PERSONALITY CORRELATES OF FREQUENT MARIJUANA AND
ALCOHOL USE IN A COLLEGE MALE POPULATION

A DISSERTATION

Presented in Partial Fulfillment of the Requirements
for the Degree Doctor of Philosophy in the
Graduate School of the Ohio State University

By

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* * * * * *

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CHAPTER I

INTRODUCTION

There is today in our society an increasing concern being shown toward the use of various drugs. The focus of this concern tends to be drug use by young persons, particularly students. The extent of actual usage is apparently widespread and, in the case of some drugs (most notably the psychedelics), has increased dramatically over the last decade.

The primary objection to drug use would seem to be the belief that these drugs are at least potentially harmful, both physiologically and psychologically; Louria (1968) is one of the chief proponents of this point of view. This aspect of the topic will be explored in some detail in Chapter II.

There would, however, appear to be a much wider basis for such objections. On the socio-philosophical level Becker (1966) sees the drug experience in conflict with traditional American values, as perhaps epitomized in the "Protestant Work Ethic" of Max Weber. Pleasure for its own sake is frowned upon; pleasure is to be viewed as a means rather than an end. Moreover, it is especially objectionable that pleasure involve a loss of control.
It is therefore beneficial for society to protect the individuals within it by preventing them from taking these chemicals and losing control and eventually becoming "enslaved."

This has been a traditional view. Today, this viewpoint is being perhaps reinforced by a student subculture which differs considerably from the mainstream of American society. And some drugs, particularly the psychedelics, are seen as a major contributing factor to an ever-increasing and, to many, an undesirable, deviant, and dangerous life-style. This life-style is centered about young people and includes many students. The stereotypic values attributed to this subculture and frequently generalized to all students revolve about the core aspects of the Protestant Work Ethic: sexual behavior and work. More recently political activism could be added to the list (cf. Allen and West, 1968; Bromberg, 1968; Becker, 1966; Blum, 1969a, 1969b, 1969c).

The most common drugs in use by students today are alcohol and marijuana (variously spelled marihuana). Alcohol has been a major drug for students -- and the general population -- for many, many years. Marijuana has grown in popularity among students only within the last decade and still is not used nearly as much as alcohol. It appears that the objections to drug use noted
above are applied much more generally to marijuana than to alcohol. The relative impact of various drugs upon various student subcultures has not yet been delimited.

One objection to marijuana use to which some research has been devoted is that it is intimately related to criminal behavior. Both Bromberg and Rodgers (1946) and Andrade (1964) found no relationship between crime and marijuana usage. McGlothlin and West review the literature and conclude that "... virtually every serious investigator who has attempted to examine the question has found no relationship between marijuana and major crime" (1968, p.373). By way of comparison, Guze et al. (1968) found that the presence and extent of alcoholism were associated with rates markedly increased over those for the general population for felony convictions. Schuckit et al. (1970) also found alcoholism associated with antisocial traits and actual convictions.

Research with these drugs is very difficult because of varying and uncontrolled potency, differential reactivity of individual users, placebo effects, and -- in extra-laboratory studies -- a host of confounding environmental variables.

Nevertheless, the research on alcohol is voluminous; but
there is not a great deal directed to the average student user. Our understanding of the effects of alcohol, moreover, remains far from complete. Alcoholism, as such, is still a major problem in our society. Generally effective means of curing it are unknown, as are even generally effective means of insuring that addicts will remain abstinent.

Marijuana use is a much more recent phenomenon. The research on it is meagre at best. Its status as illegal makes experimentation more difficult. Not being subject to inspection and quality control, the potency of the drug varies from sample to sample. Sometimes marijuana is "cut" (mixed with other substances ranging from weeds to opium).

There is very little research comparing these two drugs. Some studies simply lump them together as aspects of youthful rebellion, symptoms of deeper "pathology," or harmless releasers of tension (e.g. Bromberg, 1968). More frequently, marijuana studies put alcohol users in the "general student population" category without determining the exact extent of alcohol usage. The research on these two drugs will be reviewed in detail in Chapter II.

It would seem worthwhile, as a first step toward unraveling cause-effect relationships between personality
variables and these drugs, to discover dimensions along which marijuana users and alcohol users can be differentiated. It is questionable, at least within a student population, whether these dimensions will lie in the area of the pathological. Mensh (1965), reviewing the literature on alcoholism, points out that "... no specific alcoholic personality adjustment pattern has been identified,..." King (1970b) found no significant differences on MMPI scores between marijuana users and non-users. Hardin (1971) found no significant difference between users and non-users on the Personal Integration scale of the Omnibus Personality Inventory.

One variable, however variously defined, that has been found to be associated with the use of marijuana is social introversion (Louria, 1968; Blum, 1969c; Bentley, 1968; Bromberg, 1968; Hardin, 1971). Eysenck (1960a) has elaborated a three-dimensional framework within which personality can be viewed, the dimensions being psychoticism, neuroticism, and introversion-extraversion. This last dimension is of special interest to the present study. It is measured by the Extraversion Scale of the Maudsley Personality Inventory (developed by Eysenck for this purpose), a scale correlating highly with the Social Introversion Scale of the MMPI (Eysenck and Eysenck, 1969). Eysenck postulates that intro-
version is characterized by a state of central excitation and extraversion by a state of central inhibition, although the items on the scale are behavioral in focus.

Eysenck has found that extraverts consume more alcohol than introverts (1963) and, furthermore, hypothesizes that extraverts will prefer depressant drugs, whereas introverts will prefer stimulants. Marijuana, although it shares certain sedative qualities with alcohol, has been found to be generally a stimulant. One might hypothesize, therefore, that a group of heavy marijuana users would be introverted compared to a group of heavy alcohol users.

It has been found that introverts show more manifest anxiety, whereas extraverts exhibit more repression (Erikson, 1954). This suggests that, if marijuana users are indeed introverted, they will also be more anxious than alcohol users. Kleckner (1968), employing the Cattell 16PF, found psychedelic drug users manifested more anxiety than non-users. Hardin (1971) found that regular users of marijuana scored lower (i.e., more anxious) on the Anxiety Level scale of the Omnibus Personality Inventory than non-users.

Another factor which appears relevant is the construct of locus of control as developed by Julian Rotter (1954, 1966). Lefcourt (1966), in reviewing the literature, suggests that
externality (as defined by the Internal-External Locus of Control scale), or a belief that the self is controlled by factors external to it, is intimately linked with a feeling of alienation and withdrawal from societal interaction. In several studies it has been found that chronic alcoholics score, curiously enough, in the internal direction of the I-E scale. It might be hypothesized that heavy student drinkers might well also score in the internal direction; and marijuana smokers, in the external direction.

Extraverts have been found to be under-reactive to stress (Davis, 1948; Venables, 1955) and to have less stimulus deprivation tolerance (Petrie, Collins, and Solomon, 1960). In the course of their work with perceptual isolation, Zuckerman et al. (1964) developed the Sensation-Seeking Scale, which measures variables such as preferences for extremes of sensation, the new and unfamiliar, adventure as opposed to security, and the like. Farley and Farley (1967) hypothesized on the basis of several related studies that there would be a significant positive correlation between the Sensation-Seeking Scale and Eysenck's Extraversion Scale. This was the case. Although one might expect marijuana users to be students who, as a group, seek out new and different experiences and sensations (Bentley, 1968; Blum, 1969b), there is evidence in the literature that, at least in the case of
heavy users, alcohol users will be more sensation-seeking than marijuana users.

The present study proposes to compare alcohol-using students with marijuana-using students along the following dimensions:

1. introversion-extraversion: marijuana users will be more introverted;
2. anxiety level: marijuana users will be more anxious;
3. internal-external locus of control: marijuana users will be more external;
4. sensation-seeking: marijuana users will be less sensation-seeking.

The relevance of the present study has several facets. For one, it may provide a new perspective on the current drug situation. For example, it has been suggested that marijuana be substituted by alcoholics for alcohol insofar as: a) alcohol is addictive and marijuana is but habituative; b) the effects of marijuana, both psychological and physiological, appear at this time to be less damaging to the user and the society at large; and c) alcoholism as such is so resistive to actual cure. Such a "solution" to the problem of alcoholism may not be realistic if enjoyment of these drugs is intimately and
differentially bound up to more or less stable personality traits such as introversion-extraversion.

Secondly, several avenues of additional research are suggested. Foremost of these is a further exploration into the cause-effect relationships between drug preference and the introversion-extraversion continuum. Additionally, however, other studies suggest themselves such as the probing of the relationship between internal-external locus of control and introversion-extraversion.

Finally, the relevance for counselors would be a broader understanding of this ecological niche in student culture. This would have particular significance for psychologists dealing with students who are heavy users of either marijuana or alcohol.
CHAPTER II

BACKGROUND

A. Early History and Current Status of Marijuana and Alcohol.

Both marijuana and alcohol have long histories. Cannabis sativa, the marijuana plant, is one of man's oldest domesticated plants. Often called hemp, it has been used for thousands of years as a source of fibers for making rope, seeds used in bird seed, and certain oils used in medicinal products. Even as late as the 1940's the United States government encouraged its growth to a limited extent when the Japanese cut off the supply of sisal rope from the Phillipines. Its use as an intoxicant, however, dates only from approximately 430 B.C. (Solomon, 1966).

Today the sale or possession of marijuana is illegal to a greater or lesser extent throughout the United States and has been since the 1930's. By 1937 almost every state legislature had passed laws making the drug illegal, and the Marijuana Tax Act of the same year created a federal law requiring a tax on its growth or sale (Solomon, 1966). There was
some controversy about the nature and effects of marijuana at the time, sparked primarily by the report of the Mayor's [La Guardia's] Committee on Marihuana, which studied the problem in New York City from 1938 to 1944; but the issue tended to become dormant until the 1960's when marijuana use dramatically increased among middle class youth.

Although the plant is cultivated only to an extremely limited extent, for research purposes, it grows wild throughout large portions of the United States. Considerable effort is put into controlling its growth; in the month of September, 1969, for example, approximately 100,000 acres of marijuana were burned in the rolling countryside of Nebraska.

Estimates of the extent of usage today vary from one study to the next; but most report that from twenty to forty percent of college students have used the drug at least once (Barter et al., 1969; Imperi et al., 1968; Mizner et al., 1970), and the percentage of military personnel users is about the same (Sapol and Roffman, 1962). A recent survey done by the Editors of Playboy (1971) of 3000 college students in 60 schools, in what seems like a well-selected sample, reports the following usage figures:
Never Use  1-3 Times  4-9 Times  10 Times and Up

<table>
<thead>
<tr>
<th></th>
<th>Never Used</th>
<th>Have Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total:</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>Men:</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>Women:</td>
<td>61%</td>
<td>39%</td>
</tr>
</tbody>
</table>

A study done in the San Francisco area (Manheimer et al., 1969) indicates that there is no significant difference between students and non-students of the same age group in the extent of usage. Marijuana as a legal problem appears to be increasing at a very rapid rate. In California, as one index, there were 7,000 arrests for possession of marijuana in 1964; in 1967 the figure had jumped to 37,500. From June to September, 1967, marijuana cases accounted for 17% of all felony complaints issued by the Los Angeles district attorney's office (McClothlin and West, 1968).

Alcohol was used as early as 6400 B.C., primarily as food in the form of beer. It came into ritual usage as an intoxicant
about 3500 B.C. (Blum et al., 1969b). Its use has been viewed as at least potentially problematic in practically every civilization for which records are available. Hammurabi, in his famous laws, set limits on the types and amounts of beer which workmen could consume; the Biblical injunctions on the use of wine are many; Rome controlled wine and limited its use to the upper class. In the United States, difficulties with alcohol are as old as the Constitution itself. The Continental Congress was alarmed at the intemperance of the American sailor, whose intake of whiskey appeared to sometimes exceed that of water (Green, 1971).

Today, alcohol enjoys legal acceptance in the United States for persons who are of at least a certain age, variously 18 through 21. It was outlawed for a period by the Volstead Act. Toch (1961) observes that "... national prohibition was voted by Congress on December 17, 1917. The amendment became operative January 16, 1920. Drinking became a crime the next day, and remained so for the next thirteen years, creating the most crime-ridden period in American history" (p. 352).

At the present time, alcohol use is very common; last year more than $11,000,000,000 was spent on it in the United States alone. Approximately 68% of the adult population
drink at least occasionally. Approximately 26% average one
drink per day or more. Twelve per cent are considered heavy
drinkers; they average better than 1.5 drinks per day and
frequently drink more than five drinks at one occasion.
Approximately 6.5% of the adult population are considered
alcoholic, a condition characterized by an overwhelming
compulsion to drink (Cahalan and Cisin, 1968; Cisin and
Cahalan, 1968; Green, 1971). The Playboy survey cited above
(1971) gives the following figures for drinking among college
students:

<table>
<thead>
<tr>
<th>Never Used</th>
<th>1-3 Times</th>
<th>4-9 Times</th>
<th>10 Times or More</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total:</td>
<td>6%</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>Men:</td>
<td>4%</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>Women:</td>
<td>8%</td>
<td>8%</td>
<td>10%</td>
</tr>
</tbody>
</table>

By way of note, it probably should be mentioned that Playboy
is hardly a recognized scientific journal and that the article
in question does not elaborate the procedures used to select
the sample or to administer the survey. Their results should
be viewed cautiously.

B. Problematic Aspects of Doing Research on These Drugs.

It is very difficult to compare drug studies one with
another and even difficult to adequately control individual
drug experiments with respect to a host of variables. Trouton
and Eysenck (1960) list the main factors influencing a
subject's response to drugs:

1. Nature of the Drug
   Preparation (including concentration,
   vehicle of administration and
   whether disguised),
   Mode (oral, intravenous injection, etc.)
   and rate of administration,
   absorption and excretion,
   Dosage (according to body weight or
   the same for all),
   Interval before testing,

2. The Subject
   Personality....
   Familiarity with the situation and
   the amount of stress occasioned
   by it,
   Practice; fatigue; motivation,
   Tendency to react to placebos,
   Psychiatric state and its duration,
   Age, sex, physique, height and
   weight,
   Present state --
   General state of health, nutritional
   status, sleep,
   Conditions of work, e.g. tem-
   perature, humidity,
   oxygen lack,
   Diseases, disabilities ...., or
   effects of operations,
   Time of day.
   Interval since last meal (if
   drug given orally),
   Recent medication with other
   drugs (e.g. sedation) or
   ingestion of drinks contain-
   ing stimulants or depressants.
Previous experience of drugs —
Cumulative effect of some drugs
(e.g. bromides),
Habituation, tolerance (including
cross tolerance).
Addiction,
Idiosyncracy or hypersensitivity.

3. The Social Environment,
Interaction with other subjects,
Activities required or permitted
after administration of
the drug.
Suggestion,
Reinforcement of responses by
the experimenter (p. 635).

For a detailed discussion of drug research in general, the
reader is directed to Goodman and Gilman (1955).

There are a number of specifically relevant problems
in research with alcohol and marijuana. Alcohol, for instance,
is distributed throughout all the tissues and fluids of the
body. Therefore, it is more diluted in the blood of larger
subjects. Other factors are: the time after the last meal
and the nature of the meal (e.g. fats tend to delay absorp-
tion); the speed of drinking; the drinking habits of the
subject; the time elapsed before testing; and whether the
concentration of alcohol in the blood is rising or falling
(Trouton and Eysenck, 1960).

In the case of marijuana, the placebo effect appears
to have special significance. Edelstein and Nay (1967)
consider it a major factor in the actual behavioral and
reported subjective effects of the drug. Weil et al. (1968) note that marijuana-naive subjects demonstrate impaired performance on simple intellectual and psychomotor tests after smoking but that the impairment is dose-related only in some cases. Secondly, regular users seem less affected by the drug than inexperienced users. Jones and Stone (1970) took a crude chemical measure of the THC (tetrahydrocannabinol, the psychoactive ingredient in marijuana) content of a sample of marijuana; then they asked ten heavy users to smoke sample cigarettes (the marijuana in some, placebo in others) and rate them on a scale on which 100 was "the best grass you've ever had." The subjects rated the marijuana at 66, which corresponded to the content of the THC of this particular sample relative to the range normally available to users in the U.S. But they rated the placebo an enthusiastic 57. The experimenters later found that subjects with head colds were considerably more accurate in distinguishing placebo from the real thing. It is suggested that taste and smell, which are the same in marijuana and placebo, were sufficient to produce a high in an experienced marijuana smoker.

Decker (1953) points out the necessity of proper in-
gestion for the drug to have effects. Users frequently must be taught the correct way to smoke for maximal ingestion (take a long puff, inhale deeply, hold breath for twenty seconds). It might be pointed out that marijuana is occasionally eaten in brownies and other foods. The present author is unaware of any experimentation with this mode of ingestion, although it might offer a way around this particular methodological problem and a new perspective on the effects of the drug.

Another major factor in the study of marijuana's effects is potency. The psychoactive ingredient in Cannabis sativa is tetrahydrocannabinol which is present in the sticky resin found on the flowering leaves of ripe male or female hemp plants. A pipeful of marijuana will be more or less potent depending on 1) the ratio of resin to other plant parts and 2) the quality of the resin. Cannabis sativa grown in warmer climates contains more potent resin. The most potent cannabis preparation is hashish or "hash." This is obtained by scraping the resin from the plants and pressing it into hard blocks. Thus drug potency varies considerably from sample to sample; the concentration of THC in American marijuana tends to be
considerably less than that of the plant found in India, Vietnam, the Middle East, and other warmer climates. (For a more detailed discussion of the confounding effects of variable potency in marijuana, see Wikler, 1970, and Zunin, 1969.)

Edelstein and Nay (1967), Wikler (1970), and Zunin (1969), among others, point out that another major variable is the reaction of the personality to the changes caused by the drug. This would seem to be true also of alcohol but not to such an extent as in the case of marijuana. Eysenck (1960a) builds a theory (see below) from which one could hypothesize that introverts would be more reactive to the effects of marijuana and less reactive to the effects of alcohol than would extraverts.

C. Review of the Current Literature.

The research is replete with variables associated with alcohol use, but less so in the case of marijuana. With the difficulties noted above in mind, discrepancies between different studies would come as no surprise. The intent of this
review is to touch on the major lines of research, providing a few typical examples in each area, and then to present in detail the literature having a direct bearing on the present study. The variables explored could be roughly dichotomized as physiological and psychological.

1. **Physiological Variables Associated with Alcohol Use.**

The literature on this aspect of alcohol use is vast; experimentation has been going on for well over half a century. Acute effects have been well documented before 1940 (cf. a comprehensive review by Jellinek and McFarland, 1940), and relatively little literature has been devoted to that topic since then. Miles (1932) summarizes very well these effects by percentage of alcohol in the blood, although it should be remembered that any such summary is gross at best insofar as intra- and intersubject variability is great.

<table>
<thead>
<tr>
<th>Per cent alcohol in blood</th>
<th>Subjective state and observable changes in behaviour under conditions of heavy social drinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.010</td>
<td>Clearing of the head, Freer breathing through nasal passages, Mild tingling of mucous membranes of the mouth and throat,</td>
</tr>
<tr>
<td>0.020</td>
<td>Slight fullness and throbbing at back of head, Sense of dizziness, Sense of warmth and general physical well-being, Small bodily aches and</td>
</tr>
</tbody>
</table>

0.030 Mild euphoria, "everything is all right ... sure I will loan you some money ...." No sense of worry. Feelings of playing a very superior game. Time passes quickly.

0.040 Lots of energy for the things he wants to do. Talks much and rather loudly. Hands tremble slightly, reaching and other movements a bit clumsy; laughs loudly at minor jokes; unembarrassed by mishaps, "you don't think I'm drunk do you, why I haven't taken anything yet." Makes glib or flippant remarks. Memories appear rich and vivid.

0.050 Sitting on top of the world ... normal inhibitions practically cut off, takes personal and social liberties of all sorts as impulse prompts, is long-winded and enlarges on his past exploits, "Can lick anybody in the country" but has observable difficulty in lighting a match. Marked blunting of self-criticism.

0.070 Feeling of remoteness. Odd sensations on rubbing hands together, or on touching the face. Rapid strong pulse and breathing. Amused at his own clumsiness or rather at what he takes to be the perversity of things about him. Upsets chair on rising.

0.100 Staggers very perceptibly. Talks to himself. Has difficulty finding and putting on his overcoat. Fumbled long with the keys in unlocking and starting his car. Feels drowsy, sings loudly, complains that others don't keep on their side of the road.

0.200 Needs help to walk or undress. Easily angered. Shouts, groans, and weeps by turns. Is nauseated and has poor control of urination. Cannot recall with whom he spent the evening.

0.300 In a stuporous condition, very heavy breathing, sleeping and vomiting by turns. No comprehension of language. Strikes wildly at the person who tries to aid him.

0.400 Deep anaesthesia, may be fatal.
Trouton and Eysenck (1960) review the literature to a limited degree and are in substantial agreement with the summary of Miles. Green (1971) reports essentially the same progression of effects. From a pharmacological point of view, alcohol would clearly seem to be a depressant (Trouton and Eysenck, 1960; Green, 1971).

Long term use of alcohol has been associated with a wide variety of maladies: bone-marrow abnormalities (Hines and Cowan, 1970); cancer of the esophagus (Tuyns, 1970); a wide variety of nervous system disorders (cf, Mendelson, 1971, and Segal et al., 1970, for reviews); epilepsy (Victor, 1968); various heart dysfunctions (reviewed by Shenk and Cohen, 1970) including magnesium depletion (Seelig, 1969), cardiomyopathy (Sanders, 1970); various muscle diseases (Myerson and Lafair, 1970); malabsorption in the intestine (Roggin et al., 1969); and a variety of liver disorders, particularly cirrhosis (cf. Leevy, 1968, and Schelg, 1970, for reviews). By way of an overview it would seem that practically any disease can be either occasioned or complicated by heavy alcohol usage; almost any organ or organ system can become involved.

2. Physiological Variables Associated with Marijuana Use.

The immediate acute effects of marijuana do not appear to be nearly so dramatic as those of alcohol. Subjectively, users
report feelings of exhilaration and euphoria (Weil et al., 1968; Isbell et al., 1967), an enhanced perceptual ability (Smith, 1968; Isbell et al., 1967), and feelings of dizziness (Waskow et al., 1970). Dinnerstein (1968) feels the most commonly reported subjective effects, apart from euphoria, are "vaguely perceptual: color appears brighter, music is more impressive, shapes and distance relations are in some way different. There is also the reported effect of being better 'tuned in' on the mood of others" (p. 1016). Subjects have been observed to experience giddiness and hilarity (Weil et al., 1968), to express an exaggerated sense of their abilities (American Social Health Association, 1969), and to have difficulties in speech -- most prominently in remembering from moment to moment the logical thread of a conversation (Weil and Zinberg, 1969). Purely physiological changes that have been generally noted seem to be limited to increased heart rate, elevated pulse rate, and dilation of the blood vessels in the conjunctivae of the eyes (Weil et al., 1968; Isbell et al., 1967).

Generally, researchers have come to consider marijuana's effects to be stimulant in nature, but not perfectly so (Weil et al., 1968; Smith, 1968; Seavers, 1968; Dinnerstein, 1968),
This ambivalence is not unusual in that there are few, if any, drugs which are entirely stimulant or depressant; most occupy some position between the two extremes. And, of course, most drugs have a tendency to be somewhat inconsistent in their actions and have a variable range of side-effects -- some paradoxical. The literature does suggest that the effects of marijuana are generally stimulant, the effects of alcohol are generally depressant, and the two drugs are distinctly separate from each other on a stimulant-depressant continuum.

Additionally, it should be noted that alcohol is an addictive drug; alcoholism, indeed, is essentially alcohol addiction. Withdrawal symptoms appear, including delerium tremens. The D.T.'s, as they are called, are fatal in about 8% of the cases (Green, 1971). McGlothlin and West (1968) conclude from their review of the literature that there are virtually no symptoms of physical withdrawal in the case of marijuana other than mild irritability. Psychological dependence may develop in the sense that the individual comes to prefer the mood state resulting from marijuana use to the undrugged state.

Longer-term effects of marijuana have not been systematically and experimentally determined. The research that is available, primarily of the case study variety, suggests the following: insomnia (Socieff, 1967), conjunctivitis, chronic bronchitis, and various digestive ailments (Chopra and Chopra, 1939). Both
Soueif's and the Chopras' observations were made about patients in Egypt and India who were using hashish, which has a potency roughly ten times that of marijuana. Kew et al. (1969) found malfunction of the livers of seven male patients who had smoked marijuana on a regular basis for two years or more. As the authors admit, however, there were a multitude of uncontrolled variables in their design. Finally, Scher, writing in the Journal of the American Medical Association (1970), claims to have delimited a syndrome on the basis of patients he has seen in his private practice (N not given). He says that roughly ten to twenty percent of cannabis users become habituated users. After five years or so of smoking, a number of symptoms appear. The patients experience bitemporal headaches of greater or lesser intensity, often crescendo in type. They have a generalized sense of uneasiness and discomfort, reduced creativity, periods of intensified insecurity, and a progressive sense of purposelessness. They begin to lose interest in sex and find it difficult to derive satisfaction from their activities. They may develop ill-defined feelings of physical disturbance, weakness, or hypochondriacal somatic complaints. Sometimes there is memory and judgment impairment.

Such studies as these should not be discounted out of hand, but many questions must be raised about controls, base lines, and
methods of definition and measurement.

Some mention should be made of a number of studies that have investigated the effects of these drugs upon driving or simulated driving. A number of early studies (reviewed by Trouton and Eysenck, 1960, p. 669) clearly show a dramatic effect by alcohol upon driving. Granger et al. (1969) compared the effects of alcohol vis-à-vis marijuana on a driving simulator. As expected, those subjects who were inebriated on liquor performed very poorly; significant deterioration was found on every criterion measure. Those subjects "stoned" on marijuana, in general, performed as well as when not stoned. There were more speedometer errors, but no difference in acceleration, brake, signal, and steering errors and no difference in total errors. Waller (1971), in a brief review of the literature, concludes that alcohol is a much greater hazard to safe driving than is marijuana and that marijuana seems to have but minor effects on driving ability.

It would seem clear, on the basis of the available literature, that both marijuana and alcohol have some physiological effects. Alcohol tends to be depressant in its effects; marijuana, stimulant. Moreover, it would seem equally clear that the effects of alcohol are much more powerful than those of marijuana (as used in the United States). As pointed out in
Chapter I, the present author suspects that marijuana users will be introverted and therefore (within Eysenck's theoretical framework) over-reactive to stress. They would be low in sensation-seeking. It would seem logical for such people to choose a drug with mild effects such as marijuana rather than one with powerful effects such as alcohol. There are other much more compelling reasons for such a hypothesis, which will be explored in detail below.

3. Psychological Variables Associated with Alcohol Use.

The literature in this area is vast; unfortunately for the present study, much of it is directed to alcoholism as such. Again, the intent of this and the following section is to give the reader an idea of the kind of work that has been done.

One major approach has been the attempt to establish an alcoholic personality type. Sutherland et al. (1950) review thirty-seven studies and conclude that there is no justification on the basis of this evidence for speaking of such a type. Waxberg (1949), basing his observations on clinical experience, reached the same conclusion. Both Schaefer (1954) and Markkanen (1957), using factor analytic methods, found considerable heterogeneity among alcoholics. A large number of MMPI studies
characterize the alcoholic profile as having an elevated Psychopathic Deviate scale, suggestive of a relationship between psychopathy and alcohol addiction; Manson (1948) and Hampton (1951a, 1951b, 1953) have reported successes in differentiating alcoholics from non-alcoholics through their responses to inventories developed around the response characteristic of a high Pd score on the MMPI. As Mensh (1965) points out, however,

... no specific alcoholic personality adjustment pattern has been identified, and the only safe generalizations may be about the prevalence of psychoneurotic, psychopathic, and character disorder adjustments among alcoholics. This generalization, unfortunately, serves little use because of its inability to provide any greater focus; yet it does indicate the need to examine individual adjustments and the specifics of the behavior by which various individuals come to react to stresses by alcoholism, as others turn to addictions to drugs or to other adjustments (p. 1071).

More recently, Rosen (1966) failed to differentiate alcoholics from non-alcoholics on a Q-sort of self-perceptions. He selected characteristic descriptions from the literature and based his Qsorts on these. He concluded that there was little evidence in the data as gathered to support the notion that there is a unique, special, or modal alcoholic personality which clearly differentiates him from other kinds of socially maladaptive or psychiatrically maladjusted individuals. An intriguing angle to Rosen's work may be Partington's (1970) finding, in an article entitled "Dr. Jekyll and
Mr. High," that alcoholics seem to consider themselves to be entirely different people when sober than when intoxicated. In the same genre of study, Keehn (1970) administered the Eysenck Personality Inventory to 48 chronic alcoholics, asking them to complete it twice: 1) as they felt when sober and 2) as they felt when drunk. (The subjects were sober throughout the testing.) They scored significantly more in the extraverted direction on the E-scale when answering as they felt when drunk, supporting Eysenck's notion that alcohol, as a depressant drug, makes people more extraverted.

Jones (1968) undertook a longitudinal study of 66 subjects now in their middle 40's. They were followed from junior high school to the present. A core of traits described the problem drinkers as undercontrolled, impulsive and rebellious. Moderate drinkers and, especially, abstainers were overcontrolled, responsible, and able to function comfortably in a dependent relationship. The importance of this study is that the results suggest that alcohol-related behavior is, to some extent, an expression of personality tendencies which are exhibited before drinking patterns are established. In contrast to Jones' findings, Hoffman (1970) reports normative data for the Personality Research Form on four different age groups of 377
hospitalized male alcoholics. Significant differences of means among age groups were found on fifteen of twenty-two personality scales. There are a number of different possible explanations for such findings, but one would be that the "alcoholic personality" continues to change with age; if Jones's sample had been followed until the subjects were 60, the results might have been different.

Allen (1969) differentiated alcoholics from non-alcoholics with the California Personality Inventory; Fitzgerald et al. (1967) found small significant differences using the Edward's Personal Preference Schedule -- differences too small to be useful for diagnostic purposes; and Colightly and Reinher (1969) reviewed the studies establishing an "alcoholic profile" with the 16PF, calling into question whether such low magnitude differences actually justified such a profile.

Some recent work has been done with non-alcoholic college students. Jessor et al. (1968) found that the lower the expectation of need satisfaction, the greater the use of alcohol. Parker (1969) associated drinking to sex-role strain, and Smart (1968) related it to intermediate levels of anxiety.

Williams (1965, 1967) differentiated the self-concepts of college drinkers from those of alcoholics and from those
of college non-drinkers. The college drinkers see themselves as aggressive, self-sufficient, impulsive, disorganized, and as seeking novelty and variety in experience. In an experimental study, Williams (1968) held stag parties for male student volunteers at which the amount of alcohol consumed was monitored. He found that, as drinking progressed, inhibitions generally disappeared from self-descriptions. In a similar experiment (1966), he found that anxiety and depression decreased at low levels of alcohol consumption and increased at high levels (after eight ounces of liquor).

The plethora of research on alcohol use is, one might suspect, a function of the enormity of the problem that it presents to society at large. A conservative estimate of the number of alcoholics in the United States is six million. The annual number of deaths on the highways in which drinking is involved is conservatively put at 25,000. American hospitals are filled with patients suffering from alcohol addiction or alcohol-related dysfunctions. Hallucinations, delusions, and other psychotic symptoms are not uncommon. There is ample evidence that heavy alcohol use has precipitated many a
psychosis (Green, 1971). Although the research is prolific, it seems to this writer to lack a unifying thread. Secondly, the solutions to the problems presented by alcohol abuse still seem to be lacking, even in theory.

4. Psychological Variables Associated with Marijuana Use.

The research into psychological variables associated with marijuana use is sparse and recent; the problem qua problem is of recent origin in this country.

It is felt by some that a syndrome does develop in association with chronic heavy use of cannabis (see Scher, 1970, above). Bromberg (1968), West (1968), and McGlothlin and West (1968) outline similar symptom clusters:

... it appears that regular use of marihuana may very well contribute to some characteristic personality changes, especially among highly impressionable young persons. Such changes include apathy, loss of effectiveness, and diminished capacity or willingness to carry out complex, long-term plans, endure frustration, concentrate for long periods, follow routines, or successfully master new material. Verbal facility is often impaired both in speaking and in writing.

Such individuals exhibit greater introversion, become totally involved with the present at the expense of future goals, and demonstrate a strong tendency toward regressive, child-like magical thinking. They report a greater subjective creativity but less objective productivity (McGlothlin and West, 1968, p. 372).
Hallucinations have been reported in the literature (see, for instance, McGlothlin and West). Keeler (1968) reports that of fifty-six marijuana users interviewed, six reported that during the drug syndrome they experienced hallucinations of color, design, or marked changes in perspective with their eyes open. Nineteen of the fifty-six reported some type of visual imagery with their eyes closed. It is suggested that marijuana is capable of evoking the type of hallucinations usually associated with LSD or mescaline. Keeler et al. (1968) also report four cases in which persons experienced, in a drug-free state, unusual visual or somatic sensations previously experienced during a marijuana reaction. None had used other hallucinogens.

Case reports of actual psychoses precipitated by marijuana use are present in the literature (Keeler, 1967; Milman, 1969a); however, well controlled studies do not seem available. There does seem to be evidence of considerable psychiatric complication associated with cannabis use in India and the Middle East (Grossman, 1969; Benabud, 1957; Geert-Jorgensen et al., 1968); the drug as used in those areas, however, is much more potent than that generally used in this country. Milman (1969b) suggests that psychotic reactions to marijuana are dose-related
and therefore rare in the United States.

Some non-clinical studies of college marijuana users have been carried out. King (1970b), for instance, compared users and non-users on the CEEB Scholastic Aptitude Test, the MMPI, and the grade point average at the time of graduation. He found no significant differences on these measures, speculating that "users and non-users may not be that different" (p. 213).

However, he defined a user as one who has used drugs one time or more; his sample groups may indeed not have been that different on the criterion of usage. McAree et al. (1969) compared users and non-users on the MMPI, finding only one difference between the controls and the marijuana-only group: the latter scored more in the feminine direction on the Mf (Masculinity-Femininity) scale.

Both Blum (1969c) and King found users to be politically more liberal. Blum suggests they also feel outside or against traditional social institutions and are less satisfied with their university experience.

Kleckner (1968) compared psychedelic drug users with non-users, employing the Cattell 16PF, Form A. He found that drug users

... presented themselves as being less acculturated and more non-conformist than the non-users, manifesting
more anxiety and less effective super-ego controls with greater potential of asocial rather than antisocial acting out.

Users were considered to be more creative than non-users but to have less potential for leadership and a greater need for interpersonal isolation at work (p. 70).

Shean and Fechtmann (1971) found that marijuana smokers scored significantly lower on the Purpose in Life Test than non-users. Hogan et al. (1970) found frequent users scored lower in socialization and communality and higher in intellectual efficiency on the CPI than non-users.

Hardin (1971) compared non-user college students with three classes of users (one-time use, 2-15 times, and over 15 times) on the Omnibus Personality Inventory. Differences were found on twelve of fifteen possible measures:

Thinking Introversion: users score higher; Theoretical Orientation: users scored higher; Estheticism: users scored higher; Complexity: users scored higher; Autonomy: users scored higher; Religious Orientation: users scored higher, indicating less of this characteristic; Social Extroversion: users scored lower; Impulse Expression: users scored higher; Anxiety Level: users scored lower, indicating more of this characteristic; Practical Outlook: users scored lower; Masculinity-Femininity: users scored lower, indicating more femininity; Intellectual Disposition Category: users scored lower, indicating more of this characteristic.
There were no differences on the Altruism, Personal Integration, and Response Bias scales.

It would seem from an examination of the literature that both marijuana and alcohol users tend to be heterogeneous groups, more or less. Heavy use of alcohol can clearly lead to major psychiatric disturbance. There is some evidence that heavy use of marijuana can contribute to psychiatric disturbance, especially if the cannabis preparation is the more potent hashish; this is not so clear-cut a finding as that relating to alcohol. Among alcohol users, impulsivity and other psychopathic traits are common. College drinkers tend to see themselves as aggressive, self-sufficient, impulsive, and novelty-seeking. Some writers suggest that continued marijuana use leads to alienation, apathy, anxiety, and introversion. College marijuana users also tend to be more "intellectual" in the broad sense of that term, more politically liberal, more anxious, and more introverted. No studies were found in the literature which made a direct comparison of student alcohol users with student marijuana users.
D. Variables Related to the Present Study.

1. Introversion-Extraversion.

The research on both of these drugs is indeed far-ranging; however, it is difficult to specify a limited number of variables which hold the promise of unifying a research strategy or of bringing together a large number of the past research efforts.

As seen above, one variable, however variously defined, that has been associated with the use of marijuana is social introversion. Eysenck (1963) found that extraverts consume more alcohol than introverts. This suggests that it might be possible to differentiate marijuana users from alcohol users along a continuum of introversion-extraversion.

Eysenck (1960a, 1969) has elaborated a three-dimensional framework within which personality can be viewed — the dimensions being psychoticism, neuroticism, and introversion-extraversion. This last dimension is of special interest to the present study. It is measured by the Maudsley Personality Inventory (developed by Eysenck for this purpose), a scale correlating highly with the Social Introversion scale of the MMPI (Eysenck and Eysenck, 1969). According to this measure, the typical extravert

... is sociable, likes parties, has many friends, needs to have people to talk to, and does not like reading or studying by himself. He craves excitement, takes chances, often sticks his neck out, acts on the spur of the moment, and is generally
an impulsive individual. He is fond of practical jokes, always has a ready answer, and generally likes change. He is carefree, easygoing, optimistic, and likes to laugh and be merry. He prefers to keep moving and doing things, tends to be aggressive and may lose his temper quickly. His feelings are not kept under tight control, and he is not always a reliable person.

The typical introvert is a quiet, retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, "looks before he leaps," and distrusts the impulse of the moment. He does not like excitement, takes matters of everyday life with proper seriousness, and likes a well-ordered mode of life. He keeps his feelings under close control, seldom behaves in an aggressive manner, and does not lose his temper easily. He is reliable, somewhat pessimistic, and places great value on ethical standards (Knapp, 1962, p. 4).

Eysenck theorizes that extraverted behavior patterns are produced by excessively strong reactive inhibition and/or excessively weak excitation of the central nervous system, while introverted behavior patterns are produced by excessively weak reactive inhibition and/or excessively strong excitation. He goes on to postulate that these central nervous system predispositions are inherited; interaction with the environment as the individual develops determines where he will actually lie on the continuum. Some credence has been lent to this aspect of Eysenck's theory by Siegelman (1968) and Scarr (1969). The latter, in reviewing the literature as well as the results of her own work with sixty-one pairs of twin girls, concluded that both "longitudinal and twin
data suggest that social introversion-extraversion is a basic way of responding to the environment, produced by polygenic inheritance and environmental interaction."

a. The Maudsley Personality Inventory (MPI).

Development of the MPI is the result of years of intensive research on the dimensional analysis of personality; two "super-factors" are measured by the inventory: neuroticism and extraversion. This measure is a 48-item objective test with 24 items keyed to each factor. Essentially item selection followed by factor analysis was such as to maximize homogeneity of item content within each of the two scales while minimizing the correlation between the scales. The scales are thus considered to be independent, or orthogonal. In general, the theoretical independence of these dimensions has been empirically supported. On some twenty different samples the correlation between scales has averaged around -15. An impressive array of reliability and validity studies is cited in the Manual. Also, positive correlations between the E-scale and a number of other measures of introversion-extraversion are reported (Knapp, 1962).

A revision of the MPI has recently been completed, the Eysenck Personality Inventory (EPI) by Eysenck and Eysenck (1968). The MPI was chosen for this study because the research with it is
so much greater and the norms, at present, much better established. The MPI was chosen over other measures of extraversion because of its relationship with Eysenck's theory, from which the present study is framed; and because of its ease of administration as well as its well-established reliability and validity.

b. Research.

An extensive amount of research has been carried out using Eysenck's notion of extraversion. Findings might be exemplified by the following: introverts were found to have a low IQ/vocabulary ratio, extraverts, high (Foulds, 1956); introverts exhibit high perceptual rigidity, extraverts, low (Canestrari, 1957); introverts show low sociability, extraverts, high (Eysenck, 1956 and 1957); repression is weak in introverts and strong in extraverts (Eriksen, 1954); social attitudes are tender-minded in introverts and tough-minded in extraverts (Eysenck, 1954); conditioning is quick with introverts but slow with extraverts (Franks, 1956 and 1957); introverts tend to be over-reactive to stress whereas extraverts are under-reactive (Davis, 1948; Venables, 1955); the sedation threshold is high with introverts and low with extraverts (Shagass, 1956). Extraverts consume more alcohol than introverts (Eysenck, 1963), have less stimulus-deprivation tolerance (Petrie, Collins, and Solomon, 1960), and are higher
risk-takers (Lynn and Butler, 1962).

Eysenck, as mentioned above, defines extraversion as a score on the MPI or the EPI, which are essentially measures of social behavior or preferences; he postulates, however, that such behavior results from the interaction of environment with inherited strong cortical inhibition and/or weak excitation. He further postulates that depressant drugs increase cortical inhibition, decrease cortical excitation, and thereby produce extraverted behavior patterns. Stimulant drugs decrease cortical inhibition, increase cortical excitation, and thereby produce introverted behavior patterns. The research, reviewed by Trouton and Eysenck (1960) and Eysenck (1963) is somewhat supportive of this hypothesis. However, many studies failed to replicate earlier findings; and methodological errors abound. Trouton and Eysenck make the sad observation that enthusiasm in research "is no compensation for lack of competence, and few workers in the field have had the requisite training in psychological research methodology, statistical knowledge, biochemical expertise and general physiological know-how to avoid quite elementary errors" (p. 683).

Eysenck would predict that introverts would prefer stimulants and extraverts would prefer depressants. Some mild con-
firmsatory data is available in the case of alcohol. Additionally it has been shown that introverts are more reactive to the effects of stimulants than extraverts and vice versa in the case of depressants. The literature suggests that marijuana users are introverts as measured by instruments other than the MPT or EPI. Also, marijuana is viewed as more or less of a stimulant; alcohol is rather clearly a depressant. One would expect, theoretically, to find more introverts among regular marijuana users and more extraverts among alcohol users. (Persons who used both drugs and showed no distinct preference for one or the other might be expected to fall more toward the middle of the introversion-extraversion continuum.)

c. Implications for Other Variables.

Several researchers have suspected that the introversion-extraversion continuum might well have some bearing on perceptual isolation studies. Patrie, Collins, and Solomon (1960) found that extraverts have less stimulus-deprivation tolerance than introverts. Francis (1968) also found that introverts were better tolerators of isolation. It could be predicted from Eysenck's theory that extraverts would be more seeking of variety and new sensations than introverts. Farley and Farley
(1967) found a significant positive correlation between the E-scale of the MPI and Zuckerman's Sensation-Seeking Scale (see below). Bone and Montgomery (1970) also found a relationship between the SSS and the E-scale but no relationship between SSS and neuroticism as measured by the MPI. It is hypothesized on the basis of Eysenck's theory, as well as the above studies, that alcohol users will be more sensation-seeking than marijuana users.

A second variable under consideration is Rotter's notion of internal-external locus of control (see below). Lefcourt (1966a) suggests that persons with high external locus of control beliefs tend to be alienated and socially withdrawn. Additionally, Feather (1967), Watson (1967), and Platt and Eisenman (1968) have found a positive relationship between external locus of control and manifest anxiety. It should be remembered that a number of writers have found anxiety associated with marijuana use. Secondly, in studies of pathology, Eysenck (1960a) found anxiety neurotics and other nosological categories which included manifest anxiety as a symptom on the introverted side of the dimension; those diagnosed psychopath and other categories with little manifest anxiety were found on the extraverted side. Thirdly, the neurological basis of
Eysenck's theory would predict that introverts are more manifestly anxious. Fourthly, there is some non-clinical experimental data supportive of the notion that introverts are more manifestly anxious (e.g., Eriksen, 1954; Davis, 1948; Venables, 1955). It could be hypothesized that marijuana users would score higher on a measure of anxiety and on a measure of internal-external locus of control (more external) than alcohol users. Admittedly, the latter hypothesis is more tentative and tenuous than the former; it will, perhaps, need to be much more fully explored in additional studies.

2. Sensation-Seeking.

Zuckerman et al. (1964) developed the Sensation-Seeking Scale (SSS) in the course of their work in the area of perceptual isolation. They were interested in the personality implications of the "optimal stimulation" concept (Hebb and Thompson, 1954; Leuba, 1955; Berlyne, 1960; Fiske and Maddi, 1961) and the possible implications for their own perceptual isolation experiments. The scale was devised to measure a postulated trait of degree of tendency to seek out stimulation or tension-raising experiences. In a factor analysis of the original 54-item forced-choice scale, one large factor emerged for both males
and females. Twenty-six items for males and thirty items for females loaded .30 or higher on this factor; these items comprise the final version of the instrument. The scale items pertain to variables such as preferences for extremes of sensation, the new and unfamiliar, adventure as opposed to security, and the like. Moderate reliability coefficients were found, and the construct of sensation-seeking was differentiated from impulsivity and psychopathic tendencies. Later studies, however (most notably Zuckerman et al., 1966; Kipnis and Wagner, 1967; Blackburn, 1969; and Gorman, 1970), suggest that there is a low positive relationship between impulsivity and other psychopathic traits on the one hand and the SSS on the other.

There are a number of other tests available purporting to measure sensation-seeking (cf. Acker and McReynolds, 1967, for a comprehensive review). Zuckerman's instrument was selected because 1) a more comprehensive array of research has been performed with it; 2) some of that research touches upon the present study and will be, to however slight a degree, more comparable; and 3) there is some evidence that it may be more sensitive to a wider range of variable characteristics than other measures (McCarroll et al., 1967).

There have been a number of studies which support the valid-
ity of the SSS and which begin to paint a picture of the high sensation-seeker vis-a-vis the low. Smith et al. (1968) found sensation-seeking to be positively related to the duration and extent of sensory deprivation, and Hocking and Robertson (1969) found that the SSS predicted the amount of stimulation-seeking under conditions of sensory restriction. Gorman (1970) administered the SSS and the Cattell 16PF to sixty-four undergraduates. High sensation-seekers were characterized by greater dominance, surgency, adventurousness, suspicion, and bohemian unconcernedness and by lower shrewdness and self-sentiment control than low sensation-seekers. He suggests a relationship between the constellation of characteristics of the high sensation-seekers and psychopathy. Waters and Kirk (1968) found high sensation-seekers to be more risk-taking in a gambling situation than low.

As mentioned above, Farley and Farley (1967) noticed a connection between Eysenck's theoretical formulations, the research on extraversion, and the construct behind the Sensation-Seeking Scale. They predicted that Eysenck's E-scale would correlate positively with the SSS. Theoretically, Eysenck postulated that, because of the hypothesized greater inhibitory potential of the extravert, he will seek arousal-producing
stimuli so as to maintain some optimum level of "arousal potential" (after Berlyne, 1960); whereas introverts, with a hypothesized excitatory potential, will attempt to avoid arousal-producing stimuli. Such a positive correlation would fit with the high risk-taking of the extravert (Lynn and Butler, 1962), his more frequent alternation behavior (Eysenck and Levey, 1965), greater extent of physical movement (Bachman, 1961), less stimulus-deprivation tolerance (Petrie, Collins, and Solomon, 1960), and greater pain tolerance as compared with introverts (Lynn and Eysenck, 1961). The correlation actually obtained was a positive .47, significant at the .01 level. Kish and Busse (1969) found a significant negative correlation between the SSS and the Social Introversion scale of the MMPI using as subjects inpatient alcoholics. (Higher scores on the S1 scale of the MMPI indicate greater introversion.)

Zuckerman and Link (1968), attempting to establish additional construct validity for the SSS, found that it was positively correlated with autonomy, change, and exhibitionism scores and negatively correlated with deference, nurturance, orderliness, and affiliation scores on the Edward's Personal Preference Schedule and the Gough-Heilbrun Adjective Check List (ACL). The SSS correlated positively with Hypomania on the MMPI, Lability (ACL),
and negatively with Self-Control (ACL). The authors conclude that a "personality picture of the high sensation-seeker is beginning to emerge from these data. He tends to be oriented to body sensations, extraverted, thrill-seeking, active, impulsive, antisocial or nonconformist, and low on anxiety" (p. 421).

Zuckerman et al. (1970) selected, on the basis of the SSS, high and low scorers and compared them across a number of variables. High sensation-seekers of both sexes exceeded lows in preference for complexity (as measured by the Barron-Welsh Art Scale), drug and alcohol usage, and heterosexual experience. Female high sensation-seekers also exceeded lows in auditory, somesthetic, and cognitive "primary process" experiences, and in cigarette smoking. A word should be said of their findings in regard to drug usage. In the females 56% of the high SS group but 0% of the low SS group had tried marijuana. In the case of the males the figures were 62% of the high and 21% of the low SS group. It is not inconsistent with the theoretical framework of this study to find that high sensation-seekers try marijuana to a greater extent than low. What is predicted is that the lows will be the ones who will prefer marijuana to alcohol and continue to use it more or less regularly.
3. Internal-External Locus of Control.

The Rotter Internal-External Locus of Control Scale (I-E), developed by Rotter, Seeman, and Liverant (1962), purports to measure generalized expectancies of internal versus external control of reinforcement. Rotter's (1954) social learning theory views the probability of a behavior's occurrence as depending on a preference for certain reinforcements and an expectancy that these reinforcements can be obtained in the given situation. The I-E scale attempts to provide a distribution along a dimension specifying the degree to which an individual believes that he possesses or lacks the power necessary to control what happens to himself; that is, the degree to which he attributes the things that happen to him as a function of his own control, skill or behavior, versus attributing these events to luck, chance, fate, or other powers beyond his control.

A considerable amount of research has been done using this instrument with diverse populations both within and without the laboratory. The test shows reasonable internal consistency, adequate reliability and validity. Relationships with such variables as adjustment, social desira-
bility or need for approval, and intelligence have been found to be low, indicating good discriminant validity. Extensive reviews of the literature of this construct and research done with the scale can be found in Lefcourt (1966a, 1966b) and Rotter (1966). The latter summarizes the findings using the scale with non-clinical populations:

A series of studies provides strong support for the hypotheses that the individual who has a strong belief that he can control his own destiny is likely to (a) be more alert to those aspects of the environment which provide useful information for his future behavior; (b) take steps to improve his environmental condition; (c) place greater value on skill or achievement reinforcements and be generally more concerned with his ability, particularly his failures; and (d) be resistive to subtle attempts to influence him (p. 25).

The relationship between internal-external locus of control and anxiety has been pointed out above. There is one other area of research that supports the hypothesis that marijuana users will score higher (more external) than alcohol users. One would logically expect that heavy alcohol users would score high in the external direction. Coss and Morosko (1970) hypothesized that an alcoholic population, because it "has for a time maintained a rather marginal social existence and because of their seeming passivity and dependency" (p. 190), would
score higher on the Rotter I-E than the reported population means. They found, however, that these outpatient alcoholics scored lower than the norms (in the internal direction). They also correlated the I-E scores with the MMPI. Significant positive correlations were found with the Pt (Psychasthenia, generally looked upon as a measure of anxiety) and the Si (Social Introversion) scales. The latter correlation suggests the possibility that externals in Rotter's sense are introverts in Eysenck's sense. Gozati and Sloan (1971) also found that a group of middle-class, middle-aged alcoholics scored more in the internal direction than a fairly well-matched control group of non-alcoholics (p less than .001). Admittedly, this is far from anything that could be construed as overwhelming support for the notion that marijuana users will be more external than alcohol users in a student population, but it is suggestive. There may, nevertheless, be variables of a quite different nature differentially affecting these two populations.

The Rotter I-E scale was selected for the present study because it appears to be the only well-researched instrument purporting to measure this construct.
4. Anxiety.

The relationship of anxiety to the other variables of the present study has been reviewed above. The Anxiety Level scale of the Omnibus Personality Inventory (OPI) has been selected as the measure of anxiety in the present study. Hardin (1971) found marijuana users more anxious than non-users, employing the OPI in her study. Additionally, there are several other scales in the OPI which, it is hoped, will prove useful to the present study. Use of the OPI will enable comparisons to be made with Hardin's data.

The Omnibus Personality Inventory was developed by Heist and Yonge (1962) specifically for use in higher education. Form F of the OPI consists of 385 true-false statements. Norms are based on a sample of the entire entering classes at thirty-seven different institutions of higher learning. Validation is based primarily on correlations with other measures such as the Study of Values, the Strong Vocational Interest Blank, the College Entrance Examination Board Scholastic Aptitude Test, Myers-Briggs Type Indicator, the Kuder, the MMPI and the Guilford Zimmerman Temperament Survey. The specific scales to be examined in the present study with their descriptions from
the Manual for Form F of the OPI are as follows:

Thinking Introversion (TI) -- 43 items: Persons scoring high on this measure are characterized by a liking for reflective thought and academic activities. They express interests in a broad range of ideas found in a variety of areas, such as literature, art, philosophy. Their thinking is less dominated by immediate conditions and situations, or by commonly accepted ideas, than that of thinking extroverts (low scorers). Most extroverts show a preference for overt action and tend to evaluate ideas on the basis of their practical, immediate application, or to entirely reject or avoid dealing with ideas and abstractions.

Social Extroversion (SE) -- 40 items: This measure reflects a preferred style of relating to people in a social context. High scorers display a strong interest in being with people, and they seek social activities and gain satisfaction from them. The social introvert (low scorer) tends to withdraw from social contacts and responsibilities.

Anxiety Level (AL) -- 20 items: High scorers deny that they have feelings or symptoms of anxiety, and do not admit to being nervous or worried. Low scorers describe themselves as tense and high-strung. They may experience some difficulty adjusting to their social environment, and they tend to have a poor opinion of themselves.

Response Bias (RB) -- 28 items: This measure, composed chiefly of items seemingly unrelated to the concept, represents an approach to assessing the student's test-taking attitude. High scorers are responding in a manner similar to a group of students who were explicitly asked to make a good impression by their responses to these items. Low scorers, on the contrary, may be trying to make a bad impression or are indicating a low state of well-being or feelings of depression.

The Response Bias scale will be used to get some idea of the subjects' test-taking attitude. Hopefully, there will be no
significant differences between groups.

In summary, the literature suggests directly or indirectly some of the personality differences one might expect to find between a group of marijuana users and a group of alcohol users. The marijuana users would be expected to be more introverted, more anxious, less sensation-seeking, and more external. On a theoretical basis, these predictions emanate largely from the work of H. J. Eysenck. Within that theory, one would expect to see the sharpest differences with groups of students who clearly prefer one drug (either marijuana or alcohol) over the other, use it regularly, and use the other drug very little. To investigate these questions, the present study will attempt to obtain such groups of students.
CHAPTER III

METHODOLOGY

To reorient the reader to the main thrusts of the present study, essentially two groups of students were compared along several dimensions of personality. One group was composed of frequent marijuana users; the other, of frequent alcohol users. It was predicted that these groups would vary one from the other on measures of introversion-extraversion, sensation-seeking, internal-external locus of control, and anxiety level. These predictions, in general, are based on the work of H. J. Eysenck. Eysenck postulates certain nervous system differences between introverts and extraverts which lead them selectively to prefer the effects of one type of drug over the other. The present study hypothesizes that persons who actually do prefer one drug over the other, both verbally and behaviorally, will differ in introversion-extraversion and related variables. A control group, using little of either drug, was included.

A. Subjects.

1. Categorization.

The sample was comprised of 90 undergraduate white males
divided into three groups as follows:

Group I (Marijuana Group): 30 Ss who stated they had become "high" on marijuana 15 times or more in the last year (based on Keniston's, 1968, category of "heads" or regular users) and who had become intoxicated by alcohol fewer than 12 times in the past year. They had used marijuana at least once in the last month to indicate current usage. They also affirmed on the Usage Questionnaire that they prefer marijuana to alcohol.

Group II (Alcohol Group): 30 Ss who stated that they had become intoxicated more than 15 times in the past year or who had become "high" more than once per week on alcohol (based roughly on the Diagnostic and Statistical Manual of Mental Disorders category of "Habitual Excessive Drinking," 1968, and Committee on Nomenclature and Statistics, 1968) and who had not used marijuana more than twice in the last year (based on Keniston's categories of non-user and "taster"). They had been high on alcohol at least twice in the last month to indicate current usage, and they indicated a preference for alcohol on the Usage Questionnaire.

Group III (Infrequent User Group): 30 Ss who stated they had become intoxicated by alcohol fewer than 8 times in the past year and had used marijuana fewer than 2 times.

White males only were used to keep the number of variables at a minimum; some sex and racial differences have been found in the research with some of the instruments used in the present study.

Although, of course, the parameters of drug usage set above are arbitrary, a number of studies have designated persons using marijuana ten or fifteen times or more as frequent users. It was felt desirable to set roughly equivalent parameters for alcohol use.
2. Subject Selection.

Subjects were selected by request on the basis of their being known by one or another of fourteen undergraduate acquaintances of the experimenter to fit into one or another of these categories. Only those subjects were used who designated themselves on the Usage Questionnaire as belonging to one of the three above-mentioned groups. Only subjects unknown to the experimenter were accepted to assure anonymity and confidentiality. Any materials in which a subject identified himself would have been deleted from the study; no such identification was made. The first 30 subjects who designated themselves as fitting into each category comprised the sample.

The following instructions were given to the acquaintances:

Please ask your friends to participate in a study about students who regularly use marijuana or alcohol or who use very little of either. The requirements for eligibility in the study are as follows:

1. undergraduate student at CSU;
2. white and male;
3. fits into one of the three groups as follows: the parameter of the three groups were given -- see above; 4. does not know me personally.

If they meet these requirements and if they are willing to participate in filling out questionnaires dealing with their personalities, behavior, and attitudes, assign them to one of the times listed below. The tests will take between two and three hours. All materials will be anonymous and confidential. The sessions will be held at my apartment. I can, incidentally give no feedback on an individual basis because of the necessity to keep all materials uniformly anonymous.
Try to ask people who you suspect will fit into one of the three groups. Also avoid people who regularly use harder drugs (speed, downers, LSD, heroin, etc.). It is important to keep a record of how many say they don't fit as well as how many say they fit but decline to participate.

Give volunteers my name and address and the time they should come.

Each acquaintance was given specific time slots to fill. Once any of the groups were filled with 30 Ss, the acquaintances were notified not to seek any more of that group.

The Marijuana Group, surprisingly enough, was the easiest group to fill; the Alcohol Group was a close second. At the end of three weeks of solicitation the slots left unfilled were those of 12 Infrequent Users. These took another two weeks to find. This may well have been a function of the type of acquaintances asked to find volunteers, the social circles they travel in; it should certainly not necessarily be taken as a reflection of the make-up of the student body at the Ohio State University.

The number of persons who said they fit one of the three groups but who refused to participate was 21. The number contacted who said they did not fit was 43. The number tested was 92. Therefore, the actual volunteer rate was 59% overall and 81% of those who stated that they fit into one of the groups. Of the 92 tested, two were dropped because they admitted to being high on marijuana at the time of testing.
B. Measures.

1. The Extraversion Scale from the Maudsley Personality Inventory (MPI).

The MPI has grown out of intensive research on the dimensional analysis of personality. Eysenck (1960a) summarizes the research evidence suggesting two relatively independent factors identified by him as neuroticism and introversion-extraversion. The method of developing the inventory was factor analytic.

The MPI consists of 48 items of which 24 are keyed to N and 24 to E. Only the E scores will be tabulated for the present study. The inventory takes approximately ten minutes to complete.

There are specifically American norms available as well as British norms. Split-half and Kuder-Richardson estimates of item intercorrelations for each scale are between .75 and .90 in various samples. Test-retest reliabilities range from .70 to .90. There has been considerable research with the instrument to establish construct validity. Both scales have shown significant and replicable correlations with experimental phenomena in the fields of perception, motor learning, verbal learning, pain tolerance, and attitudes and other facets of personality. For a more complete description of the MPI, the Manual (Knapp, 1962) should be consulted.

The American norm group of university students (N=1064) had a mean on the Extraversion scale of 28.73 and a standard deviation of
8.18 (Bendig, 1962). A mean of 28.04 and a standard deviation of 8.52 is reported for the males of the norm group (Bendig, 1959). The higher the score on the E-scale, the more in the extraverted direction it is.

2. The Sensation-Seeking Scale (SSS).

The Sensation Seeking Scale was developed by Zuckerman et al. (1964) to measure a postulated trait of degree of tendency to seek out stimulation or tension-raising experiences. In a factor analysis of the original 54-item forced-choice scale, one large factor emerged for both males and females. Twenty-six items for males and thirty items for females loaded .30 or higher on this factor. These items comprised the final version of the scale. A further test found moderate reliability for both the male and the female forms ($r$'s = .68 and .74 respectively). The reported mean and standard deviation for college males were 15.1 and 3.9 (Zuckerman et al., 1964).

Although this test is a fairly new one and still basically a research instrument, a number of validating studies and other experimental work have been carried out with it (cf. Chapter II and Zuckerman et al., 1970).

The higher the score on this measure, the more in the sensation-seeking direction it is.
3. The Rotter Internal-External Locus of Control Scale (I-E).

The Rotter I-E is a 29-item forced-choice test including six filler items intended to make the purpose of the test somewhat more obscure. The instrument attempts to provide a distribution along a dimension specifying the degree to which an individual believes he possesses or lacks the power necessary to control what happens to himself, that is, the degree to which he attributes the things that happen to him to his own control, skill, or behavior versus attributing these events to luck, chance, fate, or powers beyond his control. Considerable research on diverse populations has demonstrated the construct validity of the scale in a variety of experimental and field situations (cf. Lefcourt, 1966a and 1966b; Rotter, 1966, for reviews).

Internal consistency estimates are relatively stable, ranging from .65 to .76.

While these estimates are only moderately high for a scale of this length, it should be remembered that the items are not arranged in a difficulty hierarchy, but rather are samples of attitudes in a wide variety of different situations. The test is an additive one and items are not comparable. Consequently, split-half or matched-half reliability tends to underestimate the internal consistency. Kuder-Richardson reliabilities are also somewhat limited since this is a forced-choice scale in which an attempt is made to balance alternatives so that the probabilities of endorsement of either alternative do not include the more extreme splits (Rotter, 1966, p. 10).

Rotter (1966) reports test-retest reliabilities for a one-month
period ranging from .60 to .83. Those for a two-month period range from .49 to .61. Rotter suggests that the somewhat lower reliabilities for the two-month period may partly be a function of the fact that the first test was given under group conditions and the second was individual.

The higher the score on this measure, the more in the external direction it is. The reported means for male undergraduates range from 7.71 to 8.72; and the standard deviations, from 3.59 to 3.88.

4. The Omnibus Personality Inventory (OPI).

The OPI was developed by Heist and Yonge (1962) specifically for use in higher education. Form F of the OPI has no time limit but can be completed in approximately one hour. It is composed of 385 descriptive statements each of which may be scored for one or more of fifteen scales. The respondent is asked to mark each item true or false as it applies to him. Norms are based on a sample of the entire entering class at thirty-seven different institutions of higher learning. Validation is based primarily on correlations with other measures.

Internal consistency was measured by the Kuder-Richardson Formula 21 and the split-half method. For the scales used in the present study, those figures as well as test-retest estimates of reliability are reported as follows:
<table>
<thead>
<tr>
<th>Scale</th>
<th>KR21</th>
<th>Split-Half</th>
<th>Test-Retest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking Introversion</td>
<td>.85</td>
<td>.86</td>
<td>.89</td>
</tr>
<tr>
<td>Social Extroversion</td>
<td>.83</td>
<td>.88</td>
<td>.92</td>
</tr>
<tr>
<td>Anxiety Level</td>
<td>.82</td>
<td>.84</td>
<td>.84</td>
</tr>
<tr>
<td>Response Bias</td>
<td>.67</td>
<td>.65</td>
<td>.86</td>
</tr>
</tbody>
</table>

The time interval of the test-retest was between 3 and 4 weeks for all subjects. The individual scales were described in Chapter II. The means and standard deviations of the norm group for these scales are:

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking Introversion</td>
<td>25.3</td>
<td>7.9</td>
</tr>
<tr>
<td>Social Extroversion</td>
<td>23.4</td>
<td>7.1</td>
</tr>
<tr>
<td>Anxiety Level</td>
<td>12.3</td>
<td>4.6</td>
</tr>
<tr>
<td>Response Bias</td>
<td>13.4</td>
<td>4.4</td>
</tr>
</tbody>
</table>

In the case of the Thinking Introversion and Social Extraversion scales, higher scores indicate more of the characteristic. With Anxiety Level, higher scores indicate less of the trait. With Response Bias, high scorers are responding similarly to a group of students who were explicitly asked to make a good impression. Low scorers, on the contrary, may be trying to make a bad impression or are indicating a low state of well-being or feelings of depression.

5. Usage Questionnaire.

A thirteen-question Usage Questionnaire was administered to determine the extent of usage of marijuana and of alcohol, and which drug, if either, the subject preferred. The questions are quite straightforward (see Appendix A).
C. Administration.

The scales were administered in one session for each subject. In view of the nature of some of the questions, the need for anonymity and confidentiality was felt all the more strongly. To this end, the questionnaires were administered in the experimenter's off-campus apartment to groups of four to eight, no subject's identity was known to the experimenter, and no identifying material was elicited within the questionnaires. The sessions lasted from two to three hours. At the end of each session, each subject's materials were stapled together; materials were not examined until all 90 subjects had completed the tests except to determine when a group contained 30 Ss.

The nature of the study was explained in detail to the subjects at the end of each session.

The instructions given included the following points:

Your responses to these questionnaires will be kept confidential. Please do not put your names on any of the materials; it is desired that everything be kept entirely anonymous. The questionnaires will be used in dissertation research. There are no deceptions involved in the research design. The tests are quite straightforward; please answer them honestly.

Thank you very much for your cooperation; it is very much appreciated.

The questionnaires should be done in the following order:

1. Maudsley Personality Inventory;
2. Questionnaires #1, #2, #3;
3. The Omnibus Personality Inventory. For this, the test booklet is used. Put your answers on the blue NCS answer sheet.

On Questionnaire #3 in regard to alcohol, if on a particular occasion you felt happy, euphoric, perhaps a little groggy and a little uninhibited, consider yourself "high." If you felt markedly dizzy, your coordination was poor, you were quite uninhibited — doing things you would not do without having been drinking — you became nauseous, felt very numb, or actually passed out, consider yourself intoxicated.

D. Hypotheses.

The specific hypotheses of the present study are as follows:

1. The Marijuana Group (Group I) will score lower than the Alcohol Group (Group II) on the Extraversion scale of the Maudsley Personality Inventory. The Infrequent User Group (Group III) will score intermediate to Groups I and II.

2. The Marijuana Group will score lower than the Alcohol Group on the Sensation-Seeking Scale. The Infrequent User Group will score intermediate to Groups I and II.

3. The Marijuana Group will score higher (more external) than the Alcohol Group on the Rotter Internal-External Locus of Control scale. The Infrequent User Group will score intermediate to Groups I and II.

4. The Marijuana Group will score higher than the Alcohol Group on the Thinking Introversion scale of the Omnibus Personality Inventory. The Infrequent User Group will score intermediate to Groups I and II.
5. The Marijuana Group will score lower than the Alcohol Group on the Social Extraversion scale of the Omnibus Personality Inventory. The Infrequent User Group will score intermediate to Groups I and II.

6. The Marijuana Group will score lower than the Alcohol Group on the Anxiety Level scale of the Omnibus Personality Inventory. (This will indicate that the Marijuana Group shows more anxiety than the Alcohol Group.) The Infrequent User Group will score intermediate to Groups I and II.

7. There will be no significant differences between Groups I, II, and III on the Response Bias scale of the Omnibus Personality Inventory.

An F test for one way analysis of variance was used to test for differences between the three groups. In those cases where the F test was significant, it was followed by a Tukey (b). The acceptable level of significance was p equal to or less than .05. A discussion of the Tukey (b) can be found in Winer (1962). Some experimental foundation for the efficacy of the Tukey (b) was established by Petrinovich and Hardyck (1969).
CHAPTER IV

RESULTS AND DISCUSSION

This chapter presents the results of the study following the order of the presentation of the hypotheses in Chapter III. Initially, however, the results of the Usage Questionnaire will be examined.

A. Usage Questionnaire.

The actual extent of usage of the members of the sample is outlined in Table 1. As will be quickly seen, both the Marijuana Group and the Alcohol Group used their respective drug to an extent far exceeding the parameters set in the qualifications for membership. These samples represent, therefore, more extreme groups than was anticipated and, for that matter, than is usually used in research with a college population. For the purposes of this study, such extremes are advantageous; one would expect to see more extreme differences on the dependent variables (as pointed out in Chapter II). Every individual of each group was

67
**TABLE 1**

**ACTUAL EXTENT OF USAGE BY SUBJECTS:**
**MEANS AND STANDARD DEVIATIONS BY GROUP**

<table>
<thead>
<tr>
<th>Drug Usage</th>
<th>Group N Mean</th>
<th>S.D.</th>
<th>Group A Mean</th>
<th>S.D.</th>
<th>Group IF Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marijuana</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high in last year</td>
<td>104.90</td>
<td>90.83</td>
<td>0.23</td>
<td>0.05</td>
<td>0.07</td>
<td>0.26</td>
</tr>
<tr>
<td>high in last month</td>
<td>8.73</td>
<td>3.93</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Alcohol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>high in last year</td>
<td>11.43</td>
<td>4.55</td>
<td>116.13</td>
<td>87.90</td>
<td>3.30</td>
<td>3.69</td>
</tr>
<tr>
<td>high in last month</td>
<td>0.70</td>
<td>0.94</td>
<td>6.13</td>
<td>2.02</td>
<td>0.57</td>
<td>0.77</td>
</tr>
<tr>
<td>intoxicated in last year</td>
<td>4.63</td>
<td>3.52</td>
<td>37.30</td>
<td>20.01</td>
<td>2.50</td>
<td>2.16</td>
</tr>
<tr>
<td>intoxicated in last month</td>
<td>0.13</td>
<td>0.35</td>
<td>3.33</td>
<td>2.19</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>
within the limits set for that group. It should be noted that individual deviations from the mean for each group were generally large. The range for marijuana use in the Marijuana Group in the last year was 29 to 400 times; for intoxication on alcohol for the Alcohol Group in the last year, the range was 18 to 100 times. The range for marijuana use in the last year for the Infrequent User Group was 0 to 1 time; for intoxication on alcohol the range was 0 to 7 times.

Results for lifetime usage are not reported because a) they appear to be but very rough estimations in most cases, many Ss leaving that space blank or marked with a question mark; and b) they are not essential to the present study. The results for the past year's usage also appear to be, in general, estimates when one takes into account the large number of even figures (e.g. 52, 100, 104, and so on). No spaces were left blank, however. These estimates are, hopefully, more or less accurate. They tend not to deviate extremely from projections that could be made for a one-year period on the basis of the one-month reported usage.

Inaccuracy of estimations does impose limitations on the findings of this study but not, however, severe ones. Even rough accuracy, with reported usage as extreme as it is, should suffice to differentiate the groups into marijuana users, alcohol users, and infrequent users.
B. Testing of Hypotheses.

As noted in Chapter III, a one-way analysis of variance was used on each dependent measure. If the F test proved significant, it was followed by a Tukey (b). The acceptable level of significance was p equal to or less than .05. Table 2 presents the means and the standard deviations on each of the dependent measures by group. Table 3 presents the results of the analysis of variance.

1. The Marijuana Group Will Score Lower than the Alcohol Group on the Extraversion Scale of the MPI. The Infrequent User Group Will Score Intermediate to Groups I and II.

The means for the Extraversion Scale of the Maudsley Personality Inventory were: Marijuana Group = 23.03; Alcohol Group = 32.27; Infrequent User Group = 26.03. Thus the results were in the predicted direction. The F test was significant at the .01 level. A Tukey (b) was applied to the data, The Marijuana Group differed from the Alcohol Group at the .01 level, The Infrequent User Group differed from the Alcohol Group at the .05 level; it was not significantly different from the Marijuana Group. The mean for the Infrequent User Group did fall between those of Groups I and II. Hypothesis 1 was upheld; the Marijuana Group was more introverted than the Alcohol Group as measured by the Extraversion Scale of
<table>
<thead>
<tr>
<th>Measure</th>
<th>Group M</th>
<th>Group A</th>
<th>Group IF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
</tr>
<tr>
<td>Extraversion Scale from MPI</td>
<td>23.03</td>
<td>10.26</td>
<td>32.27</td>
</tr>
<tr>
<td>Sensation-Seeking Scale</td>
<td>12.30</td>
<td>6.14</td>
<td>17.27</td>
</tr>
<tr>
<td>Rotter I-E</td>
<td>12.53</td>
<td>5.14</td>
<td>10.47</td>
</tr>
<tr>
<td>OPI scales:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking Introversion</td>
<td>26.07</td>
<td>8.86</td>
<td>23.97</td>
</tr>
<tr>
<td>Social Extroversion</td>
<td>19.70</td>
<td>8.16</td>
<td>25.63</td>
</tr>
<tr>
<td>Anxiety Level</td>
<td>10.43</td>
<td>4.63</td>
<td>13.03</td>
</tr>
<tr>
<td>Response Bias</td>
<td>9.93</td>
<td>5.29</td>
<td>11.33</td>
</tr>
</tbody>
</table>
### TABLE 3

ANALYSIS OF VARIANCE AMONG THE THREE GROUPS ON EACH OF THE DEPENDENT MEASURES

<table>
<thead>
<tr>
<th>Measure</th>
<th>Btw. Groups</th>
<th>W/in Groups</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraversion</td>
<td>1331.09</td>
<td>7063.70</td>
<td>8394.79</td>
</tr>
<tr>
<td>Scale from MPI</td>
<td>2</td>
<td>87</td>
<td>89</td>
</tr>
<tr>
<td>Sensation-</td>
<td>373.49</td>
<td>2186.74</td>
<td>2640.26</td>
</tr>
<tr>
<td>Seeking Scale</td>
<td>2594.96</td>
<td>2986.45</td>
<td>89</td>
</tr>
<tr>
<td>Rotter I-E</td>
<td>166.82</td>
<td>1808.29</td>
<td>1975.11</td>
</tr>
<tr>
<td>CPI Scales:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thinking</td>
<td>164.42</td>
<td>2</td>
<td>82.21</td>
</tr>
<tr>
<td>Introversion</td>
<td>4686.16</td>
<td>87</td>
<td>53.86</td>
</tr>
<tr>
<td>Total</td>
<td>4850.59</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Social Extroversion</td>
<td>528.42</td>
<td>2</td>
<td>264.21</td>
</tr>
<tr>
<td>Extroversion</td>
<td>4888.70</td>
<td>87</td>
<td>58.19</td>
</tr>
<tr>
<td>Total</td>
<td>5417.12</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Anxiety Level</td>
<td>166.20</td>
<td>2</td>
<td>83.10</td>
</tr>
<tr>
<td>Response Bias</td>
<td>39.20</td>
<td>2</td>
<td>19.60</td>
</tr>
</tbody>
</table>

*Significance at the .05 level for a, .01 level for b
the MPI, and the Infrequent User Group scored intermediate.

2. The Marijuana Group Will Score Lower than the Alcohol Group on the Sensation-Seeking Scale. The Infrequent User Group Will Score Intermediate to Groups I and II.

The means on the Sensation-Seeking Scale were: Marijuana Group = 12.30; Alcohol Group = 17.27; Infrequent User Group = 15.20. Again, the results are in the expected direction. The F test was significant at the .01 level. A Tukey (b) was applied to the data. The Marijuana Group differed from the Alcohol Group at the .01 level. The Infrequent User Group, although falling between Groups I and II, was not significantly different from either group. Hypothesis 2 was, in general, upheld; the Marijuana Group was less sensation-seeking than the Alcohol Group as measured by the Sensation-Seeking Scale, and the Infrequent User Group scored intermediate.

3. The Marijuana Group Will Score Higher (More External) than the Alcohol Group on the Rotter I-E. The Infrequent User Group Will Score Intermediate to Groups I and II.

The means on the Rotter I-E were: Marijuana Group = 12.53; Alcohol Group = 10.47; Infrequent User Group = 9.23, Although
the Marijuana Group scored higher than the Alcohol Group, the
Infrequent User Group scored lowest of all. The F test was sig-
nificant at the .05 level. A Tukey (b) was applied to the data.
The difference between the Marijuana Group and the Alcohol Group
was not significant. The difference between the Marijuana Group
and the Infrequent User Group was significant at the .05 level.
The Alcohol Group and the Infrequent User Group did not differ
significantly. Thus, Hypothesis 3 was not upheld.

4. The Marijuana Group Will Score Higher than the Alcohol Group on
the Thinking Introversion Scale of the Omnibus Personality
Inventory. The Infrequent User Group Will Score Intermediate
to Groups I and II.

The means on the Thinking Introversion scale were: Marijuana
Group = 26.07; Alcohol Group = 23.97; Infrequent User Group =
27.23. The Marijuana Group did score higher than the Alcohol Group,
but the Infrequent User Group scored higher than either Group I
or Group II. The F test was not significant. Therefore, Hypothesis
4 was not upheld.

5. The Marijuana Group Will Score Lower than the Alcohol Group on
the Social Extroversion Scale of the Omnibus Personality
Inventory. The Infrequent User Group Will Score Intermediate to Groups I and II.

The means for the Social Extroversion scale were: Marijuana Group = 19.70; Alcohol Group = 25.63; Infrequent User Group = 22.53. The means were in the hypothesized direction. The F test was significant at the .05 level. A Tukey (b) was applied to the data. The difference between the Marijuana Group and the Alcohol Group was significant at the .05 level. Although the mean of the Infrequent User Group fell between the means of Groups I and II, it was not significantly different from either group. Hypothesis 5 was upheld; the Marijuana Group was less extraverted than the Alcohol Group as measured by the Social Extroversion scale of the Omnibus Personality Inventory, and the Infrequent User Group scored intermediate to Groups I and II.

6. The Marijuana Group Will Score Lower (More Anxious) than the Alcohol Group on the Anxiety Level Scale of the Omnibus Personality Inventory. The Infrequent User Group Will Score Intermediate to Groups I and II.

The means on the Anxiety Level scale were: Marijuana Group = 10.43; Alcohol Group = 13.03; Infrequent User Group = 9.93. The Marijuana Group scored lower than the Alcohol Group, but the
Infrequent User Group scored lowest of the three groups. The F test was significant at the .05 level. A Tukey (b) was applied to the data. There was no significant difference between the Marijuana Group and the Alcohol Group nor between the Marijuana Group and the Infrequent User Group. The Infrequent User Group differed from the Alcohol Group at the .05 level. Thus, Hypothesis 6 was not upheld.

7. There Will Be No Significant Differences on the Response Bias Scale of the Omnibus Personality Inventory.

The means for the Response Bias scale were: Marijuana Group = 9.93; Alcohol Group = 11.33; Infrequent User Group = 11.33. Although the Marijuana Group scored lower on the Response Bias scale, the F test was not significant. Therefore, Hypothesis 7 was upheld.

A summary of findings will be found in Table 4. It will be seen that, basically, the data support the view that frequent users of marijuana are more introverted (as measured by two instruments) and less sensation-seeking than frequent users of alcohol. The differences on Internal-External Control, Thinking Introversion, and Anxiety Level were not significant. As predicted, there were no significant differences on the Response Bias scale. In no case
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Marijuana Group will score lower than Alcohol Group on the Extraversion scale of the MPI.</td>
<td>upheld&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Infrequent User Group will score intermediate.</td>
<td>upheld, but Groups M and IF not significantly different;</td>
</tr>
<tr>
<td></td>
<td>Groups A and IF significantly different.</td>
</tr>
<tr>
<td></td>
<td>upheld&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>upheld, but neither Group M nor Group A are significantly different from Group IF.</td>
</tr>
<tr>
<td>2. Marijuana Group will score lower than Alcohol Group on the Sensation-Seeking Scale.</td>
<td>not upheld</td>
</tr>
<tr>
<td>Infrequent User Group will score intermediate.</td>
<td>not upheld</td>
</tr>
<tr>
<td></td>
<td>not upheld</td>
</tr>
<tr>
<td></td>
<td>not upheld</td>
</tr>
<tr>
<td>3. Marijuana Group will score higher than the Alcohol Group on the Rotter I-E.</td>
<td>upheld&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Infrequent User Group will score intermediate.</td>
<td>upheld, but neither Group M nor Group A are significantly different from Group IF.</td>
</tr>
<tr>
<td>4. Marijuana Group will score higher than Alcohol Group on the Thinking Introversion scale of the OPI.</td>
<td>not upheld</td>
</tr>
<tr>
<td>Infrequent User Group will score intermediate.</td>
<td>not upheld</td>
</tr>
<tr>
<td>5. Marijuana Group will score lower than Alcohol Group on the Social Extroversion scale of the OPI.</td>
<td>not upheld</td>
</tr>
<tr>
<td>Infrequent User Group will score intermediate.</td>
<td>not upheld</td>
</tr>
</tbody>
</table>

<sup>a</sup>significant at the .05 level
<sup>b</sup>significant at the .01 level
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Marijuana Group will score lower than Alcohol Group on the Anxiety Level scale of the OPI. Infrequent User Group will score intermediate.</td>
<td>not upheld not upheld</td>
</tr>
<tr>
<td>7. There will be no significant differences on the Response Bias scale of the OPI.</td>
<td>upheld</td>
</tr>
</tbody>
</table>
was the difference between the Marijuana Group and the Alcohol Group in a direction other than that hypothesized. Group III, the Infrequent User Group, did deviate on several measures from its hypothesized relation to the other two groups.

It was hoped that the Infrequent User Group would be comparable to the norm groups on each measure, thus forming a small "norm group" from the same population and drawn by the same procedure as Groups I and II. Table 5 lists the means and the standard deviations for the Infrequent User Group and the original norm groups. Except perhaps, for the case of the Anxiety Level scale, the differences are not striking; this suggests that the sample of the present study is not very atypical -- the population from which the present ninety-member sample was drawn is not very unlike the populations from which the norm groups were drawn -- if we can assume that the major portion of the norm group populations use alcohol and marijuana infrequently. This last supposition is unlikely at best (cf. Chapter II).

A second point of note is the fact that the Response Bias scale means were all below the mean of the norm group, suggestive of an attempt to make a bad impression or feelings of depression. On the other hand, these results suggest that the Ss were indeed not attempting to make an especially good impression. None of the means are as much as a standard deviation below the norm; these
<table>
<thead>
<tr>
<th>Measure</th>
<th>Infrequent User Group</th>
<th>Norm Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Extraversion Scale from MPI</td>
<td>26.03</td>
<td>8.38</td>
</tr>
<tr>
<td>Sensation-Seeking Scale</td>
<td>15.20</td>
<td>5.23</td>
</tr>
<tr>
<td>Rotter I-E</td>
<td>9.23</td>
<td>3.91</td>
</tr>
</tbody>
</table>

**OPI Scales:**

<table>
<thead>
<tr>
<th></th>
<th>Infrequent User Group</th>
<th>Norm Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thinking Introversion</td>
<td>27.23</td>
<td>6.63</td>
</tr>
<tr>
<td>Social Extroversion</td>
<td>22.53</td>
<td>7.90</td>
</tr>
<tr>
<td>Anxiety Level</td>
<td>9.93</td>
<td>4.69</td>
</tr>
<tr>
<td>Response Bias</td>
<td>11.33</td>
<td>6.92</td>
</tr>
</tbody>
</table>
results, it would seem, are not a serious limitation to the present study but should be taken into account.

Finally, the I-E means of the present study are all above (more external) the reported mean of 8.15 for the males of the normative sample of Ohio State students (Rotter, 1966). In a recent article Rotter (1971) states that later studies with college students have found the average to be about 11.00. Moskowitz (1971) also reports an I-E average of 10.39 in a single study. It would seem the means obtained in the present study are not atypical.

C. Limitations and Implications for Future Research.

There are a number of obvious limitations within the present study. First, this study does not address itself to cause-effect relationships; it is merely correlational in nature. It does say something about the personality characteristics of users; but it cannot differentiate between predispositions to selective preference versus the effects of the drugs versus, perhaps, some third differential variable. According to Eysenck's formulations, one could predict that introverts would prefer stimulants, and among the acute effects of ingestion of stimulants would be increased introversion. Extraverts would prefer depressants, and depressants
would cause increased extraversion. Whether a more or less permanent increase in introversion or extraversion would occur remains a testable question. The type of study needed to resolve this question as well as elucidate other long-term effects of usage would be longitudinal in nature. Preferably data would begin to be collected before any of the subjects had used either drug — almost necessarily in junior high school.

Secondly, the self-report method is problematic. Eells (1965) suggests, for instance, the possibility that individuals may overstate the degree of drug use to shock or understate it from fear of disciplinary action. Since the design of the present study contains two rough checks on drug usage (selection by acquaintances on the basis of being known to use one drug more than the other and the subjects' self-reports), it is hoped that this limitation will not be very destructive. King (1970a) found no significant differences in the rate of return for anonymous versus identifiable questionnaires dealing with drug usage and attitudes toward drugs, lending some basis for trust in subjects' self-reports.

Thirdly, the sample might be biased in a variety of ways. The subjects were all volunteers; the volunteer rate was, it will be recalled, 59% overall and 81% of those who stated that they fit into one of the groups. Volunteers might be more sensation-
seeking than non-volunteers. However, the overall mean of the present sample on the Sensation-Seeking Scale was 14.92, as compared with the norm mean for college males of 15.10.

Another source of bias might be the illegality of marijuana. Drunkenness is also illegal, of course, as is the use of "hard liquor" by most of the subjects; this writer suspects, however, that marijuana use is viewed as a more serious infraction of the law. If the samples were actually biased in this way, one might expect the marijuana users to score higher on the Sensation-Seeking Scale (cf. Chapter II for a discussion of the connection between sensation-seeking and antisocial tendencies). This was not the case.

Most importantly, inherent in the selection method is the possibility that the acquaintances did not know a random sample of students from which to draw the study sample. There is little that can be said to refute this possibility. It would seem imperative to replicate the study with a sample selected by a more randomizing method. For instance, students enrolled in an introductory psychology course who are required to participate in experiments would seem an adequate population from which to draw a replication sample. It would, however, be difficult to find a large group whose extent of usage is extreme as that of the present sample.
These limitations must be taken into account. Nevertheless, the positive findings of the study do bear out the hypotheses built on the basis of Eysenck's theoretical formulations and, hopefully, lead a step closer to consolidation of previous findings. The results of the present study are consistent with Eysenck's theory, and the finding that marijuana users score significantly more in the introverted direction of the Extraversion scale of the MPI than alcohol users is supportive of that theory.

It is very interesting to note that marijuana smokers, at least in the case of frequent users, are less sensation-seeking than alcohol users. One might speculate that it is no coincidence that marijuana has found such great popularity among the so-called hippies and the "beatniks" before them. As Toffler points out so well in *Future Shock* (1970), the number of stimuli in today's environment is increasing at a rapid rate while the duration of these stimuli is decreasing. In short, American society is confronted with an ever-increasing rate of change. If we assume for a moment that introverts are less able to tolerate new sensations (in general, change), then they might well begin to attempt to insulate themselves from this change. One approach to insulation might be a "return to the land" (forming communes in which one might lead a simpler life) or perhaps just a rejection of modern technological
affluence. When one assumes the validity of Eysenck's theoretical formulations and the actuality of an increased tempo of change as envisioned by Toffler, one might well expect to find some phenomena occurring as a manifestation of attempts by those least able to cope with new stimuli to insulate themselves from these stimuli. It would not be surprising to see a revival of simpler belief systems such as astrology or of simpler life styles such as communes, a wider-spread resistance to technological innovation, and perhaps even a massive "dropping out" from society. Perhaps the hippies are the young introverts who are finding it difficult to adjust to the increasing change and whose life-styles represent a method of escaping the stress of modern American culture. Marijuana and other stimulants would be the drug of choice, if a) hippies are introverts and b) Eysenck's notions are accurate.

Such speculations are, at this point in time, not at all well-founded. However, they are certainly open to being phrased as research questions. Some foundation has been laid by Holmes et al. (as cited in Toffler, 1970) for the notion that the degree of change in one's life situation has an impact on one's health. One could speculate that introverts would be more adversely affected than extraverts in regard to physical health under identical conditions of change.
In summary, it can be said of the present study as of most studies that it raises more questions than it answers.
CHAPTER V

SUMMARY

Research has suggested that persons who frequently use and prefer marijuana would be more introverted than the norm and persons who frequently use and prefer alcohol would be more extraverted than the norm. The theoretical framework of H. J. Eysenck was adopted in the present study. A number of additional variables were thought to be related to Eysenck’s notion of introversion-extraversion. The marijuana users were hypothesized to be:

1. more introverted as measured by the Extraversion Scale of the Maudsley Personality Inventory and the Social Extroversion scale of the Omnibus Personality Inventory (OPI),

2. less sensation-seeking as measured by the Sensation-Seeking Scale,

3. more external as measured by the Rotter I-E,

4. more introverted in their thinking as measured by the Thinking Introversion scale of the OPI, and

5. more anxious as measured by the Anxiety Level scale of the OPI

than frequent users of alcohol.
Three groups were solicited by acquaintances of the experimenter, composed of:

a. persons who use marijuana frequently and alcohol not at all or infrequently and state they prefer marijuana to alcohol,

b. persons who use alcohol frequently and marijuana not at all or infrequently and state they prefer alcohol to marijuana, and

c. persons who use neither drug frequently.

This last group served as a control group. It was hypothesized that they would score intermediate to the first two groups. The sample was composed completely of white undergraduate males.

As a check on the test-taking attitude of the subjects, the Response Bias scale of the OPI was also given. It was predicted that there would be no significant differences on this measure.

Analysis of variance was performed for each dependent measure; whenever the F test was significant, it was followed by a Tukey (b).

The major findings of the present study are as follows:

1) The Marijuana Group scored significantly more in the introverted direction than the Alcohol Group on the Extraversion Scale of the MPI and the Social Extroversion scale of the OPI. The Infrequent User Group scored intermediate on both measures.

2) The Marijuana Group scored significantly less sensation-seeking on the Sensation-Seeking Scale than did the Alcohol Group. The Infrequent User Group scored intermediate.
3) There were no significant differences on Thinking Introversion or Response Bias.

4) There was no significant difference between the Marijuana Group and the Alcohol Group on the Rotter I-E. The Infrequent User Group scored significantly more in the internal direction than did the Marijuana Group.

5) There was no significant difference between the Marijuana Group and the Alcohol Group on the Anxiety Level scale of the OPI. The Infrequent User Group scored significantly more anxious than the Alcohol Group.

The differences between the Marijuana Group and the Alcohol Group were all in the predicted direction; only three, however, were significant. The deviations from the hypothesized direction on the part of the Infrequent User Group are attributed to the possibility that this group is not comparable to the norm groups; infrequent users, to the extent that they are infrequent users, may form a deviant group of their own.

There are a number of limitations to the present study, the most prominent being the possibility that the sample was biased by the manner of subject selection. Nevertheless, the positive findings of the study do bear out hypotheses built upon the theoretical formulations of H. J. Eysenck and, hopefully, lead a step closer to consolidation of previous findings.
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APPENDIX A

USAGE QUESTIONNAIRE

1. Have you ever been "high" on marijuana? Yes____ No____
2. If so, approximately how many times? ________
3. How many times in the last year? ________
4. How many times in the last month? ________
5. Have you ever been intoxicated (drunk) on alcohol?
   Yes____ No____
6. If so, approximately how many times? ________
7. How many times in the last year? ________
8. How many times in the last month? ________
9. Have you ever been high but not drunk on alcohol?
   Yes____ No____
10. If so, approximately how many times? ________
11. How many times in the last year? ________
12. How many times in the last month? ________
13. If you have been high on both alcohol and marijuana, which of these drugs do you prefer; that is, which drug's effects do you find the more pleasant?

   alcohol ________   marijuana ________