COGNITIVE AND SOCIAL EFFECTS VERSUS PHARMACOLOGICAL EFFECTS OF ALCOHOL CONSUMPTION ON LOCUS OF CONTROL AND DEPRESSION

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ABSTRACT

The present study investigated the effect of expectancy, alcohol consumption and social condition on the depressive behaviour and locus of control beliefs of male and female social drinkers. Using the Zung (1965) Self Rating Depression Inventory and the Collins (1974) Locus of Control Scale as the dependent variables, 2 x 2 x 2 x 2 (expectancy x alcohol consumption x social situation x sex) analyses of variance were computed on change scores. Alcohol enhanced ideational depression and females reported increased physiological depression. No further main, nor any interaction effects were significant for depression. Significant differences emerged on the four locus of control factors. Subjects who received alcohol became more internal on Factor 1 i.e., they perceived the world as more predictable. Subjects who received alcohol became more external on Factor 2 i.e., they perceived the world as less controllable. No significant main, nor interaction effects were yielded for Factor 3, the belief in a politically responsive/unresponsive world. It was concluded that this factor is unrelated to drinking behaviour. Two significant three-way interactions, (i) expectancy x alcohol x sex; (ii) expectancy x alcohol x social condition, were yielded on Factor 4, the belief in a just/unjust world. Additional support is provided for the distinctiveness of this sub-scale from the other Loc sub-scales. The importance of cognitive, gender and social factors in mediating behavioural change subsequent to drinking is underscored. Evidence suggests that Schachter's (1964) and Valins' (1966) extension of his theory may be complementary, rather than mutually exclusive. The superior utility of a multi-dimensional approach to locus of control is confirmed.

First the man takes a drink,
Then the drink takes a drink.
Then the drink takes the man.

Japanese Proverb

Alcohol, apart from the preoccupations it elicits in the public, occupies an exalted position in the eyes of the biomedical and more recently, psychological researcher. This substance, revered as a social lubricant and often an indispensible part of many a ritual, both religious and secular, has frequently been abused both by the layman, and in the laboratory.

Statistics relating to alcohol abuse have assumed alarmingly high proportions and studies of alcohol and its properties have proliferated. Unfortunately, however, until late, investigation in this area utilised a quasi-disease model of psychopathology which emphasises, almost to the point of exclusion of all else, the physiological and pharmacological properties of alcohol. Wilson (1978, p.1) acknowledges that alcohol is a potent drug and that biomedical analyses are vital to our fuller understanding of its effects, but laments that

> the inappropriate overextension of the biomedical model to psychological phenomena that cannot be reduced to the physical effects of alcohol has retarded the development of effective means for the assessment and treatment of alcohol abuse.

Implicit in the majority of previous research is the oversight of the fact that man is both a thinking and an acting being. These studies treat him as a constant. As early as 1956, Washburn had cautioned about

> a tendency to ignore the important social and psychological variables which help determine behavior in situations where alcohol is being used. Individuals ... show wide differences in behavior which can be explained only by incorporating psychological and social situational variables. [These] factors change the actual physiological effects of alcohol, because they can affect the physiological system in just as "real" a way as chemicals. (p.122)

Yet the cognitive context that influences drinking was ignored for some twenty years despite Washburne's (1956) caveat.

Studies investigating alcohol effects and alcoholic populations have typically utilised a post-hoc correlational design, extrapolating from this in order to conjecture about etiology and motivation, and frequently confusing cause and effect. In the light of the recently recognised importance of cognitive factors it would appear preferable, wherever possible, to undertake an experimental manipulation which takes cognizance of the contribution of these factors, together with the effects of alcohol. Such an approach might more clearly reveal the development of the particular problem at hand. simultaneously facilitating preparation of germane treatment packages.

Numerous studies in the areas of alcohol and alcoholism have attested to the primacy of social factors, namely that expectancy, rather than physiological and pharmacological factors, induces behavioural changes following alcohol consumption. Specifically, Marlatt, Demming and Reid (1973) demonstrated that expectancy about the alcoholic content of a drink can be the crucial determinant of subsequent behaviour, regardless of its pharmacological content. This lends support to Valins' (1966) extension of Schachter's (1964) theory - that actual physiological arousal or change might be unnecessary for behaviour to be influenced, provided the individual believes he is aroused.

What Marlatt et al. (1973) had in fact accomplished was to question the loss of control theory of drinking by proving that expectancy, rather than a physiological effect mediated by alcohol sustained subsequent continued drinking behaviour. Engle and Williams (1972) similarly found

that alcoholics' expectancies regarding the nature of their drinks were more important than actual drink content in determining subsequent craving and alcohol acquisition. Asp (1977) reached similar conclusions, however, his serious error in not controlling adequately for the various expectancies associated with the effect of both an alcoholic and a non-alcoholic beverage (Marlatt et al., 1973), renders his support suspect. Even more a deficiency in this instance, is the probability of the confounding of his results by his uncontrolled use of two different alcoholic types in two different experimental conditions. However, Asp's work extends Engle and Williams' (1972) conclusion to social drinkers, in that expectancy that a beverage was indeed alcoholic, was a significant predictor of drinking behaviour.

This expectancy effect has subsequently been conclusively demonstrated over a wide range of actual behaviours and personality dimensions. Lang, Goeckner, Adesso and Marlatt (1975) have shown that subjects who believed that they had consumed alcohol, were more aggressive than subjects who believed they had consumed a non-alcoholic beverage, regardless of the actual alcohol content of the mixture. Similar results have been obtained in the area of sexual arousal, where Wilson and Lawson (1976a) showed that male subjects who believed that they had consumed an alcoholic beverage, manifested significantly greater sexual arousal than those believing they had consumed only tonic water. In a partial replication and extension of this study, Briddell, Rim, Caddy, Krawitz, Sholis and Wunderlin (1978) assessed the effects of alcohol and expectancy on penile tumescence in response to audio tape recordings of normal heterosexual and deviant sexual (forcible rape) stimuli in male social drinkers. Expectancy, but not alcohol per se, significantly increased penile tumescence to both normal and deviant sexual stimuli.

Furthermore, belief in having consumed alcohol has been shown to produce a lowering of social anxiety and physiological arousal in male social drinkers (Wilson and Abrams, 1977). A similar study conducted on female social drinkers (Abrams and Wilson, 1978) similarly yielded an expectancy effect. However, extremely important was the fact that this was diametrically opposite to that produced in male subjects. Subjects who expected alcohol in this instance, showed significant elevations in physiological arousal and were rated as more anxious on global measures of non-verbal behaviour. A further instance of sex differences is manifest in Wilson and Lawson's (1976b) failure to replicate with female subjects, the expectancy effect of increased sexual arousal in response to erotic stimuli in males who believed that they had consumed a non-alcoholic drink (Wilson and Lawson, 1976a): Moreover, in contrast to the male study, alcohol consumption per se resulted in a significant decrease in sexual arousal at a low (< 40 mg%) blood alcohol level (BAL).

Further evidence strongly suggests that female drinkers differ from their male counterparts on several important dimensions (Beckman, 1975; Corrigan, 1974; Rosenbluth, Nathan and Lawson, 1977; Tracey and Nathan, 1976). Beckman (1975), for instance, cited studies indicating that women alcoholics reported they drank primarily to relax and forget their problems. Wilsnack (1974) suggested that major gratification for drinking was enhancement of feelings of womanliness. The above findings, while not conclusive, nevertheless emphasize that probable differences between male and female drinkers make it essential that women are not 'ignored or lumped together with men in both research and treatment efforts' (Beckman, 1975, p.797). The present study takes cognizance of this fact and

undertakes, in part, to compare the responses of male and female social drinkers under identical conditions.

In the light of the preceding discussion, Maisto, Lauermann and Adesso's (1977) statement that 'cognitive factors must be considered in any analysis of an alcoholic's drinking' (p.148) is not surprising. This conclusion is corroborated by the descriptive data provided by Ludwig and Stark (1974). Maisto et al.'s (1977) conclusion, however, must in view of the evidence be extended to encompass social drinkers as well. Wilson (1978) points out that as with other cognitive influences on behaviour (Mischel, 1968)

> cognitions concerning alcohol consumption may differ not only across individuals, depending on their respective social learning experiences with alcohol, but also across settings and at different times even in the same individual. (p.14)

It is with regard to 'settings' or social conditions that alcohol research has been especially deficient. Marlatt et al. (1973), however, recognised the need to extend their research to include drinking behaviour in groups. In such an extension, Asp (1977) concluded that drinking setting (group or individual) did not significantly affect the drinking behaviour of alcoholics or social drinkers. His findings as regards the alcoholics can be rejected however, on the grounds discussed previously. To recapitulate briefly, he based his results on the comparison of the behaviour of alcoholics in a treatment programme with those of alcoholics in the community. The former group expected to receive tonic and in fact received it, and the latter were told to expect alcohol but in fact received tonic. This, as is evident propagates a gross obfuscation of the results, by comparing two different groups in two different experimental conditions. One hesitates to accept the

conclusions of such a research study, but the results as regards the social drinkers do not appear to be similarly flawed. Pliner and Cappell (1974), however, demonstrated the differential consequences of consuming alcohol in isolation versus a group situation. Specifically, they showed that subjects who were intoxicated in groups responded to their pharmacological state as a change in affect and not as a set of physical symptoms. For subjects who drank alone the situation was reversed. In other words, 'the cognitive context represented by the social manipulation had clear consequences for the intoxicated experience' (p. 423). Pliner and Cappell (1974) however, are at pains to point out that the social manipulation was effective only to the extent that 'plasticity' was induced i.e., only when alcohol and not placebo, was consumed. This is in accordance with Schachter's (1964) theory. Recent research, however, as reviewed above, supports rather Valins' (1966) extension of Schachter's (1964) theory. Specifically, this suggests that actual physiological arousal or change (plasticity), might be unnecessary for behaviour to be influenced, provided the individual believes he is aroused. Pliner and Cappell's (1974) placebo manipulation fails to control for both the expectancies associated with the consumption of an alcoholic as well as with a non-alcoholic beverage (Marlatt, et al., 1973). They further omit an important detail from their report, namely the precise instructions (i.e. the expectancy set) given to the subject on being presented with the beverage. The study is further flawed in a number of respects. Secondly, in the combining of male and female data, which is inadmissible in the light of previous research (Beckman, 1975; Wilson, 1978) notwithstanding Pliner and Cappell's (1974) mention of the fact that a regrettably unspecified 'preliminary analysis revealed no consistent sex differences'. It is amusing to note at this juncture that sex

differences associated with alcohol research are noteworthy for their inconsistencies, rather than the obverse. Thirdly, the authors undertake a major revision of the scale administered at the pretest, in order to maximize its sensitivity on the post-test. This practice of altering an established measurement device in mid experiment in order to secure significant results, is questionable, as are the results obtained. On the basis of the pretest results it was concluded that the subjects were well matched in mood before any manipulations were applied. It is debatable, however, were the subjects to have been given the pretest using the revised, more sensitive scale, whether any differences in mood would have been apparent. Consequently, it is possible that differential changes in mood could be attributed to a statistical artifact. Fourthly, no time interval of note elapsed between pretest and post-test. It is always feasible, in these cases, that subjects may be predisposed to answer experimental questionnaires on the post-test in a manner consistent with their pretest responses, particularly so when their expectancies have not been adequately manipulated.

The present study, in a part replication, attempts a redress of these deficits.

This research project undertakes an extension of previous research, which has demonstrated the importance of cognitive and social factors with respect to alcohol consumption, in assessing the respective effects of these factors on Locus of Control (LOC) beliefs. Numerous studies have investigated the personality construct of perceived LOC (Rotter, 1966) with respect to drinking behaviour in alcoholics and social drinkers. To

a large extent the assumption underlying such research is that problem drinking represents a loss or lack of control over drinking (Jellinek, 1960). The primary measure of control employed in these studies has been Rotter's Internal-External (I-E) Locus of Control Scale (Rotter, 1966). Persons having an internal LOC according to scores on the I-E scale are described as perceiving personal events as contingent on their own behaviour. Persons having an external LOC are assumed to perceive the outcome of such events as beyond their personal control, being determined instead by such factors as fate, chance or powerful others. It is suggested that to someone having an external LOC, problem drinking might be viewed as an event external to his ability to set effective limits to his behaviour (O'Leary, Donovan and O'Leary, 1978).

A second factor suggesting the importance of LOC to drinking is the relationship between scores on the I-E scale and measures of psychopathology. Goss and Morosko (1970) and O'Leary, Donovan and Hague (1974) have found that alcoholics having an external LOC are more depressed, anxious and socially introverted according to the Minnesota Multiphasic Personality Inventory (MMPI) than are alcoholics having an internal LOC. Similar patterns of emotional distress have also been found to be associated with alcohol misuse (Whitelock, Overall and Patrick, 1971). While these findings provide suggestive hypotheses concerning the relationship between LOC and drinking, studies evaluating this proposition have been equivocal (Hinrichsen, 1976). Naditch (1975) for example, found in a large sample of males ranging from abstainers to problem drinkers, that the more a person drank, the more likely he was to have an external LOC according to the I-E scale. Nevertheless, Higgins & Marlatt (1975) found no relationship between external LOC and the amount of alcohol consumed by heavy drinkers during a taste-rating

task. Similarly, Weissbach, Vogler and Compton (1976) found no relationship between alcoholics' I-E scores and either pre-treatment or post-treatment drinking. In addition, studies directly investigating LOC orientation in alcoholics have yielded remarkably divergent results. Goss and Morosko (1970) concluded that alcoholics are more internally oriented than a comparison group (Rotter's normative sample). Similarly, DiStefano, Pryer and Garrison (1971), O'Leary, Donovan, Hague and Shea (1975), and Oziel, Obitz and Keyson (1972) showed that alcoholics were more internal than either Rotter's (1966) normative group or male non-alcoholics (Gozali and Sloan, 1971). Contradictory evidence is provided by Naditch's (1975) clearly demonstrated pattern of increasing externality with increased drinking, and Butts and Chotlos' (1973) conclusion that alcoholics are more external than non-alcoholics of the same socio-economic status. There is also some evidence which indicates that alcoholics and non-alcoholics do not differ on perceived LOC (Donovan and O'Leary, 1975; Donovan and O'Leary, 1978; O'Leary, Donovan, Cysewski and Chaney, 1977), but an experienced control (Tiffany, 1967). Weissbach et al. (1976) aptly review the available evidence:

> The findings reviewed above present a confusing picture: alcohol abusers are more external than non-abusers, more internal than a normative sample, or some alcohol abusers may be more external than normals while others cannot be distinguished from normals. (p.484)

Any conclusions drawn from such studies have an important bearing on the design and selection of treatment programmes for alcoholics. Recent research (Abramowitz, Abramowitz, Robock and Jackson, 1974; Balch and Ross, 1975; Ollendick and Murphy, 1977) has demonstrated the differential effectiveness of various types of treatment on patients who differ in control orientation. More specifically, studies have indicated that internally oriented non-alcoholics respond more favourably to less

structured therapy while more externally oriented patients fare better with a directive treatment approach (Friedman and Dies, 1974; Kilman and Howell, 1974). Obitz (1975), however, found that alcoholics, in general, have a reliable preference for directive rather than non-directive counselling techniques. Furthermore, it appears that control orientation amongst alcoholics may influence their choice of treatment (Obitz, 1978). In view of the importance of LOC orientation in regard to treatment and selection of such for alcoholics, therefore, some sense must be extracted from the maelstrom of conflicting data. Numerous errors and problems are manifest in the design of the above studies relating LOC to alcohol use and abuse. Analysis of these facilitates an appreciation of the reasons for the paradoxical results obtained and provides suggestions for a remedial course of action.

First and foremost amongst these problems is the ignoral of cognitive factors in these studies despite Maisto et al.'s(1977) warning that cognitive factors must be considered in an analysis of an alcoholic's drinking. Wilson (1977) also stresses the need for assessing the contribution of these factors to changes previously attributable to alcohol per se. The above research utilizes a post-hoc correlation type design which is clearly inadequate to isolate the demonstrated considerable role of cognitive factors in regard to alcohol consumption. In addition, identification of the respective influences of alcohol and the expectancies associated with its consumption on LOC orientation clearly has important implications for etiology and the development of alcoholism. Second, Goss and Morosko (1970), DiStefano et al. (1971), Oziel et al. (1972) and O'Leary et al. (1974) utilised an inadequate normative sample as a criterion referent. They compared the LOC scores of a largely middle-

alcoholic sample with those of Rotter's (1966) normative sample based on college students in 1966. As Weissbach et al. (1976) point out, the mean age of alcohol abusers in most studies that have used Rotter's norms is around forty, twice the mean age of the normative sample. They further cite evidence of a significant negative correlation between age and I-E scores among alcohol abusers which they speculate can be accounted for 'by greater feelings of internal control as age increases, at least to middle age' (p.486). This evidence suggests that a failure to control for age confounded the differences between groups. Rotter (1966) and Pryer and DiStefano (1977), also report correlations between LOC and age, thus strengthening this impression. Furthermore, Rotter (1966) mentions a correlation between LOC and social class which is a further possible source of confusion between the alcoholics and Rotter's (1966) norm sample. Controlling for this factor appears to bear out this point (Butts and Chotlos, 1975). Recently, Rose, Powell and Penick (1978) suggest that inconsistencies among studies of LOC with alcoholics are due in part to differences in the demographic characteristics of the samples employed. A further consideration in regard to use of Rotter's normative sample is the fact that the mean I-E score for college age subjects has increased (Rotter, 1975). Apart from the previously voiced reservations concerning the use of this normative sample a further concern is the knowledge that it represents an out-dated figure.

Third, it is highly probable that the low I-E scores exhibited by alcoholics may have been influenced by the treatment programme in which they were involved when tested (Nowcki and Hopper, 1974; Naditch, 1975). This possibility is supported by a series of investigations which have demonstrated therapeutically induced shifts towards an internal LOC among college counselling centre clients, college low achievers, and in a

variety of psychiatric patients and alcoholics (Chess, Meuringer and Goldstein, 1971; Felton and Briggs, 1972; Gillis and Jessor, 1970; Oziel and Obitz, 1975; Pierce, Schauble and Farkas, 1970).

Fourth, there is the possibility of error accounted for by social desirability, which is closely related to responses on the LOC scale (Cone, 1971; Robinson and Shaver, 1973; Weissbach et al., 1976). This raises the question of whether alcoholics are genuinely internals, or as Rotter (1975) postulates, since they have been told ad nauseam that they are wholly responsible for their own behaviour, they therefore endorse the internally keyed items.

Fifth, little research has compared alcoholics with social drinkers, limiting any inferences that can be drawn from alcoholic populations. One of the few studies that directly compares alcoholics with non-alcoholics (Gozali and Sloan, 1971) is unsatisfactory in that it utilised a normative sample composed of members of two unspecified church organisations. As Butts and Chotlos (1973) point out, some religious denominations predispose their members to a more external belief system than would be the case with a true normative sample. Corroboration may be found in the fact that the mean scores of the non-alcoholic subjects in Gozali and Sloan's (1971) study differ considerably from the normative data for subjects of the same age and social class presented by Goldstein and Reznikoff (1971), Lichtenstein and Keutzer (1967) and Murray and Stabler (1972).

Numerous studies, although largely flawed, have investigated LOC orientation in male alcoholics and non-alcoholics. Systematic examination of the phenomenon has yet to be undertaken with females. Butts and Chotlos (1973) and Gozali and Sloan (1971) sampled only male alcoholics.

Oziel et al. (1972) and Oziel and Goltz (1975) studied mostly male alcoholics, but failed to separate the sexes. The drawbacks of, and possible errors inherent in such an approach have been detailed (cf. Beckman, 1975; Wilson, 1978). Goss and Morosko (1970) separated their data by sex but limited their discussion to the male sample. Obitz and Swanson (1976) provide data indicating that women alcoholics were significantly more external than women non-alcoholics. However, the utility of this result which contrasts with studies showing that male alcoholics tend to be internally oriented, is questionable since Rotter's (1966) norms for women were used as a referent. The previous criticisms regarding the confounding of I-E score differences by age and social class are again encountered.

Failure to analyse female responses separately might well conceal any LOC differences since females in general tend to make more causal attributions to external circumstances than do males (Feather, 1969; Frieze, 1975; McArthur, 1976), and have been shown to be more externally oriented than males (McGinnies, Nordholm, Ward and Bhanthumnavin, 1974; Parsons and Schneider, 1974; Parsons, Schneider and Hansen, 1970; Reitz and Groff, 1972; Rotter, 1966). In addition, female activists have been shown to be more internal than non-activists (Sanger and Alker, 1972). It is thus obvious that future studies should separate male and female subjects and use a more appropriate normative score if desiring to measure whether female alcohol abusers/non-abusers are more external than male alcohol abusers/non-abusers.

Studies investigating alcohol and LOC beliefs are further inadequate as they utilise a unidimensional measure of LOC, typically the Rotter (1966) LOC scale which was developed as a general research instrument.

Rather than allowing for specific prediction in some specific situation such an achievement, political behaviour or drinking behaviour, it allows for a low degree of prediction of behaviour across a wide variety of potential situations (Rotter, 1975). Use of this scale as a specific predictor is therefore inappropriate. Furthermore, Rotter (1975) points out that the world has become more complex, i.e. there has been an increased *differentiation* in attitudes since the scale was constructed in 1966; separate LOC beliefs have thus emerged. LOC has now shown empirically to be a multidimensional construct (Abrahamson, Schludermann and Schludermann, 1973; Cherlin and Bourque, 1974; Collins, 1974; Gurin, Gurin, Lao and Beattie, 1969; Kaemmerer and Schwebel, 1976; Lao, 1970; Mirels, 1970; Nagelschmidt and Jacob, 1977; Parsons and Schneider, 1974; Reid and Ware, 1973; Ryckman, Posen and Kulberg, 1978; Viney, 1974; Woodburn and Bekker, 1975; Zuckerman and Gerbasi, 1977). Indeed studies show that while a unidimensional approach may yield little information, the specific factors do (e.g. Barling and Fincham, 1978). Furthermore, utilising Levenson's (1973) tridimensional locus of control scale, Caster and Parsons (1977) showed that external LOC 'by chance' predicted outcome in recidivists. That Lang et al. (1975) found no significant effects on LOC for alcohol per se, or for any expectancy beliefs, may be consonant with the finding that a unidimensional approach yields little information, since they made use of Rotter's (1966) I-E scale. Apparent evidence to the contrary is contained in Bolon and Barling's (1978) study in which they utilised Collins' (1974) LOC scale to assess the effects of expectancy and alcohol consumption on female social drinkers. Here no significant findings emerged on the four LOC subscales, while the manipulations yielded a significant result on the global LOC index,

(movement towards an internal control orientation brought about by the expectancy manipulation). Two major defects in the design of the study account for this unexpected finding. First, the authors failed to assess the efficacy of the expectancy manipulation in the study, with the result that contamination of the various treatment groups may have occurred, obscuring LOC differences in favour of a generalised differentiation which manifested in the global LOC score. It may be questioned in this light however, whether the global LOC score is in fact meaningful, since simple summation of the items involved in four conceptually distinct factors cannot logically provide a global index of LOC. Abramowitz (1973), Barling and Fincham (1978), Dixon, McKee and McCrae (1976) and Mirels (1970) have expressed reservations concerning the use of a global measure of LOC. They note that such a procedure may minimise the predictive utility as well as the meaningfulness of the construct.

Second, the authors failed to undertake a factor analysis of the scores on the Collins (1974) LOC scale. Instead they assumed that the factor profiles of a South African female student sample would approximate that of an American college sample. Current research shows this to be erroneous in that differences in LOC orientation have been found between citizens of different countries (Hsieh, Shybut and Lotsof, 1969; McGinnies et al., 1974; Parsons and Schneider, 1974; Reitz and Groff, 1972) and more specifically, between students in different countries (Malikiosi and Ryckman, 1977; Ryckman et al., 1978). Furthermore, Cherlin and Barque (1974), Duffy, Shiflett and Downey (1977), Kaemmerer and Schwabel (1976) and Nagelschmidt and Jakob (1977) have demonstrated that the factor structure of the Collins (1974) LOC scale is affected by

the experiences and characteristics of the population under study.

Depression is another phenomenon associated with both alcohol consumption and alcoholism. Kissin and Platz (1968) reported that about 80 per cent of alcoholics were significantly higher in anxiety and depression as measured respectively on the Cattell and Zung questionnaires, than a group of corresponding normals. Results such as these have led to depression's inclusion in the so-called 3 D's of alcoholism (dependence, denial, depression) in traditional discussions of the phenomenon (Blane, 1968). An association between alcoholism and depression is relatively undisputed (Gibson and Becker, 1973), but as Pitts and Winokur (1966) state:

> often the association between affective disorder and alcoholism in the individual case is quite complex and it is impossible to determine which, if either, is primary and which is symptomatic. (p.37).

The conflicting theoretical positions about this association are well documented in a recent review by Freed (1970). Briefly, some writers contend that a primary depression in alcoholics frequently underlies alcoholism (Thompson, 1959) while others argue that depression in alcoholics is largely 'a realistic response to their reality situation' (Bowen, 1956). Attempts at understanding the relationship of depression to alcoholism are frustrated by the differential effects of alcohol on different individuals. Kissin (1974, Vol. 3, p.12) notes that a significant, but by no means total proportion of individuals' experience an anti-depressant effect after alcohol ingestion. Explanations for this have typically assumed a physiological character. It is for instance, hypothesised that the anti-depressant effect of alcohol is due

to excitatory actions of small doses of alcohol; that it may be due to the demonstrated effect of alcohol of inhibiting the nerve ending uptake of norepinephrine (Feldstein, 1971) in which it resembles the tricyclic anti-depressants; or that this effect is due to acetaldehyde, the first breakdown product in the metabolism of alcohol, which is a mild MAO inhibitor (Towne, 1964).

The position is somewhat complicated by the finding that prolonged drinking is associated with ever-increasing levels of anxiety and depression amongst alcoholics in a laboratory situation (McNamee, Mello and Mendelson, 1968; Mendelson and LaDou, 1964; Nathan, O'Brien, 1971), and by the differential effects of low (decrease) versus high (increase, in depression) levels of alcohol consumption amongst social drinkers in a party atmosphere (Williams, 1966). The failure of alcohol to produce a unitary anti-depressant effect across all individuals and the marked degree of divergence across individuals in the behaviour it mediates, together with the recently demonstrated importance of cognitive factors in regard to alcohol consumption, suggests an alternative explanation to the purely physiological theories, namely that the expectancies associated with the effects of alcohol, rather than alcohol per se, mediate its effects on subsequent depressive and other behaviour at least at moderate dosages. Support for this position may be found in Wilson and Abrams (1977) conclusion:

> Rather than the therapeutic depressant pharmacological action of alcohol on the central nervous system that has always contributed greatly to the plausibility of the tension reduction theory, the present findings indicate that the person's learned expectations about the role of alcohol determine its effects, at least at low or moderate BAL. (p.205)

The capacity of a social manipulation to produce differential changes in affect (Pliner and Cappell, 1974), subsequent to alcohol consumption, provides further evidence supportive of the anticipated role of non-pharmacological factors in altering affect.

Cognitive factors have in recent years entrenched themselves in various theories of depression, not to mention theories of behaviour as a whole. Seligman's (1974) conceptualisation of depression as learned helplessness would appear particularly germane to an understanding of the relationship of depression, problem drinking and alcoholism. An extended analysis in this regard is beyond the scope of this dissertation. Suffice it to say that this view of depressive behaviour holds that depressive behaviour manifests when reinforcement is perceived to be non-contingent on response, essentially the perception of non-control (Blaney, 1977). This model of depression predicts a significant relationship between an external LOC and depression.

Miroto (1974) found, in apparent agreement, that the deficits associated with experimentally induced lack of control were more marked for external, than internal subjects. However, the relationship between LOC and depression is still controversial. Evans and Dinning (1978) and O'Leary et al. (1977) found no relation between LOC and level of depression utilising samples of psychiatric in-patients and alcoholic in-patients respectively. Abramowitz (1969), Berndt (1978, Calhoun, Cheney and Dawes (1974), Emmelkamp and Cohen-Kettenis (1975), O'Leary et al. (1974) and Prociuk, Breen and Lussier (1976), nevertheless, have demonstrated statistically significant, although often low order correlations, between I-E scores and self report measures of depression. Furthermore,

complications are introduced by the findings of Donovan and O'Leary (1978) and O'Leary et al. (1977) who concluded that alcoholics and non-alcoholics do not differ on perceived LOC but on experienced (Tiffany, 1967) control. They found that levels of depressive symptomatology in male alcoholics were related to experienced control over events rather than to generalised expectancies for internal vs. external LOC (Rotter, 1966). The above inconsistencies may be better understood when it is pointed out that the instrument utilised to assess LOC orientation in these instances was not optimal. The Rotter (1966) I-E scale, was in fact utilised and this scale has been shown to have largely historical value in the light of the recent evidence of the multidimensionality of LOC orientation. It has been suggested in fact, that instead of illuminating, it has obscured differences between groups (Barling and Fincham, 1978).

Recent research has also yielded evidence of sex differences in response to self report measures of depression. Steele (1978) found that normal female subjects report significantly greater depression than a corresponding group of males. Byrne, Boyle and Pritchard (1977) reach similar conclusions utilising an in-patient sample. The implication, once again, is that male and female samples should be tested separately and separate conclusions should be drawn for each group. Fortunately, with regard to depressive behaviour most studies have fulfilled these requirements. Studies utilising measures of the transitory mood aspect of depression and relating those findings to LOC need to exercise special care. Females show an inconsistent relationship between externality and simple depressed mood (Calhoun et al, 1974). The present study, therefore, although a partial replication of Pliner and

Cappell's (1974) study, was compelled to use a valid depression scale in place of a mood scale in order to establish the relationship between depressive behaviour and multidimensional LOC.

The assessment of both depression and LOC orientation in any particular treatment instance would be recommended in a combination of these has been shown to be a predictor of treatment outcomes (Casler and Parsons, 1977).

It is therefore hypothesised that cognitive, rather than pharmacological factors associated with alcohol consumption will effect a change in LOC orientation and depression. Differing behaviour change is expected for the solitary as opposed to the group conditions. Furthermore, male and female differences are anticipated.

METHOD

SUBJECTS

Ninety-six university students aged 17-29 years ($\underline{M}$ = 19,33, $\underline{SD}$ = 2,08), comprising 48 male undergraduate students aged 17-27 years ($\underline{M}$ = 19,94, $\underline{SD}$ = 2,09) and 48 female undergraduate students, aged 17-29 years ($\underline{M}$ = 18,73, $\underline{SD}$ = 1,91), volunteered to participate in the experiment. They were recruited through an advertisement in the local student newspaper. Each student had to satisfy the following criteria :

(i) that he/she had previously consumed alcohol

(ii) that he/she was a moderate social drinker

(iii) that he/she did not experience any medical, psychiatric or behavioural problems related to the consumption of alcohol

(iv) that he/she was willing, if necessary, to consume alcohol in the course of the experiment.

Token remuneration of R2 was offered, as well as a brief explanation of experimental method, particularly as pertaining to this study. Furthermore, each participant received a debriefing circular in which the experimental manipulations were revealed and clarified.

EXPERIMENTAL DESIGN

A completely randomised 2 x 2 x 2 x 2 factorial design with six subjects per cell was used. The independant variables were :

(i) expectancy (instructional set) - subjects were told that they would be receiving either an alcoholic or a non-alcoholic beverage and,

(ii) alcohol content - subjects received either an alcoholic beverage or a placebo. This design controls for the respective expectancies concerning the effects of alcohol and concerning the consumption of a non-alcoholic beverage (Marlatt et al., 1973).

(iii) sex - males (n = 48) and females (n = 48) were separated and subjected to identical experimental manipulations

(iv) social condition - half the subjects (n = 24), of each sex,

experienced the effects of alcohol in a group situation.

APPARATUS

Collins' (1974) revision of the Rotter LOC Scale, which consists of the Rotter (1966) 23 forced choice I-E scale items converted to 46 Likert Scale items, was used to assess LOC orientation. The items were scored in the standard Likert Scale Manner, from 1 to 5, with the higher scores reflecting externality.

The Zung (1965) Self Rating Depression Scale was used to assess level of depression. Apart from the fact that it is self administered and is a frequently used research tool, this scale was chosen because of its well established reliability and validity (Zung, 1965, 1967; Zung, Richards and Short, 1965; Blumenthal, 1975). A 5-point scale was used, instead of the usual 4-point scale. Higher scores, as in the original scale, reflect increasing depression.

PROCEDURE

Males and females were separated throughout the duration of the experiment. Prior to the two testing sessions in which the subjects were required to participate they were expected to complete a consent form stating that :

(i) the subject participated voluntarily

(ii) that he/she would endeavour to answer the questions truthfully and not discuss them afterwards

(iii) that he/she realised that the investigators would treat his/her responses in the strictest confidence, and were only interested in group trends and

(iv) that he/she acknowledged that during the course of the study, he/she may be required to consume alcohol (see Appendix A).

Upon arrival at the laboratory the subject was informed that the purpose of the experiment was to study the effects of alcohol on creativity. It was then explained that s(he) would be required to consume either an alcoholic or a non-alcoholic beverage and then perform a task which assessed creativity (Pliner and Cappell, 1974). Subjects were told that since a number of variables could affect creativity, it would be necessary to measure and control for the effects of these on creativity, during the course of the experiment..

During the pretest each subject was seated alone at a table in a 2 m x 1,5 m cubicle and accordingly administered the Collins (1974) LOC scale and the Zung (1965) Self Rating Depression Inventory.

The experimental manipulation (post-test) took place six weeks later under similar conditions. Subjects were asked to fast for five hours before, and to refrain from ingesting drugs or alcohol for twenty-four hours prior to their testing session. Subjects were informed that this procedure was necessary to standardise test conditions. On arrival subjects were weighed and reminded that the experiment was to assess the effects of alcohol on creativity. As stated previously, the sexes were separated at all stages. Half (n = 24) the subjects of each sex were to experience the effects of alcohol in isolation and the other half in a group situation. In addition to the above division, each subject was assigned to one of the four groups.

Group 1 : ($\underline{n}$ = 6) Expected, and received alcohol

Group 2 : ($\underline{n}$ = 6) Expected, and did not receive alcohol

Group 3 : ($\underline{n}$ = 6) Did not expect, but received alcohol

Group 4 : ($\underline{n}$ = 6) Did not expect, and did not receive alcohol.

After the weighing and briefing procedure the subjects were escorted to a cubicle by an aide wearing a white coat who was carrying a tray containing the ingredients for the subject's drink, and a styrofoam cup in which it was to be served. In the condition in which the subject was instructed that he was to receive an alcoholic beverage the tray contained a vodka bottle and a bottle of tonic water. The research assistant announced that the subject was in the 'experimental group', explaining that this meant that his/her drink consisted of vodka and tonic. He then proceeded to mix the drink according to a previously constructed dosage table in full view of the subject. In the actual alcohol content condition, both the vodka bottle and the tonic bottle contained an identical, previously mixed solution of ethanol and decarbonated water. However, in the condition in which the subject expected, but did not receive alcohol, both the vodka bottle and the tonic bottle contained decarbonated tonic water (Schweppes). In this case, the subject's cup had been smeared with alcohol (brandy) and three drops of brandy per cup had been added to enhance the placebo effect. This procedure was followed as previous research has shown that, despite the ingestion of small amounts of alcohol (0,08 g/kg more than the present quantity) the blood alcohol level of social drinkers remains at 0% (Wallgren and Barry, 1970).

In the condition in which the subject was told that s(he) was to drink a non-alcoholic beverage the tray contained only a tonic water bottle. The research assistant announced that the subject was in the 'control group' and explained that this meant that his drink consisted of tonic water only. The rationale given for the tonic water was as follows:

> In order to keep the experimental procedures constant for all subjects, it is necessary for control subjects to consume the same amount of fluid as subjects in the experimental group who drink an alcoholic beverage. In this way we can determine that alcohol, and not some other difference in the experimental procedure accounts for the results we obtain. (Wilson and Abrams, 1977, p.199)

In the 'did not expect, but receive alcohol' condition the tonic bottle contained the same solution of ethanol and tonic water as was given to the subjects in the 'expect alcohol receive alcohol' condition. In the control group (do not expect, do not receive alcohol) the tonic bottle contained only decarbonated tonic water. The aide was not aware of the actual content of the bottles, ensuring a double-blind drink administration procedure. This further enhanced experimental control.

For those who received an alcoholic mixture, the alcohol content of the beverage was 0,5 g of 96 per cent ethanol per kilogram body weight. This was mixed with tonic water in a 1:5 ratio. In addition three squirts of lime juice were added to all drinks in all conditions to further reduce taste acuity. The alcohol level used, the ratio of ethanol to tonic, and the drink administration procedure in general, were chosen on the basis of previous demonstrations of the success of such an expectancy manipulation (Wilson and Lawson, 1976a, 1976b).

The subject was asked to consume the drink in his/her private cubicle within 15 minutes, while simultaneously previewing the supposed experimental material, a sheet of 10 cartoons (see Appendix B) for which he/she would later be required to provide humorous captions (Pliner and Cappell, 1974). After this time period had elapsed, the subject was required to undergo a 'breathalyser' test. The 'breathalyser'[+] in this case, was a *fairly complicated-looking* apparatus with two large dials, one of which could be moved and set at any desired level ('adjusted according to your weight') by a potentiometer below it. The other dial was controlled by a hidden switch operated by the experimental assistant. The subject was required to take a deep breath and exhale into a mask which was attached to the machine, in effect merely protruding into an empty box. If the subject had been told his beverage was alcoholic, *regardless* of whether it was so or not, the assistant manipulated the switch so that the needle on the 'measuring' dial rose to a predetermined height. For those subjects who were told that they were to receive a non-alcoholic beverage, the assistant caused the needle to flicker momentarily and then return to zero. In each case, the researcher read aloud the results of this test and these were meticulously recorded in the subject's presence. When questioned post-experimentally none of the subjects expressed any doubt that the apparatus was anything other than a breathalyser.

After having undergone the 'breathalyser' test the subjects were led into a small lecture theatre where they all listened to the same

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+ The construction of this apparatus was necessitated by the fact that an actual breathalyser was unavailable. Its purpose was to enhance the experimental expectancy manipulation.

selection from a currently popular humorous recording for 10 minutes. They were told that the purpose of this was to stimulate creative thinking; in actual fact, the purpose was to facilitate the passage of time until blood alcohol levels peaked, and to allow them to adapt to the experimental setting (Pliner and Cappell, 1974). Subjects in the solitary condition returned to their cubicles after hearing the recording and were required to individually compose captions for the cartoons with which they had previously been supplied. Those in the group social situation remained in the lecture theatre and completed the captions by consensus in groups of three. Fifteen minutes were allowed for the 'creative' activity in both social conditions.

When the period of 'creative activity' was completed the subjects returned to the cubicles in which they had consumed their beverage and were required to complete both the Collins (1974) LOC scale and the Zung (1965) Depression Scale again, in the same order, as well as a post-experimental questionnaire (see Appendix C) in which they were asked to estimate the amount of alcohol they had consumed, as well as answering other questions relating to the perceived success of the experiment.

Forty minutes had elapsed between the time of commencement of the imbibing of the drink to the commencement of filling in the final test battery. This absorption period was motivated by Wallgren and Berry's (1970) observation that previous research had been especially deficient as a result of studying the effects of low doses of alcohol at too short an interval after drink administration. The commencement of measurement after 40 minutes is consistent with recent research procedures.

When subjects had completed the questionnaires a second time, they were thanked for their participation and paid. They were debriefed by circular (see Appendix D), sometime after the completion of the experiment.

STATISTICAL ANALYSIS

The significance level for all results was set at 0,05 per cent.

A principal components factor analysis with varimax rotation was conducted on the Collins (1974) LOC Scale data, although previous factor analyses have been reported for this scale (Collins, 1974; Duffy et al., 1977; Zuckerman and Gerbasi, 1977). However, the above studies made use of a different cultural population, notably, Americans, and multidimensional LOC has been demonstrated to yield different factors for different cultural populations (Nagelschmidt and Jakob, 1977; Ryckman, Posen and Kulberg, 1978). Furthermore, Duffy et al. (1977) and Kaemmerer and Schwebel (1976) have shown that the social milieu and differing experiences of subjects may exercise an influence over results obtained in a factor analytic study of the Collins (1974) LOC Scale. In addition to yielding four factors appreciably analogous to Collins' factors, Duffy et al's (1977) sample provided an additional factor, which they termed 'belief in the friendliness of the world'. This was attributed by the authors to be due to the specific nature of their sample, namely army reservists. Since many South African students may virtually be said to be army reservists due to their being required to render national service, often during their long summer vacation, cognizance was taken of Duffy et al's (1977) implicit caveat and a factor analytic study peculiar to the present population, was conducted.

Furthermore, Gorsuch (1974) demonstrated that in the interests of prediction, standardised scores should be utilised when dealing with a particular sample of subjects that were not included in the original factor analysis. Collins' (1974) factor analysis and the studies replicating his findings are thus limited in so far as generalisation since they make use of factor scores rather than standardised scores. A separate factor analysis of the Collins' (1974) LOC scale was thus necessitated.

The Zung (1965) Self Rating Depression Inventory was subjected to a factor analysis for similar reasons, viz., that the present sample differed from that on which Zung based his questionnaire, in that it was a non-clinical, South African student sample.

A principal component factor analysis with varimax rotation was therefore computed for both the Collins (1974) LOC scale and the Zung (1965) Depression Inventory. This particular rotation was selected (a) because it is orthogonal, and results in the factors being uncorrelated (Gorsuch, 1974) maximising their predictive qualities; (b) since it enhances the specificity of each factor through simplification of the columns in the factor analysis (Child, 1974; Kim, 1975). This is highly desirable in that the emergent factors become more specific predictors of ensuing behaviour.

In order to determine the significance of a factor, only those factors with an eigenvalue greater than unity, and which contributed approximately 10 per cent or more of the variance, were considered acceptable. The significance of any item loading on a particular factor was determined by the formula $3/\sqrt{N}$ (Mauer, 1976), which resulted in those items loading 0,31 and above, being accepted.

A Pearson product moment correlation was conducted on pretest scores for the Collins (1974) and Zung (1965) scales to determine their degree of relatedness, in view of the continuing controversy as to the relation of LOC to depression, particularly with regard to Seligman's Learned Helplessness theory of depression.

Finally, univariate 2 (Expect Alcohol, Yes/No) x 2 (Receive Alcohol, Yes/No) x 2 (Sex, Male/Female) x 2 (Social Condition, Isolation/Group) analyses of variance were computed on change scores (Overall and Woodward, 1975). Initially, a multivariate analysis of variance was considered mandatory because of an expected relationship between the various factors. However, on factor analysing the data, an orthogonal rotation was utilised which conceptually reduced the value of the relationship between factors to zero, precluding the use of a multivariate ANOVA.

RESULTS

LOC beliefs typically vary with age (Pryer and DiStefano, 1977; Rotter, 1966). Therefore, a Pearson product moment correlation was computed to assess the relationship in this instance. The correlations revealed that age was not significantly related to the dependent measures, accounting for less than four per cent of the common variance in all cases. It was therefore not held as a covariate.

A principal components factor analysis with varimax rotation on the Collins (1974) LOC Scale data yielded four acceptable factors (see Table 1). Analysis of the items resulted in nine items being accepted as constituting Factor 1, which on inspection of the items, was labelled 'belief in a predictable/unpredictable world'. Seven items contributed to the following factor, which, on inspection was labelled 'belief in a controllable/uncontrollable world'. Five items loaded on Factor 3 which was labelled 'belief in a politically responsive/unresponsive world'. Four items contributed to the fourth factor which was entitled 'belief in a just-unjust world'.

Three factors (Factors 1, 3, 4) with an eigenvalue greater than unity which emerged, were substantially similar to those in Collins' (1974) factor analytic study, and consequently were termed similarly for descriptive purposes.

Factor 1 was labelled 'belief in a predictable/unpredictable world'
Factor 2 was labelled 'belief in a controllable/uncontrollable world'
Factor 3 was labelled 'belief in a politically responsive/unresponsive world'

Table 1

Principal Components Factor Analysis with Varimax Rotation for Collins' (1974) *Locus of Control* Scale (N = 96)

Item No.	Factor 1	Factor 2	Factor 3	Factor 4	Communality
25	0,69	-0,03	-0,07	0,22	0,61
24	0,67	-0,03	0,21	-0,00	0,61
27	0,61	-0,09	-0,13	-0,04	0,54
28	0,57	0,05	0,19	-0,02	0,76
39	0,45	0,15	-0,10	-0,12	0,34
23	0,43	-0,23	0,11	0,09	0,51
14	0,38	0,14	0,23	0,04	0,53
46	0,37	0,01	0,18	-0,13	0,55
2	0,31	-0,01	-0,07	0,04	0,67
35	-0,00	0,78	-0,03	-0,06	0,69
31	0,05	0,69	0,09	0,03	0,62
34	-0,19	0,61	0,18	0,00	0,61
33	-0,03	0,47	0,39	0,18	0,77
38	0,2[illegible]	0,36	0,21	-0,28	0,58
1	-0,1[illegible]	0,32	0,13	-0,01	0,54
22	-0,08	-0,31	0,14	0,13	0,65
30	0,05	0,02	0,71	0,14	0,61
32	0,02	0,19	0,63	-0,07	0,55
37	-0,02	0,02	0,63	-0,01	0,48
36	-0,01	0,02	0,52	-0,02	0,59
33	-0,03	0,47	0,39	0,18	0,77
19	-0,19	-0,04	0,04	0,90	0,93
12	0,12	-0,01	0,04	0,53	0,58
13	0,09	0,00	0,05	0,48	0,32
17	0,27	-0,00	0,01	0,36	0,46
3	0,14	0,13	-0,11	0,22	0,42

Table 1 (Contd.)

Item No.	Factor				Communality
	1	2	3	4	
4	0,02	0,07	0,09	0,06	0,63
5	0,06	0,03	-0,02	-0,14	0,77
6	0,25	0,07	0,12	0,12	0,62
7	0,08	0,16	-0,10	0,01	0,57
8	0,08	0,09	0,01	0,09	0,54
9	0,12	0,03	-0,25	0,18	0,45
10	0,21	0,27	-0,21	-0,02	0,47
11	0,19	0,11	-0,14	-0,20	0,44
15	-0,03	-0,08	-0,09	0,11	0,59
16	0,09	-0,08	0,06	0,03	0,51
18	0,14	0,05	0,12	0,29	0,50
20	0,29	-0,15	-0,00	-0,12	0,38
21	-0,06	0,05	-0,02	0,15	0,57
26	0,29	0,08	-0,04	-0,04	0,69
29	0,09	-0,12	0,24	0,15	0,55
40	0,21	-0,01	0,05	0,02	0,58
41	-0,01	0,09	0,00	-0,08	0,66
42	-0,08	0,09	0,09	-0,07	0,74
43	0,10	0,08	-0,22	-0,06	0,62
44	0,09	0,03	-0,08	0,29	0,52
45	-0,10	0,06	-0,05	0,20	0,79
Eigenvalue	5,32	3,07	2,99	2,53	
% Variance	20,00	11,50	11,20	9,5	

Factor 4 was labelled 'belief in a just/unjust world'.

Factor 2 appeared attributable to the nature of the current sample. Presumably, South African students are highly concerned with matters of controllability/uncontrollability. Barling (1978) also found evidence of this factor, although with a sample of South African mothers.

A principal components factor analysis with varimax rotation was computed on the responses to the Zung (1965) Self Rating Depression Scale yielded 3 acceptable factors (see Table 2). Analysis led to five items being accepted as constituting the first factor which was termed 'Ideational depression'. Five items contributed to the next factor which was labelled 'Physiological depression'. Again, five items loaded on Factor 3 which was termed 'Behavioural depression'.

Table 2

Principal Components Factor Analysis with Varimax Rotation for Zung's (1965)

Self Rating Depression Scale

N = 96

Item No.	Factor			Communality
	1	2	3	
17	0,73	0,01	-0,04	0,68
11	0,68	0,11	0,09	0,72
16	0,65	-0,07	0,09	0,46
6	0,47	0,22	-0,29	0,37
14	0,33	0,08	0,31	0,56
5	0,11	0,55	0,04	0,56
9	0,04	0,49	0,07	0,44
8	0,05	0,37	0,16	0,18
7	-0,02	0,35	-0,17	0,18
13	-0,06	0,31	0,53	0,47
15	0,02	-0,12	0,83	0,76
13	-0,06	0,31	0,53	0,47
12	0,29	0,10	0,48	0,54
10	0,09	0,12	0,32	0,52
14	0,33	0,08	0,31	0,56
1	0,16	0,12	0,24	0,38
2	0,05	-0,12	-0,06	0,45
3	0,12	0,05	0,09	0,55
4	0,09	-0,11	0,07	0,23
18	0,24	-0,13	-0,00	0,55
19	-0,06	0,10	-0,02	0,68
20	0,19	-0,06	0,13	0,72
Eigenvalue	3,57	1,38	1,26	
% Variance	35,7	13,8	12,6	

A Pearson product moment correlation conducted between the pretest LOC and depression scores revealed the following correlations (see Table 3).

Table 3

Correlation of LOC factor subscale and total scores with depression subscale scores

LOC SCALES	DEPRESSION SCALES			
	FACTOR 1	FACTOR 2	FACTOR 3	TOTAL
FACTOR 1	-0,21+	0,02	0,01	-0,12
FACTOR 2	-0,00	-0,13	-0,02	-0,08
FACTOR 3	0,04	0,20+	0,18+	0,19+
FACTOR 4	-0,19+	0,12	0,02	-0,07
TOTAL	-0,11	-0,07	-0,05	-0,15

+ $p < 0,05$

From these results, it can be seen that although the total LOC and depression scores are unrelated, significant correlations are evident between LOC and depression factors and in one instance between a LOC factor and the total depressive score.

An analysis of variance conducted on alcohol estimates by expectancy, alcohol condition, sex and social condition yielded a highly significant main effect for expectancy or instructional set, (F (1,77) = 41,95; $p < 0,00$). Subjects who expected to receive alcohol, irrespective of whether they had received it or not, estimated the alcohol content of their beverage significantly higher (M = 1,75) than those subjects who did not expect to receive alcohol (M = 0,58). The expectancy manipulation can thus be seen to be successful.

Four, 2 (Expect Alcohol, Yes/NO) x 2 (Receive Alcohol, Yes/No) x 2 (Sex, Male/Female) x 2 (Social Condition, Isolation/Group) analyses of variance were computed on LOC factors. Change scores were used in all instances (Overall and Woodward, 1975). Full ANOVA tables are presented in Appendix E.

Locus of Control

The alcohol condition for Factor 1 (belief in a predictable/unpredictable world), was significant, (F (1,80) = 5,53; $p < 0,02$). Analysis of the mean scores indicates that the subjects who received alcohol became more internal (M = -1,19), while those subjects who did not receive alcohol became more external (M = 2,33). *Likewise*, the alcohol condition for Factor 2 (belief in a controllable/uncontrollable world) was significant, (F (1,80) = 5,90; $p < 0,02$). Analysis of the mean scores indicates that those subjects who received alcohol became more external (M = 0,75), while those subjects who did not receive alcohol became more internal (M = -1,33). No other significant main effects, nor interaction effects were yielded for either of these factors.

There were no significant main effects, nor interaction effects for Factor 3 (belief in a politically responsive/unresponsive world). It appears that these political beliefs were not significantly affected by the experimental manipulation.

There were no main effects for Factor 4 (belief in a just/unjust world). However, there were two significant three way interactions:

Expectancy x Alcohol Condition x Sex (F (1,80) = 6,21; $p < 0,02$)

Expectancy x Alcohol Condition x Social Condition (F (1,80)=5,49; $p < 0,02$)

These interactions are presented graphically in Figures 1 and 2 respectively.

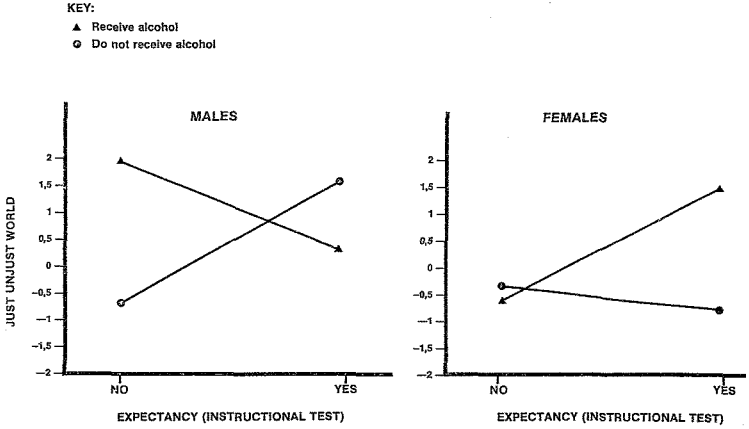

FIGURE 1: Graph of the means for the interaction of Expectancy, Alcohol Content & Sex

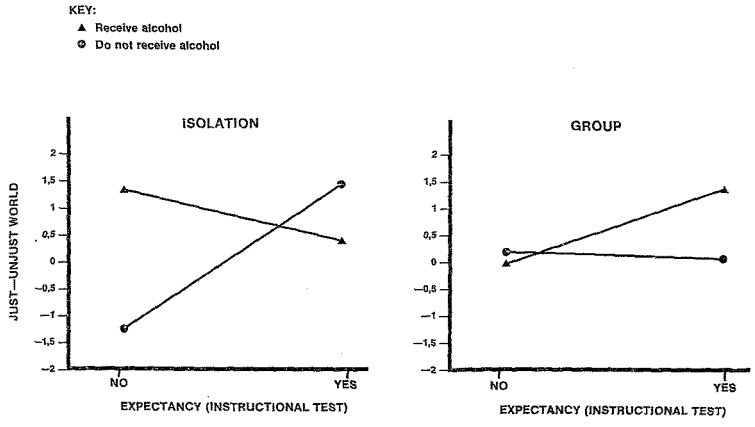

FIGURE 2: Graph of the means for the interaction of Expectancy, Alcohol Content & Social Condition

Figure 1 demonstrates important sex differences in response. Specifically, when male subjects expected alcohol and received it, they scored lower (i.e. towards the internal pole) than when they expected alcohol but did not receive it. Furthermore, when they did not expect alcohol but received it, they scored higher (towards the external pole) than when they did not expect alcohol and did not receive it. The response of females is largely the reverse of the above. When female subjects expected alcohol and received it, they scored higher (towards the external pole) than when they expected alcohol but did not receive it. Furthermore, when they did not expect alcohol, there appears to be little or no difference in their LOC belief, irrespective of whether they received alcohol or not. In addition, when females did not receive alcohol, irrespective of their expectations, there was virtually no difference in their perception of the justness of the world.

A previous study (Pliner and Cappell, 1974) has demonstrated the differential effects on behaviour induced by social condition, in conjunction with expectancy and alcohol consumption. Analysis of the interaction of expectancy by alcohol consumption by social condition (Figure 2) supports this conclusion. Specifically, when subjects in isolation expected alcohol but did not receive it, they scored higher (i.e. more externally) than subjects in the same social condition who expected alcohol and received it. In addition, when subjects in isolation, did not expect alcohol but received it, they scored higher (i.e. more externally) than subjects who did not expect alcohol and did not receive it.

Subjects who experienced the effects of alcohol in a group situation presented the reverse of those in the isolation condition. When these subjects expected alcohol and received it, they became more

external than those subjects in the same social condition who expected alcohol but did not receive it. Furthermore, when subjects did not expect alcohol they manifested no significant differences in their just world LOC belief, irrespective of whether they actually received alcohol or not. In the group situation, in addition, when subjects did not receive alcohol, irrespective of their expectancies, there was virtually no difference in their LOC belief.

Depression

A 2 (Expect Alcohol, Yes/No) x 2 (Receive Alcohol, Yes/No) x 2 (Sex, Male/Female) x 2 (Social Condition, Isolation/Group) was computed on change scores for factors of the Zung (1965) Depression Inventory.

For Factor 1 (ideational depression), there was a main effect for the alcohol condition ($\underline{F}$ (1,80) = 3,90; $p < 0,05$). Analysis of the mean scores indicates that subjects who received alcohol became more depressed ($\underline{M}$ = 0,79) than those who did not receive alcohol ($\underline{M}$ = -0,71). There were no other significant main effects nor interaction effects for this factor.

For Factor 2 (physiological depression) there was a significant main effect for the sex condition ($\underline{F}$ (1,80) = 5,09; $p < 0,03$). Analysis of the mean scores reveals that females were more depressed ($\underline{M}$ = 0,50) than males (M = -0,72) presumably as a result of the experimental manipulation. An analysis of covariance confirmed this. No other significant main effects, nor interaction effects were yielded for this factor.

For Factor 3 (behavioural depression), no significant main effects nor interaction effects were yielded.

DISCUSSION

Factor analysis of the Collins (1974) Locus of Control Scale yielded four factors, providing further evidence of the multi-dimensionality of the construct of Locus of Control. Three of the four factors emergent were substantially similar to those reported by Collins. However, a fourth factor, 'belief in the controllability/uncontrollability of the world', emerged peculiar to the present sample. This fact is supportive of the conclusions reached by Duffy et al. (1977), Kaemmerer and Schwebel (1976), and Ryckman et al. (1978); namely, that the cultural and social milieu and the consequent differing experiences of subjects exercise an influence over which LOC factors emerge in any particular study. It can further be seen that the LOC factor profiles of South African university students differ from those of American (Collins, 1974) and Rhodesian students (Ryckman et al., 1978). A significant 'controllability' factor was also found by Barling (1978) in a South African sample although this was comprised of mothers. It would appear that both South African students and mothers demonstrate appreciable concern over perceived controllability.

Factors yielded by an analysis of scores on the Zung (1965) Depression Inventory were also found to be different to those reported in other studies. In this case, however, large differences were to be expected since factor analytic studies of depression inventories have typically utilised psychiatric in-patients (e.g. Byrne et al., 1977).

An analysis of variance conducted on the depression factors yielded in this study, provided two statistically significant findings.

First, subjects who consumed alcohol became more ideationally depressed than those who did not consume alcohol. Controversy abounds whether alcohol has a depressant or an anti-depressant effect on humans. It appears to vary across individuals, and is typically explained in physiological terms. The present finding suggests however, that the depressive effect of alcohol manifests ideationally, rather than physiologically, at least at low alcohol doses. Second, there was a significant main effect for the sex condition on physiological depression. Females appeared to become more depressed than males. Analysis of pretest results, revealed that prior to the experimental manipulation, females had similarly reported greater physiologically related depression. This is supportive of studies showing that females typically report greater depression than do a corresponding group of males (Steele, 1978) and that females interpret physiological disturbance, particularly affective disturbance differently to males (Byrne et al., 1977). An analysis of covariance showed that the experimental manipulation produced increased physiological depression in females. As the primary purpose of the study was to investigate interaction effects these results will not be discussed further.

Significantly, expectancy of consuming an alcoholic beverage did not produce a change in subsequent depressive behaviour. This is significant in that previous research has demonstrated the primacy of cognitive factors in producing behavioural change over a wide range of behaviours (Marlatt et al., 1973; Wilson and Abrams, 1977). It is highly probable, however, that the Zung Self Rating Depression Inventory is too gross a measuring instrument to detect what may well be rather

subtle changes induced by cognitive factors in this instance. This seems to be borne out by the fact that no differences were found between subjects experiencing the effects of alcohol in different social conditions, although previous research, which unfortunately did not employ an optimal expectancy manipulation, has shown this to be the case (Pliner and Cappell, 1974).

With regard to the factor analysis of the Zung (1965) Depression Inventory it may well have been optimal to conduct separate factor analyses for each sex, since sex differences in factor profiles have been found in in-patients (Byrne, et al, 1977). This was not carried out for two reasons : First, the number of subjects was too small, when separated by sex, to ensure an accurate factor profile. Second, [illegible] the difficulty involved in comparing the factorial structures [illegible] instrument of scores derived from two different samples (Hamilt. 1967). While a method (Hamilton, 1967) is available, it is difficult to test the significance of differences between factors. Furthermore, the prime purpose of the study was not to compare factorial structures but to assess the relative roles of cognitive, pharmacological and social factors on behaviour.

The relationship between LOC and depression has long been controversial. It was suggested, in the introduction to this study, that the degree of relatedness between these two personality characteristics was obscured by the utilisation of an inadequate and outmoded LOC scale, typically the unidimensional Rotter (1966) LOC scale. The present results (see Table 3) support this contention. It can be seen that although total LOC is not related to depression, specific LOC factors most certainly are. Once again, the utility of a global LOC index may be questioned. It appears to entertain a serious deficiency as a

research tool, if it functions to obscure, instead of to reveal relationships and differences. Further studies investigating the relationship between LOC and depression should ensure that they utilise a multidimensional LOC scale. Recent studies have concluded that experienced control, rather than perceived control factors, are related to depressive behaviour (Donovan and O'Leary, 1978; O'Leary et al., 1977). The present study indicates that specific perceived control factors are related to depressive behaviour and it is suggested that a combination of both perceived and experienced control might provide a more sound predictor of depressive behaviour. This would appear consonant with Seligman's (1974) Learned Helplessness theory of Depression, which holds that depressive behaviour manifests when reinforcement is perceived to be non-contingent on response, essentially a perception of non-control. It is possible that depressive behaviour initially is dependent upon actual experienced non-control. The distorted cognitions characteristic of depression (Beck, 1974) may ensure a generalisation of cognitions of helplessness to other life situations. The role of perceived LOC would appear to be especially important in instances of anticipatory helplessness, i.e. where there is no actual experience of non-control, but where one still perceives that one would be helpless in a particular situation.

The results of the present study differ considerably from those of the only other reported study to date (Bolon and Barling, 1978) of the relative effects of cognitive and pharmacological factors on LOC. This previous study, however, is seriously flawed in two respects rendering suspect the conclusions which may be drawn from it. First, the authors of the study failed to assess the efficacy of the expectancy manipulation with the result that there may have been a contamination of treatment groups. Second, the authors did not take cognizance of the

fact that LOC factor profiles differ across cultures (Nagelschmidt and Jakob, 1977; Ryckman et al., 1978). They used the factors reported by Collins (1974) for American college students. A related point is that standardised scores, rather than factor scores should be utilised when dealing with a particular sample of subjects that were not included in the original factor analysis (Gorsuch, 1974).

The authors of this study noted an inconsistency in the only significant result to emerge - that expectancy of receiving/not receiving alcohol produced a change towards the external control direction in the global LOC index only. They questioned the meaningfulness of the result since they point out, correctly, that simple summation of the items involved in four conceptually distinct factors, cannot logically provide a global index of LOC.

The present results appear more consistent with a multi-dimensional approach. Specific factors yield significance of the efficacy of the experimental manipulation while the global LOC index does not.

For Factor 1 and Factor 2 the only significant result to emerge was that of the effect of alcohol on LOC beliefs. Subjects who received alcohol became more internal on Factor 1 than subjects who did not receive alcohol. Specifically, these subjects perceived the world as becoming more predictable, having consumed alcohol. It is possible that through experience and cultural conditioning subjects have constructed a pattern of expected behaviour consequent upon imbibing alcohol. As such behaviour ensuing alcohol consumption is peculiarly predictable.

Subjects who received alcohol, however, also became more external on Factor 2 than subjects who did not receive alcohol. Specifically, these subjects perceived the world as becoming less controllable, subsequent to the intake of alcohol. This belief, it must be noted, is not incompatible with the belief that the world is perceived as more predictable after having consumed alcohol. It is perhaps rooted in the belief that the world will become less controllable that it becomes more predictable. In other words a subject may anticipate that after imbibing, motor disco-ordination and befuddled thinking may well ensue.

It is important to note at this point that the above changes in LOC are in opposite directions. It is highly probable that instances such as this cancel each other out within a unidimensional framework, contributing to the frequency of the reporting of no change in LOC orientation in various experiments. Change in opposite directions is not incompatible with a multidimensional approach. In fact, data such as this serves to underscore the greater predictive utility of a multidimensional conceptualisation of locus of control.

Factor 3 the 'belief in a politically responsive/unresponsive world' was not significantly affected by the experimental manipulation. It is possible that one's political beliefs are too entrenched to be manipulated. Social observation, outside of the experimental situation, suggests that the prime effect of alcohol and group situations on political beliefs is to enhance vociferousness. Furthermore, the socio-political control subscale has shown minimal usefulness in studies of alcoholism, personality traits (O'Leary, et al., 1976) or treatment outcomes (O'Leary, Donovan, Hague and Kinsella, 1975; O'Leary, Rohsenow and Donovan, 1976). In the light of the above results it may be suggested that politically keyed items may be omitted from a LOC scale

intended for drinking related research and treatment. A specific drinking related LOC scale (DRIE) has in fact been validated, which omits all reference to political beliefs (Donovan and O'Leary, 1978). That the politically responsive subscale provides no information potentially useful for therapy and treatment of problem drinkers, is supported by the work of Zuckerman and Gerbasi (1977a). They found that the politically responsive world factor was related only to (a) political efficacy and (b) Machiavellianism (among males only). They suggest further that the I-E scale should be based only on the difficult world and the predictable world items, of which additional items should be included. These items are relatively general in that they are related to most of the five scales (Skill-chance preference, an achievement test, a political efficacy test, the Mach V scale and a Just World scale). Zuckerman and Gerbasi (1977a, 1977b)and Zuckerman, Gerbasi and Marion (1977) further concluded that belief in a just world is relatively unrelated to and perhaps inconsistent with the concept of belief in internal control.+ It was suggested that inclusion of the just world items in the I-E scale weakens the predictive and explanatory power of the latter. The results of the present study provide indirect support for this position, in that the experimental manipulation induced vastly disparate change in the just world factor, as opposed to the three other subscales. Two, three-way interactions appeared on this factor: expectancy by alcohol content by sex; and expectancy by alcohol content by social condition. Analysis of the results in the case provides a clarification of the relative roles of cognitive,

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social and pharmacological factors in behaviour change and of the importance of sex differences in response to physiological plasticity, actual or believed.

It was found that when males expect alcohol, and receive it, they score significantly lower (more internally) than do males who expect alcohol but do not receive it. It may well be that a specific set of expectancies regarding the effects of alcohol are triggered by the expectancy of receiving alcohol. Actual consumption of alcohol may provide symptoms consistent with the expectations. The world is thus perceived as just. However, when alcohol is expected but not received, the expectations are not met, resulting in a perception of the world as unjust. The latter condition is consistent with Valins' (1966) extension of Schachter's theory, whereby actual physiological arousal is not necessary for behavioural change to ensue, provided the individual believes s(he) is aroused (and labels his state so). When males do not expect to receive alcohol but receive it they score higher (i.e. more externally) than do those who do not expect, and do not receive it. Again, those in the lattur condition experience a consistency. No anticipated arousal nor physiologically induced arousal is elicited. Those receiving alcohol and not expecting it experience a state of unexplained physiological plasticity. There is no apparent reason for this and an external attribution may be made to account for the belief that the world is unjust. Here, however, the explanation for behavioural change is to be found in Schachter's (1964) theory, in that actual physiological arousal is implicated.

Females under identical conditions present to a great extent the reverse of the behaviour exhibited by males. Needless to say, this has

important implications for further research and therapy. Specifically there appears to be a differential cognitive interpretation of physiological state. When female subjects expect alcohol and receive it, they score higher (i.e. more externally) than those who expect alcohol but do not receive it. This is the converse of the reaction of males under identical conditions. It is suggested that a cultural influence accounts for this fact. Females in the course of their upbringing are frequently cautioned against the dangers of consuming alcoholic beverages, with the underlying that these may cause them to relax their inhibitions and lose control of their behaviour. It is not inconceivable therefore, for an association to be constructed between alcohol intake and the perpetration of some unjust deed (perceived or actual) upon a female. It appears that physiological arousal together with expectation of receiving alcohol is necessary to produce this change in perception. Mere expectancy of receiving an alcoholic beverage in females it appears, is not sufficient to produce this effect. Plasticity seems necessary in this case, lending support to Schachter's (1964) theory. However, when females do not expect to receive an alcoholic beverage there is no difference in their perceived LOC irrespective of whether they receive alcohol or not. Expectancy, in this instance appears to suppress or supersede physiological plasticity. This is the apparent reverse of Valins' (1966) theory. Here, if an individual (female) believes she is not aroused notwithstanding physiological plasticity, behavioural change does not occur. When alcohol is not consumed, female subjects tend to show little difference in their LOC belief.

Differing social conditions, specifically isolated vs group experiencing of the effects of drinking, have been shown to produce

differential changes in behaviour (Pliner and Cappell, 1974). This study, however, failed to control adequately for the considerable role of cognitive factors (cf. Marlatt et al., 1973). The present study provides further evidence of the contribution of social factors to behaviour subsequent to alcohol consumption. Subjects in isolation differ markedly in their behaviour as opposed to subjects in a group situation. When these subjects (isolated) expect alcohol and receive it, they score lower (more internally) than subjects in the same condition who expect but do not receive alcohol. The former experience a consistency (see discussion of males) while the latter may experience an inconsistency due to their labelled state of arousal (Valins, 1966) not matching with their learned expectations associated with drinking. The world is thus perceived as unjust. Further when these subjects do not expect alcohol but receive it they score higher than those subjects who do not expect and do not receive alcohol. Again the latter experience a consistency while the former may make an external attribution to account for a state of unexplained physiological plascitity.

In addition, however, it must be noted that subjects who experience the effects of alcohol in isolation focus on physiological symptoms (Pliner and Cappell, 1974). The responses of the above subjects can be seen to be dependent on actual physiological and labelled physiological states. Subjects in the group condition exhibit the reverse behaviour, to a large extent, of subjects in isolation. When subjects in a group expect and receive alcohol they score higher (more externally) than subjects who expect, but do not receive alcohol. The reasons for this are not exactly clear. Perhaps rationalisations become transparent with the intake of alcohol or possibly rationalisations which ensure

the perception of the justice of a situation are not that simple to conceive with the retardant effect of alcohol. At any rate, anyone who has entered a public bar will readily admit that the common theme amongst the commiseration and recriminations, peculiar to these places, may be that of the perceived injustice of the world. It appears, however, that physiological arousal, together with the expectation of receiving alcohol is necessary to produce this change in perception. Mere expectancy of receiving an alcoholic beverage is not sufficient to produce this effect in social situations. Physiological plasticity seems to be necessary in this case, providing support for Schachter's (1964) theory. However, when subjects in a group situation do not expect to receive an alcoholic beverage there is no difference in their perceived justice of the world, irrespective of whether they receive alcohol or not. Expectancy, here, appears to supersede physiological disturbance, a phenomenon, supportive of Valins' (1966) extension of Schachter's (1964) theory. When alcohol is not consumed, subjects in a group situation tend to show little difference in their LOC beliefs.

A number of important implications may be drawn from this study. First, cognitive and social factors can be seen to exercise an important influence on drinking related behaviour. The interaction of these factors is complex and extends beyond the simple instructional effect demonstrated in previous research. It appears that Schachter's (1964) and Valins' (1966) extension of Schachter's theory may not be incompatible or mutually exclusive, but that both may in fact be acceptable under specific conditions. Inconsistencies in the application of these theories may be inherent in the fact that they are predicated on male subjects. This anticipates the next point. Male and female subjects

differ markedly in their behaviour subsequent to alcohol consumption/non-consumption and the manipulation of the expectancy of alcohol consumption. This is consistent with previous research (Abrams and Wilson, 1978; Wilson and Lawson, 1976). Further research should be especially alert to sex differences in response under identical conditions.

Third, a multidimensional approach to LOC is seen as far superior to the unidimensional approach, to the point of the latter being near obsolete. The predictive utility of the unidimensional approach is rendered questionable due to the demonstration of its tendency to suppress, rather than reveal differences. Fourth, the relationship between LOC and depression is shown to be most certainly significant, although not as simple as previous research might have led one to have believed.

The hypothesis that cognitive, rather than pharmacological factors associated with alcohol consumption will effect a change in LOC orientation cannot be accepted as it stands. It would appear rather, that both cognitive and pharmacological factors effect a change in LOC orientation, the relative contribution of each factor being determined by specific social conditions at hand, as well as by the sex of the subjects. The moderating action of the latter determinants is in accordance with their hypothesised role. The relative incapability of cognitive and social factors to effect any change in depressive behaviour is ascribed to the possibility that the grossness of the depression scale utilised, masked significant differences.

It must be emphasised that the inferences that may be drawn from this study are severely limited in that a college population of social

drinkers constituted the sample. Further research with alcoholics is mandatory if implications are to be drawn for treatment and if sense is to be made of the conflicting studies on alcoholics, particularly LOC studies which compare alcoholics with non-alcoholics on redundant unidimensional scales, without taking into account the considerable contribution of cognitive and social factors. Furthermore, it is imperative that drinking related research recognises the importance of cognitive and social factors and effectively identifies their contributions to the drinking experience. With regard to social factors, the nature of the social situation is of the utmo importance and must be specified. The present results emerge from a situation which by its nature was geared to produce mirth (the humorous recording and the composing of captions for cartoons). This setting is obviously not conducive to depressive behaviour and affect and may also have exercised an effect on LOC beliefs. The study is deficient in this respect. A more appropriate setting for drinking, one which may provide the germane behavioural cues, should be utilised. A further shortcoming of the study is inherent in the small sample population which dictates the assignment of six subjects per cell. This has been pointed out to be the minimum number of subjects required for ANOVA (Kerlinger, 1964). A larger sample may have highlighted significant differences and have exposed subtle differences.

The term 'social drinkers' as employed in this and other studies is frequently too vague to be of use. Specific amounts consumed per week should be included. Furthermore, the behaviour of low to moderate to high social drinkers should be assessed and compared to isolate effectively the relative learning patterns and pharmacological changes associated with increasing alcohol consumption.

The present study confirms the importance of cognitive and social factors in mediating behavioural change. It suggests that Schachter's (1964) and Valins' (1966) extension of Schachter's (1964) theory may be complementary rather than mutually exclusive. Additional evidence is provided of the differential interpretation of physiological state by males and females, a fact that has important implications for therapy with problem drinkers.

Further support is provided for the superior utility of a multi-dimensional model of locus of control.

APPENDIX A

STATEMENT OF CONSENT

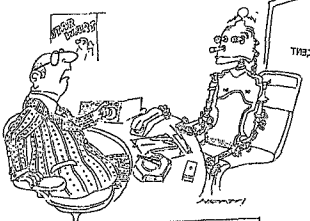
I understand that my responses to these questionnaires are confidential; and although my name appears on these forms, the authors of this research are interested only in group trends and not in my specific responses as an individual.

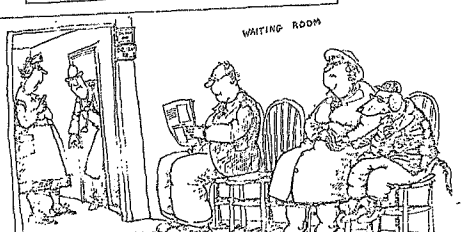
I accept that this is a serious scientific project and I will endeavour to answer the questionnaires truthfully and not to discuss them afterwards. Similarly, I understand that the authors of this project will respect the data gathered and communicate it only to other social scientists.

I acknowledge too, that during the course of this study I may be required to consume alcohol.

I have been informed that there is no requirement for me to complete these questionnaires and I hereby certify that I am doing so of my own free will.

.....

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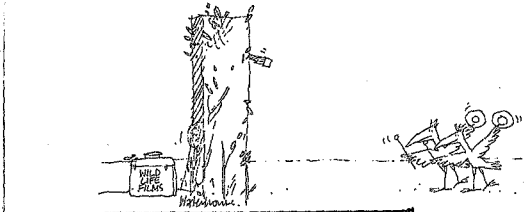
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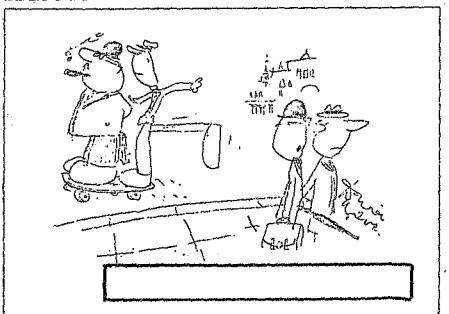

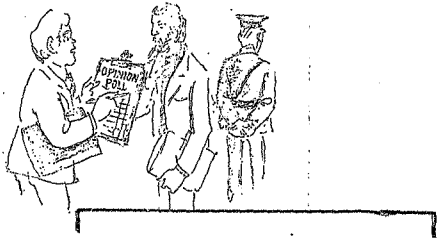
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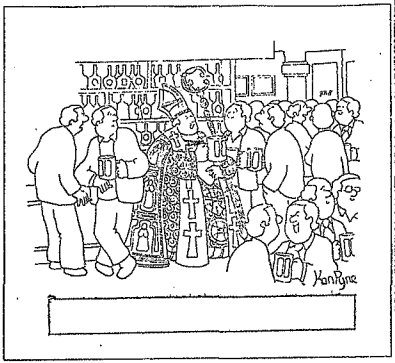
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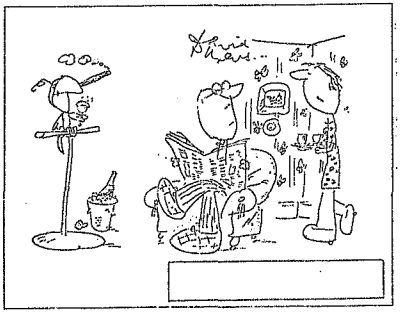
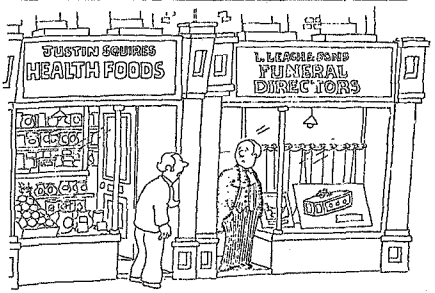
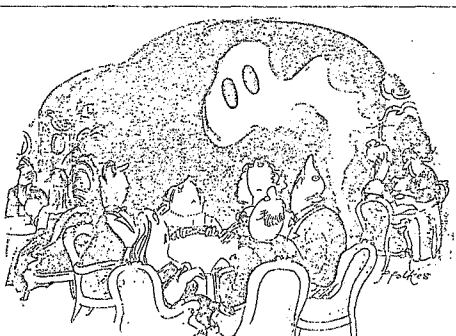



JUSTIN SQUIRES
HEALTH FOODS
L. LEACH & SONS
FUNERAL
DIRECTORS



APPENDIX C

POST-EXPERIMENTAL QUESTIONNAIRE

1. Estimate in oz. (ounces) the amount of alcohol you have consumed.

   0 0,25 0,50 0,75 1 1,25 1,50 1,75

   2 2,25 2,50 2,75 3 3.25 3,50 3.75 4

   1 oz. = 29,57 ml.

2. How do you think your drink affected your creative ability ?

   decrease _ _ _ _ _ _ _ increase

3. How did the drink affect your mood ?

   down _ _ _ _ _ _ _ up

4. To what extent do you feel that the study was successful in assessing creativity in the humour sphere ?

   successful _ _ _ _ _ _ unsuccessful

5. Do you feel that the two questionnaires adequately controlled for the various factors affecting creativity ?

   Yes/No

6. Which beverage was administered to you ?

   Alcoholic/Non-Alcoholic.

Thank you.

Appendix D

Debriefing sheet for "alcohol" study.

The "alcohol" study in actual fact had *nothing* to do with creativity. It was concerned with assessing the relative effects of alcohol intake, expectancy and social condition (isolation versus group) and sex, on depression and locus of control. Locus of control is a personality variable which provides a framework within which it may be explained the degree to which an individual perceives himself to be in control of his/her behaviour. There is a *continuum* of perceived control from internal to external orientation. An internally oriented person believes that he/she is responsible for what happens to him/ner. An externally oriented person attributes such events to luck or chance factors.

The locus of control scale used yielded 4 factors:

(i) belief in a predictable/unpredictable world
(ii) belief in a controllable/uncontrollable world
(iii) belief in a politically responsive/unresponsive world
(iv) belief in a just/unjust world.

The study can be described as a 2 (Expectancy, Yes/No) x 2 (Alcohol, Yes/No) x 2 (Social Condition, Isolation/Group) x 2 (Sex, Male/Female) factorial design. Subjects were led to believe they were/were not drinking alcohol, and of these some received alcohol and others only tonic. This provided 4 experimental conditions

(i) Expect and receive alcohol
(ii) Expect, but do not receive alcohol
(iii) Do not expect, but receive alcohol
(iv) Do not expect and do not receive alcohol.

In other words sometimes the Vodka bottle may only have contained tonic. The "breathalyser" was not a breathalyser as such. Readings were manipulated to enhance deception.

The whole "creativity experiment" was designed for two reasons

(i) to eliminate demand characteristics - that the subject will behave in the way the experimenter wants them to
(ii) to pass the time. Blood alcohol levels peak $\pm$ 40 minutes after consumption. You had 15 minutes to drink, 10 minutes of listening to the reading, 15 minutes creative activity. By the time you filled in the questionnaires for the second time, the effects of alcohol were maximized.

The results are too complicated to explain here. Briefly as expected, cognitive (expectancy) factors were very important in behavioural change, irrespective of alcohol consumption in some instances. Males and females differed in their responses and differing behaviour was found for the isolation as opposed to social groups (whether you made up captions together or alone, i.e. whether you experienced alcohol's effects in a group or singly).

Thanks very much for your participation.

Kevin Bolon

APPENDIX E - COMPLETE ANOVA TABLES

Change scores are used in all instances.

Ideational depression by Expectancy, Alcohol, Sex and Group

Source of Variation	Sum of squares	df	Mean Square	F	Signifance of F
Expectancy (A)	0,17	1	0,17	0,01	0,91
Alcohol (B)	54,0	1	54,0	3,90	0,05
Sex (C)	0,67	1	0,67	0,05	0,83
Group (D)	2,04	1	2,04	0,15	0,70
A x B	32,67	1	32,67	2,36	0,13
A x C	0,67	1	0,67	0,05	0,83
A x D	15,04	1	15,04	1,09	0,30
B x C	6,0	1	6,0	0,43	0,51
B x D	7,04	1	7,04	0,51	0,48
C x D	7,04	1	7,04	0,51	0,48
A x B x C	2,67	1	2,67	0,19	0,66
A x B x D	3,38	1	3,38	0,24	0,62
A x C x D	2,04	1	2,04	0,15	0,70
B x C x D	26,04	1	26,04	1,88	0,17
A x B x C x D	1,042	1	1,042	0,08	0,79

Physiological Depression by Expectancy, Alcohol, Sex and Group

Source of Variation	Sum of Squares	df	Mean Squares	F	Significance of F
Expectancy (A)	2,34	1	2,34	0,33	0,57
Alcohol (B)	3,76	1	3,76	0,52	0,47
Sex (C)	36,26	1	36,26	5,09	0,23
Group (D)	0,51	1	0,51	0,07	0,79
A x B	0,84	1	0,84	0,12	0,73
A x C	1,76	1	1,76	0,25	0,62
A x D	0,51	1	0,51	0,07	0,79
B x C	2,34	1	2,34	0,33	0,57
B x D	1,26	1	1,26	0,18	0,68
C x D	1,26	1	1,26	0,18	0,68
A x B x C	17,51	1	17,51	2,46	0,12
A x B x D	0,26	1	0,26	0,04	0,85
A x C x D	0,51	1	0,51	0,07	0,79
B x C x D	8,76	1	8,76	1,23	0,27
A x B x C x D	41,34	1	41,34	5,79	0,02

Appendix E contd.

Behavioural Depression by Expectancy, Alcohol, Sex, Group

Source of Variation	Sum of Squares	df	Mean Squares	F	Significance of F
Expectancy (A)	1,26	1	1,26	0,07	0,79
Alcohol (B)	14,26	1	14,26	0,82	0,37
Sex (C)	0,26	1	0,26	0,02	0,90
Group (D)	21,09	1	21,09	1,21	0,27
A x B	0,09	1	0,09	0,01	0,94
A x C	10,01	1	10,01	0,58	0,45
A x D	55,51	1	55,51	3,19	0,09
B x C	0,51	1	0,51	0,03	0,87
B x D	7,59	1	7,59	0,44	0,51
C x D	0,09	1	0,09	0,01	0,94
A x B x C	0,09	1	0,09	0,01	0,94
A x B x D	23,01	1	23,01	1,32	0,25
A x C x D	0,09	1	0,09	0,01	0,94
B x C x D	10,01	1	10,01	0,58	0,45
A x B x C x D	17,51	1	17,51	1,01	0,32

Belief in a Predictable /Unpredictable World by Expectancy, Alcohol, Sex, Group

Source of Variation	Sum of Squares	df	Mean Squares	F	Significance of F
Expectancy (A)	0,51	1	0,51	0,01	0,92
Alcohol (B)	297,51	1	297,51	5,23	0,02
Sex (C)	82,51	1	82,51	1,53	0,22
Group (D)	106,26	1	106,26	1,97	0,16
A x B	5,51	1	5,51	0,10	0,75
A x C	29,26	1	29,26	0,54	0,46
A x D	17,51	1	17,51	0,33	0,57
B x C	44,01	1	44,01	0,82	0,37
B x D	173,34	1	173,34	3,22	0,08
C x D	61,76	1	61,76	1,15	0,29
A x B x C	49,59	1	49,59	0,92	0,34
A x B x D	8,76	1	8,76	0,16	0,69
A x C x D	71,76	1	71,76	1,33	0,25
B x C x D	23,01	1	23,01	0,43	0,52
A x B x C x D	44,01	1	44,01	0,82	0,37

Appendix E contd.

Belief in a Controllable/Uncontrollable World by Expectancy, Alcohol, Sex, Group

Source of Variation	Sum of Squares	df	Mean Square	F	Significance of F
Expectancy (A)	45,38	1	45,38	2,57	0,11
Alcohol (B)	104,17	1	104,17	5,90	0,02
Sex (C)	16,67	1	16,67	0,94	0,33
Group (D)	8,17	1	8,17	0,46	0,49
A x B	7,04	1	7,04	0,39	0,53
A x C	26,04	1	26,04	1,48	0,23
A x D	15,04	1	15,04	0,85	0,36
B x C	8,17	1	8,17	0,46	0,49
B x D	0,67	1	0,67	0,04	0,85
C x D	13,5	1	13,5	0,77	0,38
A x B x C	18,38	1	18,38	1,04	0,31
A x B c D	7,04	1	7,04	0,39	0,53
A x C x D	5,04	1	5,04	0,29	0,59
B x C x D	20,17	1	20,17	1,14	0,29
A x B x C x D	30,37	1	30,37	1,72	0,19

Belief in a Politically Responsive/Unresponsive World by Expectancy, Alcohol, Sex, Group

Source of Variation	Sum of Squares	df	Mean Square	F	Significance of F
Expectancy (A)	40,04	1	40,04	0,74	0,39
Alcohol (B)	77,04	1	77,04	1,42	0,24
Sex (C)	77,04	1	77,04	1,29	0,26
Group (D)	48,17	1	48,17	0,89	0,35
A x B	0,00	1	0,00	0,00	1,0
A x C	4,17	1	4,17	0,08	0,78
A x D	0,38	1	0,38	0,01	0,93
B x C	32,67	1	32,67	0,60	0,44
B x D	51,04	1	51,04	0,94	0,34
C x D	77,04	1	77,04	1,42	0,24
A x B x C	40,04	1	40,04	0,74	0,39
A x B x D	0,00	1	0,00	0,00	1,0
A x C x D	24,0	1	24,0	0,44	0,51
B x C x D	1,5	1	1,5	0,03	0,87
A x B x C x D	155,04	1	155,04	2,85	0,09

Appendix E (contd)

Belief in a Just/Unjust World by *Expectancy, Alcohol, Sex, Group*

Source of *Variation*	Sum of *Squares*	df	Mean Square	F	Significance of F
Expectancy (A)	14,26	1	14,26	1,89	0,17
Alcohol (B)	10,01	1	10,01	1,33	0,25
Sex (C)	10,01	1	10,01	1,33	0,25
Group (D)	0,09	1	0,09	0,12	0,91
A x B	6,51	1	6,51	0,86	0,36
A x C	4,59	1	4,59	0,61	0,44
A x D	0,51	1	0,51	0,07	0,79
B x C	0,01	1	0,01	0,001	0,97
B x D	0,26	1	0,26	0,04	0,85
C x D	58,59	1	58,59	7,78	0,01
A x B x D	46,76	1	46,76	6,21	0,02
A x B x D	41,34	1	41,34	5,49	0,02
A x C x D	0,26	1	0,26	0,04	0,85
B x C x D	0,84	1	0,84	0,11	0,74
A x B x C x D	15,84	1	15,84	2,10	0,15

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