (1953) *An Introduction to Jung's Psychology*. Penguin Books, London.
- FOUQUET, A. (1965) (Cited in Report on European Institute on the Prevention and Treatment of Alcoholism, Oslo 14-15 June.) *Brit. med. J.* 2. 164.
- FRANKS, C.M. (1956) Conditioning and personality: a study of normal and neurotic subjects. *J. abnorm. soc. Psychol.* 52, 143-150.
- FRANKS, C.M. (1957) Personality factors and the rate of conditioning. *Brit. J. Psychol.* 48, 119-126.
- FRANKS, C.M. (1958) Alcohol, alcoholism and conditioning: a review of the literature and some theoretical considerations. *J. ment. Sci.* 104, 14-33.
- FRANKS, C.M. (1960) Conditioning and abnormal behaviour. In *Handbook of Abnormal Psychology* (Ed: H.J. Eysenck) Basic Books Inc., New York.
- FRANKS, C.M. (1963) Behaviour therapy, the principles of conditioning and the treatment of the alcoholic. *Quart. J. Stud. Alc.* 24, 511-529.
- FRANKS, C.M. (1964) *Conditioning Techniques in Clinical Practice and Research*. Springer Publishing Co. Inc., New York.
- FRANKS, C.M. (1965) Individual differences in conditioning and associated techniques. In *The Conditioning Therapies* (Ed: Wolpe, Salter & Reyna).
- FRANKS, C.M. and TROUTON, D.S. (1958) Effects of amobarbital and dex-amphetamine sulphate on the conditioning of the eyeblink response. *J. comp. physiol. Psychol.* 51, 220-222.
- FOURNEAUX, W.D. (1961) Neuroticism, extraversion, drive and suggestibility. *Int. J. clin. exp. Hypnosis.* 9, 195-214.
- GANTT, W.H. (1950) The conditioned reflex function as an aid in the study of the psychiatric patient. In relation of psychological tests to psychiatry. Hoch, P.V. and Zubin, J. (Eds:) Grune & Stratton, New York.

- GANTT, W.H. (1964) *Autonomic conditioning*. In: *The Conditioning Therapies*
Ed: Wolpe, Salter & Reyna.
- GARRETT, H.E. (1959) *Statistics in Psychology and Education*. Longmans,
Green and Co. Ltd., London.
- GENERAL REGISTRAR OFFICE, H.M.S.O. (1960) *Classification of Occupations*.
- GLATT, M.M. (1961) Treatment results in an English mental hospital
alcoholic unit. *Acta psychiat. scand.* 37,
143-168. (Cited in Vallance, 1965).
- GLATT, M.M. (1964) The alcoholic and his problem. *Nursing Mirror*,
17 Jan. 1964. 369-370.
- GLATT, M.M. (1964a) The alcoholic unit and its contribution to manage-
ment and prevention of alcoholism. In *Report of*
the 10th European Institute of the Prevention
and Treatment of Alcoholism, London Conference.
- GLOVER, E. (1955) *The Technique of Psycho-analysis*. Bailliere, Tindall
and Cox, London.
- GREINER, D.S. (1961) Selective forgetting in alcoholics. *Quart. J.*
Stud. Alc. 22, 580-587.
- HEBB, D.O. (1955) Drives and the C.N.S. (Conceptual Nervous System)
Psychol. Rev. 62, 243-254.
- HEBB, D.O. (1958) *A Textbook of Psychology*. W.B. Saunders Company,
Philadelphia.
- HILGARD, E. (1958) *Theories of Learning*. Methuen & Co. Ltd., London.
- HILGARD, E. and MARQUIS, D.G. (1961) *Conditioning and Learning*. (Revised
by Kimble G.A.) Methuen & Co. Ltd., London.
- HSU, J.J. (1965) Electroconditioning therapy of alcoholism: a prelimin-
ary report. *Quart. J. Stud. Alc.* 26, 449-459.
- HULL, C.L. (1943) *Principles of Behaviour*. Appleton-Century, Crofts,
New York.
- HULL, C.L. (1952) *A Behaviour System*. Yale University Press, New Haven,
Connecticut.
- HUMPHRIES, L.G. (1939) The effect of random alternation of reinforcement
on the acquisition and extinction of conditioned
eyelid reactions. *J. exp. Psychol.* 25, 141-158.

- JACOBSON, E. (1938) Progressive Relaxation. University of Chicago Press, Chicago.
- JELLINEK, E.M. and McFARLAND, R.A. (1940) Analysis of psychological experiments on the effect of alcohol. Quart. J. Stud. Alc. 1, 272-371.
- JELLINEK, E.M. (1952) Phases of alcohol addiction. Quart. J. Stud. Alc. 13, 673-684.
- JELLINEK, E.M. (1960) The Disease Concept of Alcoholism. Hillhouse Press, New Haven, Connecticut.
- JONES, G.H. (1960) Learning and abnormal behaviour. In Handbook of Abnormal Psychology (Ed: H.J. Eysenck). Basic Books, New York.
- JONES, M.C. (1924) A laboratory study of fear: the case of Peter. Pedagogical Sem. 31, 308-318. (Reprinted in Eysenck, 1960).
- JUNG, C.G. (1923) Psychological Types (Tr: H. Godwin Baynes) Harcourt, Brace & Co., New York.
- JUNG, C.G. (1940) The Integration of the Personality. Routledge & Kegan Paul, London.
- KAMIN, L.J. (1959) The delay of punishment gradient. J. comp. physiol. Psychol. 52, 434-437.
- KANTOROVICH, (1934) Cited by Razran, G.H.S. Conditional withdrawal responses with shock as the conditioning stimulus in adult human subjects. Psychol. Bull. 31, 111. (1934).
- KARP, S.A., WITKIN, H.A. and GOODENOUGH, D.R. (1965) Psychological Differentiation: Effect of achievement of sobriety on field dependence. Quart. J. Stud. Alc. 24, 580-585.
- KELLER, M. (1960) Definition of alcoholism. Quart. J. Stud. Alc. 21, 125-134.
- KENDALL, R.E. and STATON, M.C. (1965) The fate of untreated alcoholics. Quart. J. Stud. Alc. 26, 685-686.
- KEPNER, E. (1964) Application of learning theory to the etiology and treatment of alcoholism. Quart. J. Stud. Alc. 25, 279-291.

- KESSEL, N. and WAINFON, H. (1965) Alcoholism. Penguin Books, London.
- KINGHAM, B.J. (1958) Alcoholism and the reinforcement theory of learning. *Quart. J. Stud. Alc.* 19, 320-330.
- KLEITMAN, N. (1939) Sleep and Wakefulness. University of Chicago Press, Chicago. (Cited in Martin, 1960a).
- KLOPPER, B. et al. (1954) Developments in the Rorschach Technique. Vol. I. George Harrap & Co., London.
- KNIGHT, R.P. (1941) Evaluation of the result of psychoanalytic therapy. *Amer. J. Psychiat.* 98, 434. (Cited in Wolpe, 1958).
- LAZARUS, A.A. (1963) The results of behaviour therapy in 126 cases of severe neurosis. *Behav. Res. Ther.* 1, 69-80.
- LAZARUS, A.A. (1965) Towards the understanding and effective treatment of alcoholism. *S.A. med. J.* 39, 736-741.
- LEHNER, W. and VOEGTLIN, F. (1950) An evaluation of the aversion treatment of alcoholism. *Quart. J. Stud. Alc.* 11, 199-204.
- LEWIN, K. (1935) A Dynamic Theory of Personality. McGraw-Hill, New York.
- LOGAN, F.A. (1959) The Hull-Spence Approach. In *Psychology: A Study of a Science - Vol. 2* (Ed: Sigmund Koch) McGraw-Hill Book Company, Inc., New York.
- LOLLI, G. (1961) Social Drinking: The Effects of Alcohol. Collier Books, New York.
- LOVIBOND, S.H. (1963) The mechanism of conditioning treatment of enuresis. *Behav. Res. Ther.* 1, 17-21.
- LOVIBOND, S.H. (1964) Personality and conditioning. In *Progress in Experimental Personality Research. Vol. 1.* (Ed: Maher, B.A.) Academic Press, New York.
- LUNDIN, R.W. (1961) Personality: An Experimental Approach. The Macmillan Company, New York.
- MacCORQUODALE, K. and MESSL, P.E. (1948) On a distinction between hypothetical constructs and intervening variables. *Psychol. Rev.* 55, 95-107.

- MADILL, M. et al. (1965) Aversion treatment by succinylcholine induced apnoeic paralysis; an analysis of early changes in drinking behaviour. *Quart. J. Stud. Alc.* 26, 684-685.
- MAHER, B.A. (1964) *Experimental Personality Research. Vol. 1.* Academic Press, New York.
- MALLER, O. et al. (1960) Brain changes in chronic alcoholism. *Confin. Neural. (Basel)* 20, 18-26.
- MALMO, R.B. (1958) Measurement of drive: an unsolved problem in psychology. In *Nebraska Symposium on Motivation.* (Ed: M.R. Jones). Univ. Nebr. Press.
- MALMO, R.B. (1962) Activation. In *Experimental Foundations of Clinical Psychology.* (Ed: A.J. Bochrach) Basic Books, New York.
- MARKS, I.M., RACHMAN, S. and GELDER, M.G. (1965) Methods for assessment of aversion treatment in fetishism and masochism. *Behav. Res. Ther.* 3, 253-258.
- MARTIN, I. (1960a) Variations in skin resistance and their relationship to GSR conditioning. *J. ment. Sci.* 106, 281-287.
- MARTIN, I. (1960b) Somatic reactivity. In *Handbook of Abnormal Psychology.* Ed: H.J. Eysenk.
- MARTIN, I. (1962) GSR conditioning and pseudoconditioning. *Brit. J. Psychol.* 53, 365-372.
- MARTIN, I. (1963a) A note on reflex sensitivity and formation of conditioned responses. *Behav. Res. Ther.* 1, 185-190.
- MARTIN, I. (1963b) Eyelid conditioning and concomitant GSR activity. *Behav. Res. Ther.* 1, 255-266.
- MARTIN, I. (1964) The measurement of skin resistance. *Bull. Brit. Psychol. Soc.* 17, 13-16.
- MASSERMAN, H. and YUM, R.S. (1946) An analysis of the influence of alcohol in experimental neurosis in cats. *Psychosomat. Med.* 8, 36-52.
- MAYER-GROSS, W., SLATER, E. and ROTH, M. (1954) *Clinical Psychiatry.* Cassell and Company, London.

- McADAM, W. (1964) Chronic alcoholics: Observations in hospital, follow-up results and statistical studies. Paper read at Crichton Royal Hospital, Dumfries, 1964.
- McCLEARY, R.A. and MOORE, R.Y. (1965) Subcortical Mechanisms of Behaviour. Basic Books, Inc., New York.
- McCLELLAND, D.C. and McGOWAN, R.R. (1953) The effect of variable food reinforcements on the strength of a secondary reward. *J. comp. physiol. Psychol.* 46, 80-86.
- McCORD, W. and McCORD, J. (1959) Some current theories of alcoholism: A longitudinal evaluation. *Quart. J. Stud. Alc.* 20, 727-749.
- McCORD, M. and McCORD, J. (1960) Origins of Alcoholism. Tavistock Publications, London.
- McCULLOCH, M.J., FELDMAN, M.P. and PINSHOFF, J.M. (1965) The application of anticipatory avoidance learning to the treatment of homosexuality - II. Avoidance response latencies and pulse rate changes. *Behav. Res. Ther.* 3, 21-44.
- McGUIRE, R.J., MOWBRAY, R.M. and VALLANCE, R.C. (1963) The Maudsley Personality Inventory used with psychiatric inpatients. *Brit. J. Psychol.* 54, 157-166.
- McGUIRE, R.J. and VALLANCE, M. (1964) Aversion therapy by electric shock: a simple technique. *Brit. med. J.* i, 151-153.
- METZNER, R. (1963) Re-evaluation of Wolpe and Dollard/Miller. *Behav. Res. Ther.* 1, 213-216.
- MILLER, N.E. (1944) Experimental studies of conflict. In J. McV. Hunt (Ed.) *Personality and the Behaviour Disorders*. Ronald Press. (pp. 431-65). New York.
- MILLER, N.E. (1948) Studies of fear as an acquirable drive. Fear as motivation and fear reduction as reinforcement in the learning of new responses. *J. exp. Psychol.* 38, 89-101.
- MILLER, N.E. (1959) Liberalization of basic S-R concepts: extensions to conflict behaviour, motivation, and social learning. In S. Koch (Ed.) *Psychology: A Study of a Science*. (Study I, Vol. 2) McGraw-Hill, New York.

- MILLER, N.E. and KESSEN, M.L. (1952) Reward effects of food via stomach fistula compared with those of food via mouth. *J. comp. physiol. Psychol.* 45, 555-563.
- MINDLIN, D. (1959) The characteristics of alcoholism as related to prediction of therapeutic outcome. *Quart. J. Stud. Alc.* 20, 604-619.
- MONNEROT, E. (1963) Psychiatric treatment of alcoholism in the hospital: therapeutic reflections on a summing up, an investigation, and a particular experiment. (Cited in *Quart. J. Stud. Alc.* 26, 717.
- MOORE, R.A. and MURPHY, T.C. (1961) Denial of alcoholism as an obstacle to recovery. *Quart. J. Stud. Alc.* 22, 597-601.
- MORRISON, S.L. (1964) Alcoholism in Scotland. *Health Bulletin* 22 No.1.
- MOWRER, O.H. (1938) Apparatus for the study and treatment of enuresis. *Amer. J. Psychol.* 51, 163-166.
- MOWRER, O.H. (1940) An experimental analogue of "regression" with incidental observations of reaction-formation". *J. abnorm. soc. Psychol.* 35, 56-87.
- MOWRER, O.H. (1948) Learning theory and the neurotic paradox. *Amer. J. Orthopsychiat.* 18, 571-610.
- MOWRER, O.H. (1964) Freudianism, behaviour therapy and "self-disclosure". *Behav. Res. Ther.* 1, 321-338.
- MUNROE, R. (1957) *Schools of Psychoanalytic Thought.* Hutchinson Medical Publications Ltd., London.
- MYERS, R.D. (1960) The effects of varying alcohol doses on differential lever pressing in the rat. Paper presented at the Eastern Psychological Association, New York, 1960 (Cited in Lundin, 1960).
- PATTISON, E.M. (1966) A critique of alcoholism treatment concepts with special reference to abstinence. *Quart. J. Stud. Alc.* 27, 49-71.
- PAVLOV, I.P. (1927) *Conditioned Reflexes.* (Trans. and Ed. by G.V. Anrep). O.U.P.
- PEMBERTON, D. (1966) A follow-up of 50 female alcoholics. Paper read at Conference of the Scottish Psychiatric Research Society, Glasgow, March, 1966.

- PRITCHARD, V. (1966) A Study of Cognitive Functioning in Alcoholics. Unpublished M.A. Thesis, University of Glasgow.
- QUINN, J.T. and NABNEY, J.B. (1965) A survey of complications occurring in a series of fifty-eight alcoholics treated with apomorphine aversion therapy. J. Irish med. Ass. 56, 50-51.
- RACHMAN, S. (1961) Sexual disorders and behaviour therapy. Amer. J. Psychiat. 118, 235-240.
- RACHMAN, S. (1963) Critical Essays on Psychoanalysis. Pergamon Press. Oxford.
- RACHMAN, S. (1965) Aversion therapy: chemical or electrical. Behav. Res. Ther. 2, 289-300.
- RACHMAN, S. (1965a) Pain-elicited aggression and behaviour therapy. Psychological Record. 15, 465-467.
- RACHMAN, S. (1966) Review of Research in Behaviour Modification by Krasner and Ullman, Holt, Rinehart and Winston, New York. In: Behav. Res. Ther. 4, 144-145.
- RAE, J.B. and FORBES, A.R. (1966) Clinical characteristics of the wives of alcoholics. Brit. J. Psychiat. 112, 197-200.
- RAVEN, J.C. (1958) Guide to using the Mill Hill Vocabulary Scale. Lewis & Co., London.
- RAVEN, J.C. (1960) Guide to the Standard Progressive Matrices. Lewis & Co., London.
- RAYMOND, M. (1964) The treatment of addiction by aversion conditioning with apomorphine. Behav. Res. Ther. 1, 287-292.
- REESE, W.G., DOSS, R. and GANTT, W.H. (1953) Autonomic responses in differential diagnosis of organic and psychogenic psychosis. A.M.A. Arch. Neurol. Psychiat. 70, 778-793. (Cited in Eysenck, 1957).
- RICHTER, C.P. (1926) The significance of changes in the electrical resistance of the body during sleep. Proc. Nat. Acad. Sci. 12, 214. (Cited in Martin, 1960a).

- ROBSON, R.A.H., PAULUS, I. and CLARK, R.G. (1965) An evaluation of the effect of a clinic treatment program on the rehabilitation of alcoholic patients. *Quart. J. Stud. Alc.* 26, 264-278.
- ROSSI, J.J., STACH, A. and NELSON, J. (1963) Effects of treatment of male alcoholics in a mental hospital: a follow-up study. *Quart. J. Stud. Alc.* 24, 91-108.
- SANDERSON, R.E., CAMPBELL, D. and LAVERTY, S.G. (1963) An investigation of a new aversive conditioning treatment for alcoholism. (Cited in *Quart. J. Stud. Alc.* 24, 261).
- SCOTTISH HOME AND HEALTH DEPARTMENT (1965) *Alcoholics: Report on Health Services for their treatment and Rehabilitation.* H.M.S.O., Edinburgh.
- SEARS, R.R. (1934) Effect of optic lobe ablation on the visuo-motor behaviour of goldfish. *J. comp. Psychol.* 17, 233-265. (Cited in Woodworth & Schlosberg, 1955).
- SEMEONOFF, B. and TRIST, E. (1958) *Diagnostic Performance Tests.* Tavistock Publications, London.
- SHAFAR, S. and JAFFE, J.R. (1965) Behaviour therapy in the treatment of psychoneurosis. *Brit. J. Psychiat.* 111, 1199-1205.
- SIDMAN, M. (1953) Avoidance conditioning with brief shock and no extroceptive warning signal. *Science* 118, 157-158. (Cited in Lundin, 1961).
- SIDMAN, M. (1955) Technique for assessing the effects of drugs on timing behaviour. *Science*, 122, p. 925.
- SIDMAN, M. (1955a) On the persistence of avoidance behaviour. *J. abnorm. soc. Psychol.* 50, 217-220.
- SIDMAN, M. (1960) *Tactics of Scientific Research.* Basic Books Inc., New York.
- SKINNER, B.F. (1938) *The Behaviour of Organisms: An Experimental Analysis.* Appleton Century Co., New York.
- SKINNER, B.F. (1948) *Walden Two.* The Macmillan Company, New York.

- SKINNER, B.F. (1953) Science and Human Behaviour, The Macmillan Company, New York.
- SKINNER, B.F. (1959) Cumulative Record. Methuen & Co. Ltd., London.
- SKINNER, B.F. (1959) "Superstition" in the Pigeon. J. exp. Psychol. 38, 168-172. (Reprinted in Cumulative Record).
- SMART, R.G. (1965) Effects of alcohol on conflict and avoidance behaviour. Quart. J. Stud. Alc. 26, 187-205.
- SOLOMON, R.C. and BRUSH, E.S. (1956) Experimentally derived conceptions of anxiety and aversion. In Nebraska Symposium on Motivation. (Ed: M.R. Jones) Univ. of Nebr. Press, Lincoln, Nebraska.
- SPENCE, K.W. (1963) A theory of emotionally based drive (D) and its relation to performance in simple learning situations. Contemporary Research in Learning (Ed: J.R. Braun) D. Van Nostrand Company Inc., New York. (Reprinted from The American Psychologist. 1958, 13, 131-141).
- SPITLER, W.L. and TRUBIT, H. (1965) Report on an experiment demonstrating the effects of alcohol on driving skills. Quart. J. Stud. Alc. 26, 345.
- STEBBINS, W.C., LUNDIN, R.W. and LYON, D. (1960). The effect of alcohol on reaction time in the white rat. Psychol. Rev. 10, 15-19. (Cited in Lundin, 1961).
- TALLAND, G. and KASSCHAU, R. (1965) Practice and alcohol effects on motor skill and attention. Quart. J. Stud. Alc. 26, 393-401.
- TAYLOR, D.H. (1962) The Measurement of Galvanic Skin Response. Electronic Engineering, May, 1962.
- TAYLOR, J.A. (1956) Drive theory and manifest anxiety. Psychol. Bull. 53, 303-320. (Cited in Eysenck, 1957).
- THIMANN, J. (1965) Who is qualified to treat the alcoholic? Comment on the Krystal-Moore Discussion. Quart. J. Stud. Alc. 26, 310-311.
- TROUTON, D. and EYSENCK, H.J. (1960) The effects of drugs on behaviour. In Handbook of Abnormal Psychology (Ed: H.J. Eysenck) Basic Books Inc., New York.

- TURNER, L. and SOLOMON, R.L. (1962) Human traumatic avoidance learning. Psychol. Monographs. 76, No. 40.
- VALLANCE, M. (1965) Alcoholism: A Two Year Follow-up Study. Brit. J. Psychiat. 111, 348-356.
- VOEGLIN, W. and LEMERE, F. (1942) The treatment of alcohol addiction. Quart. J. Stud. Alc. 2, 717-803.
- VOGEL, M.D. (1960) The relation of personality factors to GSR conditioning of alcoholics: an exploratory study. Canad. J. Psychol. 14, 275-280.
- VOGEL, M.D. (1961) GSR conditioning and personality factors in alcoholics and normals. J. abnorm. soc. Psychol. 63, 417-421.
- VOGEL-SPROTT, M. (1965) Individual differences in the suppressing effect of punishment on a rewarded response in alcoholics and non-alcoholics. Quart. J. Stud. Alc. (In press).
- VOGEL-SPROTT, M. and BANKS, R.K. (1965) The effect of delayed punishment on an immediately rewarded response in alcoholics and non-alcoholics. Behav. Res. Ther. 3, 69-73.
- WILBY, W.E. and JONES, R.W. (1962) Assessing patient response following treatment. Quart. J. Stud. Alc. 23, 325.
- WALLERSTEIN, R.S. (1957) Hospital Treatment of Alcoholism. Basic Books, New York.
- WALTON, H. (1961) Group methods in hospital organization and patient treatment as applied in the psychiatric treatment of alcoholism. Amer. J. Psychiat. 118, 410-418.
- WATSON, G.A. and GLASER, E.M. (1952) Watson-Glaser Critical Thinking Appraisal Manual, Harcourt, Brace, and World Book, Inc., New York.
- WATSON, J.B. and RAYNER, R. (1920) Conditioned emotional reactions. J. exp. Psychol. 3, 1-14. (Reprinted in Eysenck, 1960).
- WECHSLER, D. (1958) The Measurement and Appraisal of Adult Intelligence. Bailliere, Tindall and Cox, London.

- WITKIN, H.A., KARP, S.A., and GOODENOUGH, D.R. (1959) Field dependence in alcoholics. *Quart. J. Stud. Alc.* 20, 493-504.
- WOLPE, J. (1958) *Psychotherapy by Reciprocal Inhibition.* Stanford University Press, Stanford.
- WOLPE, J., SALTER, A. and REYNA, L.J. (1964) *The Conditioning Therapies.* Holt, Rinehart and Winston, Inc., New York.
- WOODWORTH, S. and SCHLOSBERG (1955) *Experimental Psychology.* Methuen & Co. Ltd., London.
- WORLD HEALTH ORGANIZATION (1951) *Technical Report Series No. 42.* Expert Committee on Mental Health, Alcoholism Sub-Committee.
- WORLD HEALTH ORGANIZATION (1952) *Expert Committee on Mental Health, Alcoholism Sub-Committee, Second Report.*
- WORLD HEALTH ORGANIZATION (1954) *Expert Committee on Alcohol. Technical Report Series No. 84.*
- YATES, A.J. (1962) *Frustration and Conflict.* Methuen & Co. Ltd., London.
- ZAVYALOV, A.V. (1963) Potentiation of the apomorphine effect by zinc or copper sulphate in the treatment of chronic alcoholism. *Med. Inst. Chita, U.S.S.R.* (Cited in *Excerpta Medica, Section VIII, Vol. 16 (7001).*)

Alcoholism: special techniques of therapy

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Alcoholism: special techniques of therapy

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The battle against alcoholism is being fought either by treating the underlying disturbance which generated the need for escape through alcohol, or by tackling the habit of uncontrollable drinking

Today, alcoholism with its medical, psychological, economic and sociological implications, is recognized as an urgent problem. The United States, with an estimated five million alcoholics, ranks alcoholism as the fourth greatest public health problem after cancer, heart disease and mental illness. In the United Kingdom Alcoholics Anonymous puts the number of alcoholics at a tenth of this; assuming the figure to be accurate, alcoholism ranks as the country's third most serious disease in terms of numbers affected. Whereas the American Medical Association has had a programme for the treatment of alcoholics under way for some years, in the United Kingdom a tendency to regard the disease with a degree of indifference belies the urgency of the problem. Although there are signs that this unfortunate situation is improving, the number of hospital units making a positive response to the treatment of the alcoholics is too small for the size of the problem. In the United Kingdom, a good deal of the therapeutic help given towards the rehabilitation of the alcoholic is still left to the voluntary organization Alcoholics Anonymous.

England and Wales, with 1,100 alcoholics per 100,000 population aged 20 years and over, were last but one in a list of eleven countries ranked according to prevalence of alcoholism by Dr R. Popham, the Canadian expert on the Alcoholism Addiction Research Foundation. Italy with 700 per 100,000 was last. This contrasts sharply with France, another wine-drinking country, first on the list with 5,200 per 100,000. However, while such figures show the extent of the problem at an international level, the conclusion drawn from them may be misleading—a point made recently by Dr A. Fouquet of France. Drawing attention to the problem of defining alcoholism, he pointed out that problem drinking as it is known in France does not approach the pattern of loss-of-control drinking familiar in Anglo-Saxon countries.

Since the problem touches on such aspects of our social organization as medicine, sociology, psychology, economics and religion, definitions tend to vary with the agency making it. The alcoholic himself is no help since his definitions will not usually include his own case. Perhaps the most acceptable definition, if only by virtue of the frequency with which



it is quoted, is that given by the World Health Organization Alcoholism Sub-Committee. "Alcoholics are those excessive drinkers whose dependence upon alcohol has attained such a degree that it shows a noticeable mental disturbance or an interference with their bodily and mental health, their interpersonal relations, and their smooth social and economic functioning; or who show the prodromal signs (early signs prior to specific symptoms) of such developments."

The effects of alcohol

To appreciate the outward signs of developing alcoholism, the ways in which alcohol can influence the behaviour of the individual must be understood. Much of our knowledge in this respect has been obtained from experiments with animals. For example, W. C. Stebbins and his associates at Hamilton College in the United States have studied the effect of alcohol upon the reaction time in the white rat. They trained the animals to discriminate between light and dark. Once the animals had learned this simple discrimination, they were trained to press a lever within three seconds after the onset of light in order to get a food reward; they did not receive a reward for any responses made after the lapse of three seconds. The light was turned off for thirty seconds between presentations. After the animals' lever pressing response had settled down to about 1.5 seconds from the onset of the light, the experimenters injected them with two to three millilitres of a 20 per cent ethyl alcohol solution, alternating with injections of saline solution which acted as control in the measure of differences in reaction time. The results showed that while the alcohol injections had only a slight effect on the number of lever pressing responses, it significantly increased the time they took to react to the light.

These results have their parallel in human behaviour. The Quarterly Journal of Studies on Alcoholism, 1965, cited a report, by W. L. Spitler and H. Trubit, of an experiment demonstrating the effects of alcohol on driving. They found that with a blood alcohol concentration estimated by breath analysis at 0.03 per cent, one individual experienced a 30 per cent impairment of judgement of distance. Another sub-



CREATING an aversion to alcohol forms the basis of many kinds of treatment. In this case, a hypnotized man is told that he will experience the worst feeling he can imagine if he drinks from the glass of whisky offered to him

ject in the experiment with a blood alcohol concentration of 0.18 per cent experienced an over-all impairment of 20 per cent in all the tests, which included reaction time, bodily co-ordination and vision.

Of even greater significance to an understanding of the problem of alcoholism were the classical experiments of J. H. Masserman and K. S. Yum. They placed cats in a conflict arousing situation to produce an "experimental neurosis" in the animals. In this situation the cats showed a variety of behavioural disturbances, such as fear and panic reactions, restlessness and passivity, crouching, defecating, running away, violence, and so on. However, when the cats were given milk with alcohol in it, the neurosis disappeared, even though the cats remained in the conflict situation. Another investigator R. D. Myers, in a paper presented to the Eastern Psychological Association, New York, in 1960, has shown that rats will even learn to prefer a solution of alcohol and water to plain water if they are raised on the alcohol diet for a period of time providing the solution does not exceed a critical strength. Rats raised on a five per cent solution showed this preference for the mixture while rats raised on a 20 per cent solution showed a greater preference for plain water.

These last two experiments seem to offer parallels to an understanding of the development of alcoholism in a person who finds in alcohol relief from the stress and conflict of daily life and in the social drinker, whose 'taste' for alcoholic beverages may be in danger of pathological escalation. Thus the alcoholic drinks because it helps him to adjust to life, even after the falseness of this adjustment becomes apparent. He continues to drink although he realises that it will kill him eventually; he is at a point where he cannot go on living without it.

Explaining the cause

A number of speculative theories have been put forward to explain the cause of alcoholism. For example, it was once believed that factors could be transferred to offspring which predispose them to inebriety. However, although some babies have been born suffering from the effect of alcohol because

of the mother's continuous abuse of liquor during pregnancy, there is no sound evidence in support of this explanation. A modified view of the hereditary theory is that the alcoholic inherits a constitutional metabolic anomaly which leaves an abnormally low tolerance of alcohol. Another view regards alcoholism as a moral inadequacy, a religious or ethical problem. Not long ago the *Quarterly Journal of Studies in Alcohol* published an article with the thesis that one significant factor in the cause of the disease is the vain attempt of the person to satisfy deep religious needs by means of alcohol.

A more recent paper in the same *Journal* found that studies of psychoses indicate that members of the psychotic and alcoholic population are far more likely to have experienced the early loss of parents than those in the population at large. This is more frequently a factor in the development of alcoholism in females than males, although differences in social class may also influence the relationship between parental loss and alcoholism. The late Sir David Henderson and R. D. Gillespie have summarized the position in the statements that alcoholism is usually, if not always, a symptom either of instability of personality or of overt nervous or mental illness, and hereditary factors may frequently play a vital part in determining the individual soil in which the symptom develops.

Symptoms of the disease

Despite the subjective sense of stimulation that most drinkers feel, alcohol is in fact a depressant, with an anaesthetic effect on the central nervous system. The feeling of stimulation and euphoria results from a release of the lower nervous centres from the control of the higher brain centres. This frees the individual from his inhibitions and self-criticism becomes blurred. With the enhanced sense of well-being and confidence comes an impairment in the ability to assess risk, and to handle situations calling for discriminating judgment. As the level of alcohol in the blood increases, its depressing action spreads to brain centres controlling motor co-ordination, causing speech to blur and lack of control over limbs. The concentration of alcohol in the blood needed to produce these effects varies from person to person and is influenced at any one time by such conditions as physical health, body weight, the amount of food in the stomach, speed of drinking, the strength and kind of drink. For instance, the British Medical Association states that a concentration of 50 mg. of alcohol per 100 ml. is the highest blood alcohol concentration entirely consistent with safe driving. Given the right conditions, three single whiskies or 1.5 pints of beer can produce this concentration.

The breakdown of inhibitions by alcohol frequently has serious anti-social results: sexual promiscuity, aggressive behaviour, assaults, dangerous driving leading to road accidents, loss of work efficiency resulting from hangovers. In the United States absenteeism through chronic alcoholism has been estimated to cost management more than 1,000 million dollars a year. Emotional outbursts resulting from the effects of alcohol contribute to many homicidal and sexual acts and are a significant factor in a proportion of attempted suicide, as many as thirty per cent, as shown by an investigation in a Scottish city some time ago. Alcohol is also responsible for alcoholic psychoses and organic damage to the nervous system.

The signs that drinking has become pathological include

short periods of amnesia, although the subject is apparently aware of events at the time, surreptitious drinking and pre-occupation with the available supply of alcohol, the consistent use of alcohol to relieve tension, guilt feelings about drinking along with loss of the ability to control the amount drunk.

In the medical view, the alcoholic's failure to maintain a proper diet accounts for many of the physical symptoms he experiences. Some of the complications arising from chronic alcoholism include delirium tremens (D.T.s), alcohol induced hallucinations and illusions, morbid jealousy or delusions of infidelity, and Korsakoff psychosis. This latter is regarded as the most disruptive of the effects of chronic alcoholism; the most conspicuous feature is a disorder of memory, particularly memory for recent events even over a brief span of a few minutes. This memory disturbance leads the individual to confabulate in order to fill the gaps in retention.

Treatment and results

Most clinicians, whatever their type of therapy, believe that the outcome of treatment is poor if the alcoholic himself does not accept the seriousness of his problem, recognise the need for professional help and is not strongly motivated to recover. Thus, one of the main objectives of treatment is to persuade the alcoholic that he is an alcoholic and needs help.

To date, the majority of alcoholics admitted to psychiatric hospitals are experiencing what is termed "first aid management". This implies a short stay, sometimes for a matter of a few days, and discharge without adequate after-care. Recently Dr Maelor Vallance, in Glasgow, analyzed the inadequacy of the "first-aid" approach. He found that over a two-year follow-up period of one year's admission to the psychiatric unit of a general hospital, 30 per cent of the group suffered deterioration and while 25 per cent were assessed as improved, less than 5 per cent abstained for the whole of the two year period.

Before starting any form of therapy the physical and medical aspects of the person's condition must be cared for and withdrawal from alcohol and de-intoxication accomplished. In the majority of cases alcohol can be completely withdrawn as soon as the individual is admitted to hospital, without incurring the catastrophic psychological and physical reactions common to the more clear-cut addictions.

There are currently a number of specialized approaches to the treatment of alcoholism. These aim either at treating the underlying disturbance which generated the need for escape through alcohol or at tackling the habit of uncontrollable drinking. The methods that are receiving most attention in terms of published reports in professional journals are Group Psychotherapy, "Antabuse" Therapy and Aversion Conditioning Therapy. Hypnotherapy and abreactive techniques are other methods of management, while Alcoholics Anonymous plays a major role in rehabilitative work outside the hospital framework.

Group therapy and Alcoholics Anonymous: As its name implies, group therapy treats two or more persons at the same time. Because of the pressure of time on the busy clinician and the demand on hospital beds, group therapy has certain advantages in that it helps the greatest number in a limited time. Moreover, a skilled therapist can achieve results comparable to other forms of specialised treatment. Of course group psychotherapy is becoming established in the

study and treatment of a whole range of "social disorders".

Alcoholics Anonymous (A.A.) being made up of alcoholics is in a sense also a form of supportive group psychotherapy. Among the essentials to the A.A. programme is the recognition by the alcoholic that he needs help and is ready to ask for it. A.A. has been successful in 50 to 75 per cent of the cases approaching the organization for help. The fact that A.A. accepts only individuals who want to be cured is undoubtedly a strong influence on the high proportion of success achieved. However, the A.A. has no way of dealing with the various psychological and physical complications arising from chronic alcoholism such as vitamin deficiency, alcohol psychoses and the crippling diseases of the brain, liver and other organs.

"Antabuse" therapy: Some years ago a group of scientists, in Denmark, accidentally discovered that the organic compound tetraethylthiuram disulfide has the peculiar property of rendering anyone who took it highly sensitive to alcohol. The possibility of using it as a deterrent in controlling the compulsive use of alcohol was intensively investigated in various research centres. Since the late forties and early fifties it has developed into one of the major approaches to the management of alcoholism.

The drug "Antabuse" or disulfiram acts by interfering with the metabolism of alcohol by causing an increase in the level of toxic acetaldehyde in the body. Acetaldehyde is one of the products linked to the breakdown of alcohol in the body. The reaction which develops on drinking alcohol is characterised by intense flushing of the face and neck, sweating, headache, palpitation, nausea and even vomiting.

Because the patient takes on the prescribed dosage of the drug voluntarily its value as a deterrent in the management of alcoholism relies on the individual's co-operation and willingness to stick to the prescription over a long period of time. The patient can at any time stop taking his tablets and is thereby free to return to the bottle.

However, the results of a study by Dr Ruth Fox of the Alcoholic Treatment Centre of New York City, show that the drug can make a substantial contribution to the treatment of alcoholics. In this study two groups of alcoholics both received equivalent psychotherapy and social rehabilitation. In addition one group was put on a maintenance dose of "Antabuse" while the members of the other group—the control—received none. Results were evaluated over a period of two and a half years. One of the findings of this study was that in the 35 to 49 age group, 64 per cent of those who were given "Antabuse" were rated as socially recovered by the criteria of recovery set by the investigator, compared with only 36 per cent of the control group.

Conditioned aversion therapy: this method is based on the classical findings of I. P. Pavlov, the nineteenth century Russian physiologist. The events important in Pavlovian or classical conditioning are:

- (1) the conditioned stimulus (CS),
- (2) the unconditioned stimulus (UCS),
- (3) the appropriate response (R),

and to be effective, they must follow in this sequence. In a Pavlovian animal experiment, for example, the repeated association of a tone (CS), say, followed closely by the presentation of food (UCS) which induces salivation will finish up by the dog salivating at the sound of the tone alone, even though food is no longer presented. Conditioned aversion therapy tries to overcome the alcoholic habit by associ-

**THE MEAN NUMBER OF SESSIONS, RANGE AND AVERAGE TIME PER
SUBJECT ON RELAXATION - AVERSION THERAPY**

Categories	No. of Cases	Progressive Relaxation			Aversion Conditioning		
		Mean Sessions	Range	Mean (Hr)	Mean Sessions	Range	Mean (Hr)
Female	27	11.48	6-28	3.77	12.60	*3-22	1.18
Male	10	14.70	9-23	4.65	19.30	10-36	1.66
Both	37	12.08	6-28	4.00	14.43	3-36	1.32

* *One subject opted out of treatment after three sessions.*

ating nausea and revulsion with the sight, taste and smell of alcoholic beverages. Apomorphine, a drug with a strong emetic effect, induces nausea and vomiting when injected into the patient to be treated. As nausea develops the individual is given the alcoholic beverage to drink. The aim is that the nausea and disgust (R) produced by apomorphine (UCS) will become attached to the alcohol (CS) with the effect of inducing an aversion to alcohol. This aversion to alcohol may be termed a conditioned response (CR).

F. Lemere and W. L. Voegtlin, working at the Shadel Sanatorium in Seattle, Washington, were early pioneers of the apomorphine based aversion treatment. A follow-up survey published in 1950, of over 5,000 alcoholics treated at Shadel, claimed an over-all abstinence of 51 per cent for the period covered by the survey, over 10 years.

More recently there has been an attempt to replace the drug as the UCS in aversion therapy by electric shock. This substitution has opened the way for clinical investigation and application of the substantial findings in experimental psychology to the solution of human problems of neuroses and behaviour disorders.

Under the sponsorship of the Medical Research Council, a systematic investigation of the value of the electrical aversion method is currently under way at the Crichton Royal Hospital in Scotland. This method has certain advantages over the apomorphine one. The technique being developed at the Crichton takes a wider view of the treatment of the alcoholic, for it aims at relieving the abnormal anxiety, which underlies the pathological use of alcohol, as well as creating an aversion to alcohol. Dr J. Thimann has made the point that some 70 per cent of alcoholics fall into the category of mild neurotic reactions, the remaining 30 per cent comprising psychotic and severe neurotic categories—an observation which contradicts the impression, popular among laymen as well as physicians, that the majority of alcoholics are psychopaths, expressing a rebellion against or at least an unwillingness to conform to the demands of society.

The learning and conditioning school of thought regards neurotic manifestations of all kinds essentially as bad habits. Anxiety is a basic component of the neuroses. Applied to the alcoholic, the thesis is that he discovers alcohol to be effective in reducing his anxiety, and by frequent repetition of the drinking response a habit is established. But this reduction in anxiety is only temporary: the habitual abuse of alcohol only

leads to chronic alcoholism where drinking instead of reducing neurotic anxiety and tension, finishes by causing problems in its own right, generating guilt and further anxiety.

Relaxation-aversion therapy: While aversion therapy of one sort or another may establish an aversion to alcohol, if only temporarily, the underlying anxiety is left untouched. For this reason, at the Crichton, where indicated, we first trained the alcoholic in a technique of relaxation developed many years ago by Edmund Jacobson in order to fight this anxiety. Jacobson observed that "a behavioural component of the neurosis is undesirable muscular tension. It seemed then that if a person could train his perceptions to recognize initial signs of the build up of excessive muscular tension and then train his muscles to relax voluntarily, he would have in his hands a tool for combating neurotic difficulties whatever their sources." The experience of progressive relaxation is a learning process and fits comfortably into the rationale behind modern theories of learning and conditioning.

A comparison of the results achieved by the combination of relaxation and electrical aversion conditioning suggests that it has the advantage over electrical aversion alone. Of the group so far treated by relaxation-aversion therapy and discharged for periods ranging from 12 to 24 months, 54 per cent have maintained their sobriety and have with one exception, abstained from alcohol for the period of the follow-up. Of a group treated by electrical aversion conditioning alone and followed-up for a shorter period to date, six months, 47 per cent were sober for the period of follow-up.

Future prospects

To control alcoholism takes more than the scientific refinement of a specialized form of therapy such as electrical aversion therapy. The effects of the disease extend far beyond the alcoholic himself but to his family and society at large. Thus the final success must rest on the combined efforts of a variety of agencies as well as an increasing support from the general public. The newly formed National Council on Alcoholism is providing much needed propaganda in respect of bringing the problem to the public's attention. In this way more and more alcoholics and their families can be helped in their social and economic readjustment after years of experiencing the disruptive consequences of chronic alcoholism.

FURTHER READING—see *opposite*

Authors

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Further reading

Alcoholism: special techniques of therapy

SOCIAL DRINKING: THE EFFECTS OF ALCOHOL. By G. Lolli (Collier, New York, 1961).
THE DISEASE CONCEPT OF ALCOHOLISM. By E. M. Jellinek (Rutgers University, New Jersey, 1960).

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THE APPLICATION OF BEHAVIOUR THERAPY TO THE TREATMENT OF ALCOHOLISM*

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Summary—The development of alcoholism is outlined in terms of the reinforcement theory of learning and a therapeutic method of relaxation combined with electrical aversion is described. Results at 6 and 12 months after discharge for alcoholics treated by this method are given. A control group on electrical aversion therapy alone, is in process of collection. It is pointed out, that the usefulness of the method of electrical aversion conditioning employed, should not restrict the need to work towards improved techniques based upon further attention to the general body of learning, theory and experimentation. The value of arousing the motivation of the alcoholic for treatment is discussed.

INTRODUCTION

THE investigation is designed to evaluate two approaches to therapy for alcoholism, within the framework of contemporary theories of learning and conditioning, and is oriented towards electrical aversion conditioning. In the first method, subjects are trained in progressive relaxation as described by Jacobson (1938) and Wolpe (1958) before going on to aversion training. The second method consists of the application of electrical aversion conditioning by itself. Both methods are at an early stage of development.

RATIONALE

1. *Alcoholism and the reinforcement theory of learning*

For the purpose of this study, the concepts of the reinforcement theory of learning as outlined by Kingham (1958) were used to account for the development of alcoholism. Alcoholism is defined as the result of a learned habit of uncontrollable drinking which is used by the individual in an effort to reduce a disturbance in psychological homeostasis. According to this definition a variety of emotional conditions may cause a disturbance of psychological homeostasis, for example: fear, anger, anxiety, the lack of assertive behaviour, even states of "intense happiness, elation, and the like".

Thus, at one end of the scale we encounter a learned habit, in the form of uncontrollable drinking which has become the dominant response in a hierarchy of possible responses to a disturbance of psychological homeostasis. The emergence of uncontrollable drinking as the dominant response is explained by the notion in reinforcement theory, put forward by Dollard and Miller (1950), that a sudden reduction in a strong drive acts as a reinforcement of behaviour leading to that reduction.

The view has been put forward that, "anyone can become an alcoholic, if he works at it hard enough". The humour in this statement belies the repeated disappointments of those workers in the field of alcoholism, who emphasize the disease concept of the phenom-

*Based upon a current project sponsored by the Medical Research Council.

enon, and are thus inclined to expect a precise description of the alcoholic personality and to search for a homogeneous aetiological pattern. In fact, we may be faced not only with a learned habit of uncontrollable drinking, but with a heterogeneous rag-bag of underlying processes as well.

At certain stages in the development of the habit, alcohol may be seen as fulfilling a drive-reducing function, and it may continue to do so. The habit, however, having been efficiently stamped-in, may become autonomous. This is akin to the "functional autonomy" construct of Allport (1961): "what at first was desired merely as a means to something else, comes at last from habit to be desired for its own sake". By this is meant that a stage is reached when alcohol has ceased to be related to the reduction of any identifiable disturbance of psychological homeostasis; rather, alcoholism, being by nature non-adjustive, will now begin to generate its own peculiar tensions and disturbances of personal well-being. This is clearly implied in those definitions of alcoholism that take into account its effect on the work, social, domestic and personal efficiency of the alcoholic. Of these, the definition put forward by the World Health Organisation (1952) is representative.

"Alcoholics are those excessive drinkers whose dependence upon alcohol has attained such a degree that it shows a noticeable mental disturbance or an interference with their bodily and mental health, their interpersonal relations, and their smooth social and economic functioning; or who show the prodromal signs of such developments. They, therefore, require treatment."

2. *The Rationale for the Combination of Relaxation-Aversion*

It may be objected on theoretical grounds that the combination of progressive relaxation and arousal from aversion conditioning is incompatible. The argument would be that relaxation reduces drive so that the subject approaches the conditioning situation in a state of low drive which must act against the setting up of a strong conditioned response to aversion training. As will be described later, there is an arousal stage built into the therapeutic process which acts as a bridge between the relaxation and aversion experiences. Also, the GSR is used to measure conditioning and the question of the influence of progressive relaxation on conditioning strength can be evaluated by comparing the GSR measure of conditioning between the relaxation and non-relaxation samples.

The rationale for combining the two methods in a single regime was anticipated by Eysenck (1960) and Metzner (1963), in discussions on the influence of treatment by aversion therapy. It is based upon the notion that, although the electrical aversive stimulus may evoke a response that is incompatible with the drinking behaviour to be extinguished, the result may not be a permanent solution. For there is the possibility that the conditioned aversion response may become extinguished while the drive, fear or anxiety, that motivates the drinking may remain unaltered. Therefore, aversion conditioning as Metzner (1963) argues, "is only likely to be successful either (a) where the alcohol no longer reduces any drive except what is self-generated, or (b) where the anxiety is simultaneously being extinguished by other methods".

If this is so, then ideally, cases should be allocated to one or other of the two groups comprising the sample on the strength of whether they manifest underlying anxiety or not. But this procedure would bias the sampling at this stage; the issue will be better clarified by experimental evidence.

THE THERAPEUTIC PROCESS

Where training in progressive relaxation forms part of the treatment process, the overall time in therapy is geared to last 3-4 weeks. However, the actual time in therapy is necessarily a function of the pace and need of each individual. Psychiatric and psychological assessments precede the subject's entry into therapy. For subjects in the relaxation-aversion group, the therapeutic programme consists of three phases:

1. Relaxation training.
2. Motivation arousal.
3. Aversion conditioning.

Relaxation training

As pointed out, relaxation training follows the method developed by Jacobson (1938). The following criteria for successful relaxation are adopted:

1. Observation of the regularity and force of respiration.
2. Visual observation of the flaccidity of muscle groups.
3. Increasingly slow response to interruption or failure to respond.
4. The sleepy-eyed appearance of the individual after successful relaxation.
5. The vacuous appearance of the eyes once the patient has learned to relax them while open, together with relaxation of the facial musculature which makes the face appear expressionless.
6. Slow emergence from the relaxation.

As the subject approaches this level of competence in relaxation he is taken off such drugs as tranquillizers and night sedation, and is encouraged to use relaxation to control tenseness and to induce natural sleep. When this is achieved, the patient experiences a growth in self-confidence as well as confidence in the therapy, which can only act to increase his motivation for treatment and cure. For example, a female patient, aged 51, had a history of drug dependence dating back "as far as I can remember . . . all my married life, at least". She had been married for 27 years. She was weaned from the night sedation habit and at the 12-months' follow-up reported sleeping naturally and well; but what is more important, she had ceased to worry about not being able to get off to sleep without her regular night-cap.

Each session of progressive relaxation lasted approximately 20 minutes. Other information concerning relaxation training is contained in Table 1.

TABLE 1. DATA SHOWING THE MEAN NUMBER OF SESSIONS, RANGE AND AVERAGE TIME PER SUBJECT ON RELAXATION-AVERSION THERAPY

Categories	No. of Cases	Progressive Relaxation			Aversion Conditioning		
		Mean Sessions	Range	Mean (Hr)	Mean Sessions	Range	Mean (Hr)
Male	27	11-48	6-28	3-77	12-60	*3-22	1-18
Female	10	14-70	9-23	4-65	19-30	10-36	1-66
Both	37	12-08	6-28	4-00	14-43	3-36	1-32

* One subject opted out of treatment after three sessions.

Motivation arousal

It is a common observation that most alcoholics are not highly motivated for treatment. Motivation-arousal is aimed at encouraging the individual to focus on the problem. This phase is introduced after the subject has achieved competence at relaxation and is, therefore, ready to go on to aversion training. The patient is instructed, while in the relaxed state, to think about his drinking and associated problems. After a few minutes he is brought out of his relaxed state and questioned about his conceptualization; the information he reports is fed back for further conceptual activity at the next session. The arousal sessions are conducted on a daily basis, and precede the first session of aversion training of the day. It has been observed that some individuals become agitated at this stage; they lose the calm of relaxation, burst into tears, and express a sense of shame, loss of self-esteem, drinking to escape, and other sentiments.

Aversion conditioning

Aversion conditioning is carried out in relation to the smell and taste of alcohol. The subject sits at one end of a table ($7 \times 4 \times 2.5$ ft) which is boxed in to form a roofless cubicle (in order to reduce extraneous visual stimulation). A one-way vision screen in front of the therapist, fitted into the framework of the cubicle, separates him from the subject; this is aimed at cutting down distracting verbal exchanges between the subject and therapist, as well as to isolate the subject from the operations of the therapist when manipulating the apparatus for delivering shock. The circuit of the shock unit is basically the same as the McGuire box (McGuire and Vallance, 1964) with a maximum output that is well beyond the tolerance of the subject. Shock is delivered by means of electrodes attached to the forearm of the subject. The position of the electrodes is varied from session to session.

The subject is supplied with a glass, water and alcohol of his choice, as far as is practicable, and is instructed to mix his drink according to taste. The majority of subjects are either gin or whisky drinkers and are usually amenable to a mixture of gin and water or whisky and water. He is told to sip his drink but not to swallow. A shock of increasing intensity, starting randomly above the threshold reported by him in a pre-aversion test to be unpleasant, is delivered contiguously with his sip on reinforced trials. He is instructed to spit out the alcohol (into a bowl provided) as a means to have the shock terminated. This is defined as an escape trial. Partial reinforcement on a schedule randomized around a 50 per cent ratio is used. On non-reinforced trials the alcohol is ejected in response to a green light signal from the therapist. In this escape formula it has been observed that the alcohol is ejected with the same eagerness on non-reinforced trials, even when the green light has ceased to be presented, as when a trial is reinforced by shock.

Conditioning sessions extend over 4-8 days. The whole relaxation-aversion programme takes up an average of 4.93 hr per subject. Further information on aversion training is given in Table 1.

SUBJECTS

There are less than twenty subjects in the aversion group, with a follow-up time of less than 6 months, at the time of preparing this report. Thus the subjects discussed here and the results reported refer to the relaxation-aversion group exclusively.

The sample contains thirty-seven subjects (twenty-seven males, ten females). The male group has a mean age of 47.37 years with a range of 34-67. For women the mean

age is 45.2, with a range of 36–56. These figures are not conspicuously different from those of a group of fifty-five other alcoholic admissions (forty males, fifteen females), admitted over approximately the same period of time as the experimental sample, to the unit where the research is being conducted. For this group the mean age for men was 48.8 years, ranging from 29–65; for women it was 46.53, with a range of 35–67.

Socio-economic class

Subjects are fee-paying patients belonging predominantly to socio-economic classes 1 and 2 of the Registrar-General's classification.

Intelligence

As assessed by the Progressive Matrices and Mill Hill Vocabulary Scales they tend to be at the 75th percentile or above for intelligence. The test battery in use for the investigation includes assessment of individual differences in the areas of introversion–extraversion, emotionality, level of aspiration, stress tolerance, logical and analytical thinking, as well as GSR and EEG data. An analysis of the data collected will be the subject of a separate report.

Chronicity

It is generally accepted that the alcoholic is a poor witness to the severity of his drinking. Two categories—excessive drinking and alcoholism—are used in an attempt to elucidate the severity and chronicity of drinking. An excessive drinker is defined by the psychiatrist associated with the project as “someone who drinks sufficiently heavily to introduce definite conflicts at a social, economic and domestic level”. Alcoholic drinking is defined as “drinking of an order which introduces social, economic and domestic disruption with behavioural and personality changes, in a setting of compulsive drinking, that is, loss of control”.

As reported by themselves, the mean duration of alcoholic drinking for men was 4.65 years. The psychiatrist's assessment of chronicity on the basis of the case history, including reports from sources other than the patient himself (his physician or a relative for instance) put the mean at 8.84 years. Four cases rated their chronicity at 10 years or more compared with fifteen cases with a 10 year minimum as rated by the psychiatrist.

For women, the mean chronicity on self-rating was 2.7 years, that given by the psychiatrist was 9.5. Four cases were assessed as having a chronicity of not less than 10 years, including one with a history of 18 years. None of this group rated the history of alcoholic drinking as long as 10 years.

Previous hospitalization

For men the mean number of previous hospital admissions was 1.3 with a range of 0–4; for women the mean was 1.7, ranging from 0–7.

Longest period of abstinence since alcoholic drinking

The average longest period of abstinence since the onset of alcoholic drinking was 11.87 months for men. Two cases in this group claim periods of abstinence of 5 and 8 years respectively. Without these two cases the mean for the rest of the group fell to 5.31

months, with a range of 0-9 months. For women the average longest period of abstinence was 4-18 months, ranging from 0-18 months. Many of these periods of sobriety followed previous hospital treatment for alcoholism and included the time spent in hospital.

Clinical features

The group consisted of cases with varying degrees of prognostic "goodness" as defined by such writers as Mindlin (1959), Glatt (1964) and Vallance (1965), and on psychiatric classification would be seen to contain cases in the neurotic, psychopathic and organic reaction (including epilepsy) diagnostic groupings.

Cases are not specially selected for the investigation; all cases that are made available are accepted. At the same time the experience with one subject who presented with Korsakoff syndrome, and who was unable to learn and retain the sequence of operations involved in aversion training, indicates that subjects with serious organic syndromes may not benefit from conditioning therapy. They are probably better studied as a special group in order to verify their conditionability and response to aversion therapy.

EVALUATING THE EFFECT OF THERAPY

While the single necessary criterion for evaluating the effect of aversion therapy is that the alcoholic should regain sobriety, successful patients also tend to demonstrate general improvements after therapy, with readjustment in the areas of work efficiency, improved social relationships, domestic and sexual adjustment. These positive shifts in behavioural and social adjustment are frequently reflected in the individual's profile when retested on such items in the psychological battery as stress tolerance and emotionality. It is thought that the five criteria formulated by Knight (1941) for evaluating the effect of psychotherapy provide a useful framework within which to operate. They include:

1. Symptomatic improvement.
2. Increased productiveness.
3. Improved adjustment and pleasure in sex.
4. Improved interpersonal relationships.
5. The ability to handle ordinary psychological and reality stresses.

Of course, not all of these criteria are applicable to every case and emphasis must be placed on symptomatic improvement. Evaluation of the effect of therapy by these criteria is conducted on the basis of follow-up interviews, retest on the relevant items in the psychological battery, clinical assessment by the psychiatrist in charge of the case and independent reports from relatives and the patient's physician where necessary.

FOLLOW-UP

In order to accommodate the time-table of the research, the minimum follow-up period is set at 12 months. Subjects are requested to return to the hospital for interview at intervals of 1, 3, 6, 9 and 12 months. This is a flexible arrangement and some individuals are able to fit in more frequent visits. A high response to follow-up interviews has been obtained. This is particularly satisfying in view of the fact that the subjects are not usually resident within the area normally served by the hospital but, rather, are widely scattered throughout the country. Follow-up interviews supply a kind of after-care function. The importance of after-care in the rehabilitation of the alcoholic has been suitably emphasized by Glatt (1964).

RESULTS

Table 2 gives the breakdown of results for the thirty-seven subjects in the relaxation-aversion group at 6 months after discharge. Twenty-five of these are at the 12-months point or beyond. The results for this group are shown in Table 3.

TABLE 2. SIX MONTHS' FOLLOW-UP OF THIRTY-SEVEN CASES TREATED BY RELAXATION-AVERSION THERAPY

Outcome	Cases		Total	%
	Male	Female		
1. Sober	15	5*	20	54
2. Relapsed	9	5	14	38
3. No information or opted out of therapy	3	—	3	8
Total	27	10	37	100

* Includes one case relapsed, readmitted for further aversion training and has remained sober since.

TABLE 3. TWELVE MONTHS' FOLLOW-UP OF TWENTY-FIVE CASES TREATED BY RELAXATION-AVERSION THERAPY

Outcome	Cases		Total	%
	Male	Female		
1. Abstinent	8	5*	13	52
2. Relapsed	7	2	9	36
3. No information or opted out of therapy	3	—	3	12
Total	18	7	25	100

* Includes one case relapsed, readmitted for further aversion training and has remained sober since.

One of the fifteen male subjects reported as sober in Table 2 has been drinking in a controlled manner since discharge; because of this controlled sobriety the term "sober" is used in preference to the term "abstinent". In Table 3, where this subject does not appear, none of the thirteen subjects in this category has reported drinking or is known to be drinking. The relapsed groups contain subjects who have had further hospitalization for alcoholism since discharge and who have not rejoined the group for further aversion therapy, or those who have reverted to severe drinking.

These results do not invite complacency. It is felt that they can be improved upon with further systematisation of the therapeutic process. At the same time, they are not discouraging and may be said to stand in fair comparison with other follow-up reports.

A 2-year follow-up of fifty alcoholics by Davis, Sheppard and Myers (1956), treated on a Disulfiram regime, reported 36 per cent abstinent for most of the 2 years. On a 2-year

follow-up period of ninety-four patients treated by group psychotherapy, Glatt (1961, 1964) found that two-thirds of the group had either recovered (one-third) or improved (one-third) during the follow-up period. The great majority of Glatt's patients were middle-class, loss-of-control alcoholics (86 per cent) and resemble closely the sample in the present study. Vallance (1965) reported on the results of "first-aid" management of sixty-eight alcoholic admissions to a general hospital psychiatric department. On this regime 25 per cent were reported as improved in a 2-year follow-up period: less than 5 per cent were abstinent.

Of 100 relapsed alcoholics discussed by Glatt (1964) ninety-two relapsed within the first 6 months of discharge. This pattern of relapse, where the first 6 months after discharge are the most crucial, is borne out in the present study and can be inferred from a comparison of the results in Tables 2 and 3, where the percentages do not vary widely between 6 and 12 months after discharge.

DISCUSSION

In conditioning therapy for alcoholism we are interested in the class of stimuli that operate aversively to control behaviour. The kinds of aversive operations included in this class are conveniently classified by Lundin (1961) as: escape, avoidance, punishment and anxiety. Although in any chain of activity these four ways of controlling behaviour aversively may be interrelated, it is possible and useful to distinguish them for purposes of behavioural analysis.

In escape learning a response is strengthened by the removal of some stimulus. Experiments by Mowrer (1940) and Dinsmoor and Hughes (1956) among others, demonstrate the escape procedure and its effect. In avoidance conditioning, as demonstrated by Sidman (1960), a response is made in order to prevent the onset of some stimulus; while in the punishment contingency a response is followed by a stimulus which then acquires the effect of depressing the response on future occasions (Estes, 1944; Skinner, 1953). The aversive condition called anxiety operates where a neutral stimulus is followed by one that is aversive and the organism can do nothing to avoid or escape from the stimulus. Experiments by Estes and Skinner (1941), and Brady (1951) demonstrate the process.

The present technique of aversion conditioning

In the chain of activity making up the present technique of electrical aversion conditioning two paradigms may be distinguished. A behavioural component is evident in the one while the other relies upon arousal within the autonomic nervous system for demonstration of its effect. The first entails conditioned reinforcement of an escape operant, with the paradigm:

$$S_1 \longrightarrow S_2 \longrightarrow R_1$$

in which the S_1 is the neutral stimulus, in this context the smell-taste complex experienced in sipping the alcohol; S_2 is the primary aversive stimulus, the electric shock; and R_1 is the response that terminates the shock, that is, the act of spitting out the alcohol.

The second component of the method concerns the conditioning of an autonomic response. This response, or autonomic arousal, is measured by GSR. The GSR method employed and findings related to aversion to alcohol will be the subject of a separate report. An analysis of the whole sequence of activities involved in the present technique

will show that the acquisition of escape behaviour is contingent upon an initial process of classical conditioning.

By preventing or drastically reducing the absorption of alcohol into the system, the present method controls the depressing effect of alcohol upon conditioning. Another advantage is that a conditioning session may consist, theoretically, of any number of trials.

Improving the present technique

Some of the variables that are instrumental in the acquisition of a conditioned response and in strengthening resistance to extinction are already built into the present method. They include a random alternation of reinforced and non-reinforced trials. The value of this process in increasing the resistance to extinction has been demonstrated by Humphries (1939). McClelland and McGowan (1953) have demonstrated that variability in the amount of reinforcement during training enhances the resistance to extinction of a secondary reinforcer. As described above, the present method involves a randomly varied force of shock above the threshold reported to be unpleasant by the subject. At the same time, while the speed of response in escape training is a function of the force of the shock, the importance of shock is not necessarily in its force nor in the length of its duration but, as argued by Dinsmoor and Hughes (1956) in the fact of its occurrence.

While the present method as it stands has demonstrated its therapeutic possibilities, there is a need for continued experimentation into methods that will further facilitate the acquisition of a conditioned aversion response and reinforce its resistance to extinction. With this aim in view, further operations that would be instrumental to improvement in the present technique would include the following:

1. Breaking up the sensory modalities, that is, making separate processes of conditioning to the sight, smell and taste of alcohol. By so doing, conditioning procedures that would otherwise be difficult to apply may be introduced.
2. Making use of the technique of avoidance learning. Sidman (1960) has demonstrated the value of avoidance training; while Solomon and Brush (1953) and Feldman and MacCulloch (1965) have described the technique of anticipatory avoidance learning and outlined its advantages over other methods of aversion training. A modification of the present method of escape learning to include the acquisition of an avoidance response is under investigation currently. In addition to avoidance techniques, the extensive experimentation on the acquisition and resistance to extinction of a conditioned anxiety response by Brady (1951, 1955) and his associates seems, also, to have something to offer towards the development of better techniques of electrical aversion conditioning for the treatment of alcoholism.
3. The use of a central stimulant drug to facilitate the acquisition of conditioned behaviour (Eysenck, 1960). The drug Ritalin (methylphenidate) has been used on the periphery of the current research and has indicated its effectiveness in arousing the alcoholic's response to conditioning. A sub-group, comprising relapsed patients, is being collected on this technique.

But apart from improvements in the therapeutic techniques themselves, the patient's degree of involvement in his treatment will influence the effect of therapy in preventing relapse into further alcoholism. And while it may be the case that the alcoholic is reluctant to undertake therapy, this is not to say that he cannot be oriented to an active role in his

treatment. As far as is possible, then, the treatment process should entail some attempt to reinforce the desire to break the drinking habit. It has been noticed that the process of aversion training itself can trigger off this kind of positive response. An example is a male subject of thirty-seven years who was treated by relaxation-aversion therapy over 30 months ago (not included in the present series). After his third day in aversion training he summarized his attitude by commenting that up to that point in his hospitalization he had been doing his best to resist involving himself in treatment and was blind to the fact that we were doing what we could to help him. Up to this point arousal from aversion training had shown itself behaviourally in increased irritability and tension. From then on he became more communicative and friendlier in his relationship with the staff, including the therapist, and reported feeling considerably more at ease with himself and confident in the future. He is still abstinent.

In addition to systematic planning of the treatment programme, the patient's observations on his perception of the aversion experience can, conceivably, be of value in planning the way individuals are introduced to therapy and in overcoming their objections to undergoing aversion treatment.

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REFERENCES

- ALLPORT G. W. (1961) *Pattern and Growth in Personality*. Holt, Rinehart and Winston, New York.
- BRADY J. V. (1951) The effect of electro-convulsive shock on a conditioned emotional response: the permanency of effect. *J. comp. physiol. Psychol.* **44**, 507-511.
- BRADY J. V. (1955) Extinction of a conditioned "fear" response as a function of the reinforcement schedules of competing behaviour. *J. Psychol.* **40**, 25-34 (cited in Lundin, 1961).
- DAVIES D. L., SHEPPARD M. and MYERS E. (1956) The two year prognosis of fifty alcohol addicts after treatment in hospital. *Quart. J. Stud. Alc.* **17**, 485-502.
- DINSMOOR J. A. and HUGHES L. H. (1956) Training rats to press a bar to turn off shock. *J. comp. physiol. Psychol.* **49**, 235-238.
- DOLLARD J. and MILLER N. E. (1950) *Personality and Psychotherapy*. McGraw Hill Book Co. Inc., New York.
- ESTES W. K. and SKINNER B. F. (1941) Some quantitative properties of anxiety. *J. Exp. Psychol.* **29**, 390-400.
- ESTES W. K. (1944) An experimental study of punishment. *Psychol. Monogr.* **47**, 1-40.
- EYSENCK H. J. (1960) *Behaviour Therapy and the Neuroses*. Pergamon Press, London.
- FELDMAN M. P. and MACCULLOCH M. J. (1965) The application of anticipatory avoidance learning to the treatment of homosexuality: I, Theory, technique and preliminary results. *Behav. Res. Ther.* **2**, 165-184.
- GLATT M. M. (1961) Treatment results in an English mental hospital alcoholic unit. *Acta Psychiat. Scand.* **37**, 143-168 (cited in Vallance, 1965).
- GLATT M. M. (1964) The alcoholic unit and its contribution to management and prevention of alcoholism. In Report of the 10th European Institute on the Prevention and Treatment of Alcoholism, London Conference.
- HILGARD E. R. and MARQUIS D. G. (1961) *Conditioning and Learning*. (Revised by Kimble, G. A.). Methuen and Co. Ltd., London.
- HUMPHRIES L. G. (1939) The effect of random alternation of reinforcement on the acquisition and extinction of conditioned eyelid reactions. *J. exp. Psychol.* **25**, 141-158.
- JACOBSON E. (1938) *Progressive Relaxation*. University of Chicago Press, Chicago.
- KINGHAM R. J. (1958) Alcoholism and the reinforcement theory of learning. *Quart. J. Stud. Alc.* **19**, 320-330.
- KNIGHT R. P. (1941) Evaluation of the result of psychoanalytic therapy. *Amer. J. Psychiat.* **98**, 434.
- LUNDIN R. W. (1961) *Personality: an experimental approach*. The MacMillan Company, New York.

- MCCLELLAND D. C. and MCGOWAN D. R. (1953) The effect of variable food reinforcement on the strength of a secondary reward. *J. comp. physiol. Psychol.* **46**, 80-86.
- MCGUIRE R. J. and VALLANCE M. (1964) Aversion therapy by electric shock: a simple technique. *Brit. Med. J.* **i**, 151-153.
- METZNER RALPH (1963) Re-evaluation of Wolpe and Dollard/Millar. *Behav. Res. Ther.* **1**, 213-216.
- MINDLIN D. (1959) The characteristics of alcoholism as related to prediction of therapeutic outcome. *Quart. J. Stud. Alc.* **20**, 604-619.
- MOWRER O. H. (1940) An experimental analogue of "regression" with incidental observations of "reaction-formation". *J. abn. soc. Psychol.* **35**, 56-87.
- SHEFFIELD F. D. and TEMMER H. W. (1950) Relative resistance to extinction of escape training and avoidance training. *J. exp. Psychol.* **40**, 287-298. (Cited in Hilgard and Marquis, 1961).
- SIDMAN M. (1960) *Tactics of Scientific Research*. Basic Books Inc., New York.
- SKINNER B. F. (1953) *Science and Human Behaviour*. The MacMillan Company, New York.
- SOLOMON R. C. and BRUSH E. S. (1956) Experimentally derived conceptions of anxiety and aversion. In *Nebraska Symposium on Motivation* (Ed. M. R. Jones). University of Nebraska Press, Nebraska.
- VALLANCE MAELOR (1965) Alcoholism: A Two Year Follow-up Study. *Brit. J. Psychiat.* **111**, 348-356.
- WOLPE JOSEPH (1958) *Psychotherapy by Reciprocal Inhibition*. Stanford University Press, Stanford.