The modification of cigarette smoking by oversatiation and covert behavior rehearsal.

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'LA THÈSE A ÉTÉ MICROFILMÉE TELLE QUE NOUS L'AVONS REÇUE
EXTERNAL EXAMINER'S REPORT

As an educator in a field concerned primarily with prevention rather than treatment of respiratory diseases, my recent involvement with the author in his somewhat unique approach to the problem of cigarette smoking cessation has proven to be most valuable.

Educationally-oriented programs have of course been growing in popularity since the release of the Surgeon General's report in 1964 on the relationship between cigarette smoking and disease, particularly lung cancer. However, having myself reviewed and subjectively evaluated most of the related studies regarding smoking withdrawal programs, it seemed to me that, on the basis of apparent diminishing success rates with such educationally-based cessation clinics, a great need has come about for techniques which may, perhaps subconsciously, affect the consummate behaviour of the ingrained smoker.

From the point of view of the local Tuberculosis and Respiratory Disease Association, educational approaches have provided a reason (or reasons) for "kicking the habit" rather than a means, in most cases.

In our initial discussion, it was anticipated that a somewhat original program would ultimately be developed for the smoker who needed some outside support, the smoker couldn't or wouldn't stop smoking by himself. In the end, I was convinced that oversatiation should, rather than a program in itself, be a technique of cessation from which a certain type of smoker may and should benefit.

The project's overall relevance to the field of respiratory disease, in general, and anti-smoking programs specifically, cannot certainly be underestimated. My personal experience with several smoking withdrawal clinics, has given me the experience upon which such a statement can be based.

Tom W. McFadden
Executive Director
Essex County-Windsor TB & RD Association
PREFACE

This research project is an extension of the author's continued attempts to quit smoking. In each period of abstinence, he would again fall prey to the lingering cognitions involved with smoking and the act of stopping a two-pack-a-day habit. The last associations with smoking were pleasant; quitting was a masochistic rite of self-deprivation, and relapse was thus inevitable.

Clearly some kind of aversion training was indicated to reduce if not eradicate the images of pleasure that had been conditioned both directly and vicariously over a quarter of a century. The idea of the cigarette itself providing the agency of its own demise had particular ironic appeal, so the current investigator arbitrarily smoked 10 cigarettes consecutively before quitting, committing himself to repeat this procedure on every subsequent smoking occasion.

The last two years have been absorbed in an attempt to replicate this experience beyond an N of one. From pilot projects to a factorial experiment the combination of oversatiation and covert behavior rehearsal has been fraught with clinical and methodological pitfalls. Such efforts to assess the efficacy of this approach would be impossible without the talent and resourcefulness of the members of the research team that enacted the fantasy of this thesis.

First, the dissertation committee helped to create a solid factorial design from the many possibilities discussed. To my chairman Ray Daly goes the credit of non-directive guidance, providing both the autonomy to investigate independently and the thoroughness to
ensure adequate breadth for a sound theoretical understanding of the area as a whole. My thanks extend to Neal Holland for the inspiration to select behavior therapy as a field of research, and to Ron Frisch for emotional support in following this path. Martin Morf provided strong consultation in statistics and experimental methodology at critical moments of the process, and forever deepened my respect for hardnosed academicians.

Secondly, credit goes to Tom McFadden, director of the Essex County Windsor Tuberculosis and Respiratory Disease Association. Through consultation and participation in several smoking withdrawal clinics together, we both have gained valuable practical experience with a wide variety of smokers. The assistance of Tom and his staff was helpful in providing the materials and publicity to ensure the success of the study.

Thanks also go to the Ontario Thoracic Society, whose funds helped defray the expenses incurred in conducting this research project.

However, when I think of the most crucial people in the project itself, my fellow experimenters come to mind, people like Bob McArthur, Mary Ricketts, Chris Hansvert, Kathy Navarre, and Pat Ryan. Most important was my tireless technician, compulsive conscience, and sound-studio shadow for those three nerve-wracking weeks, George Andreoff, who amazed me with his consistent success in keeping me and the rest of the crew organized.

Finally, a great deal of credit goes to my wife, Susan. Her hard work and clinical skills in manipulating the main covert independent variable in this study (i.e., the experimenter's motivation) was a feat
of strength and endurance for which I shall forever be grateful......

unless I start smoking again.
Abstract

Research on the modification of smoking behavior was comprehensively reviewed, with special attention to subject characteristics, treatment modes, and experimental methodology. It was found that factors associated with the initiation of smoking (such as curiosity, conformity, and rebellion) are different from those associated with its habituation (impulse gratification, affect management, and ritualization), and that social environmental influences are particularly strong in the beginning phases. The correlational search for a typical "smoker's personality profile" has yielded ambiguous findings due to the diversity of methods employed and populations studied. Nevertheless, traits such as orality, impulsiveness, extraversion, sensation-seeking, a fatalistic orientation of external control, chronic stress and emotional instability have been linked with a subcategory of psychologically dependent heavy smokers. This dependency appears to be fostered by the role of nicotine in mediating arousal level and affect management for the smoker.

Nearly all organized programs and techniques devised to induce smoking cessation have proven ineffective for the majority of smokers treated. Where changes in smoking have been reported, differences between treatments have not been consistently replicated, and the variance has been attributed to non-specific factors such as expectancy, effort-placebo, self-monitoring, etc. Educational approaches such as antismoking campaigns yield diminishing returns as the audience susceptible to direct persuasive appeals has been largely
removed from the target population. Smoking withdrawal clinics based on this motif augmented by group support fare little better, with cessation rates between 10 and 20% at follow-ups. Contractual and group techniques, even when augmented by role-playing, systematic desensitization, or contingency management, appear to shift Ss' dependency from smoking to an external support for cessation. When the group or individual contract expires, so generally does the resolve to remain quit that was based on its reinforcement.

Recently, evidence from several independent sources has accumu-
lated in favor of behavior modification techniques inducing negative reactions to smoking. Electric shock has had limited success as an artificial punishing stimulus, and has been abandoned in favor of oversatiation strategies such as smoke-blowing machines and consecutive chain-smoking. Thus the cigarette itself is repeatedly applied as a CS undergoing extinction, and as a UCS eliciting noxious reactions in the treated smoker. Such aversion training can be further generalized beyond the laboratory by the use of imagery and covert sensitization. Hypnosis mainly relies on these effects; while all evidence in its favor comes from uncontrolled and often preselected case studies, the method has shown promise. Covert sensitization, especially in combination with systematic desensitization, has also shown potential under more rigorous experimentation. Nevertheless, the failure of these methods to generate consistently high cessation rates can be attributed to the operations employed rather than their theoretical bases. Sensitization and hypnosis rely entirely on imaginal stimuli and responses, rather than actual practice and
aversive bodily reactions. Oversatiation attempts have not been thorough enough in ensuring sufficient, consistent, overlearned, and cognitively integrated aversion training sessions.

Accordingly, the author developed a method combining oversatiation and covert behavior rehearsal. The procedure consists of 6 1-hour sessions spaced over a 3-week period. During sessions Ss chain-smoke 8 cigarettes while listening to recorded instructions focusing their attention on body reactions and instructing them in rehearsed responses to imagined smoking situations. Smoking is punished by the oversatiation effect while non-smoking responses are negatively reinforced by escape from oversatiating. Based on promising results (91% cessation at end-of-treatment, 43% at 3-month follow-up) in an earlier pilot study, a factorial experiment was conducted to assess the contribution of three process variables to the efficacy of treatment. Oversatiation, covert behavior rehearsal, and a homework instruction (to chain-smoke 8 cigarettes on all smoking occasions) were identified as the independent variables in a $2 \times 2 \times 2 \times 7$ repeated measures design for analysis of variance on smoking rates in the baseweek, and weeks 1, 2, 3, 4, 8 and 16 during the experiment.

A total of 65 Ss were randomly assigned to 8 groups of which six featured active treatment combinations; the remaining two were attention-placebo (discussion group) and self-monitoring controls. Six Es were fully rotated through the 6 treatment groups. Attendance at the sessions was regular, with only 4 Ss failing to come to at least 5 of the 6 sessions as required by the treatment contract.
Results generally failed to support the investigator's hypotheses. The effect of the homework instruction (for which no significant pattern emerged) was unable to be assessed because a random observer spot check revealed that it was not uniformly followed. Analysis of the data converted to percentage-of-baserate smoking confirmed the Oversatiation x Time interaction (p < .001) showing the inferiority of the oversatiation treatment. The inclusion of the covert behavior rehearsal procedure facilitated the reduction of smoking throughout the experiment (p < .01) and at follow-up (p < .01 for interaction with time). An OS x CBR trend (p < .05) was observed, reflecting the superior performance in follow-up of two groups featuring covert behavior rehearsal combined with imagined (rather than actual) oversatiation smoking. Further testing with Sheffe post hoc comparisons of means indicated that the smoking rates of these groups were lower than those of the control groups at the follow-up observations at week 4 (p < .001), at week 8 (p < .01), and at week 16 (p < .005). Cessation rate data again confirmed the performance of these two groups at the last follow-up (over 40% of Ss totally abstinent) compared to other groups (0 to 20% abstinent). Moreover, these data revealed a 38% cessation rate for the group most closely approximating pilot study conditions, a finding obscured in the smoking-rate data.

The relatively poor performance of oversatiation groups was explained in terms of the disruption of self-reinforcement patterns required by the method and the resistance of adult Ss to the rationale for this paradoxical treatment. That is, the fact that Ss had to
smoke at every session regardless of smoking between sessions dissipated motivation to remain abstinent since there was no reward for such behavior and because treatments would also be more noxious. Moreover, such subjects throughout the experiment were deprived the self-reinforcement and social praise for abstention for "records" of continuous days of non-smoking. Secondly, in contrast to the student Ss of the pilot, adult Ss in the general population apparently have greater difficulty in grasping the rationale for the treatment. Given minimal exposure to the cognitive elements of treatment, Ss who oversatiated without the CBR procedure performed uniformly poorly.

However, the CBR procedure demonstrated considerable merit as a treatment, even independently of the OS condition for which it was designed. Of remaining research interest was whether some experience with OS, either direct or vicarious, was necessary for the adequate operation of the treatment elements that the CBR tapes provided. Suggestions for further research in this area were outlined.
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I INTRODUCTION

Cigarette smoking has become the object of increasing worldwide public concern, especially during the last two decades. Since the publication of the first studies linking smoking and disease, research on all the parameters of the practice has risen dramatically. This paper documents this research activity with emphasis on the psychological aspects of smoking, culminating with a rationale for a technique to modify smoking behavior and an experimental test of its efficacy.

A literature of over 4,000 studies conducted worldwide has implicated cigarette smoking as a major causal factor in cancers of the lip, mouth, trachea, and lungs, in emphysema, chronic bronchitis, colds, coronary heart disease, atherosclerosis of the cerebral arteries, and various stomach and intestinal disorders (Advisory Committee to the Surgeon General, 1971; The National Clearinghouse, 1967; The Royal College of Physicians, 1962, 1971; Smoking and Health, 1964; Steinfeld, 1972). Specifically cigarettes, rather than other tobacco products, are cited as dangerous, because inhalation appears to be a crucial factor in the major health damage caused by tobacco smoke. In contrast to the alkaline curing of pipe and cigar tobacco that renders inhalation difficult and uncommon (Hammond, 1959), the acidic qualities of fluecured cigarette tobacco encourage the inhalation of smoke (Grigson, 1970). There is increasing evidence to suggest that if pipe and cigar smoke were inhaled, adverse health effects similar to those of cigarette smoke would be produced (Kershbaum et al., 1966, 1967, 1968). It is for this reason that cigarette smoking has been selected as the
target behavior of the present research, and the investigator has modified Jarvik's (1970, p. 155) definition of smoking. Thus the term "smoking" in this dissertation will refer to the inhalation into the mouth and respiratory system of the volatile products of the combustion of burning tobacco, specifically in the form of a cigarette.

A. Subject Variables: The Characteristics of Smokers


a. Sociological Factors in Smoking

Cultural factors. Throughout history, all known societies have demonstrated some form of hand-mouth non-nutrient behavior, such that the cultural universality of repetitive oral stimulation is an established anthropological fact (Pflaum, 1965). Such behavior may include the chewing or handling of various substances, but most often takes the form of smoking, more specifically, tobacco smoking, which has spread worldwide in the last four centuries.

Since the advent of the cigarette about seventy years ago, patterns of tobacco consumption have appeared to coincide with economic development and social instability. According to several cross-cultural studies, per capita cigarette consumption varies according to such social indices as flexibility of sex roles (Pflaum, 1965),
extraverted life styles (Lynn & Hayes, 1969), racial tension (Weaver, 1962), and war (Richards and Crowdy, 1961; Smoking and Health, 1964). In general smoking tends to be heaviest in those societies that feature low social rigidity, rapid change, transience, stress, and wide ranges of opportunities for both success and failure. Several observers of this phenomenon have attributed the popularity of smoking to its stabilizing effect on the individual in a society where consistent expectancies are lacking to the point of potential chaos. The performance of a stable and consistent behavior whose effects are predictable and controllable may offer comforting, if ineffectual, succorance to an overwhelmed individual in a highly transient society.

Demographic factors. Such speculation derives further support from similar patterns of smoking incidence and other cigarette usage indices within demographic groupings of the various populations studied. Nonsmoking is generally associated with stable patterns of living and family relationships (Haenszel et al., 1956; Higgins et al., 1967; Larson et al., 1961; Lilienfeld, 1959; Rose, 1972; Salber et al., 1964; Zagona, 1967) and the pursuit of an upward-striving self-disciplined work ethic in education (Baer, 1966b; Dunn, 1967; Graham & Gibson, 1971; Higgins et al., 1967; Lieberman, 1969; Mausner & Mischler, 1966; Peters & Ferris, 1967; Pumroy, 1967; Robbins et al., 1971; Rogers & Reese, 1964; Salber et al., 1962; Use of Tobacco, 1969; Veldman & Bown, 1969; Wake, Moore, & Booth, 1966) occupation (Clausen, 1968; Graham & Gibson, 1971; Haenszel et al., 1956; Hammond & Garfinkel, 1968; Higgins et al., 1967; Lilienfeld, 1959; Matarazzo & Saslow, 1960;
McArthur et al., 1958; Rose, 1972; Russek, 1965; Schwartz & Dubitzky, 1968c; Straits, 1968; Use of Tobacco, 1969; Veldman & Bown, 1969) socioeconomic status (Clausen, 1968; McKennell & Thomas, 1967; Straits, 1968), and religious fervor (Borgatta & Evans, 1967; Cattell & Krug, 1967; Fodor, Glass, & Weiner, 1967; McArthur et al., 1958; Straits & Sechrest, 1963). In contrast, smoking is associated mostly with social and occupational instability and tension, and a lack of confidence in social institutions, leading to a self-gratifying consumer ethic featuring downward mobility with lowered motivation and performance in school and career.

Another prominent theme emerging from demographic research is the emergence of smoking among young women in the last fifteen years. With the steady dissolution of sex-role stereotypes in smoking (Pflaum, 1965; Vitz & Johnston, 1965; Zagona & Zurcher, 1965), female patterns of earlier initiation, greater incidence and accelerated consumption have recently approached the formerly higher rates observed in males (Creswell, 1967; Dominion Bureau of Statistics, 1971; Evans, 1967, Haro & Dilley, 1968; Isabelle, 1969; Laughlin & Wake, 1970; Levitt & Edwards, 1970; Lieberman, 1969; McKennell, 1968; Pygott, 1964; Schwartz, 1968; Smoking and Health, 1964; Steinfeld, 1971; Veldman & Bown, 1969; Wake, Moore and Booth, 1966; Zagona, 1967; and Zagona & Zurcher, 1965). Moreover, there are several indications that smoking is positively associated with socioeconomic status—striving among women whereas among men the relationship is inverse (Guilford, 1966; Haro & Dilley, 1968; Schwartz & Dubitzky, 1968c; Srole, 1968; Zagona & Zurcher, 1965).
Initiation and habituation to smoking are related to age. Experimentation with cigarettes generally begins at the age of 11 (Barrett, 1962; Carr, 1963; Cope, 1968; Lieberman, 1969; McKennell, 1968; Royal College of Physicians, 1962, 1971; Schwartz & Dubitzky, 1967a; Smoking and Health, 1964), although recent trends indicate a lowering of initiation age (Laughlin & Wake, 1970; Levitt & Edwards, 1970), especially among girls (McKennell, 1968). According to McKennell, about three years elapse between initiation and the onset of regular smoking. Incidence and consumption rates of smoking increase rapidly in adolescence, reach peak proportions in the 25-44 age bracket, and thereafter gradually decline, according to Schwartz's (1968) review of this curvilinear pattern.

Apart from these three major trends, most studies have failed to demonstrate relationships between smoking and demographic categories. Factors generally unrelated to smoking include racial or ethnic background, religious denominational affiliation, population of community of residence, and income.

Social environmental factors. A consensus of reviews of the literature indicates that the factors associated with starting to smoke are different from those associated with its habituation, and that the influence of the social environment is especially strong in the beginning phases of smoking. Correlations between the incidence of smoking between children and their parents (especially the same-sexed parent) suggest the importance of the process of identification and modelling (Baer & Katkin, 1971; Bergen & Olsen, 1962; Clausen, 1968; Creswell
et al., 1967; Dunn, 1967; Horn et al., 1959; Mausner, 1967; Moyer, 1967; Morison & Medovy, 1961; Offer, 1964; Salber & MacMahon, 1961; Schwartz & Dubitzky, 1967a; Trahair, 1967; Zagona & Zurcher, 1965). The relationship between parental and child smoking patterns appears to diminish as the child grows older (Rosenblatt et al., 1967; Straits & Sechrest, 1963; Wohlford, 1970). Older siblings and peers gain increasing importance as reference models (Berger & Olsen, 1962; Clausen, 1968; Dunn, 1967; Evans, 1967; Forbes, 1970; Hill, 1971; Levitt & Edwards, 1970; Lieberman, 1969; Moyer, 1967; Newman, 1969; Offer, 1964; Ritter & Holmes, 1969; Roberts et al., 1970; Salber et al., 1963a & b; Trahair, 1967; Zagona & Zurcher, 1965). Conformity to smoking is further promoted by mass advertising supporting the illusion held by teenagers that smoking is a majority (70%) behavior, whereas it is now actually practiced by only 40% of the North American population (Lieberman, 1969; National Clearinghouse, 1968). According to the most sophisticated research, although teenagers pay lip-service to adult antismoking attitudes, they secretly hold a positive image of teen and adult smokers (Zagona & Babor, 1969). Smoking is seen among boys as tough, masculine, adventurous; and among girls as sophisticated and mature (Dixit, 1964; McKennell & Bynner, 1969; Pflaum, 1965; Salber et al., 1963; Weir, 1967).

By mid-high school years smokers begin to congregate socially (Levitt & Edwards, 1970; Mausner, 1971; Zagona, 1967) for mutual support and compensation for diminished participation and expectation of success in school activities and achievements, despite their stronger needs for such status (Baer, 1966b; Carney, 1967; Dunn, 1967; Lieberman, 1969;
Rebellion against the double-standard adult disapproval is a common theme among teenage smokers, whose numbers prevail among such groups as delinquents, psychedelic drug users, frequent or heavy drinkers of alcoholic beverages, and those prone to car accidents (Dimond, 1964; Kraus et al., 1970; Robbins et al., 1971; Schonfield, 1966; Smart, 1970; Smart & Jones, 1970; Stewart & Livson, 1966). Furthermore, the less an individual (or subgroup) resembles his cultural group in outlook, orientation, and social values, the more likely he (or that subgroup) is to smoke (Switzer et al., 1965; Zagona, 1967).

The factors prominent in adolescent smoking appear to be: curiosity, identification with and conformity to adult and peer models, social pressure to emulate adult-status behavior plus curiosity in such role-experimentation, compensation for achievement or social inadequacies, and rebellion against hypocritical adult edicts against smoking (Wohlford & Giammona, 1969). Beyond the social environmental factors operating primarily in adolescence, it has been posited that smoking is later maintained by internal needs generated by the personalities of smokers.

b. Personality Factors in Smoking

The research on the personality characteristics of smokers versus non-smokers is complicated by the vast assortment of theoretical approaches, concepts, measures, categories, populations and sample sizes that have been used. While such lack of standardization renders syntheses difficult and conclusions imprecise, "the very heterogeneity of approach adds to the generality of the findings" (Smith, 1970, p. 43).
The present section will extend the review of Smith (1970), present-
ing more recent studies, and again limiting the scope to empirical
rather than speculative articles. The literature is organized under
the six categories of greatest promise: orality, impulsiveness, anti-
social tendencies, internal-external control, and mental health.

Orality. Ever since McArthur, Waldron, and Dickenson (1958)
found that ability to stop smoking was positively correlated with the
number of months their Harvard subjects were fed as babies, psycholo-
gists have been curious about orality in smoking. This concept has
been investigated primarily with special questionnaires and projec-
tive methods whose lack of psychometric sophistication casts some
doubt on the findings derived. Nevertheless, several studies have
offered support for the association between smoking and a reportedly
cold, harsh, and overprotecting mother in the smoker's childhood, and
for the implication of smoking as compensatory symbolic gratification
or retaliation. In the studies of Jacobs and associates (see Table
1.), orality was defined by questionnaire items concerning nail-
biting, pencil chewing, beer drinking, excessive coffee intake and a
number of other "non-nutritional oral intake activities." Orality
thus defined was repeatedly associated with heavy smoking patterns in
males, especially when combined with projective test (Adolescent Conflict
Test and Family Interaction Test) patterns indicating maternal harsh-
ness and overprotection (Jacobs & Spilken, 1971). On another projective
measure (Blacky Picture Test), Kimeldorf and Giewitz (1966) observed
more "oral craving" and "playfulness" signs in seven heavy smokers than
in fifteen non-smokers. While the research results on male subjects studies are unidirectional regarding orality trends in heavy smokers, the findings await independent verification on both sexes by other researchers.

**Impulsiveness.** Smoking, especially heavy smoking, can be categorized as an impulse control dysfunction. Immediate satisfactions seem to outweigh long-term consequences as the smoker turns to consistent self-reward systems in the face of stress, rather than rely on the social support he has come to mistrust. Such is the extension of Jacob's theory to explain the common finding of impulsiveness as a trait among heavy smokers as opposed to non-smokers. Table 2 presents results of 13 studies dealing directly with smoking-impulsiveness relationships. Ten of the 13 indicate that smokers are more impulsive than non-smokers according to questionnaire and interview data; three studies failed to show this relationship; none disconfirmed it. The three non-significant results occurred in studies of older men likely biased (by differential mortality of heavy smokers) toward over-representation of light and moderate smokers. Moreover, the Dubitzky and Schwartz (1968) study, heavy smokers vs. light smokers (rather than
Table 1
Orality (Extension of Review by Smith, 1970, p. 52)\(^1,2\)

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>N</th>
<th>Sample Characteristics</th>
<th>Measurement Procedure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>McArthur, Waldron and Dickinson</td>
<td>1958</td>
<td>191</td>
<td>College males, as adults</td>
<td>SQ (meaning in infancy)</td>
<td>$^+$</td>
</tr>
<tr>
<td>Jacobs, Knapp, et al.</td>
<td>1965</td>
<td>97</td>
<td>Adult males</td>
<td>SQ</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>136</td>
<td>Adult males</td>
<td>SQ</td>
<td>$^{++}$</td>
</tr>
<tr>
<td>Jacobs, Andersen, et al.</td>
<td>1966</td>
<td>134</td>
<td>Adult males</td>
<td>SQ</td>
<td>$^+$</td>
</tr>
<tr>
<td>Knaul'sdorf and Geissitz</td>
<td>1966</td>
<td>22</td>
<td>College males</td>
<td>Blashy test</td>
<td>$^+$</td>
</tr>
<tr>
<td>Jacobs and Spilken</td>
<td>1971</td>
<td>150</td>
<td>College males</td>
<td>SQ (including projective measures)</td>
<td>$^+$</td>
</tr>
</tbody>
</table>

* The comparison of heavy smokers versus non-smokers yields a t-value of 2.45. The comparison of moderate plus heavy versus mild non-smokers yields a t-value of 1.50, which is not significant by the criterion employed here.

Note:

1. For Tables 1 - 6, each entry identifies the author(s), year of publication, sample size; characteristics of the sample, procedure used to measure personality, direction of association between personality and smoking, and an indication of whether that association reached the two-tailed 0.05 level of significance.

Throughout this review the term "association" is used to refer to the findings themselves, rather than to the statistical test applied to these findings. Thus, smoking is said to be significantly associated with a particular aspect of personality, whether the significance of that relationship was found with measures of correlation or with measures of group-differences.

2. The following personality questionnaires were used in one or more of the studies reviewed here; they are referred to by abbreviations: Cornell Medical Index (CMI), California Personality Inventory (CPI), Edwards Personal Preference Schedule (EPPS), Guilford-Zimmerman Temperament Survey (G-Z), James Test of Internal and External Control (JTEC), Kuder Personality Inventory (CPI), Minnesota Counseling Inventory (PCI), Minnesota Multiphase Personality Inventory (MCPI), Neuropsychiatric Screening Adjunct (NSA), Sashir Psychosomatic Screening Inventory (SPSI), Sixteen Personality Factor Questionnaire (16 PFS), Strong Vocational Interest Blank (SVIB), and Taylor Manifest Anxiety Scale (TMAS). In addition to these published questionnaires, numerous unpublished questionnaires were also used. These will be referred to hereafter as Special Questionnaires (SQ). The standard abbreviations are used to designate scales of the MCPI: Lie (L), Hypochondriasis (H\(_L\)), Depression (D), Hypertension (H\(_H\)), Psychopathic Deviate (P\(_Q\)), Masculine-Feminine (CPI), Paranoia (P\(_Z\)), Psychasthenia (P\(_P\)), Schizophrenia (S\(_S\)), Hysteresis (H\(_H\)), Social Introversion (S\(_I\)).
### Table 2

**Impulsiveness (Extension of Review by Smith, 1970, p. 50)**

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>N</th>
<th>Sample Characteristics</th>
<th>Measurement Procedure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lilienfeld</td>
<td>1959</td>
<td>1806</td>
<td>Males and females, age 18-70</td>
<td>NSA:item*</td>
<td>S+</td>
</tr>
<tr>
<td>Whiskin et al.</td>
<td>1962</td>
<td>174</td>
<td>Males, age 50-90</td>
<td>MMPI:Gough’s Impulsivity Scale</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>228</td>
<td>Females, age 50-90</td>
<td>MMHP:Gough’s Impulsivity Scale</td>
<td>S+</td>
</tr>
<tr>
<td>Eysenck</td>
<td>1963</td>
<td>3000</td>
<td>British males, age 45-64</td>
<td>SQ</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>136</td>
<td>Adult males</td>
<td>SQ:impetuousness</td>
<td>S+</td>
</tr>
<tr>
<td>Schubert</td>
<td>1965</td>
<td>172</td>
<td>College males and females</td>
<td>SQ+</td>
<td>S+</td>
</tr>
<tr>
<td>Lane et al. Schwartz</td>
<td>1966</td>
<td>675</td>
<td>Airmen</td>
<td>G-Z:restraint</td>
<td>S+</td>
</tr>
<tr>
<td>Dubitsky and Schwartz</td>
<td>1968</td>
<td>324</td>
<td>Adult males</td>
<td>MMPI:Block’s Scale of Ego Control</td>
<td>N.S.</td>
</tr>
<tr>
<td>Lieberman</td>
<td>1969</td>
<td>1562</td>
<td>Teenage males and females</td>
<td>SQ:Self and peer ratings</td>
<td>S+</td>
</tr>
<tr>
<td>Jacobs, Knapp et al.</td>
<td>1970</td>
<td>130</td>
<td>College males</td>
<td>Clinical interview</td>
<td>S+</td>
</tr>
<tr>
<td>Jacobs and Spilken</td>
<td>1971</td>
<td>150</td>
<td>College males</td>
<td>SQ</td>
<td>S+</td>
</tr>
</tbody>
</table>

* This item reads: Do you often say things you later wish you had not said?

non-smokers) found trends towards impulsiveness in heavy smokers that reached the 0.10 level of significance. Since the Jacob's hypothesis purports to deal with the dynamics of heavy smokers versus non-smokers, the results surveyed here generally support the impulsiveness–smoking relationship. However, the research awaits further independent verification, especially among females, to qualify as an indication of a general trend. To further complicate matters, recent research (Jacobs, 1972; Jacobs, Knapp, et al., 1970; Jacobs & Spilken, 1971) has revealed an obverse type of impulse control pathology, i.e., inhibition, constriction, procrastination, and compulsive guardedness. This syndrome, integrated within the Jacob's framework of impulsiveness, may not emerge as such in the conceptual scheme utilized in the research of other investigators.

Antisocial tendencies. Table 3 presents 40 analyses from 27 reports on the relationship between smoking and "antisocial tendencies", e.g., rebelliousness, psychopathic deviance, defiance, etc. Of the 40 analyses, 35 yielded significant data indicating that smokers, especially male heavy smokers, are more antisocial than nonsmokers.

The data sources (questionnaires and ratings) leave room for alternate interpretation of the findings. Among questionnaire studies, the antisocial self-reports have been convincingly attributed to lower defensiveness and social confidence among smokers (Evans, 1967; Robbins...
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>N</th>
<th>Sample Characteristics</th>
<th>Measurement Procedure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawton and Phillips</td>
<td>1956</td>
<td>62</td>
<td>General medical and surgical patients</td>
<td>SQ: agreeable, disagreeable</td>
<td>$^+$</td>
</tr>
<tr>
<td>Lilienfeld</td>
<td>1959</td>
<td>1806</td>
<td>Males and females, age 18-70</td>
<td>NSA:items</td>
<td>$^+$</td>
</tr>
<tr>
<td>Schubert</td>
<td>1959</td>
<td>226</td>
<td>College males and females</td>
<td>SQL:PD</td>
<td>$^+$</td>
</tr>
<tr>
<td>Koponen</td>
<td>1960</td>
<td>1418</td>
<td>Adult males</td>
<td>EPS: aggression</td>
<td>$^+$</td>
</tr>
<tr>
<td>Thomas</td>
<td>1960</td>
<td>657</td>
<td>Medical students (mostly males)</td>
<td>SQ: anger in response to stress</td>
<td>$^+$</td>
</tr>
<tr>
<td>Whiskin, et al.</td>
<td>1962</td>
<td>402</td>
<td>Males and females, age 50-90</td>
<td>MCT: PD</td>
<td>N.S.</td>
</tr>
<tr>
<td>Straits and Sechrest</td>
<td>1963</td>
<td>125</td>
<td>College males</td>
<td>MCT: PD</td>
<td>$^+$</td>
</tr>
<tr>
<td>Salber and Kochman</td>
<td>1964</td>
<td>131</td>
<td>High school senior males</td>
<td>MCT: items</td>
<td>$^+$</td>
</tr>
<tr>
<td>Jacobs, Knapp, et al.</td>
<td>1965</td>
<td>97</td>
<td>Adult males</td>
<td>SQ: defiance</td>
<td>$^+$</td>
</tr>
<tr>
<td>McDonald</td>
<td>1965</td>
<td>129</td>
<td>Unmarried first pregnancy females</td>
<td>SQ: defiance</td>
<td>N.S.</td>
</tr>
<tr>
<td>Schubert</td>
<td>1965</td>
<td>956</td>
<td>College males and females</td>
<td>MCT: PD</td>
<td>$^+$</td>
</tr>
<tr>
<td>Weatherley</td>
<td>1965</td>
<td>102</td>
<td>Male college students</td>
<td>EPS: aggression</td>
<td>N.S.</td>
</tr>
<tr>
<td>Lane et al.</td>
<td>1966</td>
<td>675</td>
<td>Airman</td>
<td>G-Z: scales F &amp; P*</td>
<td>$^+$</td>
</tr>
<tr>
<td>Schoenfield</td>
<td>1966</td>
<td>121</td>
<td>Male delinquent vs. non-delinquent</td>
<td>SQ: patterns of smoking</td>
<td>$^+$</td>
</tr>
<tr>
<td>Stewart and Livson</td>
<td>1965</td>
<td>99</td>
<td>Males and females</td>
<td>Teacher ratings</td>
<td>$^+$</td>
</tr>
<tr>
<td>Cattell and Krug</td>
<td>1967</td>
<td>256</td>
<td>College males and females</td>
<td>16PF: profile analysis correlations</td>
<td>$^+$</td>
</tr>
<tr>
<td>Dvorak</td>
<td>1967</td>
<td>635</td>
<td>College males and females</td>
<td>MCT: PD</td>
<td>$^+$</td>
</tr>
<tr>
<td>Evans, et al.</td>
<td>1967</td>
<td>1851</td>
<td>College males</td>
<td>MCT: PD</td>
<td>$^+$</td>
</tr>
<tr>
<td>Smith</td>
<td>1967</td>
<td>762</td>
<td>College males and females</td>
<td>EPS: aggression N.S.</td>
<td>Peer ratings</td>
</tr>
<tr>
<td>Smith</td>
<td>1967</td>
<td>700</td>
<td>Nursing students</td>
<td>Peer ratings</td>
<td>$^+$</td>
</tr>
<tr>
<td>Lieberman</td>
<td>1969</td>
<td>1562</td>
<td>Teenage males and females</td>
<td>SQ: self &amp; peer ratings</td>
<td>$^+$</td>
</tr>
<tr>
<td>Smith</td>
<td>1969</td>
<td>188</td>
<td>High school males</td>
<td>Peer ratings</td>
<td>$^+$</td>
</tr>
<tr>
<td>Smith</td>
<td>1969</td>
<td>198</td>
<td>High school females</td>
<td>Peer ratings</td>
<td>$^+$</td>
</tr>
<tr>
<td>Smith</td>
<td>1970</td>
<td>311</td>
<td>Peurto Rican high school females</td>
<td>Peer ratings</td>
<td>$^+$</td>
</tr>
<tr>
<td>Jacobs, Knapp, et al.</td>
<td>1970</td>
<td>130</td>
<td>College males</td>
<td>Clinical Interview:</td>
<td>$^+$</td>
</tr>
<tr>
<td>Reiter</td>
<td>1970</td>
<td>60</td>
<td>College males and females</td>
<td>EPS: Neur. &amp; Def.</td>
<td>$^+$</td>
</tr>
<tr>
<td>Jacobs and Spilken</td>
<td>1971</td>
<td>150</td>
<td>College males</td>
<td>SQ: defiance</td>
<td>$^+$</td>
</tr>
<tr>
<td>Robbins et al.</td>
<td>1971</td>
<td>86</td>
<td>College males and females</td>
<td>MCT:PD and Dream</td>
<td>$^+$</td>
</tr>
</tbody>
</table>

* Scales F and P are "Friendliness" and "Personal Relations," respectively.
+ One of four samples was significant; the other three were not.
et al., 1971; Schubert, 1965) and especially to greater nonsmoker aversion to social and other kinds of excitement (Berger, 1971). Several investigators have discovered that the "antisocial" elevations (such as the MMPI Pd scale) seen in the test protocols of many smokers reflect factors of social immaturity, sensation-seeking, extraversion, and self-indulgent irresponsibility more accurately than the hostile components of these scales (Berger, 1971; Cattell & Krug, 1967; Veldman & Bown, 1969; Zuckerman, 1970).

Among peer and teacher ratings, disapproval of possibly higher motoric activity, lower grades, and the habit itself may contaminate otherwise well-controlled research with halo effects (Stewart & Livson, 1966; Smith, 1967). Nevertheless, the more recent research of Smith (1969a, 1969b) on large samples of two populations adds considerable weight to the implication of antisocial tendencies among smokers. He found that smokers received significantly (p < .001) lower peer ratings on each of six personality traits loading positively on a factor he labelled "agreeableness," and significantly higher scores on each of five traits loading negatively on that factor.

Amplifying this finding, it is noteworthy in the present review that none of the 25 articles showed opposite results and that most confirmed antisocial trends among smokers. Therefore, although the inherent limitations of the group-difference method and the problems of contamination and response bias obscure the meaning and scope of these findings, the bulk of the evidence still favors Smith's (1970) conclusion that smokers display more antisocial tendencies than nonsmokers.
Extraversion. Table 4 outlines 20 studies dealing with the relationship between extraversion and smoking. Of the 32 analyses reported in the literature, 27 obtained statistical significance, and all showed

smokers to be more extraverted than nonsmokers. Of the remaining five analyses, four approached but did not achieve significance, and one did not report a statistical test. Only one study (Rode et al., 1971) has indicated an opposite trend, and this was short of significance.

The tide of evidence has flowed from many diverse populations of both sexes and various measurement instruments. Moreover, data from Cattell's laboratory, not charted here, shows that the relationship between smoking and extraversion appears to hold between nations as well as between individuals (Lynn & Hayes, 1969). Lest the reader be overwhelmed by appearances, it is well to remember Matarazzo's (1966) observation that a mean difference of 0.5 on the 31-item Maudsley Extraversion Scale, even though statistically significant, is virtually meaningless psychologically. One should also heed Wohlford's warning against attributing general significance to aggregate findings (Wohlford & Giammona, 1969).

Moreover, only recently could smoking be predicted from an extraversion measure (Zuckerman, Neary, & Brustman, 1970). Bearing these qualifications in mind, the near unanimity of results favors the maintenance of Smith's (1970) conclusion that smokers are more extraverted than nonsmokers.
Table 4
Extraversion (Extension of review by Smith, 1970, p. 45)

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>N</th>
<th>Sample Characteristics</th>
<th>Measurement Procedure</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Davis</td>
<td>1956</td>
<td>775</td>
<td>British males, age 18-34</td>
<td>S.O.</td>
<td>Not re-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ported</td>
</tr>
<tr>
<td>Kochert et al.</td>
<td>1958</td>
<td>246</td>
<td>College males</td>
<td>SVIB</td>
<td>$+$</td>
</tr>
<tr>
<td>Schubert</td>
<td>1959</td>
<td>226</td>
<td>College males and females</td>
<td>MOFT:5I</td>
<td>$+$</td>
</tr>
<tr>
<td>Eysenck et al.</td>
<td>1960</td>
<td>2360</td>
<td>British males, age 40-70</td>
<td>S.O.</td>
<td>$+$</td>
</tr>
<tr>
<td>Eysenck</td>
<td>1963</td>
<td>1000</td>
<td>British males, age 45-64</td>
<td>S.O.</td>
<td>$+$</td>
</tr>
<tr>
<td>Straits and Sechrest</td>
<td>1963</td>
<td>175</td>
<td>College males</td>
<td>MOFT:5I</td>
<td>N.S.</td>
</tr>
<tr>
<td>Feather</td>
<td>1963</td>
<td>78</td>
<td>Australian college males</td>
<td>MPI</td>
<td>$+$</td>
</tr>
<tr>
<td>Selber and Roehman</td>
<td>1964</td>
<td>131</td>
<td>High school senior males</td>
<td>MCI:items</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>153</td>
<td>High school senior females</td>
<td>MCI:items</td>
<td>$+$</td>
</tr>
<tr>
<td>Schubert</td>
<td>1965</td>
<td>134</td>
<td>College males and females</td>
<td>MOFT:5I</td>
<td>$+$</td>
</tr>
<tr>
<td>Cattell and Krug</td>
<td>1967</td>
<td>356</td>
<td>College males and females</td>
<td>16 FP:Introversion</td>
<td>$+$</td>
</tr>
<tr>
<td>Lane et al.</td>
<td>1966</td>
<td>675</td>
<td>Others</td>
<td>G1:socialability</td>
<td>N.S.</td>
</tr>
<tr>
<td>Evans et al.</td>
<td>1967</td>
<td>1051</td>
<td>College males</td>
<td>MOFT:5I</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1813</td>
<td>College females</td>
<td>MOFT:5I</td>
<td>$+$</td>
</tr>
<tr>
<td>Smith</td>
<td>1967</td>
<td>700</td>
<td>Female nursing students</td>
<td>16 FP:Introversion</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>208</td>
<td>College males</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>121</td>
<td>College females</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td>Smith</td>
<td>1969</td>
<td>1562</td>
<td>National sample of males and females aged 13-18 years</td>
<td>S.O:Self and peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td>Lieberman</td>
<td>1969a</td>
<td>358</td>
<td>High school males</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>195</td>
<td>High school females</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90</td>
<td>Junior high school males</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>96</td>
<td>Junior high school females</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td>Smith</td>
<td>1969b</td>
<td>331</td>
<td>Puerto Rican high school males</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>568</td>
<td>Puerto Rican high school females</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td>Kanfer and Dolbe</td>
<td>1970</td>
<td>100</td>
<td>Indian males</td>
<td>Peer ratings</td>
<td>$+$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Eysenck Personality Inventory</td>
<td>$+$</td>
</tr>
<tr>
<td>Reiter</td>
<td>1970</td>
<td>60</td>
<td>College males and females</td>
<td>EFPS:Chg. and Ex</td>
<td>$+$</td>
</tr>
<tr>
<td>Zuckerman, Neary, and Brumman</td>
<td>1970</td>
<td>43</td>
<td>College males</td>
<td>Sensation Seeking Scale</td>
<td>N.S.</td>
</tr>
<tr>
<td>Berger</td>
<td>1971</td>
<td>652</td>
<td>College males and females</td>
<td>MOFT:Item analysis</td>
<td>$+$</td>
</tr>
<tr>
<td>Meares, Griswade et al.</td>
<td>1971</td>
<td>204</td>
<td>Pregnant females</td>
<td>Eysenck Personality Inventory</td>
<td>$+$</td>
</tr>
<tr>
<td>Rode</td>
<td>1971</td>
<td>601</td>
<td>Canadian males and females</td>
<td>Cattell 16 PF</td>
<td>N.S.</td>
</tr>
</tbody>
</table>
External control. Table 5 presents results of seven analyses dealing with the concept of "external control" and smoking. The internal-external control dimension measures "the extent to which a person perceives events as determined by factors intrinsic to himself versus the extent to which he views events as determined by fate, chance, or the manipulation of others" (James et al., 1965). Of these seven analyses, all showed smokers to be more externally oriented than nonsmokers, five at a statistically significant level.

As it is possible that I-E attributions may vary across societies, eras, occupations, and life styles, further research on a wider sampling of populations is necessary. For now, the tentative observation is that smokers appear to be more fatalistic or externally oriented than nonsmokers.

Mental health. Table 6 summarizes the literature relating to a broad category of adjustment or stress indices. It includes such conceptual entities as "neuroticism", "anxiety", "adjustment", "emotionality", and "excitability" and other labels of distress, across which the lack of consistency in findings is hardly surprising.

Slightly more than half the analyses show a significant association
Table 5

External Control (Extension of review by Smith, 1970, p. 49)

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>N</th>
<th>Sample Characteristics</th>
<th>Measurement Procedure</th>
<th>Result</th>
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<tr>
<td>Lilienfeld</td>
<td>1959</td>
<td>1806</td>
<td>Males and females, age 18-70+</td>
<td>NSA:item*</td>
<td>S+</td>
</tr>
<tr>
<td>Straits and Sechrest</td>
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<td>245</td>
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<td>S+</td>
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<tr>
<td>James et al.</td>
<td>1965</td>
<td>185</td>
<td>College males</td>
<td>JTIEC</td>
<td>S+</td>
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<tr>
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<td></td>
<td>272</td>
<td>College females</td>
<td>JTIEC</td>
<td>S+</td>
</tr>
<tr>
<td>Christiano et al.</td>
<td>unpub-</td>
<td></td>
<td>High school males and females</td>
<td>SQ:item #</td>
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<tr>
<td>Hjelle and Clouser</td>
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<td>49</td>
<td>College females</td>
<td>JTIEC</td>
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</table>

* This item reads as follows: Do you feel you get more share of bad luck (Reviewer's comment: Lilienfeld's item does not precisely fit James' definition of Internal-External Control, but does relate to that concept; hence, results obtained with it are included in this table).

# The item reads as follows: When a man is born, the success or failure he is going to have is already in the cards, and there is not much he can really do to change it.

+ This t-value of 1.94 is just short of the 1.96 which is needed for p=0.05 with a two-tailed test. If significant, it would have been entered as S+. 
<table>
<thead>
<tr>
<th>Study</th>
<th>Sample Size</th>
<th>Methodology</th>
<th>Findings</th>
</tr>
</thead>
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<tr>
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<td>1971</td>
<td>211</td>
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</tbody>
</table>

* Differences between anxious and nonanxious are tested separately for each of 25 items representing different symptoms. In the test of total score for the total group of 25 items, only those items differing significantly are classified as + and are not included in the %-prefix. 

between smoking and "mental health", suggesting that the relationship is inverse. Only two studies imply less neuroticism and emotionality for smokers, the former among Indian males (Kanekar & Dolke, 1970), and the latter employing a measure of emotional flatness more akin to sociopathy than emotional stability (Nesbitt, 1972). Thus the limited contradictory evidence for the prevalent relationship cannot be taken as representative. However, it should be noted that numerous studies failed to confirm the "mental health" trend, among them large-sample surveys that did show other personality differences related to the practice of smoking. While many (28-38%) smokers do admit to coping with stress by use of their habit (Ikard, Green, and Horn, 1968), and seem from peer observations to be more agitated, active, and emotional (Nesbitt, 1972; Smith 1969 a & b), it seems they vary on self-reports of anxiety and emotionality to such an unreliable extent that little can be concluded. There is mild evidence to suggest a trend toward greater stress and poorer "mental health" among smokers, but additional work is needed to further define the specific aspects of mental health on which smokers and nonsmokers differ.

To summarize, many regular smokers, and especially heavy smokers have exhibited "adolescent" personality characteristics to a greater extent than their non-smoking peers. Such traits include:

(a) oral, self-indulgent, and impulsive sensation-seeking behavior and drug usage patterns, sometimes conflicting with mass cultural norms and labelled "antisocial";

(b) gregariousness and socially outgoing or extraverted interaction patterns;
(c) a fatalistic external orientation that attributes the events of
life to factors largely outside the individual's control, coupled
with a lifestyle of chronic emotional stress or instability.

It is impressive that a trend toward the chimera "smoking profile"
has been identified despite the wide diversity in populations studied
and instruments used. Nevertheless, the group-difference approach
upon which most of this research is based limits the width of appli-
cation of such findings. More likely this profile describes primarily
a subcategory of psychologically dependent heavy smokers. This group
would only emerge in greater statistical prominence by the attrition
of casual and social smokers if public attitudes were to strongly
oppose the practice. For now, however, the concept of "the smoking
personality" is inappropriate for this multiply-determined and main-
tained behavior.

c. Motivational factors in smoking

The effects of nicotine. The World Health Organization (1957),
among other eminent authorities (e.g., Smoking and Health, 1964),
has concluded that smoking is an instance of habituation (psycholo-
gical dependence) rather than addiction (physiological dependence).
Nevertheless, some researchers have attempted to demonstrate the
role of nicotine in the tobacco habit (e.g., Russell 1971 a & b).
Nicotine has shown weak but positive incentive properties in habitu-
ated animal (Deneau & Inoki, 1967; Jarvik, 1967) and human subjects
(Ague, 1972; Ashton & Watson, 1970; Frith, 1971; Lucchesi et al.,
1967; Jarvik et al., 1970). On the other hand, there are numerous findings showing the independence of nicotine and smoking habits such as to relegate the incentive properties of the drug itself to a minor role in the maintenance of the habit (e.g., above studies plus Eisinger, 1971; Finnegan et al., 1945; Goldfarb et al., 1970; Modonesi & Rongo, 1966). Similarly, tobacco deprivation is often a distressing and negatively motivating state for habituated smokers, sometimes causing impaired concentration and psychomotor performance (Heimstra et al., 1967; Perard, 1967), slowing EEG wave patterns (Knapp et al., 1963; Ulett & Itil, 1969), and falling cardiovascular indices (Larson, Haag, & Silvette, 1961). However, where withdrawal symptoms have been reviewed thoroughly, it has been found that: (a) no syndrome has been consistently identified; (b) often symptoms are completely absent; (c) the most prominent symptoms (craving, anxiety, irritability, and restlessness) are more indicative of psychological rather than physiological dependence (Chessick, 1964; Goodman & Gilman, 1965; Hammond & Percy, 1958; Jarvik, 1970; Seever & Deneau, 1963).

Several investigators have attempted to attribute the popularity of cigarettes not to nicotine but to other components of smoke or the act of smoking. Their conjectures regarding the importance of taste, sight and smell (Brown, 1963; Pybus et al., 1969; Schwartz & Dubitzky, 1968), movement and manipulation (Rosenburg, 1959), carbon dioxide inhalation (Cahoon, 1971) and pleasurable irritation of the mouth and respiratory tract (Ejrup, 1965; Pangborn & Sharon, 1971), remain generally unproven. It is possible that such factors are salient for some
smokers, but it would appear that such smokers are in a minority (Jarvik, 1970).

Another physiological possibility has been examined, that of a constitutional predisposition to smoking (Seltzer, 1959; 1963; 1967). Well-controlled research has demonstrated the inadequacy of this theory, indicating instead that bodily differences between nonsmokers and smokers are largely attributable to the practice itself (Baer, 1966a; Brown, 1968; Carney et al., 1969; Chedd, 1968; Dies et al., 1969; Lincoln, 1970). Smoking greatly increases the production of corticosteroids and glucocorticoids on each smoking occasion, converting protein to sugar to energy, or, if unused, to fat (Chedd, 1968).

A thorough review of the literature on the physiological effects of nicotine concluded that "small doses of nicotine had a stimulating action on the central nervous system whereas large doses depressed" (Silvette et al., 1962, p. 172). In the typical human dosage range, i.e. 1 – 2 micrograms per kilogram per puff of smoke, the effect is sympathomimetic. In terms of cardiovascular, biochemical and electroencephalographic indices, the organism is in a temporary heightened state of alertness (Armitage et al., 1967, 1968; Brown, 1967, 1968; Frankenhaeuser et al., 1970; Goldstein et al., 1967; Hoff & Hockman, 1967; Murphree et al., 1967; Philips, 1971, etc.). Despite such arousal smoking appears to have no consistently demonstrated facilitative effects on learning or performance (except vigilance) in human subjects (Jarvik, 1970; Larson et al., 1961; Larson & Silvette, 1968).
Therefore, learning-facilitation is unlikely to be a genuinely motivating factor in smoking.

Nicotine and arousal. On the other hand, the pharmacological effects of nicotine and the arousal it triggers may interact with positive and negative feedback systems in maintaining an optimal level of stimulation for the organism (Jarvik, 1970; Nedergaard & Bevan, 1967; Schmelterlow et al., 1967; Stein & Wise, 1967; Wise & Stein, 1969). Thus smokers may self-stimulate with nicotine to achieve the best energy, affect, and cortical activation levels to adjust to the environmental situation (Frith, 1971).

The facilitation of nicotine in reducing the boredom and blandness of low-arousal situation is obvious from the stimulant properties of the drug (Frith, 1971; Nesbitt, 1970; Schubert, 1965). The converse phenomenon, that of the "calming" effect of smoking in high arousal situations, is paradoxical. Despite evident physiological arousal, smokers have been reported to feel and observed to act less emotional when smoking than when not (Nesbitt, 1970, 1972, 1973). It is possible that smokers may learn to ignore arousal states to which they have habituated and, by Wilder's (1967) law of initial values, react less to environmental stress stimuli superimposed on their elevated basal levels, or misattribute the arousal experienced to be merely a function of the cigarette (Nesbitt, 1973). An alternative possibility is that, following the artificial stimulation of nicotine, the physiological depression or fatigue of the refractory period is felt or interpreted as "relaxation" by the smoker, and that
through repeated practice of the chain, the act of lighting a cigarette becomes a cue for adopting an attitudinal and behavioral set for relaxation, a process that appears to require considerable experience with smoking (McKennell, 1970).

Frith's (1971) findings that men have a higher desire to smoke in low arousal situations and women crave smoking in high arousal situations, while heavy smokers desire a cigarette in any situation, further complicates the relationship between nicotine and arousal. Frith attributes the sex differences to rate and depth of inhalation with the common finding that women inhale less than men (Todd, 1969; Trahair, 1967) and may perhaps use smoking in a more motoric or gestural manner to dissipate stress or negative affect, a speculation shared by Delarue and Moss (1972). Whatever the explanation, it appears that different people use smoking in different ways to modulate affective states in varying arousal situations.

**Affect management typologies.** The usage of cigarettes to manage affect has inspired investigation of motivational typologies for smoking habits in the hope of developing a diagnostic system for treatment. The prototype of such schemata was the affect management model of Tomkins (1966; 1968) in which four types of smoking were delineated: smoking to increase positive affect, smoking to reduce negative affect, habitual (affectless) smoking, and addictive smoking which combines both positive and negative affect smoking. With the assistance of the National Clearinghouse for Smoking and Health, a scale to measure these types was designed by Horn and Waingrow (1966). When tested on several
samples (Ikard, Green & Horn, 1969), the results generally supported the model with the emergence of six factors. The pleasurable relaxation, stimulation, and sensorimotor manipulation aspects of "positive affect smoking" were found to be independent factors. The majority of smokers endorse pleasurable relaxation as their main motivation; a smaller proportion (28% in males, 38% in females) report negative affect reduction; about a third of smokers can be considered addictive, and roughly 10% habitual.

McKennell (1970), factor analyzing surveys of British national samples, found the same seven factors in the smoking of both adolescents and adults. "Social smoking" and "social confidence smoking" peak in adolescence and thereafter decline with age, as they do in American samples (Lieberman, 1969). "Nervous irritation" smoking appears early among teenagers, while "relaxation" smoking and "addiction" smoking develop much later in the learning process. The other factors (smoking alone, activity accompaniment, food substitution) had less general application.

More recently, Mausner (1971) reported a series of five experiments producing evidence disconfirming the original typology. Tomkins (1968) had by then modified his model to differentiate affects within each category, and to include factors such as higher-order conditioning and dissonance reduction. Using a revised scale, Ikard and Tomkins (1973) validated self-reports on affective types of smoking by observations of subjects in experimentally contrived affective situations, and demonstrated that psychologically addicted
smokers experienced the greatest discomfort during cigarette deprivation and the greatest difficulty following a stimulus-control withdrawal procedure.

In summary, factor analytic studies on the motivation for smoking indicate the early role of social factors and the later role of affect management and psychological dependency in the habituation of smoking. The physiological effects of nicotine may act as a cue for affect alteration, but otherwise the drug seems of minor importance in the habit. Some skepticism may be prudent in interpreting the research on affect management typologies for smokers. Experimenter bias is possible in the wording and selection of items, the naming and interpretation of factors, and the demand characteristics conveyed to observed smokers. Because most people smoke for a variety of reasons under varying circumstances, any motivational typology is limited in its application only to those who smoke for a consistent motive across most smoking situations. Furthermore, in terms of differential diagnosis for different suggested treatments according to affective type, no empirical evidence for the predictive efficacy of Tomkin's model has been reported to date. Nevertheless, one general conclusion can be extracted from this literature: the degree to which a smoker has come to depend on cigarettes to manage both positive and negative affect will likely be a negative prognostic indicator for his likelihood of success in quitting smoking.

In the previous section of this paper, the characteristics of smokers were examined in terms of sociological, personality, and motivational factors influencing the initiation and continuance of smoking. Comparisons were made with non-smokers (mostly never-smokers) as a reference group. The present section considers the same subject factors in their relationship to the discontinuance of smoking, i.e., difference between smokers and ex-smokers. The object of such comparisons is to detect prognostic differences according to subject variables which, if uncontrolled, would contaminate outcome research interpretation. Therefore a distinction is made between factors operative in the general smoking population and in those of volunteers for assistance in smoking withdrawal via participation in an experimental clinic. In interpreting the results of such experimental studies weighting is given to those treating larger numbers of subjects and those specifically testing prognostic indices.

a: Sociological Factors

In unstructured (non-experimental) studies. Among surveys of general populations, few trends can be clearly discerned between smokers and ex-smokers as a function of cultural or demographic variables, such as culture, race, religion, and population density.
However, the ability to discontinue smoking or remain an ex-smoker has been associated with upward social mobility in men especially (Clausen, 1968; McKennell & Thomas, 1967; Schwartz & Dubitzky, 1968b; Srole, 1968; Straits, 1968), with educational achievement (Graham & Gibson, 1971; Wake, Moore, & Booth, 1967), and with advancing age (Erskine, 1966; Haenszel et al., 1956; Hammond & Garfinkel, 1964; 1968; Rose, 1972; Schwartz, 1968; Use of Tobacco, 1969; Waingrow et al., 1968). The better-educated upwardly-mobile segment of any society, presumably more accustomed to deferred gratification for long-term goals, might be expected to discontinue ultimately self-destructive behavior (Mausner, 1971). Another conspicuous recent trend is the greater proportionate tendency to discontinue smoking among men than women (Dominion Bureau of Statistics, 1971; Use of Tobacco, 1969).

In terms of the social environment, married men seem pliable to the anti-smoking influences of their wives and children (Guilford 1966, 1972; Ross, 1967; Wake, Moore, & Booth, 1966), whereas married women seem immune or even adverse to such pressures (Ross, 1967; Guilford, 1972). Among single people, pro-smoking peer group attitudes and behavioral contagion operate against continued cessation in many instances (Graham & Gibson, 1971; Straits, 1965; Trahair, 1967; Wilhelmsen, 1968), but not always (Eisinger, 1971; Straits, 1970). Conversely, the model of one's best known friend being a former smoker has been associated with success in quitting (Eisinger, 1971).
In structured (experimental) studies. Among those who volunteer for smoking withdrawal programs, no demographic patterns clearly emerge from these middle-class, relatively educated subjects. Success in discontinuing smoking does not reliably correlate with age although there is a mild tendency favoring older subjects in some of the experiments reviewed (Chen, 1971; Eisinger, 1971; Graham, 1965; Guilford, 1966, 1972; Hepper et al., 1970; Leone et al., 1968; Lichtenstein et al., 1967; Keutzer, 1968; Painter, 1972; Ross, 1966; Straits, 1966; Whitmán, 1969). Sex differences are still more unclear. Men respond to treatment better than women in some experiments (Cruikshank, 1963; Dale & Lau, 1970; Graham, 1966; Ross, 1966; Schaubel, Woody & Reskinoff, 1967; Wilhelmsen, 1968), worse than women in others (Delarue & Moss, 1972; Farrell & Fusal, 1970; Guilford, 1972; Keutzer, 1968; Marston & McFall, 1971) and equally in others (e.g., Hepper et al., 1970; Painter, 1972). On other demographic factors there appears to be few emergent relationships, except isolated cases of success for better-educated and maritally stable subjects (Moyer, 1967; Guilford, 1966; Ross, 1967; Schwartz, 1969b; Waters, 1971).

As in general population surveys, familial anti-smoking attitudes have facilitated male successes (Guilford, 1966, 1972; Ross, 1967) but sometimes inhibited female successes in quitting smoking (Delarue & Moss, 1972; Guilford, 1972). Peer group prosmoking influences also have undermined attempts to quit smoking among clinic volunteers (Schwartz, 1969b; Wilhelmsen, 1968).

To summarize, such factors as advancing age, higher education,
and an antismoking social atmosphere are generally associated with discontinuance of smoking, although none of these reliably predict success in experimental smoking withdrawal programs. Apparently social factors exert more influence on the initial decision to smoke than on subsequent ability to discontinue.

b. Personality Factors

In unstructured (non-experimental) studies. The general survey information on personality characteristics of those successful in discontinuing smoking is somewhat meagre. The only noteworthy study is that of Weatherley (1965) using the Edwards EPQ scale with college students. Efforts to stop smoking were associated with low deference and high aggression; success in such attempts were correlated with low affiliation and change, and high need for achievement.

In structured (experimental) studies. Among organized withdrawal project volunteers, personality measures generally fail to correlate with success in quitting. For example, the concepts of extraversion, anxiety level, emotionality, internal-external control, measured by various instruments, have been found unrelated to cessation of smoking in studies designed to assess their effect (Bernstein, 1970b; Best & Steffy, 1971; Keutzer, 1968; Lichtenstein & Keutzer, 1969; Ober, 1968; Steffy et al., 1970; Wagner & Bragg, 1970; Whitman, 1969). However, there are isolated examples of success among internally-oriented males (Chen, 1971; Platt, 1969) and
externally-oriented and extraverted females (Marston & McFall, 1971; Resnikoff et al., 1968).

More demonstrative results have come from other measures of emotional functioning featuring relative freedom from stress, and organized yet flexible adaptive patterns. Dubitzky and Schwartz (1968) found that their successful male subjects showed significantly greater levels on the MMPI scales of "Ego Resiliency" (adaptiveness and mental resourcefulness) and "Ego Control" (impulse controlled structured patterns of thinking and behavior) than unsuccessful subjects. At follow-up continuing successes were confident and relatively tension-free; no-change subjects were ambitious, pressure-ridden, hostile and defensive; recidivists were relaxed, easy-going, jocular, and acquiescent (Schwartz, 1968). Similar results were obtained from another large project using the Cattell 16PF test on volunteers of both sexes; Rode et al., (1971) found cessation to be associated with assertiveness, independence, a scientific style of thinking, and lack of tension. Apparently, the lifestyle of recidivists is often characterized by tension or distress (Delarue & Moss, 1972; Jacobs et al., 1971; Mair & Ball, 1967), sensation-seeking and risk-taking (Jacobs et al., 1970, 1971; Waters, 1971; Straits, 1965, 1970) and more frequent and heavier consumption of alcoholic beverages (Dale & Lau, 1970; Guilford, 1966; Straits, 1970).

In the only propsoective study yielding noteworthy results, Jacobs (1972) extended previous research on smoker-nonsmoker differences (Jacobs et al., 1966, 1970, 1971) to the prediction of
success in a smoking withdrawal experiment. He developed a questionnaire battery tapping such features as immediate gratification patterns and defiant, impulsive, danger-seeking traits associated with manifest distress and lack of regard for long-term consequences or goals. This battery was predictively accurate \((p < 0.001)\) in discriminating between success and failure to quit smoking among 104 men exposed to a 10-week program.

Summarizing the literature on personality, it appears that the dimensions of introversion-extraversion and internal-external control are of limited utility in predicting success in smoking cessation. On the other hand, an orientation characterized by organized, persistent, and flexible striving for mastery has been associated with discontinuance of smoking. Conversely, a profile featuring impulsive behavior associated with immediate tension-reduction and stressful life circumstances has been linked with recidivism. Such findings, generated primarily from studies on male subjects, await further validation to extend the scope of their promise. Meanwhile there appears to be little diagnostic or prognostic potential in the use of most personality measures to predict smoking cessation.

c. Motivational Factors

In unstructured (non-experimental) studies. Research on motivational factors in smoking cessation has occurred in three main areas: smoking history variables, smoking usage patterns (affect management types), and motivation for discontinuance of smoking.
Typically the smoking history variables are unreliably related to cessation such that for each factor most articles reveal no relationship while one or two show alternating positive or negative correlations. Factors apparently unrelated to successful abstention in the general population are: age of starting smoking, number of years smoking, amount of cigarettes smoked per day, depth of inhalation, number and duration of previous attempts to quit, or use of cigarette substitutes such as gum, candy, or pipe while quitting (Eisinger, 1971; Graham & Gibson, 1971; Guilford, 1966; 1972; Haenszel et al., 1956; Hammond & Garfinkel, 1964; Jacobs et al., 1966, 1970; McArthur et al., 1958; Snegireff & Lombard, 1955; Straits, 1965; Trahair, 1967; Weatherley, 1965).

Of the various types of affect management smoking proposed in the Tomkins-Horn-Ikard typology, only the last "psychological addiction" grouping has significantly correlated with failure in studies of unaided attempts to quit smoking. That is, a strong involvement with smoking to both increase positive affect and reduce negative affect, accompanied by intense "cravings" for cigarettes while abstaining, is a pattern of usage or dependency particularly difficult to break (Guilford, 1966; Straits, 1966; Trahair, 1969).

Attempts to quit smoking are invariably preceded by some decision-making process. Health-concern is often prominent as the individual becomes aware of the smoking-disease relationship, its severity and personal relevance and finally the susceptibility of the threat to preventive action (Born & Waingrow, 1966). Each stage
of this assessment is vulnerable to denials and relationalizations about disease immunity, or fatalism, or the urging to quit at some unspecified time in the future. Even when the smoker's attitude has been resolved against smoking, behavior change is usually non-existent or temporary. Health-concern motivation is notoriously unreliable in its relation to outcome of attempts to quit (Eisinger, 1971; Graham & Gibson, 1971; Larson et al., 1961; Rappaport, 1968; Straits, 1966; Turbeville, 1965; Wake et al., 1966; Weatherley, 1965); however such concern is usually facilitative if not adequate. In a U.S. national sample of ex-smokers, health improvement and the conviction that smoking was morally wrong were significant predictors of success, while avoidance of the expense of smoking was a motive associated with high recidivism (Eisinger, 1971). In an adult Australian sample of ex-smokers, the actual experience of health symptoms was the main reason cited for quitting, followed by expense, lack of enjoyment, general health concern, personal medical advice, and persuasion of family or friends (Trahair, 1967). Among a national sample of American teenagers, health concern, economics costs, unpleasant taste and smell, and social concerns such as attractiveness to the opposite sex were prominent motivators for the discontinuance of smoking (Lieberman, 1969).

In structured (experimental) studies. The results of smoking withdrawal research projects basically support the same conclusions as those derived from general surveys. Smoking history variables are not related to cessation in any reliable way, although a few
studies have indicated trends towards greater difficulty for subjects who had started smoking early in life, inhaled deeply, increased their smoking rate during the year prior to the current attempt to quit, and reported previous failure to remain abstinent for more than one week (Chen, 1971; Dale & Lau, 1970; Delarue & Moss, 1972; Graham, 1965; Guilford, 1966, 1972; Hepper et al., 1970; Lichtenstein et al., 1967; Mair et al., 1967; Ross, 1967; Schwartz & Dubitzky, 1969; Straits, 1970; Thompson & Wilson, 1966; Wagner & Bragg, 1970; Whitman, 1969; Wilhelmsen, 1968). Given the tendency to publish significant results, the conclusion derived from this review is that smoking history variables are generally unreliable predictors of success in the discontinuation of smoking whether unaided or assisted by organized forms of treatment.

Parallel with the findings of general surveys, results from smoking withdrawal experiments show the greatest difficulty for negative affect and addictive smoking types (Guilford, 1966; Ikard & Tomkins, 1973; Lichtenstein et al., 1967; Schwartz & Dubitzky, 1968b). Again, antismoking attitudes and concern about health appeared to facilitate but not to predict success in quitting (Cohen, 1969; Delarue & Moss, 1972; Hepper et al., 1970; Keutzer, 1968; Lichtenstein & Keutzer, 1969; Schwartz & Dubitzky, 1968b; Straits, 1970).

In an attempt to find the combined social, personality, and motivational variables most predictive of success in quitting smoking, Schwartz and Dubitzky (1968) factor analyzed 101 subject variables in their Smoking Control Research Project on male volunteers. They
selected the five most salient clusters and isolated a total of twelve subject types according to patterns of personal adjustment, chronic illness and anxiety, antismoking attitudes, habituation to smoking, and use of smoking in affect management. The four types containing the most successes (60%) displayed good adjustment, low illness and anxiety, low habituation and strong antismoking attitudes. Recidivists showed patterns of poorer personal adjustment, prosmoking environmental influences, and high dependency on cigarettes, and negative-affect or addictive affect management smoking (Schwartz, 1970b). Straits' (1970) discriminant function analysis of the same data confirmed the influence of smoking dependency and attitudes, interpersonal environments and personal health and adjustment, with personality variables playing a relatively minor role. These factors have not yet been used in a prospective or predictive study, except in unweighted form in a somewhat unsuccessful attempt to screen successful and unsuccessful volunteers for the Toronto Smoking Withdrawal Study Centre (Delarue & Moss, 1972).

**Summary**

To summarize the literature on subject variables, it appears that factors influencing the beginning of smoking differ from those maintaining the habit and those leading to its discontinuance. Adolescent conformity and rebellion and social environmental influences recede and are supplanted by personal needs for impulse gratification, affect management and the stability of a familiar ritual. Heavy psychological
dependence on cigarettes, life situations of stress, and disorganized and ineffectual patterns of coping with problems interfere with the success of attempts to quit this unhealthy practice.

While a great deal of research has been conducted on the characteristics of non-smokers, smokers, ex-smokers, and recidivists, little can be stated in terms of predicting success in a smoking withdrawal research project according to subject variables. Only one study has accurately predicted success in an experiment on the basis of subject variables (Jacobs, 1972); this was conducted only on male heavily-habituated smokers and needs further verification to be confirmed. In other words, for outcome research, the undeveloped state of information in this area does not warrant stratification of treatment groups according to subject variables.

B. Treatment Variables: A Review of Systematic and Experimental Attempts to Modify Smoking Behavior.

Nearly all programs and techniques developed to induce smoking cessation have proven to be ineffective for the majority of smokers treated (Bernstein, 1969a, 1970; Keutzer, Lichtenstein & Mees, 1968; Lichtenstein, 1971b; Lichtenstein & Keutzer, 1971; Schwartz, 1969a; and other less recent or comprehensive reviews). This section provides an updated comprehensive review and critique of existing techniques categorized according to the theoretical models from which they were generated.
1. The Health Education Model

In this model man is assumed to make decisions about the utility of his behavior according to reason, then conform his behavior to attitudes generated in this decision-making process. The problem of smoking is therefore one of educating the smoker that his habit is dangerous to health, and that stopping smoking can greatly reduce this danger. When the smoker accepts such information, his continued tobacco usage creates a state of internal inconsistency among his attitudes and values. The pressure to reduce this "cognitive dissonance" (Festinger, 1964) should lead to the termination of the habit, provided that the educational material has sufficient rational and emotional impact to overcome defences against changing attitudes affirming the desirability of smoking.

a. Antismoking Campaigns

The health education model is evident in the strategy of the anti-smoking campaigns of public health agencies in the last 15 years. These campaigns consist of lectures, movies, pamphlets, posters, articles, announcements, and advertisements proliferated by community social and communication media. Their effect in each case has been to generate brief public concern, a slight and temporary decline in tobacco consumption, a boost in cigarette advertising intensity, and a subsequent increase in production and sales (Borgatta & Evans, 1968; Erskine, 1966; Greenberg, 1964; Jeffreys et al., 1967; Science News,
1966). During the 1960's, a saturation effect seemed to be operating, as the impact of each successive wave of campaigns became less, and subsequent increases in consumption became greater, despite some legislative restrictions on advertising (Financial Post, 1970; Time, 1965, 1969). Perhaps the early campaigns persuaded the "rational smokers" to quit, thereby extracting from the target population pool that diminishing subgroup of smokers who conformed to the predictions of the model, leaving the majority of smokers increasingly immune to subsequent campaigns featuring no-longer controversial information. In the meantime smoking had become a well-established phenomenon bolstered by subtle and subliminal associations with leisure, pleasure, status, and relaxation conveyed by the images of advertising.

Compared to the sophisticated implicational tactics of cigarette advertising, the direct presentation of factual smoking-disease information seems a somewhat naive approach. Even when conveyed in a variety of media in an unbiased manner by trustworthy sources, or augmented by fear-arousing stimuli of varying intensities, or presented in a student-centred or community-involvement format, the health education approach has generally produced negligible effects on long-term attitude and behavior change (Auger, 1972; Dabbs & Leventhal, 1966; Higbee, 1969; Insko et al., 1965; Janis & Terwilliger, 1962; Leventhal & Niles, 1964; Merki et al., 1968; Monk, 1965; Niles, 1964; O'Keefe, 1971; Zagona & Harter, 1966). Smokers defend against these health warnings by: (a) denying them outright (e.g., Abelson, 1968); (b) limiting or reducing the probabilities cited (Davis, 1968; Leventhal & Watts, 1966; Pervin & Yatko, 1965; Spelman & Ley,
1966; Swinehart & Kirscht, 1966; Watts, 1968) (c) believing that they will defy the odds by reducing or quitting in the future or smoking "milder" brands (Swinehart & Kirscht, 1966; Johnson, 1968; Lichtenstein, 1967); and (d) divesting health threats of their emotional impact by refusing to care about their future (Johnson, 1968; Straits, 1965).

Beyond such defenses are the great majority of individuals who fail to alter their smoking despite obvious worry and concern for their present and future health (Baer, 1966c; Leventhal & Niles, 1964; Leventhal et al., 1967; Rogers & Thistletwaite, 1970; Straits, 1965). In fact, their behavior provides evidence that is equivocal (Baer, 1966c; Cannell & McDonald, 1956; Janis & Terwilliger, 1962; Levin, 1959; Quinn, 1961) and even disconfirming (Brock, 1965; Feather, 1962, 1963; Lane, 1961; Dubitzky & Schwartz, 1969; Rappaport, 1968; Straits, 1965) regarding the predictions of cognitive dissonance theory in smoking cessation. Fluctuations both across and within individuals in their ability to tolerate imbalanced states such as ambiguity and dissonance may account for the variability of results better than the methods of dissonance reduction purported by cognitive theorists (Guilford, 1966; Wolitzky, 1967). Rather than further investigating how smokers maintain such dissonance, Guilford (1966) astutely recognized its presence as indicative of the need for new approaches to the problem. Meanwhile, the only demonstrated utility of the campaigns has been the promotion of the public knowledge that smoking is unhealthy, perhaps providing a nagging reminder to continuing smokers, supporting the resolve of ex-smokers to remain
quit, and discouraging some nonsmokers from experimenting with the behavior (Abelson, 1968; Corwin, 1972; Delarue, 1970; Evans & Borgatta, 1970). In terms of inducing most smokers to quit, the campaign approach has been generally unsuccessful (Bernstein, 1970a; Ford & Ederer, 1965; Royal College, 1971).

b. Smoking Withdrawal Clinics

The basic premise of this approach is that education and insight can change smoking if augmented by group pressure and support for abstinence. In this method unselected groups of varying size are exposed to various multimedia antismoking educational approaches, followed by discussions about the health dangers of smoking, the benefits of ceasing, "insight" into the seasons for smoking, and problems encountered by members in their attempts to overcome the habit. Also prevalent is a great deal of exchange of "tips" or uncontrolled attempts to apply different techniques supposed to be helpful for different "types" of smokers. Meetings, usually led by a health professional, vary from one to several hours in duration, and range in frequency from a daily to monthly basis.

Reviews of the efficacy of these clinics have been plagued by their inadequate and biased reporting, measurements, criteria, controls, follow-ups, and statistical procedures. Treatments have been variously combined in uncontrolled ways so as to confound the interpretation of the results. Nevertheless, the findings of several larger and more scientifically rigorous clinics have offered some basis for the evaluation of this form of treatment.
Clinics employing medication. Consonant with the early view of smoking as a form of addiction, the first organized attempts to change it were modelled after other drug-withdrawal approaches, especially the use of one or more drugs in conjunction with the health-education approach. The drugs were invoked to negate supposed cravings for nicotine and withdrawal symptoms.

Series of such 10-day clinics run initially in Stockholm (1956-60) and later in New York City yielded an apparent success rate (cessation) at end-of-treatment of between 43 and 88 percent (Ejrup, 1964). However, such initial success could be attributed to novelty, attention-placebo, and selective statistics -- Ejrup counted only those subjects who completed treatment and also responded to follow-up questionnaires. More stringent reanalyses of his data revealed a more modest success level of roughly 20% cessation at 1-year follow-up (Bjartveit, 1967; Schwartz, 1969a). Similar results were obtained in a later series of Swedish clinics (Wilhelmsen, 1968).

Based on Ejrup's prototypes, a number of antismoking clinics employing medication were conducted during the 1960's in Europe, North America, and Australia. The typical results, where reported, are of moderate (30 - 70%) initial success during treatment, high relapse rates within the first 2 months after treatment, and a small (5 - 20%) but stable residual of subjects who remain quit at follow-ups of more than 4 months (Bernstein, 1969a; Ford & Ederer, 1965; Hunt et al., 1971; Pflaum, 1965; Schwartz, 1969a). The lack of experimental control in such clinic research renders these results even more meaningless, especially in clinics employing drugs, a
treatment factor notorious for placebo effects (Lichtenstein et al., 1967; Loranger et al., 1961). For this reason reviewers attach greater interpretive weighting to the relatively few double-blind studies in evaluating the effectiveness of the drugs employed.

The effects of such "nicotine substitutes" as lobeline hydrochloride and buffered lobeline sulphate are not significantly different from that of placebos (Bernstein, 1970a; Schwartz, 1969a). Other forms of medication, such as tranquilizers, stimulants, amphetamines, anticholinergics, astringents, and local anaesthetics have also proven of little help in modifying smoking. The absence of a universal withdrawal syndrome and the variability of the mainly psychogenic symptoms such as anxiety, irritability, tiredness, insomnia, and hunger virtually assure the negligible results obtained for group-administered medication (Bernstein, 1970a; Ross, 1967; Schwartz, 1969a). The efficacy of any drug in the remediation of smoking has yet to be demonstrated.

Clinics without medication. The famous Five Day Plan, developed by McFarland and Folkenburg (McFarland et al., 1964) and sponsored by the Seventh Day Adventists and the National Health Foundation, is the basic procedural model for the majority of the non-medical smoking withdrawal clinics conducted in North America, Europe, and Australia. Typically, this intensive program features five consecutive daily 2-hour meetings of groups exposed to lectures, movies, diets, special "tips" and discussion. The withdrawal regimen consists of such diversions as physical fitness exercises, water and fruit juice
saturation, hot and cold showers and baths, a buddy system, and avoidance of caffeine, alcohol, and social situations conducive to smoking. The effect of such rigorous distraction is reflected in outcome results showing high initial cessation rates (even up to 80% in early clinics) with sharp relapses after termination, resulting in 6 or 12 month follow-up results ranging from 30 to 10 percent (Allen & Jackler, 1966; Delarue & Moss, 1972; Guilford, 1966; Hepper et al., 1970; Morse, 1970; McFarland, 1964, 1965; McFarland et al., 1964; Peterson et al., 1968; Ross, 1967; Thompson & Wilson, 1966).

It should be noted that later (after 1964) clinics reported in the literature featured variations in the basic format (usually extending the meetings over several weeks) and more reputable and accurate statistical procedures. Nevertheless, as with the "medical" clinics, the results of such projects are rather mediocre in proportion to the time, energy, and expense invested by staff and participants. Their educational format does not have more than a temporary impact on behavior change. As for group support, the tendency appears to be that smokers transfer dependency on cigarettes to reliance on group support for sustained abstinence. When the group or clinic disbands, so does the behavior it bolstered; the reference values have not been adequately internalized due to the lack of cohesion of larger superficial and short-duration groups characteristic of most smoking withdrawal clinics.

Extended group therapy formats. Perhaps in an attempt to remediate this deficiency of sustained group cohesion and support, the
group therapy approach has been applied to smoking. This method emphasizes insight development regarding the psychological factors (rather than health factors) involved with smoking, and features the repeated meetings of small groups over the course of four to ten weeks.

Three early studies lacking adequate controls showed moderate (40 - 60%) cessation rates initially, followed by lesser results (roughly 15 - 20% at 1 year for all Ss beginning treatment) at varying periods of follow-up (Lawton, 1962, 1967; Backman, 1964; Horn, 1964). More recent studies have employed either control groups or other treatments for comparison. Mausner (1966b) found no difference in smoking levels between the therapy group (N=17 college girls) and a control group; he also observed the inconsistent attendance and high drop-out rate typical for this method. Graff and his associates (1966) found group therapy and hypnotherapy more effective than drug therapy (lobeline and chlordiazepoxide) in a 10-week treatment program. However, as Keutzer (1968) pointed out, the small number (24) of Ss finishing treatments and therapist attention effects prevent an accurate test of effectiveness. Lawton (1967) tried combinations of educative and group approaches with massed and spaced meetings to a waiting list control group. Success rates (based on only those finishing treatment) ranged around 26 to 20% after treatment and at follow-ups for all treatment groups; compared with 2% for the control group. In the large and well-controlled Smoking Control Research Project, Schwartz & Dubitzky (1967b) compared drugs, individual
counselling, and group counselling in an 8-week treatment program. Initial results (success = 85% reduction in smoking) showed individual counselling to be superior (42% success), followed by group counselling (34% success) and drug treatment (22%). These differences, however, disappeared at 4-month follow-up, when all groups, including a control group, showed about 20% success rates.

In summary, smoking withdrawal clinics based on health education or insight-oriented group-support models seem to yield little gain for the effort invested. Health education appears to have little impact on a generation of smokers in the 1970's who persist in a habit they know is unhealthy. Augmenting the antismoking message with group pressure produces only temporary behavior change; regardless of the massing or spacing of meetings, when the clinic or group expires, so generally does the resolve to remain quit that was based on its reinforcement. The commitment and consequences likely still remain external and remote to the participant smokers, who quickly resume their habit after the clinic terminates.

2. The Role-Playing Approach

A possible solution to the emotional remoteness of the long-term health consequences of smoking is to involve the smoker in role-playing situations resulting from smoking-related disease. Janis and Mann (1965) had 14 women act the role of a patient being told by her doctor that she had lung cancer and had to prepare for
surgery. Twelve control subjects rated tape-recordings of the role-playing scenes. Both groups were unaware that the procedures were aimed at modifying their smoking. Experimental group consumption rates were lower than control group rates at termination and 18-month follow-up (Mann & Janis, 1968). No data was reported for cessation rates. Strelitzer & Koch (1968) obtained similar results in their role-playing experiment using 20 female Ss; despite changes in attitudes and smoking reduction, none were able to quit completely. Lichtenstein, Keutzer, and Himes (1969) reported minor changes in attitudes and behavior in three studies using 54 female smokers, such that no differences emerged between role-players and observer-controls.

In terms of role requirements, it appears that emotional involvement has complex effects. Clearly, scenes depicting "lung-cancer patients" are superior in effect than the more cognitive roles of "debaters", especially among females relative to males (Mann, 1967). However, it seems that playing the role of patient may generate countertherapeutic levels of anxiety and defensiveness; the patient becomes so overwhelmed by fear of the ultimate health consequences that he fails to attend to arguments favoring the advantages of non-smoking. Partial insulation from these paralytic effects can be obtained by observing the role-play, reducing reactance (Brehm, 1966) through overheard rather than direct persuasive communications (Walster & Festinger, 1962). For example, the Lichtenstein, Keutzer, and Himes (1969) study found that emotional arousal during sessions was more closely associated with change-scores for observing controls than for
the role-playing subjects: Mausner and Platt (1971) obtained similar results with 135 males Ss in that observers reduced smoking more than "patients". In the latter study and its pilot (Platt, Krassen, & Mausner, 1969), the investigators observed the greatest smoking reduction in Ss playing the ego-building and more objective role of "doctor". It has been noted that acceptance of threat and compliance with threat-reducing recommendations is a function of high self-esteem (Dabbs & Leventhal, 1966; Leventhal & Trembly, 1968). Therefore, the role of "doctor" should temporarily inflate self-esteem so that the subject can carefully attend to the content of antismoking messages. From research to date this appears to be the case.

To summarize, the literature on role-playing indicates that this technique enhances the emotional impact of the smoking-disease message, encouraging the endorsement of antismoking attitudes and the mild reduction but not elimination of smoking behavior. The technique appears to operate most successfully when the subject is given the role of "doctor" counselling a smoking lung-cancer patient. Nevertheless, this technique has not proven effective in producing total cessation of smoking.

3. The Use of Hypnosis

The repeated demonstration of placebo effects in smoking intervention research (e.g., Gould, 1953; Lichtenstein et al., 1967) underlines the power of suggestion in providing both incentive and
confidence in attempts to quit smoking. The logical extension of this idea is the application of hypnotic techniques to the smoking problem. Despite some esoteric claims by its advocates, the practice of hypnosis has received little empirical support for its efficacy other than uncontrolled case studies (see review of Johnston & Donoghue, 1971). Von Dedenroth (1964a, 1964b, 1968) reported a series of case studies in which suggestions that smoking would become extremely unpleasant were delivered while the subject was in a trance state in each of 4 sessions over a 3-week period. He also provided instructions on simple self-control procedures during the course of therapy. While uncontrolled for combined treatments, therapist effects, patient selection, or adequate follow-up, his (1968) claimed cessation success of 40 in 1000 cases is still extraordinary. Other practitioners usually report less dramatic success for 1-to-3-session treatments (e.g., 12% cessation rate at follow-up for Moses, 1964; 20% for Spiegel, 1970). However, Nuland and Field (1970) reported an impressive 60% cessation rate at 6-month follow-up for their 181 patients. These subjects received feedback under hypnosis of their reasons for quitting, meditation on these motives, self-hypnosis training, and sustained telephone contact with the therapists. Moreover, Crasilneck and Hall (1968) reported 64% cessation for a similar behavior modification approach augmented by hypnosis.

While showing apparent promise, the widespread effectiveness of the method per se has not been adequately demonstrated independently of experimenter and selection effects. It is interesting to note
that the most successful formats include techniques that could be described in the learning-theory terms of self-control training and aversive covert sensitization, and that the orientation accentuates immediate aversive effects rather than long-range aversive expectancies. Dengrove (1970) has made similar comments about other modified-hypnotic approaches (e.g., Spiegel, 1970). It seems that these techniques of immediacy offer greater potential than the more remote and cognitive methods of the health-education and role-playing approaches. One would therefore expect smoking to be an ideal target behavior for the application of behavior modification procedures. The next two sections investigate this speculation.

4. Positively-Oriented Behavior Modification Techniques

Cigarette smoking can be variously construed as an expression of personality and social dynamics, as a public health education problem, and as a testbed for theories of human behavior. It provides "opportunities to investigate behavior change processes in a meaningful, naturalistic context that still permits adequate measurement and controls" (Lichtenstein, 1971b, p. 163). As such it has captivated the interest of behavior therapy researchers as a "model pathology" (Koenig & Masters; 1965). It is discreet, completely operational by definition, potentially observable; it is frequent and widespread; it is essentially maladaptive, compulsive, neurotic, and generative of illnesses, thus motivating change in volunteering subjects; it
is also similar in topography to other appetitive and drug dependency disorders. Therefore "a variety of techniques can be applied to smoking permitting comparisons among behavioral treatments" (Lichtenstein, 1971b, p. 173).

a. Systematic Desensitization

In many people, smoking has become a means of temporary escape from anxiety and of the management of affect, especially negative affect. It has been argued by Pyke and associates (1966) that under conditions of high arousal, the probability of the most-practiced response appearing is increased. Therefore stimulus situations of high arousal have the capacity to elicit a smoking response which, if blocked, generates frustration further elevating arousal and the cues for smoking for its relief. Now if these stimulus situations could be divested of their anxiety-eliciting (and therefore smoke-cueing) capacity, the anxiety-smoking cycle would be broken, and the response would again be manageable by simple voluntary control.

Systematic desensitization (abbreviated SD), developed by Wolpe (1958), involves training the client in deep muscular relaxation, then pairing this state with hierarchically organized imagined scenes that elicit a strong urge to smoke. Such pairing is supposed to "reciprocally inhibit" this urge by the substitution of the incompatible response of relaxation. Given sufficient training the client becomes immunized or desensitized to the former cue properties of the stimulus in a manner analogous to desensitizing anxiety cues in other neurotic patterns.
Although successful with phobias and other compulsive behaviors (e.g., Walton & Mather, 1963; Wolpe & Lazarus, 1966), SD has not proven effective in the treatment of smoking. The prototype study in this method (Koenig & Masters, 1965) compared SD, electric shock aversion training, and non-directive supportive counselling stressing "underlying reasons". Each of seven therapists treated six Ss, two under each treatment condition. After 1 week of baseline recording, all 42 volunteer Ss (19-26 years old, rate/day: 20+) were seen for nine individual treatment sessions spaced over a 6-week period. No information was reported on number of Ss who failed to finish treatment or cessation rates for the treatments.

Pyke, Agnew, and Kopperud (1966) divided their 55 paid college student subjects into 3 groups: (a) combined individual SD, group discussion, antismoking literature, and the feedback of group progress; (b) monitoring (making graphs) alone for the first 8 weeks; or (c) monitoring alone for the first and eighth week only. In contrast to the Koenig and Masters (1965) study, only two subjects were able to complete their hierarchies due to stricter (GSR) criteria for non-anxiety reactions. Each treated S attended one SD and one group session a week for 10 weeks. At the end of treatment, only the treated Ss had reduced their rate significantly, but 4 months later they had relapsed to pretreatment level.

Kraft and Al-Issa (1967) using SD, sometimes in conjunction with hypnosis and methohexital sodium, focused on the social anxieties of their five alcoholic smokers to eliminate their excessive drinking.
They found that alcohol and cigarette consumption decreased together, and both changes endured in 1-year follow-ups. The small N and case-study nature of this study limit the scope of the authors' speculation that low post-therapy anxiety level may be an important prerequisite for lower cigarette consumption.

Morganstern and Ratcliffe (1960) employed SD to reduce the smoking rates of eight experimental college Ss relative to 32 no-treatment controls, for whom they neglected to report data. While three of the eight quit smoking by the required 5 to 6 sessions, and four others reduced their smoking, no follow-up data were presented.

Engeln (1969) conducted a controlled study with 60 male college students and 22 VA patients, comparing desensitization with shock-aversion, a record-keeping control group, and a non-treatment control group. In the desensitization sessions, Ss were taught to relax and were instructed to imagine themselves not smoking in a number of situations associated with smoking. These Ss were told to relax and breathe deeply 5 times each time they had a desire for a cigarette outside the laboratory, whereas the aversion group Ss were told to hold their breath for 15 seconds in such situations. Results at 1-month follow-up maintained initial significant reductions in smoking for the desensitization, aversion, and monitoring groups relative to the nontreatment control. The "strong trend" (presumably subsignificant) for the desensitization group to relapse less during this short follow-up (in terms of mean percentage of baseline smoking) parallels other suggestive but unconvincing studies. Moreover, the
author attributed the success of the method mainly to the practice in new role behavior and the homework assignments featured in this treatment.

b. Systematic Desensitization Combined with Covert Sensitization

A number of recent studies have employed combinations of treatments to enhance or complement their separate effects. A common example is the combination of SD with the technique of covert sensitization (CS: the pairing of imagined cigarettes with imagined scenes of nausea and displeasure). Wagner and Bragg (1970) compared the methods of SD alone, CS alone, SD combined with CS, relaxation, and counselling on their 54 adult subjects. There were eight twice-weekly 20-minute individual treatments—the first three in relaxation training and the last five in differential experimental treatments. Using a post-relaxation base rate, results at 3-month follow-up showed the SD group was about as effective as the "counselling" group, and was slightly (p < .05) less effective than the combined SD-CS group and more effective than the CS group. The fact that total treatment consisted in less than 3 hours, combined with failure to report cessation rates, leads the reviewer to infer mediocre effectiveness for this method. Nevertheless, the differences in consumption between the SD-CS group and the CS group (p < .01) seemed to encourage Wagner to cut a self-administered programmed recording of the method (Wagner, 1968), but evidence for its efficacy is as yet not clearly established.

McCallum (1971), using 54 male college students as subjects
compared a SD-CS treatment with a stimulus satiation condition (in which Ss tripled their base rate of smoking for 7 days) and a number of elaborate control groups with pseudotreatments or waiting periods. Ss generally attended individual 20-minute sessions for six consecutive days. Rate of smoking (mean cigs. per day per S over 1 week) at follow-ups of 1 and 2 months after treatment, showed that no differential treatment effects emerged, nor did relaxation training (provided to half of Ss prior to the main treatment week as a control for participation-placebo) have a significant effect. Significance only emerged when comparing pooled data of all treated Ss versus all control Ss.

Gerson and Lanyon (1972) tested their SD-CS treatment (administered in groups) against CS immediately followed by general group discussion. Ten 1-hour treatments were given at the rate of twice per week. At the 13-week last follow-up considerable relapse from earlier reductions in smoking had occurred in both groups with slight but definitely nonsignificant superiority for the SD-CS condition. The small number (N=21) of this unusually heavy-smoking (40+ per day) sample and the lack of control groups further delimit the results of this study. However, the authors reported a bimodal split in the efficacy of the SD-CS treatment indicating male responsiveness to this modality.

To conclude thus far, the technique of systematic desensitization, whether applied individually or in groups, alone or in combination with other techniques has not yet been proven effective in eliminating
smoking. Apparently the anxiety- or craving-reduction model does not apply to the vast majority of smokers (see motivation section). An interesting line of investigation (as yet unpursued) would be to find out whether success in SD treatment correlates with negative-affect smoking, as the model would suggest. Clearly, however, the SD method at best is limited to a narrow segment of the smoking population and seems barren of further wide-range promise.

c. Response Substitution Procedures

Similar to the tactics of SD are the other procedures which attempt to train a new response to compete with smoking in the same stimulus situations. For example, Keutzer (1968) used breath-holding (see Mees, 1966) in one of her large (33-40 N) treatment groups seen once a week for 15 weeks. All treatment groups (coverant control, breath-holding, negative practice, attention-placebo) reduced smoking significantly more than untreated controls, but they did not differ from one another. Gutmann and Marston (1967) used the routine of inhalation and stretching in response to smoking cues, combined with successive approximation and self-reinforcement procedures. While this group outperformed the control group employed, the effect of this response substitution regime cannot be assessed independently of the treatment combination in which it occurred.

Johnson (1969) also used breath-holding as an incompatible response to smoking cues as one of the treatment conditions in her study. The other treatment applied contingency management (Homme,
1965) to emphasize Ss' reasons for quitting smoking; the control group received monitoring instructions and feedback only. These techniques were taught and practised during the 3 weeks of the program in weekly meetings with the experimenter. While initial results showed smoking reductions for all groups, at 6-month follow-up only the contingency management and breath-holding groups were continuing to smoke significantly less than baseline. In summary, the four studies reviewed here fail to demonstrate the differential effectiveness of the response substitution approach over other techniques.

d. Stimulus Control Procedures

As in the preceding strategies, this approach is based on a classical conditioning model in which eliciting cues are extinguished and smoking is limited to increasingly restrictive situations. While former associations with smoking are being broken, the operant principle of "time-out" further weakens the last remnants of the habit. While two case studies reported cessation success after progressive stimulus restriction, (Nqlan, 1968; Roberts, 1969), results in general have been poor with this method. Although stimulus control procedures especially hierarchical reduction have been applied in several studies, their effect cannot be isolated from other components of the combined and often ineffective treatment in which they occurred (Gutmann & Marston, 1967; Marston & McFall, 1971; Ober, 1968; Pumroy & March, 1966). A possible exception was a study in which hierarchical
reduction of smoking cues according to increasing difficulty did result in significantly lower rates of smoking than an attention-placebo control group (Sachs et al., 1970). However, the follow-up was short (1 month) and at no time did any subject completely quit smoking.

Another approach to reduce the effect of situational cues is to have subjects smoke only at increasing intervals preset by the experimenter and signalled by a portable buzzer. Azrin and Powell (1968), for example, used a self-locking cigarette dispenser case that signalled when each locked interval had elapsed and a cigarette could be taken. The device reduced but did not eliminate smoking in the five subjects tested. Shapiro et al., (1971) also tried the portable signal approach with 40 Ss over roughly 8 weeks of treatment. Overall reduction of cigarette consumption at the 6-week follow-up was 43% of baseline for all Ss pooled: best results were obtained by those few Ss motivated enough to complete treatment. Significance relative to a self-monitoring control group can be disqualified because its lack of change can be attributed to expectation of further treatment (Bernstein, 1969a). Following this lead, Levinson et al., (1971) compared the portable-signal stimulus control technique with a mechanical counter procedure whereby a subject could smoke at will, using the counter to progressively reduce daily intake. Group meetings helped to maintain morale over the 12-week course of treatment. Despite a $15.00 treatment-completion deposit, dropout rates were high (50%) among the 52 Ss. While more subjects
in the counter group finished treatment, the stimulus-control group (three of the four Ss at end-of-treatment) was more successful in eliminating smoking at the 3-month follow-up. Upper & Meredith (1970) increased interstimulus intervals on their portable times and found that the stimulus control group was superior to the attention-placebo groups in terms of reduction but not cessation at treatment termination. Although there was less dropout among their 51 Ss, failure to report follow-up results further weaken interpretation of such inconclusive data.

In summary, stimulus control procedures have taken the form of hierarchical elimination of controlling stimuli, or the use of a portable signal to become the sole discriminative cue for smoking, whose occurrence is systematically reduced. Researchers of these techniques report moderate reduction (seldom below 10 per subject per day) but rarely cessation of smoking in those few Ss persistent enough to complete the lengthy treatment. It may be important that in hierarchical strategies the most potent cues are eliminated last. In all "reduction" methods, each successive cigarette eliminated is an increasing proportion of the remainder consumer (Tooley & Pratt, 1967). This effect, plus the deprivation of increasing intervals, may enhance the reinforcing properties of each cigarette. The longer such reduction programs are extended over time, the greater the number of highly reinforced smoking trials run, and the greater the problem in eliminating the last cigarettes in the series. Considering these theoretical counter-indications and empirical experience, it seems that stimulus control procedures can effect a temporary reduction of
smoking among highly motivated subjects, but are unlikely to succeed
where complete elimination is sought.

e. Self-Control Procedures, Including Contingency Management

This category includes "those techniques which allow an individu-
dual to directly manipulate the variables which control his own
behavior" (Lichtenstein & Keutzer, 1971, p. 69). While in the
broad sense the definition could include all techniques requiring
extra-laboratory practice or cooperation by the subject, the present
usage is confined to treatments in which S carries out an organized
program of voluntary procedures to handle smoking situations.

Contingency management is typical of self-control strategies.
Homme (1965) reported the successful application of Premack's (1965)
principle "for every pair of responses, the more probable one will
reinforce the less probable one." Each of his four Ss listed covar-
ants (covert operants or silent statements to oneself) incompatible
with smoking and agreed to think of one or more of these statements
before performing a rewarding response removing S from the smoking
situation. Tooley and Pratt (1967) successfully applied this prin-
ciple in conjunction with covert sensitization and contractual
management in extinguishing the smoking of their two Ss. Lawson and
May (1970) subsequently separated these components into three treat-
ment groups and one non-directive control group in a sample of 12
college Ss matched for age, consumption and age of onset for smoking.
Each S met individually with E for one orientation session and 14
25-minute treatment sessions (3 per week). While all groups (including
the control group) significantly reduced their percentage of baseline smoking, no differences were discerned between them. The authors concluded that their results were due to non-specific effects, while cautioning the limitation of this conclusion because of their small sample size and the lack of a follow-up. Rutner (1967) also compared the separate techniques of covert sensitization, response substitution, contingency management, contractual management, and self-monitoring. Again, while all groups significantly reduced cigarette consumption, specific treatment effects did not emerge. Rutner observed that social pressure and social reinforcement were the aspects of treatment most prevalent in the case of successful subjects; however, no follow-up was reported. As mentioned before, Johnson (1969) found that contingency management was as effective in reducing smoking as breath-holding response substitution in a 6-month follow-up where they both outperformed a self-monitoring attention-placebo control group. Hark (1970) compared contingency management with two control groups (self-monitoring and attention-placebo). Early relative gains for the contingency management group diminished to non-significance by the 8-week mark of follow-up.

Studies employing various self-control procedures similar to contingency management emphasize the heavy usage of performance feedback, self-reinforcement rituals, shaping, chaining and response substitution techniques and recitals of ultimate aversive consequences of smoking. Ober (1968), using 50 college students Ss, compared such a group with an aversion training group and a transactional analysis group. All groups met for 10 treatment sessions over 4 weeks. At
termination of treatment and at 1-month follow-up, the rates of all
treatment conditions were significantly lower than the self-monitoring
control group (p < .001). No significant treatment, therapist, or
interactional differences were found. Whitman (1969) essentially
replicated this study and its results with 73 adult Ss matched for
age, smoking rate, and age of onset of smoking. A self-control
training group was compared with an aversive conditioning group, an
educational approach discussion group, and a non-treated control
group. All groups, including the control group, showed
reductions in smoking that were not significantly different across
groups at the 3-month follow-up. A contingent self-reinforcement
group was also run in the Gutmann and Marston (1967) study. However,
since this procedure used cigarettes as reinforcers for non-smoking
periods, its insignificant results and high dropout rate are not surpris-
ing.

In summary, there appears to be no evidence to support the efficacy
of contingency management and other self-control techniques relative to
any other treatment modality. On the other hand, the possibilities for
self-control techniques in supplementing other methods may still be a
profitable area for further research.

f. Contractual Management

Contracts are "structured social arrangements involving the
reciprocal promise of reinforcement for the successful execution of
contractual contingencies" (Tooley & Pratt, 1967, p. 212). Since many smokers are externally-oriented and may lack sufficient self-esteem to self-reinforce effectively, this approach might provide the incentive and reward needed to maintain nonsmoking over long specified periods of time.

Results from empirical tests of this method have not been clearly definitive. Tooley and Pratt (1967) induced smoking cessation in two Ss using contractual management in combination with contingency management and covert sensitization. Lawson and May (1970) ran these components independently among 12 Ss and found all to be as effective as a non-directive control group. Rutner (1967) observed trends short of significance favoring contractual management over covert sensitization, response substitution, and contingency management approaches in reducing—but not eliminating—cigarette consumption.

Nehemkis (1969) used a contractual management approach with eight married couples seen once a week for 5 weeks. The couples were trained to give each other social reinforcement and privileges contingent upon systematic reduction and eventual cessation. Although half the group had ceased smoking by the last session, at the 6-month follow-up no subject was abstinent and smoking had returned to 75% of baseline for the group.

A similar but less overt contract operates in the "buddy system" of frequent contact among quitting smokers. Janis and Hoffman (1971) investigated the effect of daily versus minimal (clinic only) contact among stable versus rotated partners. Daily contact facilitated the
development of attitudes unfavorable to smoking and favorable toward the clinic and the partner; it also reduced anxiety symptoms in smoking withdrawal. Results at the 1-year follow-up showed that high-contact subjects continued to smoke fewer cigarettes ($p < .01$) than Ss in the other two groups. From content analyses of partner conversations the investigators concluded that daily contact facilitated interpersonal attraction which enhanced internalization of clinic antismoking norms. However, this suggestive study has not been replicated, and several clinics and studies in which a "buddy system" was employed have failed to report any differential success among "buddies" versus unpaired subjects.

Contractual approaches are often prey to the dual nature of control. These systems may function provided the reinforcement of the partner is salient to the smoking client, and provided both parties do not violate the contract. Violations provide opportunities to abandon the commitment plus blame the other party for failure to control smoking. In the case of both parties engaged in a joint attempt to stop smoking, the relapse of either member both weakens the commitment of the contract and provides a model for negative behavior contagion effects (e.g., Nehemias, 1969). Furthermore, contracts may hinder internalization of antismoking resolve, especially when the relationship, the contingent reinforcement, or the contract itself is either disrupted or terminated (e.g., while away on vacation, or when the period of a wager has expired, etc.). Only one isolated study has demonstrated favorable cessation rates during and after contracted abstinence. Elliot and Tighe (1968)
had their 25 college students Ss place a $50.00 deposit to be forfeited to the quit-smoking group resource pool if they relapsed. They then could earn money back by completing specified periods of abstinence until the program terminated at 12 (Group I) or 16 (Group II) weeks. Although 21 Ss abstained for the duration of their programs, relapse occurred for many Ss after termination of the contract. Group I had a 38% cessation rate after 1 year; Group II showed 36% cessation at the 3-month follow-up. Lichtenstein and Keutzer (1971) pointed out that such results could be attributed to other factors, such as motivation and selection. Given the absence of control groups and replication of results, it is difficult to assess the efficacy of this contractual approach. It seems that contractual methods may serve well as treatment adjuncts, but used in isolation lack sufficient training in internalization of antismoking resolve to work effectively on most smokers.

5. Aversion-Based Behavioral Techniques

The behavior therapy methods reviewed thus far are essentially positive in their emphasis, indicating alternative responses to a client faced with discriminative stimuli for smoking, and rewarding the client for efforts at extinguishing the cue capacity of these situations. These approaches seem weak in their capacity to overcome the high reinforcement potency of cigarettes. As Hunt and Matarazzo (1970) have pointed out, smoking is a grossly overlearned
and multiply-determined habit in which secondary (learned) reinforcement has made the behavior functionally autonomous or rewarding in its own right. Few maladaptive behaviors have been so thoroughly overlearned.

In dealing with intrinsically rewarding but ultimately maladaptive behaviors (e.g., obesity, alcoholism, sexual deviation)...

a frequent strategy is to weaken or eliminate the reinforcing or "pleasurable" component of the behavior. This may be done by altering the consequences of the behavior or by pairing the problem-behavior with a noxious stimulus to develop a conditioned aversion response.

(Lichtenstein & Keutzer, 1971, p. 62)

While a wide variety of aversion based behavior modification methods have been tried both within and beyond the laboratory setting, the results, with a few recent exceptions, have been rather discouraging.

a. Aversion Training with Electric Shock

Laboratory training. Electric shock is the most common, convenient, precise, and traditional unconditioned (naturally punishing) stimulus applied in aversive conditioning in general. It is therefore not surprising that it has been often tried in attempts to control the smoking of volunteer subjects. Case study results indicated promise for shocking cigarette inhalations. McGuire, and
Vallance (1964) reported cessation for six of their 10 subjects. Russell (1970) found that of 14 highly motivated and preselected subjects that began treatment, six of the nine who finished were still abstinent 1 year later. Controlled studies have failed to match these success rates.

Gendreau and Dodwell (1968) subjected each of nine subjects to increasingly painful shocks for smoking which terminated when S extinguished his cigarette. The treated Ss smoked less than four "subliminal shock" control Ss; in fact, three treated Ss were still abstinent 8 months after treatment. The small sample size and the escape paradigm employed render interpretation of punishment effects difficult. Comparing paradigms, Stokols (1969) found that simple punishment (contingent shock), random reinforcement (noncontingent shock), escape (shock termination for extinguishing cigarette), and session avoidance (non-smoking allowing release from attending session next day) had equivalent effects in the moderate suppression but not elimination of smoking up to the 12-week follow-up. The non-specific nature of the effects of shock implied in these studies was also supported in the placebo effects found by Carlin and Armstrong (1968). Among their 30 male volunteers, contingent shock produced roughly the same reduction as non-contingent (pseudoconditioning) shock and "subliminal" shock controls.

Best and Steffy (1971) used aversive training in a group setting where either E or S himself inflicted shock while smoking, with termination of shock contingent upon extinguishing the cigarette.
Experimental groups met for 1 hour twice weekly over a 3-week period. From the treatment phase to the 4-month follow-up, at no time were the reductions in smoking rates among the aversion groups significantly different from a threat-placebo (minimum contact, exposure to anti-smoking film and materials) control group. Incidentally, factors varied around the treatment had either no effect (internal-external focus of messages about control of smoking) or a merely temporary impact (inducing high dissonance by having S attempt to stop smoking late rather than early in the treatment phase) which disappeared at follow-up.

In addition to these studies, several other experiments, reviewed in other sections, employed electric shock aversion training conditions as a technique for comparison with other approaches. For example, Koenig and Masters (1965) found equally unimpressive results for aversion, systematic desensitization and supportive counselling in producing a temporary suppression of cigarette consumption in their Ss. Engel (1969) added homework practice requirements (e.g., breath-holding) outside the laboratory to shock aversion, desensitization, and record-keeping groups. These treated (8 session over 2 weeks) groups decreased their smoking relative to a control group. There were no significant differences between treatments although a trend favored the desensitization condition at the 1-month follow-up.

While aversion training as a technique in isolation has had little success, one study has reported moderate results using it in combination with intensive training in self-management techniques
(Chapman, Smith, & Layden, 1971). During each of the five daily 1-hour sessions, Ss were given a minimum of 25 shock pairings while smoking, during which time E and S were not allowed to speak. During a non-smoking "coffee break" E trained S in such self-control tactics as stimulus control, contingency management, time-out, contractual management, response substitution, role-playing replies to offers of cigarettes by other people, and other forms of coaching and counselling. By the end of treatment 21 of 23 subjects were abstinent; nine were still abstinent after 1 year, six of whom came from an 11-member subgroup receiving extra (11 weeks) therapist monitoring. These favorable results should be tempered with such possible confounding factors as motivational preselection ($100.00 deposit), lack of control groups or controls for therapist effects, and the provision of "booster sessions" for recidivists. Further research in replicating these results with controls is indicated.

It seems apparent that, regardless of the learning paradigm in which it is employed, "human Ss appear to be all too capable of discriminating between shock and no-shock situations and the hoped-for generalization never materializes" (Lichtenstein & Keutzer, 1971, p. 63).

**Portable aversive stimulators.** Attempts to remedy the problem of discriminated aversion in laboratory training have taken the form of portable devices to administer shock contingently in the smoker's natural environment. Ober (1968) instructed 12 Ss on the rationale of aversive conditioning and the use of the pocket-size "habit breaker"
whenever temptations to smoke occurred. The operant (n=11) and
transactional analysis (n=12) groups were given rationales for their
treatments and "reminder cards" to consult in tempting situations.
No significant differential treatment effects emerged at treatment
conclusion and at 1-month follow-up, although smoking rates for all
groups were significantly reduced.

Two further studies employed a special cigarette pack which
automatically delivered a painful shock when opened. Powell and
Azrin (1968) found that the smoking reduction of their three Ss was
directly related to shock intensity; however, at increasingly higher
intensities the Ss wore the apparatus less of the time, and when the
treatment phase was discontinued, their smoking returned to baseline.
Whaley, Rosenkrantz, and Knowles (1971) reported that nine of their
10 volunteer Ss were abstinent 1 month after the apparatus had been
removed and five were still abstinent at the 18-month follow-up.
These favorable results with a small N have not been replicated in
a controlled study to the knowledge of the present reviewer. The
central issue here clinically is whether Ss can be sufficiently
motivated to adhere to the treatment outside the laboratory. Empiri-
cally the unresolved issue is whether E's monitoring systems can
detect violations of the method in larger-scaled studies.

Shock for imagined smoking. Another dimension of shock-induced
aversion is the punishment of smoking imagery rather than, or in con-
junction with, actual smoking. The rationale is the enhancement of
extra-laboratory transfer because the imaginal stimuli generated by
the subject will be more directly relevant to his natural smoking situations than the concrete stimuli of the laboratory.

In an early study, Mees (1966) separated his 43 Ss into four treatment conditions, including the shocking of imagined smoking, "subliminal" shocking of imagined smoking, and two "breath-holding" response-substitution groups. While follow-up was short (1 month) and results were non-significant, reduction trends favored the breath-holding and the "subliminal" shock groups.

Such strong placebo effects discouraged further research in this area until Steffy, Meichenbaum, and Best (1970) interpreted the prevalence of non-specific effects in smoking research as evidence for the possible operation of cognitive and social factors that lay undefined and confounded within the treatment procedures. Citing further evidence that the modification of self-verbalization about maladaptive behavior can affect the behavior itself, they attempted to apply this strategy to smoking. They compared an attention-placebo control group with three treatment groups: overt verbalization about the smoking chain without actual behavior, overt verbalization accompanied by actual smoking, and covert (imagining a smoking situation) verbalization accompanied by actual smoking. Smoking vocalizations and behavior were punished by shock, which could be terminated or avoided on each trial by extinguishing or renouncing cigarettes. The behavior rehearsal conditions were provided as a test of Geer's (1966) contention that the most effective focus of aversion is the behavioral act itself. Results sustained this precaution: substantial smoking
cessation was obtained and maintained at the 6-month follow-up for only the combination of covert verbalization and behavior rehearsal (56% cessation rate). While the study suffered considerable attrition from the original 48 college-community Ss to the 34 available at follow-up, the promise of punishing behavior rehearsal with covert verbalization or imagery appears worthy of further investigation.

In a similar vein, Berecz (1972) investigated the prediction that if imagined smoking behavior were punished by self-administered shock, corresponding overt behaviors would be suppressed. Of the 150 students who attended an orientation session, 111 actually began treatment, randomly assigned to groups matched for sex and baseline rate of smoking. Self-administered shock was contingent upon actual smoking in one group, upon imagined smoking in another. Additional controls were provided by placebo (subliminal shock for imagined smoking), wait, and minimal-contact groups. Treated Ss were seen in small groups for twice-weekly half-hour sessions over the course of 3 weeks. For moderately smoking male subjects, data on percentage of baseline smoking showed imagined and actual smoking treatments were both effective relative to control groups, but not significantly different from each other. For heavy smoking (162 + cigarettes/week) males, imagined smoking was clearly more effective at the 9-week follow-up than the placebo (p < .05) or actual-smoking (p < .001) conditions. Moreover, the superiority of the imagined-smoking was replicated within the study by using Ss who had been originally assigned to the wait group. When exposed to the imagined-smoking
treatment, their results paralleled those obtained with the original group. Berecz interpreted the null results with females as a function of their tendency to self-administer significantly less painful shock intensities than their male S counterparts. He further explained the results obtained with heavy smokers in terms of a theory of cognitive conditioning based on Estes' (1969) theory of punishment focusing on imagining the target behavior to reactivate "amplifier elements" that have become obscured by overlearning in heavily habituated smokers. Whatever the theoretical explanation, there appears to be encouraging empirical support for the efficacy of shocking imaginal elements of smoking behavior.

The use of electric shock as a UCS for punishing real or imagined smoking with laboratory or portable devices has its inherent flaws. Even when self-administered, shock is undeniably artificial and extrinsic to the behavior itself and its natural sequelae. It may even implicitly reinforce the antitherapeutic cognition that smoking is naturally pleasurable. These drawbacks have led investigators to seek more suitable alternatives to shock as an unconditioned stimulus.

b. Covert Sensitization

In covert sensitization (CS) both the behavior to be modified and the noxious stimulus are presented in imagination. In a paper outlining the application of CS to smoking, Cautela (1970) cited evidence showing that imagery behavior is subject to the same principles as overt behavior. He then outlined the procedure in which S is
told to imagine in vivid detail a smoking scene in which he experiences increasing nausea in the initial acts of the smoking chain, culminating in putrid descriptions of vomiting over himself and the smoking materials. Alternating with the aversive scene is a self-control scene in which S escapes the increasing nausea by renouncing cigarettes and feeling proud of his mastery over the situation. In addition to training sessions of 10 punishment and 10 avoidance trials, S is told to practice the 20 scenes on every day between sessions. In clinical practice this technique is often augmented with relaxation training and thought-stopping to increase self-control. Furthermore, training is carried beyond the extinction of smoking to overlearn the aversion.

While Cautela (1970) presented several unpublished studies in support of his technique (e.g., Mullen, 1968; Viernstein, 1968), their small Ns and inadequate controls undermine their contribution to the evaluation of CS. The more tightly controlled empirical studies in the published literature generally affirm the temporary suppressive effects of CS, with follow-up results roughly equivalent to the other intensive treatments applied in these experiments.

Painter (1972) tested CS (8 groups, N=45) against conventional group therapy on an educative-supportive model (8 groups, N=47). Therapy groups met for a total of 7 sessions each. In addition there were control groups (N=53) for no contact, expectation, meeting, and effort. While the control groups showed little improvement and no differences between them, both experimental treatments were superior in terms of reduction of base rate smoking compared to controls, but
did not differ from each other. The follow-up assessment was only 3 weeks after therapy; this fact makes interpretation difficult. Gordon (1972) employed a covert aversive stimulus in conjunction with imagining early or late components of the smoking behavior chain in a self-control training treatment. Results for the 36 Ss showed that these two groups, a contingency management group, and an attention-placebo control group all reduced their smoking but with no differential effectiveness at the 1-month follow-up. Gardner (1971) also used a covert aversive stimulus (the memory of increased heart-rate and circulatory changes while self-monitoring smoking in the laboratory) in a contingency management paradigm reinforced with a high probability behavior. He compared this with a group punishing the identified stimuli eliciting their smoking with a low probability behavior. While post-therapy cessation rates favored the former strategy, results at the 4-month follow-up showed no differences between the strategy groups.

In a study comparing CS with hierarchical stimulus-control procedures and an attention-placebo control group, Sachs, Bean, and Morrow (1970) obtained the unusual result of enduring between-treatment differences. Although interpretation of the findings is limited by the small N (24 Ss) and short follow-up (1 month), cessation rate and smoking rate data show that the CS group was significantly superior to the stimulus-control group which in turn outperformed the attention-placebo group.

A few studies have evaluated the efficacy of CS alone versus the
CS-SD combination. These have been reviewed in the systematic desensitization section. To recapitulate, the Gerson (1971) study found that the CS and CS-SD treatments, although not significantly different from one another, were significantly different from the effort-control group, both at treatment termination and at the 1-week and 5-week follow-ups. As in Sachs et al. (1970) the CS treatment resulted in either very positive or very negative changes within the CS group, i.e., a bimodal distribution of results. (This may be a feature of quitting smoking in general, rather than a specific treatment artifact, although steep extinction curves seem more characteristic of the CS method than others). Wagner and Bragg (1970) compared SD, CS alone, CS-SD, relaxation alone, and "counselling therapy". The CS-SD treatment was superior at all points during the treatment, though not significantly so until the 7-, 30-, and 90-day follow-up periods. These researchers attribute the apparent superiority of the combination method to the fact that it decreases the pleasure derived from smoking (CS) while lessening the negative affect associated with smoking deprivation (SD). Wagner's (1968) self-administered programmed recording combining relaxation, SD and CS training has not yet been empirically evaluated.

To summarize the scientific efforts to date, covert sensitization procedures have generally had significantly more impact than the control procedures employed. In comparative studies they have proven at least equal and sometimes superior to other behavior and group therapy techniques. The CS-SD combination appears to be the most
successful application of the method, although further research is needed to establish this tentative lead. Some interesting comparisons could be made between CS and shock aversion of actual and imagined smoking, especially the latter. It seems that the punishment of imagined behavior, either with shock or with nausea imagery, enhances the extratherapy transfer of aversion to cigarettes. Further research on this line is indicated by the trend in results thus far.

Of less promise are isolated attempts to find effective unconditioned stimuli for smoking apart from shock or nausea imagery. Green (1964) found that supposedly punishing white noise superimposed of taped music was ineffective in reducing the smoking of his mentally retarded subjects. Raymond (1964) reported success in inducing cessation in a 14-year-old boy by pairing smoking with apomorphine-induced nausea. However, difficulties in accuracy of timing, treatment aversion, and discrimination likely would restrict the applicability of this method. As in all aversive approaches reviewed thus far, the UCS applied is still unrelated in nature to the target behavior.

c. Hot Smoke Aversion Training

Several investigators have attempted to use hot smoke blown in the subject's face while he inhales as punishment for smoking. Usually such training is combined with escape such that extinguishing the cigarette is rewarded by removal from the smoke, a breeze
of cool mentholated air, etc. These contingencies are provided by a smoke-blowing apparatus mounted in front of the subject's face.

Wilde (1964) pioneered the use of this method with seven Ss. He paired hot smoky air with smoking, and cool mentholated air plus the opportunity to eat a peppermint with putting out the cigarette and saying "I want to give up smoking." Between daily 25-minute sessions (6 to 20 trials per session) Ss were instructed to remember the conditioning when tempted to smoke and use an alternate response. Treatment terminated when S reported that he was no longer smoking or needing to exercise "excessive self-control" (for most Ss this occurred between 2 and 20 sessions). Preliminary results showed that three of the seven Ss had quit smoking and two had withdrawn from treatment. By a year later, however, all seven had returned to baseline rates of smoking, and declined further "booster" sessions (Wilde, 1965).

Franks, Fried, and Ashem (1966) improved the smoke-blowing apparatus to give more immediate and precise latencies and durations. In each conditioning trial S would light his cigarette and continue smoking while the apparatus would blow smoke in his face and flash the lit sign "SMOKE" until S could no longer endure the punishment. At this point he would butt out the cigarette, at which the apparatus would deliver a stream of cooler air and the words "FRESH AIR" would light up on the front panel. S would continue in this manner to light up on the front panel. S would continue in this manner to light up and extinguish new cigarettes (to a maximum of 10 per session) as often as possible during each session. Of the 23 original Ss,
only nine completed treatment (12 sessions over 4 weeks), attesting to the unpleasantness of this type of treatment. Of these five male and four female Ss, four (three of them male) were not smoking at 6-months follow-up: one S switched to a pipe. The authors suggested that their technique should be bolstered with a "broad spectrum" approach, including the acquisition of an attitudinal set against the continuation of smoking.

In an experiment by Grimaldi and Lichtenstein (1969), 29 Ss were assigned to one of three groups: contingent punishment, "non-contingent" punishment, and attention-placebo. The contingent punishment group received essentially the same treatment as that of Franks et al., (1966), that is, hot smoke while smoking and fresh air for extinguishing the cigarette. The "non-contingent" (actually reverse-contingent) group were given hot smoke while not smoking and fresh air while smoking. The control group Ss, yoked to either of the experimental group Ss, received no smoke or fresh air. Instead, they were asked by E to light or extinguish cigarettes according to the behavior of the experimental S to whom they were yoked. Each half-hour session consisted of 10 trials, one cigarette per trial. The seven individual treatment sessions were spaced over a 3-week period. Using the number of cigarettes smoked before, during and after treatment up to a 1-month follow-up, the investigators found only a significant trials effect. Reduction, but not cessation prevailed for all groups at the 1-month follow-up. No treatment effect or Trials x Treatment interaction emerged. Trial duration and ratings of trial unpleasantness were unrelated to treatment success.
Furthermore, the take-home instructions given to half the Ss (to chain smoke four cigarettes on each smoking occasion) was unrelated to outcome, although the authors do not report the extent to which the instruction was followed.

Lublin and Joslyn (1968) using a similar apparatus achieved more favorable results. Although 21 Ss dropped out of treatment, 40 of the 78 heavy smokers who completed at least 3 sessions ceased smoking. At follow-up, averaging about a year after treatment, 15 Ss were still abstinent and 16 were smoking less than 50% of their original baseline. Grimaldi and Lichtenstein (1969) noted that Ss in the Lublin and Joslyn study tolerated more smoke (4.55 trials per session; 107.9 sec. per trial) which may have facilitated treatment. Nevertheless, the lack of control groups especially for attention-placebo, plus the relatively standard cessation rate of 16% at one year, lessen the impact of the impressive initial results.

Schmahl, Lichtenstein, and Harris (1972) sought to reconcile the different findings of these studies while questioning the effect of follow-up frequency and the role of blowing smoke as an effective application of an aversive stimulus. To test the latter, two groups were exposed to warm smoky air blown in S's face contingent on his smoking; two other groups received warm, mentholated air while smoking. Procedure was identical for all groups; every 6 seconds E would tell S "smoke" and S would inhale as in normal smoking. This continued with S chain-smoking cigarettes until he could no longer tolerate another inhalation, at which point he would repeat the
Autosuggestive phrase "I don't want to smoke anymore" then crush out his cigarette. This action turned off the blower and started the exhaust fan. As soon as S felt he could tolerate another cigarette, the next trial was begun. This procedure continued until S was unable to tolerate another cigarette. Ss were firmly discouraged from smoking between sessions; non-scheduled sessions were offered and utilized when Ss felt an overwhelming desire to smoke. All Ss were seen initially for three consecutive days, then less frequently according to their ability to control their smoking. Ss were also offered booster treatments (of 3 sessions each) for relapses. Seven Ss were seen on this basis.

Results showed that all 28 Ss in all groups terminated smoking completely, usually taking an average of 7 to 9 sessions to complete treatment. Of the 25 Ss available at the 6-month follow-up, 16 were abstinent, 4 Ss were smoking less than half of baseline, while the rest had relapsed, so that the average rate for all 25 Ss was 22% of baseline. Counting unavailable Ss as complete relapses, cessation rate is still an impressive 57%, and overall smoking would equal 30% of baseline. The warm, smoky air and menthol air groups did not differ, but, contrary to Es' expectations, Ss followed up at 4-week intervals were significantly (p < .01) more successful than Ss contacted every 2 weeks. Furthermore, Ss' evaluations of treatment components rated the experienced therapist and the act of rapid smoking as the two most important factors in the treatment they received. This observation, coupled with the obvious lack of differential advantage of the smoke over mentholated air, led the authors to consider
the possibility that rapid and continued smoking itself might have a major role in producing the results achieved by the method. Thus these investigators were led to a path unsuccessfully trodden by other behavior therapists. Remembering that the tars and nicotine in cigarette smoke are essentially irritating and poisonous, especially in larger doses, several experimenters began in the late 1960's to consider the untapped potential of the cigarette itself in eliciting noxious reactions.

d. Oversatiation

In layman's terms, oversatiation is a case of the cliché "too much of a good thing." It is the repeated application of a normally appetitive (positively reinforcing) stimulus to the extent that it becomes noxious to the organism. It is supposed to lead to escape from the applied stimulus and avoidance of operants that lead to further application of the oversaturated stimulus. The principle has been applied to smoking in various forms with mixed success.

Review of experiments. Resnick (1968a) instructed his eight student Ss to smoke 4 packs a day for 1 week. At the end of the week six of the eight had declared no further desire to continue smoking; 4 months later they still were completely abstinent. Based on this preliminary success. Resnick (1968b) attempted to test this technique in a controlled study. He divided his 60 student Ss into three treatment groups. One group doubled normal consumption for a week, a second group tripled it, while a third (control) group smoked
at its normal rate. Results in terms of smoking rate before treatment, and at 2 weeks and 4 months after treatment, showed no significant change for the control group, whereas both satiation groups significantly decreased their smoking rates, although double and triple satiation did not differ. Cessation rates at 4 months were 25% for the control group, 60% for double satiation, and 65% for triple satiation.

While these early findings appeared promising, a series of experiments reported by Claiborn, Lewis, and Humble (1972) failed to replicate Resnick's results. In the first study, a control group given a convincing rationale for their procedure and a double satiation group were compared with a fixed-interval scheduled group, who smoked their normal rate but at preset intervals. The rationale for the latter group was that smoking according to a time schedule (as in the oversatiation condition) would break the link between the usual eliciting stimuli and the act of smoking. The authors did not report cessation rates for their 44 Ss. However, they showed by one-way, analyses of variance on pretreatment and 2-week and 6-month follow-up smoking rates that there were no significant differences between groups at any period measured. The second experiment replicated the first with 60 new undergraduate Ss, with the added provision of a group who both doubled their smoking rate and smoked according to fixed intervals. Analysing the 2-week follow-up data only, they found no significant effects due to either doubling or scheduling or the doubling-scheduling interaction. Here again they failed to present data; moreover they failed to report an analysis using their 4-month
follow-up data, where between-treatment differences might emerge.

In the third study, 60 Ss (this time University faculty and staff members) were assigned to one of four groups: a no treatment control, a tapering-off (gradual reduction of smoking to zero) group, a fixed-interval scheduling group, and a combined tapering and scheduling group. The data presented and significance tests performed revealed no significant differences between the three experimental groups. The authors therefore concluded that Resnick's results are not general and that his theoretical rationale is of questionable validity when effects such as those of placebo and scheduling are controlled.

Another study that casts doubt on the Resnick procedure is a well-controlled experiment by McCallum (1970). A "resolve to quit" control group smoked their normal rate while a stimulus satiation group tripled their smoking rate for a week. Other treatment conditions (CS-SD) and controls (attention-placebo/systematic desensitization, relaxation training, expectation, and waiting list) were also run. The 46 male student Ss were assessed on smoking rate before treatment and at 1 and 2 months after treatment. Although pooled data showed all control groups inferior to the treatment groups, no differential treatment effects emerged. Stimulus satiation was equally as effective as the CS-SD treatment.

In another variant of oversatiation, Marrone, Merksamer, and Salzberg (1970) had their adult Ss chain-smoke cigarettes in either a 10 or 20-hour marathon session prior to withdrawal. All Ss complied with the rule of holding a lit cigarette at all times and inhaling on it at least every 2 or 3 minutes. In terms of both smoking
rates and cessation rates, the 2-week and 4-week follow-ups show the treatment groups significantly superior to the control (no treatment) group. By the 4-month follow-up, however, the 10-hour group had a cessation rate similar to the control group (less than 20%), whereas the 20-hour group still maintained a 60% cessation rate, similar to the Resnick study. Another 10-hour group, in which oversatiation was combined with sensitization procedures (health-scare films, instructions to focus on bodily sensations) produced results similar to but slightly poorer than the ordinary 10-hour saturation group. However the small N (9 Ss) and other contaminations limit the tentative conclusion that cognitive sensitization does not enhance saturation effects in a 10-hour group. The authors suggested, despite the findings of their main experiment, that even shorter treatments could produce effective oversatiation effects.

Keutzer (1968) construed the smoking of several cigarettes in a row as a form of negative practice, a type of mass practice generating "conditioned inhibition" according to the theoretical framework of Hull. In this "negative practice" (NP) procedure, smokers are made to chain-smoke three cigarettes at the rate of one inhalation every twelve seconds, while the experimenter reads a script focusing on a description of the unpleasant bodily sensations and effects of this "habit" that Ss "want to break". Ss are advised that, in the event of severe nausea, they can leave the room where the group is smoking. When the last cigarette has been smoked, Ss can exit to the fresh outdoor air and into a room full of fresh air in which instructions are given to avoid smoking completely, or if this is impossible, to
replicate the treatment on their own in a quiet room, concentrating on the body sensations. Regardless of external practice or success in non-smoking, Ss are given three weekly NP treatment sessions.

With a large sample (N=213) of adult subjects, Keutzer (1968) investigated the efficacy of NP as compared with: covariant control (contingency management by reinforcing antismoking covert statements) supplemented with educational slides; a breath-holding technique developed by Mees (1966), a type of fantasy-control by aversive conditioning; an attention-placebo "smoking-substitute drug" treatment; and a non-treated control group. Non-specific factors controlled across all groups were length of treatment, monitoring, assessment, financial investment, educational materials, therapist effects, and opportunity for home implementation. End-of-treatment results in terms of both percentage-of-baseline smoking and cessation rates showed treated groups to be superior to untreated groups, but no differential success for any particular treatment. (The best cessation rate was 33% and occurred in the NP treatment). Furthermore, a 6-month follow-up (Lichtenstein & Keutzer, 1969), reporting consistent relapse for all groups (including a combined-treatment group featuring all three behavioral techniques) concluded that the treatments were not effective.

Marston and McFall (1971) conducted a similar controlled study, essentially replicating Keutzer's (1968) treatment but calling it "stimulus satiation". This treatment included instructions to chain-smoke three cigarettes on every smoking occasion focusing on the physical reactions of the body to smoking, practice in the method
during the first sessions, plotting individual and group smoking curves, and practicing ways to refuse cigarettes in social situations. The stimulus satiation procedure was compared with a hierarchical reduction condition supplemented with instructions and practice in relaxation and deep breathing, behavior rehearsal, coverants and verbal practice of ultimate aversive consequences. In addition, two minimal treatments were administered. In the pill control group, Ss were instructed to dissolve tablets in the mouth on each smoking occasion that would make the cigarette distasteful. The "cold turkey" control group emphasized will power, rational counterarguments to smoking, and a non-directively led discussion group. All groups met for six 45 minute sessions held twice a week, plus a seventh (follow-up) session one month after treatment for return of deposits and submission of data. The monitoring procedure was detailed (hour-by-hour tallies on record cards) and supplemented by instructing all Ss to obtain their smoking supplies only from E, who provided them on request. As expected, the shapes of the smoking-rate curves differed across groups during treatment, with control groups showing immediate reduction, the hierarchy group a gradual linear reduction, and the satiation group an initial increase followed by a sharp decline. All groups converged in smoking rate at end-of-treatment, and showed identically strong relapse at the 6-month follow-up. One interesting but unpursued finding was that the satiation technique (which is more authoritarian and less obviously rational) worked well in reducing the follow-up rate of externally-oriented female subjects.

The controversial findings on oversatiation techniques challenge
the reviewer to account for the discrepant results. Where oversatiation (OS) is compared with control groups only, good (60% cessation) results are obtained, but when compared with other behavioral techniques, effectiveness wanes to the level (10 - 20%) of a non-specific treatment effect (Claiborn et al., 1972; Marston & McFall, 1971). It may be possible that the theoretical bases of oversatiation are unsound or that smoking is not a behavior class to which the theory properly applies, or that each method developed to operationalize the principle has a debilitating flaw rendering it inoperable and thus not differentially effective.

The negative practice rationale. Keutzer (1968) explained her technique in terms of response-produced inhibition, giving Dunlap (1932) historical credit for the notion that over-repeated and massed responses often generate affective states different from the same behavior performed in a spaced manner. These response-generated affective states (e.g., boredom, tedium, fatigue, exhaustion) can be grouped under Hull's (1952) concept of "conditioned inhibition". In Hull's framework, the massed practice of a response results first in reactive inhibition ($I^R$) as a fatigue or refractory state develops rapidly in the organism. When $I^R$ reaches a certain critical point, the organism is forced to cease responding. The resultant dissipation of $I^R$ reinforces the new habit of not responding via the conditioned inhibition ($S^R$) generated in the drive-reduction while ceasing to respond. Thus with repeated massed practice, a negative habit will arise that is incompatible with the original response,
while massed practice cannot increase the asymptotic habit strength of the original response. Eventually the original response tendency (its effective reaction potential) will recede below threshold level as the original excitatory drive is equalled and then surpassed by the summation of reactive and conditioned inhibition generated by the massed practice. Thus Keutzer (1968) construed her NP technique as the massed practice of a habit under circumstances which deprived it of its former reinforcing value.

Hullian theory, especially regarding response-produced inhibition in massed practice (e.g., Calvin et al., 1956), has been proven of dubious validity as an explanatory system in light of the refutatory evidence accumulated, especially in "latent extinction" paradigms (Deese & Hulse, 1967; Hall, 1966). Nevertheless, the massed or negative practice of motor responses has proven effective in clinical practice for reducing and eliminating several compulsive and involuntary behavior patterns like typing errors, nervous tics, and stammering (Dunlap, 1932; Jones, 1960; Rafi, 1962; Walton, 1964; Wolpe & Lazarus, 1966; Yates, 1958). Of crucial importance is whether smoking can be categorized as a behavior pattern to which the principle of response-produced inhibition is appropriate. It is true that smoking is for most people a deeply ingrained, over-determined habit that has compulsive qualities. However, this compulsion might be an autonomous function of overlearning (Hunt & Matarazzo, 1970) rather than the anxiety-relief mechanism underlying most neurotic compulsions. Undoubtedly the greatest argument against the application of the negative practice rationale to smoking is that
the motor components of the response chain could never achieve the state of fatigue necessary to effect response-produced or reactive inhibition. Only in the sense of the boredom of repetition could one say that the response itself generates inhibition. In summary, the "negative practice" rationale is inadequate on two major points: (a) the Hullian theoretical basis has been eroded by relentless waves of empirical research; and (b) the emphasis on response-produced inhibition is inappropriate to the act of smoking, a relatively effortless behavior in terms of motor components.

The implosion rationale. In view of the inadequacy of explanations arising from response characteristics, perhaps other formulations focusing on stimulus properties might better describe massed-practice extinction effects. Guthrie's (1952) response competition theory, for instance, recommends the repetition of a conditioned stimulus until the original response is exhausted and the organism is forced to substitute alternative responses such as resting, relaxing, or otherwise ignoring the conditioned stimulus. Such is the strategy underlying the stimulus "implosion" technique of Stampfl (e.g., Stampfl & Levis, 1967) in which the conditioned stimulus is applied repeatedly at maximal intensity. Since avoidance or escape responses are prevented, and the feared unconditioned stimulus never follows, the client undergoes forced extinction trials. The anxiety-response becomes exhausted, allowing the competing response of relaxation to be paired with the conditioned stimulus.

While the behavior therapy literature documents the successful
application of implosion with such neurotic complaints as phobias (see Wolpe & Lazarus, 1966), there is considerable difficulty applying the rationale to smoking. As with stimulus control and SD techniques, efficacy is predicated on the model of smoking as a classically conditioned response elicited by environmental and internal stimuli. However, a crucial distinction can be made between a conditioned stimulus in a reflex and a discriminative cue in an operant. Stimulus control and implosion techniques are appropriate to the former paradigm (since the stimulus is the major determinant of the following response), but not the latter (since the cue is not the crucial element in response maintenance). Smoking can most accurately be construed as a voluntary (even if strongly motivated) skeletal activity monitored and coordinated by the central nervous system. Therefore the principles of operant conditioning ought to apply to smoking more effectively than those of classical conditioning, and the emphasis should thus be placed on stimulus events following the response rather than those preceding it. It is in this context that oversatiation phenomena in smoking are most accurately described.

The oversatiation rationale. Operationally defined, oversatiation is the repeated application of a stimulus beyond the point of satiation and to the extent that the organism demonstrates an aversion for the stimulus. In the operant conditioning paradigm of Skinner (1938), responses are maintained by stimuli which temporally follow and are contingent upon the behavior performed. A
given behavior is likely to increase in frequency when followed by positive stimulus, or escape from (or avoidance of) an aversive stimulus. That stimulus is called a reinforcer in terms of the behavior it maintains. However, a positive reinforcer loses its effect when excessively available, since the supply is adequate to fill the finite capacity of the organism for amounts or intensities of any given stimulus, especially one which acts on the physiology of the organism. Accordingly, if the stimulus is applied with sufficient frequency and constancy to continually oversaturate, the response will undergo extinction due to lack of incentive for performing it and perhaps a fading of the response-stimulus contingency. Furthermore, if the stimulus is applied in still greater quantities or intensities, an aversion for the stimulus develops in the organism. At this stage the organism suppresses or avoids any responses that result in further cumulation of the stimulus, especially the target operant to which the oversatiation contingency applies. Moreover, the organism will likely emit vigorous responses to escape or relieve this oversupply so that active counter-responding or overcorrection are negatively reinforced.

The incentive-removal property of oversatiation (OS) takes effect upon the termination of the organism's deprivation state regarding that stimulus. The punishment or avoidance effect comes into play when the oversupply of the stimulus exceeds the organism's tolerance threshold for the stimulus. Such effects are most easily understood in the case of a primary reinforcer (e.g., food), which acts immediately and directly on the limited physiological capacities
of the organism (e.g., in overeating). OS effects are more remote and obscure in the case of secondary or learned reinforcers. The parameters of OS effects here might include the storage capacity available, the degree of effort expended to continue collecting and hoarding as these limits are approached, and the range and later oversupply of back-up reinforcers that the stimulus signals. Apart from extremely wide-range reinforcers (e.g., money), OS may be effectively applied to control many operants, even those maintained by secondary reinforcement.

Demonstrations of the application of OS have been reported in the behavior modification literature, notably in the clinical research of Allyon and his associates (Allyon, 1963; Allyon & Michael, 1959). These experimenters have eradicated a number of overlearned maladaptive behavior patterns (e.g., hoarding, compulsive hand-washing, etc.) using the principle of OS. In every case reported, observations and behavioral measures have clearly indicated a brief appetitive stage, a satiation or incentive-removal phase, and finally an aversive or counter-responding stage. In such examples, the capacities for saturation and toleration were psychologically determined and therefore both flexible and remote. It follows that more efficient, effective, and reliable results could be obtained if the target behavior was consumptive rather than acquisitive, because then the saturation limits would be physiologically determined and experientially proximate to the organism. Furthermore, the aversive effects of OS of consummatory responses are both functionally
and temporally contiguous with the target behavior, allowing for optimal specificity of punishment.

Cigarette smoking can be construed as a consummatory behavior because it involves the ingestion of tobacco smoke. The fact that cigarettes are practically never used without at least occasional puffing affirms the inherent consumptive nature of the act. The chemical constituents of tobacco smoke, notably nicotine and some phenols providing taste and aroma, act as primary reinforcers for this operant among habituated smokers. However, it should be remembered that habituation is necessary for tobacco smoke to acquire reinforcing properties. Tobacco smoke is generally aversive to all animals, including man. Both children (Cameron, 1972) and non-smoking adults exhibit escape and avoidance behaviors and verbal reports attesting to the noxious nature of cigarette smoke for all but habituated smokers. Only when a certain tolerance has been trained can the tars and nicotine be considered pleasurable, and this only in the limited case of minor dosages.

In the OS condition, any tolerance developed is soon overridden by the latent noxious capacity of smoke. As in the case of the smoke-blowing machines of the previous section, smokers suffer the effects of second-hand tobacco smoke by being in the smoke-filled room. In addition, their direct inhalation of their own cigarettes is severely irritating to the upper respiratory tract because of the heat and dense concentration of the poisoning particles in the smoke. Most crucial here is the effect of nicotine, which at these dosages induces in all subjects the effects of dizziness, nausea, and finally vomiting.
The experience of nausea and/or vomiting can be considered universally aversive to all animals including man. Nausea has never been shown to have any appetite or positive incentive value. In the case of OS smoking, the nausea and vomiting induced are involuntary and serve no functional purpose because the system of absorption is respiratory rather than digestive. Therefore, in terms of both nullifying the primary reinforcement effects of smoking and establishing a condition of aversion in all subjects, OS would act as a sufficient suppressor of the behavior so that it would again be amenable to voluntary processes, including cessation by all who sincerely desired to quit. At this point only the effects of secondary reinforcement could operate to maintain the habit. However, OS can also assist in undermining this secondary reinforcement.

Since smoking is for most smokers a habit that has been excessively overlearned, the role of secondary reinforcement in its maintenance deserves special consideration. In fact:

It may well be that smoking represents an example of Allport's functional autonomy; that the smoking which began as a gesture of role definition turns into either a purely habitual response, a response based on social stimulation, or a response supported by its pleasurable or tension reducing characteristics.

(Mausner & Platt, 1968)
OS training weakens these bases for smoking. First, the unpleasant affective reactions produced should (given sufficient OS trials and conditions) generalize to normal smoking, nullifying its pleasure and tension-reduction capacities. The generalized aversion and avoidance may not, however, be sufficient to overpower the cue capacity of social stimuli. The OS regime per se is deficient because it does not specify and train alternative responses; often the novice quitter may succumb to the need to structure ambiguous or vacuous social situations "with the dignity of purposive behavior" (Hunt & Matarazzo, 1970, p. 72).

Regarding smoking as a purely habitual response, the OS technique is especially appropriate because of the awareness it generates. As a habit maintained by the self-reinforcing capacity intrinsic to the performance of a familiar ritual, the response is now determined primarily by external cues. As with compulsive overeating, the secondary reinforcement is immediate, the aversive consequences remote, and the current physiological feedback suppressed (Schacter, 1968). Awareness of the unpleasant concomitants of the response is at best vague or suppressed for the habituated smoker. Yet awareness often facilitates learning (Estes, 1967). Therefore a procedure which leads subjects to attend to stimulus-outcome relationships such as smoking and bodily damage will facilitate learning regarding those relationships. The OS experience makes present health symptoms salient to the smoker and symbolically foreshadows the future consequences of continued smoking in a way that has emotional impact and personal
relevance to the individual. The noxious effects are not external, artificial, or arbitrarily imposed, but rather are immediate, authentic, compelling, and directly contingent upon the behavior itself. Awareness is thus restored to the habit.

The respiratory and nausea symptoms induced by OS satisfy the condition that the punishing or unconditioned stimulus in aversion training be of strong intensity and emotional impact (Kushner & Sandler, 1966; Solomon, 1964). The rationale of utilizing excessive smoking to generate its own aversive consequences follows the experience of Lazarus in clinical practice (1968) and Wilson and Davison (1969) in animal experimentation. That is, aversive conditioning can be rendered most effective by using an aversive stimulus which is highly similar to the positive or appetitive stimulus for the undesirable behavior. Because the unconditioned stimulus (self-applied doses of tobacco smoke) involves several sensory modalities, is functionally related to the target behavior, and is on the same generalization gradient (but opposite polarity) as the attractive conditioned stimulus (tobacco smoke), conditioning of aversion should be more effective and permanent, according to Lublin's (1969) criteria for selection of the unconditioned stimulus in aversion training.

To recapitulate, the theories by which OS phenomena have been explained include Hull's inhibition model, Guthrie's response substitution model, and Skinner's behavioral maintenance model. The latter seems to be the most appropriate in the application of OS to smoking when viewed as an operant. The author construes
smoking as a compulsive consummatory habit pattern to which OS techniques might be suitably applied. OS would reverse the primary reinforcement contingency and overrule the secondary reinforcement properties through the personal awareness it compels in the smoker by using the most appropriate unconditioned stimulus for this behavior. Since OS seems theoretically promising, the inconsistent record of the technique to date may be a function of the manner in which principle has been translated into practice.

The Resnick method does not guarantee that all cigarettes smoked during the double-rate week will be aversive. Intermittent positive reinforcement scattered in a training procedure featuring mild to moderate intensities of punishment is a situation normally predictive of resistance to extinction as a partial reinforcement effect strengthens the target behavior. Moreover, the Resnick (1968) method shares with the Marrone et al., (1970) procedure (10 and 20-hour smoking marathons) the fact that all aversive conditioning trials occur prior to the extinction phase. Jost's Law that "other things being equal, the older of two learned responses has precedence over the newer" (Hunt & Matarazzo, 1970, p. 76) favors the endurance of smoking, especially when weighing many years of positive learning versus a few days of aversive training. Although massing aversion trials increases the sensitization produced, this effect decreases with time since the last presentation (Catania, 1971). Soon the positive associations gained in the prior reinforcement history again reassert their
former prominence in the subject's hierarchy of images and satisfactions related to smoking (Haag, 1971), and he becomes vulnerable to the demoralizing cognition that he is being deprived of an enjoyable experience. It seems obvious that, in order to produce a lasting and generalized avoidance of smoking, OS training must be consistent in application, sufficient in number, and maintained during the crucial first three weeks of quitting, when most relapses occur (Hunt et al., 1971).

The major weakness of Keutzer's (1968) negative practice technique is that, when practiced in natural settings, it may often fail to provide a genuinely aversive experience for the subject. First of all, natural settings allow release from the requirement to inhale every 12 seconds while listening to descriptions sensitizing S to the physiological effects of smoking. Not only do smokers usually suppress such feedback, but also titrate their nicotine intake by modifying puffing frequency to adjust the dose to "optimal" levels which may vary for different activities and settings (Ashton et al., 1970). Secondly, the act of smoking only 3 cigarettes consecutively may not be unpleasant in many circumstances. It is noteworthy that Keutzer reported that her Ss experienced some discomfort in the three laboratory sessions, but none of them vomitted. In natural settings, the effect is even milder. Any moderate smoker will testify that it is easy and sometimes even pleasurable to smoke three-in-a-row of his favorite brand. In fact, many habitual smokers do so when drinking or engaged in behavioral settings producing strong smoking cues and
distraction from bodily feedback. What is necessary, therefore, is the provision that S chain-smoke sufficient numbers to guarantee aversion in every oversatiation session, regardless of natural inhalation rate. Furthermore, S should smoke several cigarettes beyond the point of aversion, so that this reaction is well retained in a manner analogous to the overlearning retention facilitation effect demonstrated in various other learning situations (see Deese & Hulse, 1967; Hall, 1966; Pavlov, 1927).

Following this line of reasoning, the current writer began a series of case studies to establish norms for oversatiation phenomena following the consecutive chain-smoking format. He found that, for most of subjects, the incentive-removal stage had been achieved by the first cigarette; noxious symptoms had developed by the fourth, including nausea by the fifth or sixth. The smoking of 8 cigarettes produced in all Ss an overlearning of aversion for cigarettes in at least the last three smoked. Moreover, with each subsequent session the aversion generalized closer to the first cigarette in the chain, rendering the overlearning still more extensive.

e. Oversatiation Combined with Covert Behavior Rehearsal

The pilot study. Based on the success in totally eliminating smoking in the first two subjects exposed to the "Chain-8" technique, Young (1973) exposed a group of 12 college students to the method, which was arranged in five 1-hour group sessions spaced over a 10-day period. The treatment consisted in having Ss chain-smoke eight
consecutive cigarettes while listening to recorded material giving a simple rationale for the technique. The tapes also featured verbal descriptions of the current and remote bodily effects caused by smoking, a covert behavior rehearsal section where Ss imagined anticipated future smoking situations, and finally the instruction to smoke only in the Chain-8 manner if at all between sessions. As an additional attention-focusing technique, Ss were asked to fill out a "craving scale" (devised by the experimenter) rating their desire to smoke in various situations including the laboratory.

Results showed a cessation rate of 91% that was maintained through week 4 (about 2 weeks after treatment termination), but considerable relapse occurred during the Christmas vacation immediately following, so that the rate at the 2- and 4-month follow-ups had dropped to 50% and 42%, respectively. Despite this drop, the success rate was considerably higher than most studies, and paralleled the effectiveness of the more successful smoke-aversion (e.g., Lublin & Joslyn, 1968; Lichtenstein & Keutzer, 1971) and oversatiation (Resnick, 1968 a,b) techniques. The demonstration of superior initial success rates plus the possibility of automating the procedure via audiotape cassettes for leaderless groups rendered the method worthy of further investigations.

As a result of clinical experimentation the full "chain-8" technique had been modified in several minor but perhaps significant aspects from Keutzer's (1968) original formulation of OS. Most prominent was the common problem of Ss vomiting and the
experience of the next cigarette after such episodes as being pleasurable to throats and mouths now cooled by rinsing with water. In response to this finding, E changed the instructions slightly. Ss were told to inhale often enough to induce and maintain a state of nausea short of vomiting, and if vomiting occurred to cease further smoking but return from the nearby washrooms to the treatment group and watch the others continuing to smoke. Thus for many Ss vicarious learning followed actual oversatiation experience during the session. Secondly, as with Keutzer's method, interaction and distraction were minimized by E's instructions to attend to the verbally described and directly experienced effects of smoking. However, the use of tape-recorded materials in Young's study minimized or at least standardized the E-S interaction effects that contaminate most smoking research (Miller, 1967; Pincherle & Wright, 1970; Weir, Dubitzky, & Schwartz, 1969).

The Covert behavior rehearsal rationale. A major departure from previous oversatiation applications was the provision of what the author calls "covert behavior rehearsal" (CBR). Briefly, the procedure involves the pairing of imagined scenes of yielding to impulses to smoke with actual rapid (therefore noxious) inhalations during oversatiation smoking, augmented by E commenting on the physical effects being felt by Ss. Alternated with these are the same situations, but Ss imagine they are resisting the impulse to smoke and feeling healthy, happy, and free because they "don't have to smoke." During the latter, Ss are instructed to
not inhale but rather to hold their lit cigarettes as far as possible away from their face. Although this instruction does not provide total escape from second-hand tobacco smoke in the room, at least it affords relief from highly noxious direct inhalation.

This technique was inspired from several sources. Primarily, CBR is an attempt to extend the generalization of aversion to cigarettes beyond the laboratory. Ideally, generalization would be facilitated by rotating OS treatment sessions over several stimulus settings, e.g., office, coffee shop, home, cocktail lounge. While such maneuvers are appropriate in clinical practice, they are logistically unmanageable in a controlled research experiment. Fortunately, Ss have the ability through imagery to escape the confines of the laboratory and depict stimulus settings for which affective responses are altered, as demonstrated in techniques like SD, implosion, and CS. Indeed, CBR can be classified as a variant of Caulela's (1970) covert sensitization technique, with a few minor but crucial departures.

In CBR, only the setting is imagined. The aversive stimulus of nausea is genuinely experienced and immediately and directly contingent upon actual rather than imagined smoking. This distinction has been proven important in the recent research of Steffy, Meichenbaum, and Best (1970). They found that a treatment featuring both covert activity (imagining a smoking situation with self-description of behavior) and behavioral practice (actual smoking punished by electric shock) performed differentially better
in achieving and maintaining smoking cessation than the other treatment combinations tested. The investigators concluded:

...the manipulation of events and behavioural rehearsal of the deviant act may be important adjuncts of the aversive paradigm by virtue of the greater generalizability of the self-generated cues to extra-therapy situations.

(Steffy, Meichenbaum, & Best, 1970, p. 115)

The use of a neutral (nicotine-induced nausea) rather than arbitrary (electric shock) unconditioned stimulus should enhance such generalization. According to both the behavior and verbal reports of Ss in Young's (1973) pilot study, such generalization did indeed occur where CBR was used to complement the basic OS procedure.

CBR also remedies shortcoming of ordinary OS by both specifying and providing training in an alternative response to smoking. The rehearsal of the avoidance response of non-smoking and its affective results in many regards parallels the "assertive response training" of Wolpe and Lazarus (1966) wherein S practices or role-plays the behavioral, cognitive, and affective components of substituting alternative responses for the undesirable behavior. In this case, S practices the role of a non-smoker, one who "no longer is forced to smoke," who is "free from enslavement to the tobacco habit."
It is obvious from these quotations that E is also attempting to reshape S's cognitions about the desirability of being a non-smoker. In a symposium on smoking, Premack (1970) contrasted the embarrassing failure of most behavior modification approaches for smoking versus the success of 21 million people in quitting without resort to such methods. While it is highly likely that spontaneous quitters are different from experimental volunteers for smoking cessation research (see subject variables section), Hunt and Matarazzo (1970) present other evidence that long-term cessation is not easily explained solely in terms of traditional learning concepts (e.g., extinction). Rather two processes appear to be at work: some kind of habit control procedure in conjunction with a decisional process to reject smoking. Education and group-therapy approaches neglect the former to attend to the latter; strictly behavioral approaches usually focus on the former and assume the latter; both typically fail. Successful techniques invariably combine these two aspects, although credit is mainly attributed to only one. More enlightened behavior therapists realize the limitations of learning theory in accounting for their success. They instead construe their techniques only as ways to diminish the control of the habit and weaken the psychological dependency on it, to the extent that decisional processes can regain ascendancy in modifying or totally eliminating the target behavior (e.g., Resnick, 1968b). Thus the effective technique should contain both behavioral as well as
meaningfully integrated cognitive components; research should assess their proportionate contribution to the success of the technique, or at least determine whether such components can operate independently.

The homework instruction rationale. In addition to the learning theory and cognitive aspects of oversatiation and covert behavior rehearsal in the "Chain-8" method, one further possibility deserves discussion. At the end of each session, Ss are given the instruction to avoid smoking between sessions, as this would "undermine the effectiveness of the treatment," and the contingency instruction "any time you are unable to resist the urge to smoke, then chain smoke 8 cigarettes." In the framework of communication theory (Watzlawick, Beavin, & Jackson, 1967), S is given a paradoxical injunction which has implications for the course of therapy as well as S's self-esteem, since temporary relapse can be construed as success. If the suggested contingency is followed then the smoking of cigarettes in extinction will not constitute an admission of defeat. Rather, each situation in which the urge to smoke prevails can be construed by S as an opportunity for furthering the effectiveness of his treatment. That is, supposed violations of the program demand (you must quit smoking) are an integral part of the program itself (you must train yourself to dislike smoking). The implications of the demand characteristics invoke subtly the aspects of a therapeutic double-bind. S is ordered to practice his pathology
while E maintains the control of paradoxical intent, so that, provided that S smokes the amount designated by E, he cannot perceive himself as failing in his efforts to control smoking. The self-perception of success in achieving treatment goals is an important factor in the maintenance of non-smoking. This contingency also provides an opportunity for S to return to his treatment group without shame for having yielded to the desire to smoke, instead proud about carrying out another successful over-satiation session. Thus the self-perception of success augments the effect of having all of the last experiences and associations with smoking being consistently aversive both in the laboratory and in the natural environment of the smoker.

Of course, as in all therapy approaches involving "homework" or the assignment of unsupervised practice of a treatment procedure by the client in his natural environment, there are a number of inherent problems. First, the laboratory procedure may be too difficult or complicated to be replicated by the client. That is, there exists the possibility that the homework done by the client is different in both process and likely outcome from the laboratory routine. In the case of the Chain-8 method, both the simplicity of the instruction and the consistency of the aversion generated guarantee the effectiveness of in-vivo practice. A second problem is that the procedure may be sufficiently aversive that the client deliberately violates the method by smoking cigarettes singly between sessions, allowing the possibility of some
positively reinforced trials undermining the goal of overgeneralized aversion for smoking. Unless such violations are quickly curtailed, there is a strong possibility for recidivism among delinquent clients. Therefore, the approach taken by E is to occasionally remind all Ss that "single" smoking is a violation of the treatment-compliance contract and that it constitutes "working against themselves" and "undermining all the time and effort expended in the clinic".

In this context, the problem of detection of such violations is a difficult one, especially where self-reports are the main source of information.

In clinical settings, the client's failure to perform his tasks must be dealt with as a form of resistance. In research contexts, where performance of the homework assignment may be a crucial aspect of the independent variable, it becomes a matter of great importance to verify that Ss did what they were supposed to do. Sometimes the behavior may take place in private places, for example, the bedroom (Davison, 1968), or involve private (cognitive) events such as Homme's (1965) covariant control technique. Cigarette smoking, however, is often a public and observable behavior.

(Lichtenstein, 1971b, p. 164)
Moreover, Chain-S smoking is easily discriminable from "single" smoking by even casual observation on the part of the subject's informant or witness. It is highly unlikely that an observer would see S smoking merely the last of the required 8 cigarettes, as the procedure is rather obvious and lasts usually for at least 20 minutes. While the possibility exists for S to escape detection by single smoking only in private, this practice is itself a form of behavioral control restricting smoking to limited stimulus situations. Furthermore, while there is little E can do to prevent S-O collusion, the possibility of detection by unobtrusive observers recruited by E within the community renders such an alternative undesirable by both S and his observers. Thus the problems faced by S in violating the method by "single smoking" either openly, in private, or in collusion with his observers are deemed sufficiently unpleasant to discourage such maneuvers in most instances.

6. Problems Related to the Evaluation of Treatment Factors

a. The Dependent Variable

The reliability of self-reports. Closely related to the previous issue of self-reports in the performance of behavioral homework is the question of the reliability of self-reports in general. The latter is of crucial importance where such reports are the primary source of data for measurements of changes on the dependent variable.
The issue of the validity of self-reports is one that has received a great deal of attention in the reviews of smoking outcome studies (e.g., Bernstein, 1969a; Lichtenstein, 1971b). While continuous smoking records (e.g., Marston & McFall, 1971) are superior in reliability to gross retrospective estimates, they are still subject to the distortions of self-reporting. Self-monitoring of smoking is reactive and tends to slightly suppress behavior in both frequency and duration (McFall, 1970; McFall & Hammel, 1971). Further distortion is possible given the demand characteristics perceived by the subject (Orne, 1969; 1970; Orne & Holland, 1968). Therefore, in studies comparing a number of treatment variations and controls, it is of vital importance to standardize such characteristics across all groups to the greatest extent possible. Moreover, as a validity check on self-reporting, the standard procedure employed in the better-controlled more recent studies is the reporting on S's smoking behavior by informants who constitute S's social environment. While there are often noticeable discrepancies between subject and observer reports (e.g., Ober, 1968; Goldstein, 1966) they are still deemed preferable to unsupported self-reports. On reviewing this practice, Lichtenstein (1971b, p. 164) comments:

Informants' reports on smoking rates or the frequency of any target behavior may be biased by the informants' limited opportunities to observe the S and the possibility of collusion cannot be ruled out. Nevertheless, when
constant observation is impractical, they can provide a partial validity check on Ss' self-reports (Ober, 1968; Schmahl, Lichtenstein, & Harris, 1970), particularly if E is concerned about smoking versus non-smoking rather than the rate of response. The use of paid assistants to take observation samples in public places is also a possibility (Bernstein, 1970).

(Lichtenstein, 1971b, p. 164)

Reflecting a consensus among researchers on smoking, the self-report is a necessary evil dictated by the inability of E to monitor S's target behavior at all times, and the observer report is the best available check on S's self-report among the general populations from which smoking volunteer samples are drawn. Results gained from such smoking studies are accepted by convention as being the closest available approximations to actual smoking rates. The reliability of such reports can be increased by lessening the degree of specification of the response unit or category, e.g., heavy smoker and light smoker versus nonsmoker, or better still, smoker versus nonsmoker. Regarding the smoker-nonsmoker dichotomy, a recent study (Delarue & Moss, 1972) has demonstrated the use of testing carboxyhemoglobin levels to verify non-smoking status reported by S. In validating self-reports such testing can be a valuable adjunct where it is technically feasible to perform
(i.e. given equipment, staff, and clinic facility to which Ss report in person at follow-up).

The choice of the response unit. Apart from the smoker—non-smoker dichotomy, however, chaos has prevailed as researchers have proliferated a wide variety of conversion and criteria categories for "improvement" or "success" or patterns of reduction and recidivism. In response to the common lament of exasperated reviewers (e.g., Bernstein, 1969a, 1970; Keutzer, Lichtenstein, & Mees, 1968; Lichtenstein & Keutzer, 1971; Schwartz, 1969a), several conventions of reporting have been adopted in recent research. First of all, data are now reported on all subjects in the study, not merely those who completed treatment. Attrition and attendance irregularities have been largely eliminated by use of a refundable treatment completion deposit, usually of $20.00 (Lebedum, 1970; Mees, 1966; nearly all studies since 1968). Secondly, the primary raw data unit for nearly all smoking withdrawal studies is number of cigarettes smoked per unit time per subject. The unit of time is usually a week, or an averaged "day" for the week of observation; although a few studies have used actual day-by-day data (e.g., Marston & McFall, 1971). Thirdly, where factorial designs have been employed, the standard procedure has been to use this raw data directly in the analyses. However, in order to provide comparability with other studies, the researchers typically have converted the raw data into "percentage of base-line smoking". That is, observed rates of smoking are
divided by the base rate and multiplied by 100. Although it could be argued that such a conversion biases the statistics in favor of heavier weighting for light smokers, such effects have proved negligible where both raw and converted data were analyzed in the same manner (e.g., Berecz, 1972). Accordingly, in several recent experiments the raw data (number of cigarettes smoked per subject per week of observation) have been used in the main analysis of variance, while for purposes of display and comparison the data have been converted to the standard "percentage of baseline smoking" form.

The most crucial and stringent test of the success of any smoking control procedure is its so-called "cessation rate" or "abstinence rate". This statistic is computed by dichotomizing the raw data such that subjects are identified as either smokers or completely abstinent non-smokers for the period of observation; the percentage of abstinent subjects of that treatment group is defined as its cessation rate. While the criterion of total abstinence is unusually strict from both a health and empirical point of view, nevertheless it has the advantage of higher reliability than reported smoking rates, especially among observers. That is, it is easier for an observer to detect the presence or absence of the subject's behavior than to assess the rate of smoking where it occurs. Another aspect of treatment group cessation rate is that, although this statistic does not control for differences in base rate smoking across groups, it provides the most meaningful information clinically. For one thing, it has been repeatedly proven
that abstinence rates vary independently of original smoking rate (Chen, 1971; Guilford, 1972; Jacobs et al., 1971b; Keutzer, 1968; Lichtenstein, 1967; Schmahl et al., 1972; Wagner and Bragg, 1970; Wilhelmsen, 1968). Also, it has been demonstrated that reduced but non-abstinent cigarette smoking rates are predictive of high rates of recidivism in follow-up (e.g., Azrin and Powell, 1968; Lichtenstein and Keutzer, 1971), whereas complete cessation precedes a relatively low incidence of relapse (Schwartz, 1969; Eisinger, 1971b; Lichtenstein, 1971a). Accordingly, cessation rate can be considered most stringent and valid indication of the differential performance of treatment groups in research on techniques to eliminate smoking.

The timing of follow-up data collections. As with any outcome study in behavior modification, follow-up observations regarding the target behavior are an integral feature of the experimental design. Appropriate timing of follow-up observations are usually determined by the characteristic extinction and spontaneous remission patterns of the behavior being modified. In the field of the addictions, Hunt, Barnett, and Branch (1971) presented relapse rate curves based on 84 studies on heroin, alcohol, and smoking rates after therapeutic intervention. These curves conformed to a negatively accelerated typical extinction curve. The graph over time featured a steep decline in the first 3 months, a subsequent levelling off, and an asymptotic level well above zero. Hunt and Matarazzo (1970) later presented a graph of similar shape.
based on 17 well-controlled smoking studies using data from only those Ss who were not smoking at the end of treatment, and plotting the pooled percentage of these Ss who remained abstinent at each follow-up point. The authors further commented that adding data from studies they considered unreliable merely increased the distribution around each point, but did not change the shape of the "extinction" curve for nonsmoking. Nearly all studies surveyed by the current writer as well other reviewers (Bernstein, 1969a, 1970a; Keutzer, Lichtenstein, & Mees, 1968; Lichtenstein & Keutzer, 1971; Schwartz, 1969a) support this pattern where initial results have been achieved. In accord with the prevalent trends in the literature of smoking cessation and the shape of the cessation extinction curve, it is likely that a 3- or 4-month follow-up provides adequate coverage for the purposes of treatment evaluation. It should be noted in this regard that excessive lengths of follow-up may reflect factors other than the effect of treatment. Credit for this caution goes to Jerome Schwartz, who, after surveying the literature, concluded:

"Thus, even if highly successful cessation methods were devised, these techniques themselves cannot be expected to maintain the burden of keeping people off cigarettes once abstinence is achieved. This task must necessarily be reserved for societal and environmental influences."

(Schwartz, 1969a, p. 502).
b. The Independent Variable

The role of non-specific factors. The effects of factors not specific to the therapeutic techniques being tested are well documented in the literature on the modification of smoking. Reviews have often pointed to the common failure to provide a clear demonstration of the superiority of any of the treatments tested (except relative to no treatment). The striking similarities in outcome across such a diversity of methods and populations have attracted the attention of investigators to the role of factors common to all the studies.

Thus Bernstein (1970b) conducted a series of three experiments employing a total of 96 college Ss, comparing group support (or social pressure) smoking withdrawal clinic procedure with an attention-placebo condition and several control groups. Both social pressure and placebo groups showed significant reduction in smoking, but did not differ. Subjects asked to quit on their own displayed consistent and significant gains (at least as large as those found in treated groups) only if future aid was not expected. No-contact subjects' smoking remained essentially unchanged. While follow-up revealed the common pattern of relapse, a curious finding emerged. The social pressure condition was superior (especially in the first two experiments) to the placebo treatment in terms of maintenance of treatment-period gains.

Hammen (1971) also conducted a series of three experiments
exploring the role of non-specific effects with college student volunteer subjects.

The studies generally confirmed the importance of desire to quit, positive outcome expectancies, self-monitoring, and participation in a structured program as factors which strongly influence subjects' success in controlling their smoking.

(Hammen, 1971, abstract).

In a publication reporting one of these experiments, McFall & Hammen (1971) suggested that their placebo results (expressed as percentage of base rate smoking) be taken as a minimum standard against which the specific treatments offered by other researchers be evaluated. Such a standard, although quite severe in its requirements, may pose a partial resolution for the ethical and practical problems posed by the provision of all the control groups deemed desirable by Bernstein (1969a).

Recommended controls. Upon reviewing the early literature, Bernstein (1969a) suggested that experiments should include groups of subjects to control for contact, effort, expectation of future help, and attention or treatment placebo. While recommending such ideal conditions, he acknowledged the limitations experienced in most controlled smoking modification research in terms of subject recruitment, personnel time, funds, and equipment. In establishing priorities for the exclusion of control groups, he stated that the no-contact control (unobtrusive observation of unaware nonparticipants)
can be rejected on the grounds that the "operant quit rate" was so low in the general populations studied. Secondly, as his own later research confirmed (1970b), in order to achieve any genuine attempts to quit among contacted but untreated controls, expectation of future treatment had to be removed. Therefore, monitoring effort, contact, and expectation controls could be combined in one group told to quit on their own without present or future clinic help. The final control group to be eliminated, the one deemed essential by Bernstein, was the attention-placebo group, the control for nonspecific treatment effects contaminating the central technique being employed.

In addition to the provision of control groups Bernstein, (1969a) and Lichtenstein (1971b) offered further recommendations to avoid methodological pitfalls prominent in existing research. Such problems include: selection factors in solicitation and sampling; failure to equate groups on timing, frequency and amount of experimenter contact; inadequate rotation of experimenters across treatments or standardization of E - S interaction; and the possibility of simultaneous manipulation of more than one independent variable in the same condition. The latter caution applies especially to composite treatments such as the Chain-S technique which involves the combined aspects of oversatiation, covert behavior rehearsal, and the contingent smoking homework instruction.
7. Hypotheses Under Investigation in the Present Research

To summarize the focal elements of the introduction, most organized attempts to reduce or eliminate the smoking of motivated volunteer subjects have yielded consistently poor results. Only in the area of oversatiation phenomena have encouraging trends been observed. The inconsistency of success in OS techniques may be attributable to inadequate conceptualization and operationalization of the key elements purported to modify the target behavior, and the inability of OS in its pure form to provide training in incompatible responses to social stimuli that act as discriminative cues for smoking.

Accordingly, the present writer has developed a technique involving OS training (i.e., smoking 8 cigarettes consecutively in each treatment session) augmented by covert behavior rehearsal. The CBR routine of imagining responses to social smoking situations while oversatiation is intended to enhance the generalization of aversion to cigarettes while specifying alternate responses. Finally a homework instruction (to chain-smoke 8 cigarettes on every smoking occasion) also facilitates generalization while applying a paradoxical injunction which allows a subject the provision of relapse within the context of extension of treatment. Therefore, an investigation of these components of an augmented OS method for smoking reduction was conducted to examine the following experimental hypotheses regarding these treatment factors as operationally defined:
1. Oversatiation is an effective condition in the reduction of smoking.

2. Covert behavior rehearsal enhances the effectiveness of oversatiation.

3. The homework instruction assists the generalization of training such that its presence in a treatment facilitates the reduction of smoking for that treatment. That is,
   a. The homework instruction increases the effectiveness of oversatiation.
   b. The homework instruction increases the effectiveness of covert behavior rehearsal.
   c. The homework instruction increases the effectiveness of oversatiation combined with covert behavior rehearsal.

Given the complexity of the experimental design to be elaborated in the ensuing section, the investigator will address himself to specific predictions in the analysis of variance for indications of either support or rejection of the hypotheses. These predictions, stated in null form, are:

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>Verbal statement</th>
<th>Relevant hypothesis</th>
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<tbody>
<tr>
<td>A</td>
<td>The effect of the oversatiation factor on smoking rate shall not be different from that expected from chance.</td>
<td></td>
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</table>
The effect of the covert behavior rehearsal factor on smoking rate shall not be different from that expected from chance.

The effect of the homework instruction factor on smoking rate shall not differ from chance expectancies.

The combination of the OS and CBR factors shall effect a change in smoking rate that does not differ from chance expectancies.

The combination of the OS and homework instruction (HI) factors shall effect a change in smoking rate that does not differ from chance expectancies.

The combination of the CBR and HI factors shall effect a change in smoking rate that does not differ from chance expectancies.

The combination of the OS, CBR, and HI factors shall effect a
change in smoking rate that does not differ from change expectancies.

D The effect of the time (T) factor on smoking rate shall not differ from chance expectancies.

A x D The oversatiation factor, over the course of time (i.e., as a function of time), shall effect a change in smoking rate that does not differ from chance expectancies.

B x D The covert behavior rehearsal factor, over the course of time, shall effect a change in smoking rate that does not differ from chance expectancies.

C x D The homework instruction factor, over the course of time, shall effect a change in smoking rate that does not differ from chance expectancies.

A x B x D The combination of the OS, CBR, and T factors shall effect a change in smoking rate that does not differ from chance expectancies.
A x C x D  The combination of the OS, HI, 3a, 1
and T factors shall effect a
change in smoking rate that does
not differ from chance expectancies.

B x C x D  The combination of the CBR, HI, 3b, 2
and T factors shall effect a
change in smoking rate that does
not differ from chance expectancies.

A x B x C x D The interaction of all factors 3c, 1, 2
(OS, CBR, HI, and T) shall effect
a change in smoking rate that does
not differ from chance expectancies.
Subjects

Radio announcements, short articles and advertisements in local newspapers, and posters informed the public that two smoking withdrawal clinics would be sponsored by the local Tuberculosis and Respiratory Association. (See Appendix 1.). Smokers were invited to participate by registering in advance by telephone for either clinic, one to be held during the day, and the other during the evening. Upon calling the advertised telephone number the potential subjects were given whatever further information they requested about the clinic except information about the nature of the treatment process, which was veiled in ambiguous terms. That is, all inquirers were kept uninformed of the nature of treatment to be received, except the vague description that films would be followed by group meetings (a standard educational group-support clinic was being recruited in the same solicitation campaign), a feature common to both clinics. This vagueness was designed to exclude the possibility of preselection by subjects according to treatment description. The preregistration feature was designed to administer standard educational literature and receive questionnaires and baseline data prior to the orientation session. Public response was slow over the 3-week period of recruitment, however, and few of the approximately 40 preregistrants were able to receive and examine materials before this session.
Of the 65 people who came to the orientation session, nine were students, the rest were adults from the community. The mean age of these clinic participants was 34.5 years (S.D. = 3.7), with a nearly equal ratio of men to women (33:34). In terms of smoking habits, subjects had been smoking for an average of 17.4 years (S.D. = 3.48), at a current rate of 25.6 cigarettes per day (S.D. = 3.2), they had made an average of 9.1 (S.D. = 5.1) previous attempts to quit.

Experimenters

Six (three male, three female) psychology graduate and honours students were recruited by the author to act as experimenters. All had previous research experience with human subject experimentation and all were given a standard briefing as to their role. They were instructed to relate pleasantly but minimally with subjects in all the six treatment groups among which they would be rotated during the course of the 6-session clinic. They were told to function as clerks, distributing and collecting forms, operating cassette tape players, and telling Ss to remain quiet and attend to the audiotaped material being played. The experimenters were briefed with minimal information as to the nature of the project, except for the specific difference among treatment groups that were composed to "test various formats of the Chain-8 method". Such briefing allowed adequate information for E's to confirm and act in accordance with taped
instructions, while being partially blind to the author's hypotheses about differential treatment success. Regarding smoking itself, all E's were given no technical briefing on health or psychological aspects of the habit, as their role was constructed to minimize interaction or information exchange with subjects. Furthermore, for modelling purposes all E's were to represent themselves to subjects as "nonsmokers" and exhibit no smoking during the course of the project. (This ruling was a compromise on the author's original screening qualification that all E's be genuine nonsmokers, since he discovered that two E's were, in fact, recidivists in recent attempts to quit smoking).

In addition to the overall project briefing session, Es were given a nightly checklist to read featuring their clerical duties for that night including their room assignment, recording equipment, forms, attendance and data checklists, and debriefing filing procedures (see Appendix II for examples of checklists and assignments). Assignments to groups followed a 6 x 6 Latin Squares design (Fisher & Yates, 1957, p. 81) such that each of the 6 Es appeared once in each of the 6 treatment groups during the course of the 6 sessions of treatment. The author acted as overall project coordinator, and occasionally as non-directive leader of the attention-placebo discussion group.

**Procedure**

**Registration and orientation.** The initial phases of the
project were conducted in two adjacent rooms with a capacity for about 60 people each. As compensation for the general failure of the preregistration campaign, the author decided to conduct both registration and orientation procedures in the same evening. Potential subjects were cleared past a series of "check-points" with one E at each desk.

At the first desk each S was given the standard materials package that had been mailed the week before to a few preregistrants. This package included standard smoking-and-health educational pamphlets supplied by the local branch of the T.B. and R.D. Association, a written introduction to the project, a smoking-history questionnaire, and an "observer contact form" (see Appendix iii for materials). Subjects were advised at this desk to read the introduction form and the session schedule (Appendix iv), noting the requirement of a refundable $20 cash deposit for attendance, treatment compliance, and data submission as an entry requirement to the clinic.

At the second desk the terms of the treatment-compliance and data submission contracts (see Appendix v) were outlined and explained to potential registrants. It was made clear that refunds would not be contingent upon success in quitting smoking, but only on cooperation with treatment procedures, attendance, and submission of smoking data to the clinic. At this station Es then collected deposits and signed contracts with Ss.

At the next station, the postcard-size participant smoking
record card and witness card (Appendix vi) were explained to S, who was then asked to estimate the number of cigarettes he had smoked per day over the previous week, record it on the card, and return the card to E. Furthermore, S was asked to give the two witness record cards to two people he chose to observe his smoking and have them report on the previous (base) week, and return these two cards at the first treatment session.

The remaining two stations collected and checked the observer contact forms (listing observer addresses, telephone numbers, and relationship to S) and smoking history questionnaires completed by S. Only one of the subjects covertly refused to comply with this procedure by giving an "I.O.U." note and false addresses and phone numbers for herself and her observers. After passing the last station, Ss were then permitted to join the other registrants in the adjacent room watching two standard educational anti-smoking films provided by TB and RD Association. The registration process, although somewhat lengthy for the nearly 30 late-registrants, proceeded briskly and was completed for all 65 participants in less than 40 minutes. After showing the films, the investigator briefed the participants on the mechanics of the clinic.

Registrants were told that, in addition to the health education materials and films, treatment would consist of variations of a new and effective procedure, called the "oversatiation method" which was still at the experimental stage. In exchange for the free services of the Windsor Smoking Withdrawal Project,
they were asked to be candid and sincere in keeping and submitting accurate recordings of their smoking rates at the required times in the next 4 months, in the interests of scientific research to further refine the oversatiation method. Subjects were given a vague description of OS as "smoking in a special way so that you learn negative associations with smoking and you come to dislike the habit so much that you quit because you're sick of smoking." They were told that an active approach based on individual motivation and commitment was required in order to stop smoking. Temptations to smoke would be conquered directly; rather than avoiding smoking situations, participants would be required to carry cigarettes with them at all times during the following 3 weeks as a constant reminder for their active efforts to extinguish the temptation to smoke. This rationale was given to ensure that participants would all appear with cigarettes at the first treatment sessions, and that those groups given the "chain-8" contingency for external practice would always have sufficient cigarettes for this instruction to be followed. In response to questions from the participants, the author presented a more extensive rationale for the OS method without disclosing exact descriptions of the procedures involved. The author also told them that the clinic was oversubscribed (an illusion bolstered by overcrowding and lack of sufficient chairs in the room) and that some arrangement would have to be made to deal with the surplus of people at the clinic. He then dismissed them indicating that in the next day they would be assigned to treatment
groups, that lists of names would appear on each of the side-
rooms adjacent to the main assembly hall, and that they were to
appear in their assigned rooms 2 nights later at their first
treatment session.

**Group assignments.** Using a table of random numbers (Fisher
& Yates, 1957, pp. 126-127) subjects were distributed among 8
groups. The groups were matched for sex and proportion of stu-
dent subjects. The subject variables review (see introduction)
indicated that although sex is generally unrelated to cessation
success in smoking withdrawal research, nevertheless it has
emerged prominently in a few isolated studies (e.g., Delarue &
Moss, 1972; Marston & McFall, 1971). Therefore the author
balanced the groups for sex as a traditional precaution against
such a remote but possible contamination. The second variable
on which groups were equated was based on a number of considera-
tions. Among other areas in which students and non-students
might differ is their greater ability to accept the learning
theory rationale for Cs which is essentially a paradoxical pro-
cedure seemingly contradictory to common sense logic. Secondly,
the pilot study subjects were nearly all students; perhaps this
method would only work well among student subjects. However,
by far the most important consideration was that a mid-winter
vacation break would be occurring at the University immediately
following the last week of the clinic. Such a break in routine
and structure, and escape from environmental supports for non-
smoking was seen as the greatest single factor undermining the initial success of the pilot group (Young, 1973), as well as being a factor prominent in other studies of smoking recidivism (e.g., Jacobs et al., 1971; 1972). To further complicate predictions, several of the student volunteers in the present study were known to be friends of successful pilot Ss and thus subject to modelling, expectation, and behavioral contagion influences more so than the non-student volunteers. Therefore stratifying according to sex and student status were seen as reasonable precautions. Balancing according to baseline smoking rate was not undertaken, as this variable has been demonstrated to be unrelated to success in treatment (see Introduction: smoking-history variables) and would further complicate the already cumbersome subject assignment process such that the main balances would be harshly compromised.

After the random assignment, members of the self-monitoring control group were contacted by telephone. They were told that due to oversubscription some registrants had to be eliminated in order to provide adequate treatment for the majority, and that their names appeared on a random list of people to be excluded from the clinic. Upon expressing our regrets for the necessity of their exclusion, the interviewer solicited their help in furthering our research on "the ability of motivated people to quit on their own using will-power" by sending in data reports on their attempts to quit. Conforming to Bernstein's (1971b) expectancy control stipulation, these Ss were also told that it was
unlikely that another clinic would be conducted in this area within the next year.

Of the group selected for self-monitoring control, three Ss who could not be contacted were shifted to the attention-placebo group. Another two Ss, both preregistrants, became indignant at their exclusion, and flatly refused to cooperate. These two Ss were promptly refunded their deposit and dropped from the subject pool. Only four agreed to withdraw from the clinic and submit data on their attempts to quit smoking on their own. Since four Ss would constitute too small a cell size for the performance of an analysis of variance, more control Ss had to be solicited. Such subjects would have to have minimal exposure to the clinic, adequate provision of educational and questionnaire materials the orientation registrants had received, and preferably demonstrated equivalent motivation for treatment. The experimenter therefore began telephoning clinic preregistrants who had not attended the orientation session and inquiring about their absence. Of the eight people he contacted, five appeared to have the necessary motivational attributes (desire for inclusion in treatment, orientation missed because of unforeseen situations or scheduling difficulties) for inclusion as self-monitoring controls; these volunteered to monitor their smoking for the required periods. Thus this control group was composed of four deselected orientation registrants and five non-attending preregistrants, all receiving educational pamphlets and self-monitoring their smoking on the same schedule as those Ss attending the clinic.
Common features across treatments. Beyond the orientation session, all groups except the self-monitoring control group received six 1-hour treatment sessions at the rate of 2 per week over the 3-week treatment period (see Appendix iv). In the first session, all groups received a 5-minute description of OS smoking and a rationale for its effectiveness in layman's terms. In addition, before the last session all treated subjects saw the anti-smoking film "One Way to Quit" produced by the Canadian Broadcasting Corporation and supplied by the TB and RD Association. This film was designed to act as a booster to morale and resolve to quit (a suggestion of pilot subjects) among all subjects, as well as a content placebo additive for the relatively untreated groups 3, 4, and 7 (see Figure 1). All rooms were adjacent to a corridor across which were washrooms such that those groups actually smoking (G1, G2, G3, G4) were positioned opposite these washrooms, while groups not smoking (G5, G6 and G7) were further away from them. All rooms measured roughly 15' x 30' walled by windows, the corridor wall, and grey collapsible room partitions that provided moderate sound insulation between groups. The rooms were plain and unfurnished except for up to 10 cushioned folding chairs arranged in an oval conforming to the shape of the room and offset toward the position of the tape player. The tape players were staggered (i.e., alternating in position from one room to the next) to provide further sound insulation across groups (see Appendix viii).
All sessions began with each E taking attendance, collecting data cards and investigating any incomplete or late data, and distributing materials. When this work was completed, E would then operate the tape player and direct the Ss to listen to the taped material, discouraging any distractions, chatter, or group interaction, commenting that such diversions would detract from the effectiveness of treatment. E would end the session by turning off the tape player, collecting any extra forms, and recapitulating the sign-off instructions for that group.

In using these procedures the experimenter was attempting to eliminate spurious E-S interaction effects and standardize several features across groups as had been done in other controlled studies (e.g., Keutzer, 1968). Thus length of treatment, the rationale given for treatment effectiveness, practice and progress records, assessment battery, financial investment, passivity-activity set, educational materials, therapist effects, treatment setting, and technical equipment were constant across all conditions for the 7 groups attending the clinic. Moreover, in an attempt to insulate specific treatment effects, throughout the clinic all treatment groups (G1 - G7) were told to refrain from sharing information and discussing the experiences gained within their group. While cross-group information leaks could not be entirely prevented, Es were told to discourage any talking at all anywhere during the clinic to reduce possible expectancy and group interaction effects.
Treatment groups. Figure 1 shows a design including all possible combinations of both levels (inclusion and exclusion) of the three independent variables or treatment factors under investigation. Thus each of the 8 cells in this $2 \times 2 \times 2$ matrix

-------------------------------------------------------------

Insert Figure 1 about here

-------------------------------------------------------------

represents a group containing from seven to nine subjects exposed to one variation of treatment based on the oversatiation theme.

Group 1 included all three treatment components and approximated the method of the original "Chain-8" procedure used in the pilot study. Subjects in this group were required to smoke in the oversatiation (OS) manner, while listening to the covert behavior rehearsal (CBR) tapes, finishing with the Chain-8 homework instruction. In OS smoking, subjects were required to smoke eight consecutive cigarettes without extinguishing any of them, allowing smouldering butts and ashes to accumulate in the ashtrays held by the subjects. These Ss were urged to smoke as rapidly as possible until an unpleasant feeling of nausea developed, and thereafter to maintain a rate that was sub-threshold for vomiting but rapid enough to maintain the nauseous feeling. In the possible event of imminent vomiting, Ss were told to keep their cigarette in front of them at all times while being sick in the nearby washrooms, then to return to the group and smoke no more while watching others complete their remaining cigarettes for that session.
### A. OVERSATIATION

<table>
<thead>
<tr>
<th></th>
<th>A₁: Oversatiation</th>
<th>A₂: No Smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B₁. Covert Behavior Rehearsal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C₁: Homework Instruction</td>
<td>Group 1: a₁ b₁ c₁</td>
<td>Group 5: a₂ b₁ c₁</td>
</tr>
<tr>
<td>C₂: No Homework Instruction</td>
<td>Group 2: a₁ b₁ c₂</td>
<td>Group 6: a₂ b₁ c₂</td>
</tr>
<tr>
<td><strong>B₂. No Covert Behavior Rehearsal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C₁: Homework Instruction</td>
<td>Group 3: a₁ b₂ c₁ (Attention-Placebo Control)</td>
<td>Group 7: a₂ b₂ c₁</td>
</tr>
<tr>
<td>C₂: No Homework Instruction</td>
<td>Group 4: a₁ b₂ c₂</td>
<td>Group 8: (Self-Monitoring Control) a₂ b₂ c₂</td>
</tr>
</tbody>
</table>

**Fig. 1.** Diagram of 2 x 2 x 2 x 7 repeated measures design (time factor not represented in matrix). Each cell represents a group exposed to one combination of the three factors under investigation. (The convention of showing level 1 as exclusion and level 2 as inclusion has been reversed by the author for purposes of description).

- a₁ = chain-smoking 8 cigarettes during all treatment sessions
- a₂ = no smoking during sessions
- b₁ = covert behavior rehearsal tape played during sessions
- b₂ = no exposure to covert behavior rehearsal
- c₁ = subjects are given homework instruction "Chain-8 on every smoking occasion"
- c₂ = subjects are told "Do not chain-8 except during clinic sessions"
The CBR procedure involved a series of six 50-minute audiotape recordings played on a cassette recorder. In this procedure Ss are repeatedly sensitized to their bodily experiences while oversatiating with verbal descriptions of the physiological effects of smoking and attention-focusing exercises. Each session begins with S filling out a rating form called a "craving scale." The craving scale (see Appendix ix) is a 2-page form on which S compares his expectations versus his experience of smoking the first cigarette of the session. (This is the target toward which aversion generated in previous sessions is intended to generalize). The rest of the scale rates "desire to smoke" in a list of typical cue settings to which CBR is later addressed. While S is completing the scale, the tape continues to emphasize the "poisoning" and "pollution" with which the smoker constantly assaults his body. By this time S has been attending to his own feelings, augmented by suggestions of nausea, dizziness, and revulsion toward cigarettes to the point that he is invariably feeling quite miserable and suitably prepared for the main exercise in CBR. S is told to imagine a typical smoking situation (e.g., "morning coffee break") in vivid detail. He is then told to imagine yielding to a strong impulse to smoke. The tape then instructs him to retain this image while actually inhaling several times from the cigarette he is holding as if lighting up the imagined cigarette in the scene depicted. While this is happening, the sensitization script is reinstated with the S induced to feel disgusted for having yielded to a useless and acutely
unpleasant habit. The scene is then blanked for a few moments while S holds his cigarette and ashtray at arm's length away from his face. The imagined situation is then revisited, but this time S resists the impulse to smoke, instead reinforcing himself with instructed self-approval and relief from having to smoke. Because such self-praising statements are paired with escape from aversive smoking, they tend to become negatively reinforced associations. Throughout the session, many smoking scenes are imagined as the target behavior is punished and the alternative responses are reinforced. Scenes are sampled and mixed in various orders during each session and are varied in minor ways across sessions to provide a little variety in an otherwise stereotyped and over-repeated routine (excerpts of script segments from the tapes can be seen in Appendix x). In addition, several rationalizations frequently used by continuing smokers are ridiculed by the taped commentary in the smoking situations as efforts to build personal resolve to quit are emphasized. Thus the CBR routine applied to Group I involved the use of an attention-focusing craving scale plus the imagining of smoking scenes while oversatiating with a taped sensitizing commentary.

At the end of the first-session tape, Ss were told to remember their feelings vividly, to write them down on the "clinic reminder card" marked "If I smoke now, I will feel...", (Appendix xi) to carry this card with them at all times, and to consult it when tempted to smoke between sessions. In the event that the impulse to smoke overwhelmed them, Ss were told that this would
be an opportunity to continue their treatment. That is, at this point Ss were to "Chain-8", i.e., smoke 8 cigarettes consecutively as they did in the laboratory setting. At the end of each of the remaining 5 sessions, subjects were repeatedly reminded of the necessity of adhering to the contingency that any cigarette smoked be immediately followed by an additional seven. Warnings against smoking one-at-a-time or "single smoking" were accompanied by a rationale emphasizing the learning of consistently unpleasant last associations with smoking as the only effective way to extinguish the lingering cravings to smoke that weaken the resolve of many ex-smokers.

To summarize, Group 1 subjects were required to oversatiate cigarettes while listening to and following taped instructions for CBR and receiving the homework instruction to "Chain-8" on every smoking occasion.

The treatment given Group 2 differed from that of G1 only in the homework instructions at the end of each session. That is, G2 subjects smoked in the OS manner and were directed to attend to the same CBR tapes and routines. At the end of the session, however, G2 subjects were instructed to avoid smoking in any form between sessions, to consult their "clinic reminder cards" when tempted, but to not use the "Chain-8" procedure except in the laboratory where it could be "properly administered under supervised conditions" to ensure that the "correct method was followed." Thus, provided subjects adhered to this instruction,
their experience of OS smoking would be confined to the laboratory setting compared with the expanded experience of homework requirements in the G1 treatment condition.

Group 3 received a treatment combination wherein subjects were required to oversatiate eight cigarettes during every session, but to smoke in silence (i.e., without experiencing the CBR exercises and tapes). After these brief instructions, the tapes for G3 were blank until the end of the session when Ss were dismissed with the clinic reminder cards and "Chain-8" homework instruction given G1.

Group 4 received treatment identical to that of G3 except for the "Avoid any smoking at all between sessions" final instruction given G2. That is, the performance of Groups 3 and 4 provide a raw test for pure OS effects devoid of CBR assistance, since treatment consists of having these groups chain-smoke eight cigarettes in silence on six occasions in a laboratory. Only the provision of the Chain-8 homework instruction differentiates G3 from G4.

Group 5 received a treatment combination of CBR and the Chain-6 homework instruction. As in all Groups 5, 6, 7, and 8, subjects in this group were not permitted to smoke during the sessions, therefore no actual OS smoking took place in the laboratory. However, subjects in Groups 5 and 6 were given a convincing rationale stating that the body could not discriminate between real and imagined states and that aversion could be conditioned to cigarettes by merely imaging the effects of OS
smoking rather than actually doing it. Therefore, subjects in Groups 5 and 6 imagined OS smoking while listening to the same CBR cassettes as Groups 1 and 2, with one minor difference - the first page of the craving scale (including comparisons of expectations versus actual reactions to the "first" cigarette) was deleted as being unessential while the "imagining" rationale and instructions were substituted for the first few minutes of the tapes. Group 5 received the same sign-off instructions as Groups 1, 3, and 7, that is, avoid smoking and use the reminder cards to resist the urge to smoke, or where this was impossible, to "Chain-8". Thus subjects in this group would have the opportunity of actually experiencing the noxious effects of OS smoking in their natural environment, and relate these experiences to the segments of the CBR tapes telling Ss to smoke after yielding to the temptation of an imagined smoking situation. If subjects did no "Chain-8" in their natural environment, then all aversion effects learned would be either vicarious or suggested from the sensitization descriptions on the tapes. In this way Group 5 is a control group testing the necessity of actual repeated oversatiation with CBR and the Chain-8 homework instruction.

The treatment given in Group 6 is identical to that of Group 5, except that subjects were given the G2 sign-off instruction to avoid all smoking, including OS smoking, outside the clinic. The only treatment element assumed to be operative in this group is the CBR procedure with imagined rather than actual smoking. All aversion generated would presumably be a function
of vicarious or suggested covert sensitization from taped descriptions of bodily reactions.

Group 7, designated the "attention-placebo control" group, was presented to its subjects as "the discussion-group format of the Chain-8 method." As in all other "treated" groups, G7 had a leader who dispensed forms, collected materials, and operated the cassette player, and the first treatment session was preceded by a taped description and rationale for the Chain-8 method. Also, as in G1, G3, and G5, each session ended with taped instructions on the use of the reminder cards and the homework instruction to "Chain-8" on all smoking occasions outside the clinic. However, this group was given the task to use the time at the clinic to discuss their smoking problems and support each other in efforts to quit using the Chain-8 method. The rationale given was the same given for discussion groups in typical educational discussion groups, to help the "building of personal resolve" with group support. The author acted as intermittent observer-leader in this group in a manner parallel to the clerk-observers of the other groups, except for offering more reflections of feeling and statements of smoking-health information conforming to the stereotyped smoking withdrawal group discussion-leader role. The group process during the 6 sessions followed typical lines of confrontation of rationalizations, exchange of experience and anecdotes, and positive endorsements of abstinence or reduction of smoking by various members. In terms of the experimental
design, the only element of "treatment" active in this group as the Chain-8 homework instruction.¹

Group 8, the self-monitoring control group, occupied the design cell in which none of the hypothesized components were present. Apart from educational material and monitoring, no treatment was given this minimal contact group. The group was composed of volunteers, attempting to quit on their own, who were excluded from participation in the clinic due to scheduling or logistic problems (5 Ss), or to random deselection by the clinic staff (4 Ss). Expectancy of further treatment was minimized by the telephone interviewer (the author) to discourage postponement or abandonment of efforts to quit resulting from such expectancy (e.g., Bernstein, 1970b).

Collection of data. In the second treatment session, all subjects were given a package containing a schedule for data returns (Appendix xii) enfolding six stamped self-addressed participant smoking record cards (Appendix vi). The letters to observers outlined their duties and a corresponding schedule for data returns. The subjects were told to keep their own schedule

¹. In the original formulation of the design (See Appendix vii) Group 7 was intended to be a self-monitoring group rejected from the clinic as in Group 8 but receiving a telephoned briefing on the OS technique and the instruction to quit on their own by using the Chain-8 method in all smoking situations. Difficulties in contacting Ss, public relations, and soliciting cooperation from G8 Ss persuaded E to make G7 an attention-placebo group included in the clinic and conforming to Bernstein's (1971) recommendations regarding the desirability of such a control group.
and data cards, and give the two observers they named in the orientation session the two packets of letters and witness record cards. At this time the various treatment groups were given different instructions on the use of the "Note" column of the participant smoking record cards. Groups 1, 3, 5, and 7 were told to record the number of cigarettes consecutively smoked on each smoking occasion, while Groups 2, 4, 6, and 8 were given the placebo instruction to record any unusual personally significant details about the circumstances of each smoking situation. Again prompt, candid, and accurate reporting was emphasized, bolstered by the announcement that the "group leaders" would be making occasional telephone "spot-checks" on the reliability of data submitted by subjects and their respective observers.

By about the same time, members of Group 8 had received the same materials and instructions mailed to them the day before with cover letters (Appendix xiv and xv) appropriate to the mode of their contact with the clinic (i.e., deselected vs. preregistered).

Thus data began accumulating in the mails after each reporting week of observation. After the deadline for data submission for that week had elapsed, all Ss were sent a "data reminder card" (Appendix xvi). This card gave non-evaluative feedback on the completeness of the data and indicated missing reports and penalties assessed against the deposit. All subjects were allowed one "free warning" after which $2.00 penalties were exacted whenever the missing data exceeded one late submission. In this manner of enforcement most subjects learned to submit their reports and
exert pressure on their observers to mail their reports within the stated deadlines. Delinquent subjects were contacted for data reports by telephone. Given the 2 month time lag between the 8th and 16th weeks of observation, the author mailed an additional prompting letter (Appendix xvii) to arrive the first day of that week to remind subjects to observe and report on their smoking. Upon receiving this information, the author mailed them the balance of their deposits with a general cover-letter (Appendix xviii). Incomplete data at this time was pursued by the author telephoning defaulting subjects and their observers.

The data were checked by a random correlational check after the completion of the study, and by a spot-check during week 3 of the observers of two randomly selected subjects per group.

Questions asked of observers (see script Appendix xix) included estimates of the subject's current rate of smoking and patterns of smoking, specifically whether "chain" or "single" smoking on each occasion. This check would be indicative of the extent to which treatment instructions regarding the "chain-8" contingency were being followed.

**Analysis of results.** As outlined in Figure 1, this experiment utilized a $2 \times 2 \times 2 \times 7$ factorial design with repeated measures on all subjects across the last variable, time. Each of the three independent variables manipulated occurs on two levels: level one indicates inclusion, and level two, exclusion or omission.
Thus the factors are classified as fixed in the eight-cell matrix repeated seven times.

The dependent variable to be analyzed in raw form is the number of cigarettes smoked per subject per week observed, for baseweek, week 1, week 2, week 3, week 4, week 8, and week 16. The appropriate statistic for such continuous raw data is a standard repeated measures analysis of variance for unequal cells (n per cell varied between seven and nine Ss), against the F ratio appropriate to the corresponding degrees of freedom.

An objection could be raised that the cells were not specifically balanced for smoking rate at the beginning of the study, and that analysis of covariance (using each S's baserate as the control covariate) would be more desirable in this case. While such an elaborate procedure (given an already-complex design) would be possible in this case, it is unnecessary in that it would provide little in the way of further information beyond the ordinary analysis of variance since "if there is only a small, chance difference between the groups on the uncontrolled variable, the use of the covariance adjustment may not be worth the effort" (McNemar, 1969, p. 422). A statistical test would suffice in indicating that the randomization procedure had succeeded in keeping the difference in baseweek smoking between groups well within the limits of chance. Furthermore, if significant differences did emerge on post-treatment smoking rates, their correlation with baserates and this their regression slopes would
differ, thus violating an assumption of uniformity basic to the analysis of covariance (Ferguson, 1971, p. 291).

Nevertheless, there still remains a possibility that between-group differences after treatment emerge statistically as a partial function of pretreatment smoking rates, however unlikely according to the previous research literature (see Introduction: smoking habits). The standard procedure in smoking research has been, therefore, to convert all data to percentage of baseline smoking. Results invariably parallel the original findings since there is no established and general relationship between rate of baseline smoking and degree of percentage reduction following treatments. However, data converted this way are helpful in making cross-study comparisons.

Finally, the most stringent test of the efficacy of a treatment is the percentage of subjects exposed to it that remain totally abstinent from smoking at follow-up. Data dichotomized (smoker vs. non-smoker) according to this criterion would best be analyzed using the chi-square statistic.

Thus the dependent variable was analyzed in its raw form by analysis of variance, and in dichotomous form by the chi-square statistical procedure. In all main analysis performed, the .05 level of confidence was accepted as sufficient to demonstrate differences between groups worthy of further statistical investigation; the .01 level would warrant rejection of the null and acceptance of the scientific hypothesis and encouragement for further experimentation and implementation of the treatment method.
II. RESULTS

a. Subject Attrition

Of the 65 people who registered for the clinic in the orientation session, five were dropped from the analyses. Two Ss who were randomly deselected from the clinic to be self-monitoring controls refused all further cooperation in the submission of data (see Method, assignment to groups). One S, who gave bogus addresses for herself and observers and did not submit a treatment deposit (only an I.O.U. note), attended one session in Group 7 and was never seen or heard from again. One S who attended the first session and demanded to be placed in another treatment group was given the option of remaining in her original assignment (Group 6) or withdrawing from treatment. She chose the latter course, obtained an immediate refund, and quit smoking on her own. Although she subsequently continued to submit unverified self-reports of abstinence, her minimal exposure to treatment was considered insufficient to warrant inclusion of her data. One further subject was eliminated by sudden death in the follow-up period; therefore his data was not included. At the time of death this member of Group 4 was still a heavy smoker. Although data from these five Ss were dropped from the analyses, the subject pool was increased by five with the addition of self-monitoring controls solicited from the preregistration list (see Method, assignment to groups), thus rounding the total N to 65.
Of the 56 treated and control Ss who came to the clinic, attendance was generally high. All these Ss attended at least 3 sessions; only 4 Ss failed to come to at least 5 sessions as required by the treatment contract. Thus nearly all Ss received equivalent treatment in terms of the number of clinic contact hours.

b. Observer Spot-checks

During the third week of treatment, a secretary-hostess affiliated with the clinic conducted a telephone survey of observers of two Ss per group. She asked the observers to estimate the current rate of smoking of the subject, whether he smoked more than one cigarette at a time, and related probe questions to determine the extent to which the Chain-8 homework instruction was being followed. Her data (Appendix xx) indicates that several violations of the homework instruction occurred in Groups 1, 3, 5, and 7, such that the C factor (effect of the homework instruction) can be considered inoperable in this study. Observers' telephone data for their Ss generally corresponded with their mailed reports of his behavior; no reports were suspiciously discrepant.

c. Subject-Observer Reliability

By inspection of the raw data, the observer reports on subjects' smoking showed less cigarettes smoked than their corresponding
self-reports. A random 10% sample of all self-reports and their respective observer reports was extracted from the data pool. Grand sums of this sample (see Appendix xxxi) indicate that observers report about half the number self-reported. It appears that limitations on the time that Ss and their observers spend together deflate observer reports of cigarettes smoked by Ss in their presence. Moreover, this effect carries over to a lesser extent on the observer estimates of the number of cigarettes S was currently smoking, such that estimates generally approached three-quarters of the amount self-reported. Only in a small minority (about 10%) of instances did observers estimate heavier smoking than reported by the Ss concerned. Inter-rater reliability appeared to be highest in cases where S was smoking few or no cigarettes and where both observers spent a lot of time with their S.

d. Test for Adequacy of Randomization

The reader may recall that although groups were balanced for sex and student vs. non-student ratio, they were not balanced on the main dependent variable, number of cigarettes smoked per subject per week, because of logistical problems. The experimenter assumed that the randomization procedure would approximate a balance across groups for the baseline week prior to treatment assignment. Testing this assumption, E conducted an analysis of variance on the baseline data. Results (Appendix xxii) revealed
no significant differences between groups, sustaining the inference that the randomization procedure was adequate for the purposes of this study.

e. Analysis of Raw Data

Table 7 summarizes the results of the main analysis of variance of the dependent variable in its raw form. Throughout the experiment, no consistent differences appeared between treatment combinations, except a trend for an A x B interaction at a level of significance between 0.01 and 0.05.

Insert Table 7 about here

When the effect of time is assessed, however, patterns emerge at greater levels of significance. Data on the number of cigarettes smoked per subject per week show a significant time effect (p < 0.001) across treatments, indicating some change in smoking patterns through the course of the experiment. An A x D interaction, significant at the .01 level, and trends toward significance for B x D (p < 0.10) and A x C x D (p < 0.05) interactions also emerged from this analysis.

The sources of these trends and differences can be illustrated in three tables showing pooled group means. Table 8

Insert Table 8 about here
### Table 7

**Analysis of Variance: Cigarettes Smoked per Subject per Week**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oversatiation (A)</td>
<td>1/57</td>
<td>14139.94</td>
<td>0.43</td>
</tr>
<tr>
<td>Covert Behavior Rehearsal (B)</td>
<td>1/57</td>
<td>81226.44</td>
<td>2.49</td>
</tr>
<tr>
<td>Homework Instruction (C)</td>
<td>1/57</td>
<td>153.63</td>
<td>0.01</td>
</tr>
<tr>
<td>A × B</td>
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<td>3.58+</td>
</tr>
<tr>
<td>A × C</td>
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</tr>
<tr>
<td>B × C</td>
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<td>0.13</td>
</tr>
<tr>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Time (D)</td>
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<td>56.29***</td>
</tr>
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<td>5986.85</td>
<td>3.04**</td>
</tr>
<tr>
<td>B × D</td>
<td>6/342</td>
<td>3880.49</td>
<td>1.97+</td>
</tr>
<tr>
<td>C × D</td>
<td>6/342</td>
<td>1222.40</td>
<td>0.62</td>
</tr>
<tr>
<td>A × B × D</td>
<td>6/342</td>
<td>926.51</td>
<td>0.47</td>
</tr>
<tr>
<td>A × C × D</td>
<td>6/342</td>
<td>4255.50</td>
<td>2.16*</td>
</tr>
<tr>
<td>B × C × D</td>
<td>6/342</td>
<td>815.05</td>
<td>0.41</td>
</tr>
<tr>
<td>A × B × C × D</td>
<td>6/342</td>
<td>451.82</td>
<td>0.23</td>
</tr>
<tr>
<td>S × D</td>
<td>342</td>
<td>1967.83</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Factor S is the replication factor. The cells have unequal ns so that S has an unequal number of levels for each combination of levels of the factors in which it is nested. The approximate method of unweighted means (Winer, 1962, pp. 224-227, 241-244) has been used.

+ p < 0.10 trend
* p < 0.05
** p < 0.01
*** p < 0.001
Table 8
Main Effects and A \times B Interaction Effects Across Time for
Mean Cigarettes Smoked per Subject - Week

<table>
<thead>
<tr>
<th>Factor Level</th>
<th>( D_1 ) Base-week</th>
<th>( D_2 ) Week 1</th>
<th>( D_3 ) Week 2</th>
<th>( D_4 ) Week 3</th>
<th>( D_5 ) Week 4</th>
<th>( D_6 ) Week 8</th>
<th>( D_7 ) Week 16</th>
<th>( x ) Across Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>( A_1 )</td>
<td>189</td>
<td>88</td>
<td>52</td>
<td>63</td>
<td>84</td>
<td>116</td>
<td>127</td>
<td>103</td>
</tr>
<tr>
<td>( A_2 )</td>
<td>174</td>
<td>88</td>
<td>72</td>
<td>63</td>
<td>67</td>
<td>88</td>
<td>92</td>
<td>92</td>
</tr>
<tr>
<td>( B_1 )</td>
<td>183</td>
<td>73</td>
<td>40</td>
<td>45</td>
<td>58</td>
<td>93</td>
<td>94</td>
<td>84</td>
</tr>
<tr>
<td>( B_2 )</td>
<td>180</td>
<td>103</td>
<td>84</td>
<td>80</td>
<td>93</td>
<td>110</td>
<td>125</td>
<td>110</td>
</tr>
<tr>
<td>( C_1 )</td>
<td>182</td>
<td>90</td>
<td>59</td>
<td>60</td>
<td>71</td>
<td>105</td>
<td>117</td>
<td>98</td>
</tr>
<tr>
<td>( C_2 )</td>
<td>180</td>
<td>86</td>
<td>65</td>
<td>65</td>
<td>80</td>
<td>98</td>
<td>102</td>
<td>97</td>
</tr>
<tr>
<td>( A_1 \times B_1 )</td>
<td>200</td>
<td>88</td>
<td>50</td>
<td>63</td>
<td>85</td>
<td>126</td>
<td>128</td>
<td>106</td>
</tr>
<tr>
<td>( A_1 \times B_2 )</td>
<td>180</td>
<td>88</td>
<td>54</td>
<td>63</td>
<td>84</td>
<td>106</td>
<td>127</td>
<td>100</td>
</tr>
<tr>
<td>( A_2 \times B_1 )</td>
<td>167</td>
<td>57</td>
<td>31</td>
<td>28</td>
<td>31</td>
<td>60</td>
<td>61</td>
<td>62</td>
</tr>
<tr>
<td>( A_2 \times B_2 )</td>
<td>180</td>
<td>118</td>
<td>113</td>
<td>97</td>
<td>102</td>
<td>114</td>
<td>123</td>
<td>121</td>
</tr>
</tbody>
</table>
presents data for main effects and A x B interactions across time. Scanning the table-top reveals the parallel course of $A_1$ and $A_2$ until the follow-up periods when $A_2$ emerges superior in reducing smoking. $B_1$ assumes its superiority to $B_2$ early in treatment and retains its lead through follow-up. Clearly the most striking discrepancy occurs in the A x B interaction where, at level $A_2$ (no oversatiation smoking during sessions), the inclusion of covert behavior rehearsal ($B_1$) is facilitative relative to control conditions excluding this feature ($B_2$). Figures 2, 3 and 4, based on the data of Table 8 illustrate

these three prominent patterns. C effects and interactions are generally absent, except a minor trend (see table of Appendix xxiii) toward superiority over time for groups featuring no oversatiation or homework instruction, including the self-monitoring control group.

Returning to the main arena of interest, the effects of factors A and B over time are further clarified in Table 9. This table displays the performance of each treatment group separately across time, and obviates the differential success of Groups 5 and 6 over other groups at end-of-treatment (week 3)
Fig. 2. Mean smoking rates for A₁ (oversatiation) vs. A₂ (no oversatiation) at time intervals before, during, and after treatment.
PIC 4 Mean smoking rate for x, y, z subjects during and after treatment.

Follow-up Period

Treatment Period

Weeks 1-16

Weeks 1-4

Weeks 2-3

Week 6

Mean Cigarettes Smoked per Subject/week

Value 80

Value 120

Value 160

Value 200

Legend:

- x
- y
- z
- T
- V
- I
- G
Table 9

Mean Cigarettes Smoked per Subject - Week by Treatment Group (AxBxCxD) Interaction

<table>
<thead>
<tr>
<th>Group (Factor Level)</th>
<th>D1 Baseweek</th>
<th>D2 Week 1</th>
<th>D3 Week 2</th>
<th>D4 Week 3</th>
<th>D5 Week 4</th>
<th>D6 Week 8</th>
<th>D7 Week 16</th>
<th>x Across Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 (A1B1C1)</td>
<td>214</td>
<td>103</td>
<td>75</td>
<td>84</td>
<td>99</td>
<td>145</td>
<td>138</td>
<td>122</td>
</tr>
<tr>
<td>G2 (A1B1C2)</td>
<td>186</td>
<td>72</td>
<td>25</td>
<td>41</td>
<td>70</td>
<td>108</td>
<td>117</td>
<td>89</td>
</tr>
<tr>
<td>G3 (A1B2C1)</td>
<td>153</td>
<td>78</td>
<td>45</td>
<td>65</td>
<td>74</td>
<td>103</td>
<td>121</td>
<td>91</td>
</tr>
<tr>
<td>G4 (A1B2C2)</td>
<td>206</td>
<td>98</td>
<td>63</td>
<td>61</td>
<td>94</td>
<td>109</td>
<td>133</td>
<td>109</td>
</tr>
<tr>
<td>G5 (A2B1C1)</td>
<td>171</td>
<td>47</td>
<td>12</td>
<td>12</td>
<td>15</td>
<td>50</td>
<td>61</td>
<td>53</td>
</tr>
<tr>
<td>G6 (A2B1C2)</td>
<td>163</td>
<td>67</td>
<td>50</td>
<td>44</td>
<td>48</td>
<td>69</td>
<td>60</td>
<td>72</td>
</tr>
<tr>
<td>G7 (A2B2C1)</td>
<td>193</td>
<td>131</td>
<td>105</td>
<td>80</td>
<td>95</td>
<td>122</td>
<td>150</td>
<td>125</td>
</tr>
<tr>
<td>G8 (A2B2C2)</td>
<td>167</td>
<td>106</td>
<td>123</td>
<td>114</td>
<td>109</td>
<td>107</td>
<td>96</td>
<td>117</td>
</tr>
<tr>
<td>x Across Groups</td>
<td>182</td>
<td>88</td>
<td>62</td>
<td>63</td>
<td>75</td>
<td>102</td>
<td>110</td>
<td>97</td>
</tr>
</tbody>
</table>
and especially in the three follow-up periods (weeks 4, 8, and 16). It should be noted, however, that sizeable differences in means do not necessarily indicate statistically significant differences in variance, and that large within-group variance can be related to the effect of a treatment on subjects within groups. In follow-up this could be reflected by the exaggerated variance of the total abstinence of some group members plus the full remission of others, and thus obscure in an analysis of variance mean differences indicative of treatment success.

Following this line of reasoning, the investigator undertook four comparisons of the means of Groups 5 and 6 versus 7 and 8 at baseweek, end-of-treatment, the week 8 follow-up and the week 16 follow-up. Using Sheffe's (1957) formula for multiple comparisons,

[Insert Table 10 about here]

it is customary to relax the criterion for rejection of the null hypothesis to the 0.10 level of probability, as this test is rigorous and conservative. According to such a criterion, level B₁ significantly outperforms level B₂ at all times except the baseline period when the groups are roughly balanced (see Table 10).

f. Analysis of Converted Data

Data on the dependent variable were converted to percentage
Table 10
Scheffe Multiple Comparisons for B at Level A₂
for Basewk, End of Treatment, 8 - and 16 - week
Follow-up Periods

<table>
<thead>
<tr>
<th>Source</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A₂B₁ vs A₂B₂ at D₁</td>
<td>0.33</td>
<td>0.57</td>
</tr>
<tr>
<td>A₂B₁ vs A₂B₂ at D₄ (using percentage of baseline data)</td>
<td>7.21 (13.36)</td>
<td>0.01 (0.001)</td>
</tr>
<tr>
<td>A₂B₁ vs A₂B₂ at D₆ (using percentage of baseline data)</td>
<td>3.15 (7.69)</td>
<td>0.09 (0.01)</td>
</tr>
<tr>
<td>A₂B₁ vs A₂B₂ at D₇ (using percentage of baseline data)</td>
<td>3.83 (9.28)</td>
<td>0.06 (0.005)</td>
</tr>
</tbody>
</table>
of baserate smoking. Following the formula of Keutzer (1968), this dependent variable represents the number of cigarettes smoked during a given week of observation divided by the number of cigarettes smoked by that subject in the baseweek and the result multiplied by 100. This conversion lessens the variation across individuals in their varied rate of consumption by having each subject as his own control. A repeated measures analysis of the converted data generally confirmed patterns discerned in the raw data at slightly higher levels of significance (see Table II). The A x D interaction is still prominent, and the

__________________________

Insert Table II about here

__________________________

main B effect and B x D interaction have now achieved the 0.01 level of significance. The A x B trend remains, but this time at the 0.05 level, while the A x C x D trend disappears. Tables showing means for main and interaction effects (see Appendices xxiv and xxv) resemble Tables 3, 4, and 5, except for their uniform baseline. Figure 5 based on the converted data, plots

__________________________

Insert Figure 5 about here

__________________________

the mean percentage smoking rate for each group over time. The most outstanding features of this graph are the relative sta-

bility of Group 8 compared with the relapse curves of the clinic-
Table II
Analysis of Variance: Percentage of Baserate Smoking

<table>
<thead>
<tr>
<th>Source</th>
<th>$\eta$</th>
<th>df</th>
<th>MS</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oversatiation</td>
<td>1/57</td>
<td>5723.82</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>Covert Behavior Rehearsal (B)</td>
<td>1/57</td>
<td>4796.43</td>
<td>8.99**</td>
<td></td>
</tr>
<tr>
<td>Homework Instruction (C)</td>
<td>1/57</td>
<td>1197.70</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>A x B</td>
<td>1/57</td>
<td>21222.84</td>
<td>4.25*</td>
<td></td>
</tr>
<tr>
<td>A x C</td>
<td>1/57</td>
<td>963.91</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>B x C</td>
<td>1/57</td>
<td>165.01</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>A x B x C</td>
<td>1/57</td>
<td>857.56</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Subjects</td>
<td>57</td>
<td>4983.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time (D)</td>
<td>6/342</td>
<td>35176.56</td>
<td>73.04***</td>
<td></td>
</tr>
<tr>
<td>A x D</td>
<td>6/342</td>
<td>2224.38</td>
<td>4.62***</td>
<td></td>
</tr>
<tr>
<td>B x D</td>
<td>6/342</td>
<td>1449.59</td>
<td>3.01**</td>
<td></td>
</tr>
<tr>
<td>C x D</td>
<td>6/342</td>
<td>272.44</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>A x B x D</td>
<td>6/342</td>
<td>718.88</td>
<td>1.49</td>
<td></td>
</tr>
<tr>
<td>A x C x D</td>
<td>6/342</td>
<td>730.07</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>B x C x D</td>
<td>6/342</td>
<td>596.68</td>
<td>1.23</td>
<td></td>
</tr>
<tr>
<td>A x B x C x D</td>
<td>6/342</td>
<td>100.50</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>S x D</td>
<td>342</td>
<td>481.62</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Factor S is the replication factor. The cells have unequal $\eta$s so that S has an unequal number of levels for each combination of levels of the factors in which it is nested. The approximate method of unweighted means (Winer, 1962, pp. 224–227, 241–244) has been used.

* $p < 0.05$ trend
** $p < 0.01$
*** $p < 0.001$
FIG. 5 Percentage of Baseline Smoking per subject-week for treatment and control groups at time intervals before, during, and after treatment.
Groups at time intervals before, during, and after treatment.

Figure 5: Percentage of base rate smoking per subject-week for treatment and control.

Follow-up Period

<table>
<thead>
<tr>
<th>Treatment Period</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 2</td>
<td>Week 3</td>
<td>Week 4</td>
<td>Week 5</td>
<td>Week 6</td>
</tr>
</tbody>
</table>

Base rate

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
<th>Group 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Percentage of Base Rate Smoking

0% | 20% | 40% | 60% | 80% | 100%
attending groups, and the unusually low rates of smoking for Groups 5 and 6 during the follow-up period.

Sheffe comparisons (see Table 10) between Groups 5 and 6 versus 6 and 7 reveal highly significant differences between percentage-of-baserate means at end of treatment and especially in the follow-up observations at week 8 (p < 0.01) and week 16 (p < 0.005). Inspection of the data suggests that similar comparisons between the $A_2 B_1$ pair and other treatment group pairs would yield similar if not even more dramatic results.

g. Cessation Rate

The cessation rate for a group is the number of its members totally abstinent from smoking during the week of observation, divided by the n of the group, and the result multiplied by 100. For the small ns of the groups in this experiment, the wide fluctuation caused by abstention of any member of a group render the data on this variable almost useless for meaningful statistical analysis. However, inspection of the quitting or cessation pattern (see Figure 6, based on the table in Appendix xxvi) reveals information concealed by the previous measures. While Groups 5 and 6 again emerge prominently as successful in generating proportionately high (about 40%) cessation rates, Group 1 approaches
ment and control groups at time intervals before, during, and after treatment.

Pic. 6: cessation rate (percentage of group total abstinent from cigarettes) for treat-

Follow-up Period

Treatement Period

Week 4

Week 3

Week 2

Week 1

Base week

0

Cessation Rate (Percentage of Group Totally Abstinent)
this level twice, once during treatment and later in follow-up. Among other groups cessation never occurs in more than one quarter of their members at any given point in the experiment.

To summarize the results section, analysis of variance of raw and converted smoking rate data have yielded a main effect (p < 0.001) for Factor D i.e., the time in treatment and follow-up, reflecting a general reduction of smoking for most Ss over time regardless of treatment. Factor A (oversatiation) interacted significantly (p < 0.01) with time such that the exclusion level of this factor assisted reduction of smoking. A main effect trend for Factor B (covert behavior rehearsal) attained statistical significance (p < 0.01) in the analysis of the percentage of baseline data, as did a B x D interaction, both favoring the inclusion level of this factor. Main or interaction effects regarding Factor C were generally absent. An A x B interaction trend, while failing to achieve the criterion level (p < 0.01) for rejection of the null hypothesis, indicated the superior performance of 2 groups employing the $A_2 B_1$ treatment combination. Further analysis, via Sheffe comparisons, documented differences in group means at the .01 level of significance. Furthermore, total cessation data, especially in follow-up, confirm the impression that the $A_2 B_1$ combination is more effective than the others tested in reducing and eliminating smoking behavior.
IV. DISCUSSION

The results of this experiment counterindicate a simple operant learning theory approach to the treatment of smoking, and instead suggest that cognitive and self-reinforcement factors in the treatment process may account for the observed reduction of smoking.

a. The Effect of Oversatiation

Regarding the effectiveness of oversatiation in reducing smoking, the data not only fail to support the investigator's main hypothesis, but actually negate his prediction. That is, the groups showing the most success in maintaining lowered smoking rates were those in which the OS procedure was not employed. While all the OS groups demonstrated a sharp decline in smoking in the first week of the project (see Fig. 5), only Group 1 showed substantial reduction and cessation results at the 16-week follow-up, while the rest relapsed considerably. Such results were obtained despite the resistance to treatment (only 3 sessions attended) of $S_1$, whose unusually heavy smoking rate (50/day) inflated the Group 1 rate at all points of measurement. It is noteworthy that this group was the one in which treatment conditions most closely approximated those of the pilot study. However, the failure of Group 2 to respond to virtually identical treatment, and the rather disappointing performance of Groups 3
and 4 contrast sharply with the dramatic reduction and cessation observed in the pilot study. Some differences in the populations sampled may account for the failure to replicate; but one essential feature of the OS regimen appears to undermine the process especially in the general population, and that is the requirement of smoking at sessions after sustained abstinence.

**Disruption of self-reinforcement.** Covert reinforcement patterns are given prominence in such techniques as contingency management (Homme, 1965) where such patterns are taught to control smoking. The importance of such patterns as they already exist in the novice ex-smoker may be an obvious but overlooked aspect of habit modification in human subjects. For example, perhaps the strongest reinforcer to the continued resolve of a recent ex-smoker is counting and reciting to himself and others the number of days since he smoked his "last cigarette." In all methods of treatment in which cigarettes are not used, this self-reinforcement pattern is allowed to operate. On the other hand, in treatments that require smoking in the laboratory after periods of abstinence between sessions, this pattern is frustrated unless the subject can convincingly discount cigarettes smoked in the laboratory, a perhaps antitherapeutic discrimination. Such cognitive skills needed to compartmentalize affective reactions according to context are beyond the intellectual and emotional capacity of many people. Even the student pilot subjects displayed difficulty in this area, and preferred to think of
themselves as having "quit" smoking for days numbering from the last treatment session only. Although these Ss complained of their inability to congratulate themselves during the 3-week treatment phase, they were able to control smoking without this support. Such was not the case for most Ss in the current study. Many became disturbed and disheartened when told they had to smoke despite encouraging "records" of not having smoked since the first session. The resulting discouragement led to the majority of oversatiating Ss abandoning attempts to refrain from smoking between sessions because they would "just have to start smoking again at the next session anyways." Feedback relayed by Es rotated through these groups indicated drops in motivation for quitting and rises in hostility toward the clinic staff and the treatment method partly as a function of this requirement. Clearly, self-reinforcement systems and the social support derived from announcing "the number of days since the last cigarette" are morale factors than cannot be ignored in smoking withdrawal methods, especially when dealing with general populations. Disruption of these systems appears to be the main explanation for the results of treatments featuring oversatiation.

Acceptance of the treatment rationale. Another factor that could account for the failure to replicate pilot results in the main study is the difference in educational background of the samples. While university students have usually taken an introductory psychology course, most Ss from a general adult population
have not. This distinction appears to be important in the edge of accepting the rationale provided for this essentially paradoxical treatment. Most researchers on oversatiation have commented upon the resistance of their Ss to the scheme of quitting smoking by smoking more (e.g., Keutzer, 1968; Resnick, 1968b). Perhaps those already acquainted with the principles of conditioning are more able to accept and implement the terms of treatment. While a Skinnerian approach would dismiss the importance of internal or cognitive events, recent research (e.g., Locke, 1971; Wilkins, 1971) has demonstrated the importance of such factors in behavior therapy treatments. That is, the meaning the subject attributes to the treatment experience and his attitude toward the therapist's counselling style and the treatment offered appear to be strong determinants of outcome results (e.g., Marston & McFall, 1971; Weir, Dubitsky & Schwartz, 1969). In terms of this experiment, some factors were loaded against success. Advertising and solicitation were conducted by a health agency identified with more traditional forms of treatment such as educative-supportive clinics. The nature of treatment was kept vague to eliminate the possibility of subject selection as an alternative hypothesis. However, during the experiment it became obvious that some of the problems were related to the set induced in Ss by the agency image. Feedback from Ss to experimenters indicated considerable resistance to the unconventional and experimental mode of treatment offered. Moreover, the relatively impersonal and uninformative behavior of the Es (as required by their
role of impulsive observer-clerks) violated an expectation of
b group interaction and verbal support and succorance on the part
of many Ss. Some felt as if "herded like cattle" or "treated
like guinea pigs" and their resentment sometimes became manifest
skepticism for the treatment and its rationale. Such attitudes
contrast strongly to the enthusiastic and flexible attitudes of
the pilot Ss who had a set for trying an experimental method of
quitting smoking more than being a member of a smoking withdrawal
clinic. While this effect was regrettable in the main project,
solicitation divulging the nature of treatment likely would have
altered patterns of volunteering, and more interactive and
informative roles for Es would have contaminated the research
with uncontrolled therapist effects.

b. The Effect of Covert Behavior Rehearsal

Results strongly favor the inclusion of Covert Behavior
Rehearsal as a factor in reducing and eliminating smoking. Three
of the four groups (1, 2, 5, 6) featuring this factor show sig-
nificant reduction of smoking plus favorable cessation rates at
follow-up. The experimenter is unable to explain the relatively
high smoking rate of group 5 during the treatment phase, nor the
strong reprise of Group 2 in follow-up, but taken collectively,
groups featuring CBR perform well.

Nevertheless, the present investigator cannot take comfort
in such results, for again they fail to support the predictions
of his second hypothesis as stated. As the graph of $A \times B$ interactions (Fig. 4) clearly shows, Covert Behavior Rehearsal does not enhance the effectiveness of oversatiation ($A_1 B_1$ vs. $A_1 B_2$), but rather acts as a treatment in the absence of oversatiation ($A_2 B_1$ vs. $A_2 B_2$).

It would appear that CBR as a treatment mode is capable of producing reductions in smoking even when unaccompanied by the actual behavior of smoking and the actual aversive experience of inhaling tobacco smoke while imagining scenes of yielding to the temptation of smoking. In his original formulations, the investigator had thought CBR inoperable without this aversive component, and therefore hypothesized its effect as adjunctive to CS. The results, however, indicate its ability to operate independently, apparently by virtue of the suggestions of noxious bodily events in the sensitization scripts for the aversive scenes. Although such suggestions are mild compared with the vivid depictions of nausea in Cautela's (1970) Covert Sensitization scripts, they seem to operate in a similar manner, at least with Ss who know of fellow Ss feeling nausea and general discomfort in response to oversatiation smoking. As in the CS procedure, aversive scenes are mixed with avoidance or self-control scenes reinforcing mastery over the habit. While results here are generally comparable with those of CS, the present writer feels that such levels (40-45% cessation) are less than optimal. Perhaps the success rate of CBR could be raised by recombining it with CS if the problem of the disruption of self-reinforcement in this
treatment could be circumvented. Yet another consideration is whether CBR could operate in total isolation from any direct or vicarious experience with OS, i.e., purely on the basis of suggested sensitization.

c. The Effect of the Homework Instruction

As mentioned earlier, an observer spot-check revealed enough violations of the "Chain-8 on all smoking occasions" homework instruction that it could not be considered to be in operation, and its effect could not be assessed. Results generally showed no differences between groups with or without the instruction, except an $A_2 \times C_1 \times D$ trend counterindicating the homework instruction in treatments not featuring oversatiation during sessions. If this trend has any meaning whatsoever, it advises against merely telling people to "Chain-8" without giving laboratory training. Thus there is no evidence for smoking withdrawal clinics to use this instruction on a list of "tips" on helping to quit smoking.

As with the Resnich (1968) method of doubling or tripling consumption many smokers could not adhere to the homework instruction. Its demand was so difficult, time-consuming, and aversive, that only a person thoroughly determined to quit could follow it, and that person would likely soon stop smoking permanently anyway. Contrary to the intent of the instruction, guilt and shame could be experienced by many Ss who found themselves unable to carry
out the homework requirement, thus violating what they were led to believe was a necessary condition for effective treatment, and reinforcing a self-perception of failure.

Many Ss in both the pilot and the present study attempted to comply with the homework instruction intermittently when circumstances and motivation permitted, but otherwise smoked cigarettes singly at a greatly reduced rate. While this practice permitted some generalization of training across situations, it still allowed Ss to discriminate between the aversion of chain-smoking versus the pleasure of single smoking, undermining the transfer of aversion to the behavior of smoking cigarettes in general. To summarize, it seems that the homework instruction in its present form has little or no therapeutic value because many Ss find they cannot adhere to its demands consistently.

d. Directions for Further Research

Oversatiation by rapid inhalation. The reader may recall that research in hot smoke aversion training with smoke-blowing machines had led investigators to the possibility that the rapid inhalation required in the method might be the underlying factor in its success. Recent research by Lichtenstein and associates (1973), published while the current study was underway, replicated the 60% cessation rate observed in an earlier study by the same research team (Schmahl et al., 1972). Lichtenstein assigned his 40 Ss to one of four treatment groups: warm, smoky air plus rapid
smoking; warm, smoky air only, rapid smoking only; an attention-placebo control group. Three experimenters, also randomly assigned, saw each S individually for an average of 7.2 sessions, with treatment termination contingent upon complete abstinence, and with the provision of 3-sessions booster treatments upon request. Ss in the rapid-smoking group had to inhale every 6 seconds according to a metronome timer until they could no longer tolerate smoking, then say "I don't want to smoke anymore," and extinguish the cigarette. A treatment session would consist of roughly 10 of these escape trials. Results showed no significant Therapist or Therapist × Time effects. A significant Treatment Group × Follow-up Interval interaction was observed and attributed to the relapse (74% of baseline) of the attention-placebo control group relative to the stable and low (22–28%) percentage of baseline smoking of the three treatment groups. As in previous research, Ss rated rapid smoking as the most effective feature of treatment; Ss took roughly 8 sessions to terminate smoking, little relapse occurred after the third month of follow-up, and over 60% cessation was obtained at the 6-month follow-up. The authors concluded:

...that the smoke-blowing apparatus and rapid smoking have no additive effect and that they are virtually interchangeable.

...The possibility of small group treatment should also be explored, for this would make possible
factorial research designs that could better illuminate the process variables contributing to what appears to be a stable outcome effect.

(Lichtenstein et al., 1973, p. 97)

Avoidance rather than punishment. It is obvious that the rapid-smoking application of the principle of oversatiation is superior to the Chain-8 method of the present research. Aversion is generated rapidly for every cigarette smoked rather than only the last five in a sequence. Conditioning is brief. Many trials can occur, each beginning with lighting a fresh cigarette after a non-smoking pause, thus more closely approximating most smoking behavior than the unusual method of chain-smoking several cigarettes consecutively. Since each trial is a discrete event, aversion generated will more easily transfer to each cigarette lit outside the treatment setting. It is crucial that the aversion be conditioned to early stimuli and behaviors in the smoking chain, and the rapid-inhalation technique accomplishes this goal better than the chain-smoking OS procedure. Furthermore, all trials feature the provision of negatively reinforced escape training in renouncing the act of smoking by crushing out the cigarette. Finally, treatment is based on an avoidance paradigm wherein Ss are never forced to smoke after sustained abstinence between sessions; self-reinforcement patterns are thus allowed full scope for operation.

It is in this latter regard that the method used in the
present experiment was grossly inadequate. The investigator mistakenly followed the inference, primarily derived from research on motor learning, that aversion training would have to be over-learned (i.e., learned beyond criterion) to be effective in establishing a lasting and generalized negative affective reaction to cigarettes. Thus his method incorporated the extended practice of oversatiation during sessions spaced over the general extinction period (see the oversatiation rationale, p 95). Unfortunately he ignored the possibility of discrimination phenomena that often accompany overlearning (e.g., the overlearning reversal effect) to the detriment of generalization. Repeated OS sessions in the extinction period may have provided Ss with opportunities for greater learning of incidental cues assisting the discrimination between laboratory and non-laboratory smoking. In his zeal to provide a uniform treatment across Ss and cells controlling for frequency and quality of exposure or therapeutic contact, the investigator apparently sacrificed the clinical effectiveness of the process. It is ironic that thereby unwittingly he set the conditions for the failure of the Chain-8 method for the same reasons he criticized in the literature on other methods of oversatiation, namely the inadequate operationalization of a potentially effective principle. Successful applications of the OS principle should include the crucial provision for avoidance of punishment and the operation of self-reinforcement systems for abstaining from smoking. Had the present method incorporated
this provision, it is likely that the results would affirm the effectiveness of OS in concert with the simultaneous findings of Lichtenstein's rapid-inhalation research.

The future of Chain-8 applications. Because of the demonstrated success of the covert behavior rehearsal procedure, the Chain-8 method may still be the most appropriate way of inducing oversatiation for CBR. The Chain-8 method permits smoking at a more natural pace than the rapid-inhalation method, thereby allowing more opportunity for Ss to attend to the social settings depicted in the CBR scenes. Subjects can focus on the antecedent conditions that act as cues for their smoking, as well as alternative responses to these stimuli, planned and rehearsed with their consequences.

In this aspect the Chain-8 method is especially appropriate. Although the toxification induced in this manner takes effect more slowly than it does in the rapid-inhalation method, it nevertheless provides a stable substrate against which any inhalation, regardless of depth or rate, is noxious. Thus, after a saturation period for smoking the first two cigarettes in the chain, punishment is consistently provided for practice in yielding to the impulse to smoke in imagined smoking scenes. Consistent escape from punishment or negative reinforcement is provided for practice in alternative non-smoking responses. The demand of having to inhale every 6 seconds is incompatible with
the contingencies of CBR, unless E asks S to inhale at that rate while imagining yielding to the impulse to smoke, but such a demand is unnecessary.

Here the present writer still operates on the assumption that some experience with oversatiation, either direct or modelled, is necessary for the optimal operation of CBR. In the present experiment, most Ss were dubious about the noxious potential of cigarettes until experiencing the Chain-8 method themselves or hearing the first-hand accounts of those who did. It is unlikely that in the absence of such models Groups 5 and 6 would have responded so favorably to treatment purely on the basis of implied or suggested nausea in the CBR tapes.

On the basis of the experience gained in this experiment, future applications of the Chain-8 method would incorporate a number of modifications of the present procedure. Subjects would be required to chain-smoke in the first session. In the subsequent sessions, Ss who smoked since the previous session would be required to oversatiate, while Ss who succeeded in abstaining since the previous session would merely listen to the CBR tapes and imagine that they were oversatiating. Ss would be reinforced for abstaining by avoiding the unpleasant experience of having to smoke at the next session which would still be modelled by the remaining smokers in the group.

In each session, Ss would smoke their first three cigarettes while attending to a sensitization script in the CBR tape. Next, alternate scenes of yielding to and resisting the
impulse to smoke would be presented. This would parallel the present procedure, except that in "yielding" scenes S would have to light a new cigarette for each scene, smoke it as rapidly as possible, then silently repeat a phrase like "I don't want to smoke" and then extinguish the cigarette. This would incorporate some of the desirable features of the rapid-inhalation method but avoid the problem of the rigid 6-second pacing. There would be no homework instruction except to avoid any smoking whatever between sessions. In accordance with the findings of rapid-inhalation research that the mean number of sessions to abstinence was about 8 (Lichtenstein et al., 1973; Schmahl, Lichtenstein, & Harris, 1972) Ss would be required to attend at least 6 of the 8 sessions scheduled.

Research to test this combination of oversatiation and CBR would consist of four groups run separately but in similar rooms with four Es rotated twice across groups. The treatments compared would be oversatiation plus CBR, vicarious CBR (no experience with oversatiation, Ss imagine they are smoking), rapid-inhalation, and attention-placebo. E would predict greatest success for the OS plus CBR combination and the rapid-inhalation groups. The vicarious CBR treatment would perhaps yield moderate success by virtue of its covert sensitization features, while the attention-placebo would produce marginal results.

e. Methodological Problems in Smoking Research

Methodological issues and problems in smoking research have
been carefully and rigorously discussed in a number of review articles (e.g., Bernstein, 1970a; Hunt & Matarazzo, 1973; Keutzer, Lichtenstein, & Mess, 1968; Lichtenstein, 1971a & b; Lichtenstein & Keutzer, 1971; Schwartz, 1969a). More recently, a special issue of the Journal of Abnormal Psychology (1973, vol. 81, number 2), in which current approaches to smoking are presented, documents the relatively sophisticated state of research methodology for testing clinical strategies to eliminate this habit. To the robust and eloquent commentary of more experienced investigators the present writer can add relatively few new insights. However, a few cautions are noteworthy.

In the present experiment clinical effectiveness was sacrificed to scientific rigor. As with other therapeutic interventions, results are generally best when tailor-made to individual specifications. Flexibility in the number of sessions, amount of oversatiation practice, provision for booster treatments, etc. would likely increase effectiveness, but would also allow the contamination of uncontrolled factors. For example, having Ss continue treatment until they reach total cessation raises problems of treatment exposure that could be adequately controlled only by matched Ss yoked to the same treatment schedule, a design fraught with problems of demand characteristics. On the other hand, rigidly standardized treatments characterize the better controlled research designs to an extent that stifles success. In this regard some compromise must be made on these competing goals. Again the research on rapid-inhalation
(Lichtenstein et al., 1973) is exemplary in allowing process factors to vary, but reporting measures on them (e.g., mean trials per session) to show that all treatment groups were roughly equivalent with regard to the uncontrolled factors. Similarly in the present research E depended on randomization to balance the groups on baseline smoking rate. The problem with such compromised designs is that the research is vulnerable to chance happenings that may prevent the rejection of alternate hypotheses or even render the results meaningless or uninterpretable. Since compromised designs are risky ventures, the experimenter should weight the increase in clinical effectiveness provided by such flexibility versus the implication regarding interpreting results should randomization fail on that variable.

Regarding chance happenings, this writer is fully aware of the unforeseen difficulties that plague clinical research. In this experiment, one S died in the follow-up period from a heart attack (he was still a heavy smoker at the time of death). One S who quit the clinic after the first treatment session and was dropped from the data also quit smoking. The inclusion of her data would further support the observed success of Group 6. The most ironic happening was the abnormally high cessation rate (25%) for the self-monitoring control Group 8 being a function of one S who became pregnant and stopped smoking because cigarettes made her sick. (At the time of writing the woman had delivered the child and still was a non-smoker).

Only one other aspect deserves a special mention. Smoking
research typically employs the analysis of variance on smoking rates the main statistical procedure. While such analysis are robust despite considerable heterogeneity of variance (Winer, 1962), nevertheless there may be problems in interpreting significance in the follow-up period. During treatment, less variance within a group generally indicates that some treatment effect is operating uniformly on a group, i.e., smoking rates have been reduced to near zero for most Ss. Suppose, however, that at follow-up half the Ss relapse to close to baseline, and half remain non-smokers. A great deal of variance would appear within this group due to its moderate success, whereas a group in which nearly all Ss returned to baseline rates would actually register less variance, especially on percentage-of-baseline data. For this reason, tests based on comparisons of means (e.g., Sheffe, Newman-Keuls, etc.) might be more meaningful and appropriate than tests based on variance.
V. CONCLUSION

To begin the conclusion, it might be helpful to review the problem and procedure. Cigarette smoking is a behavior pattern of proven danger to the health of smokers and those who constitute the smokers' environments. Yet the intractability of the habit in the face of such condemnatory educational campaigns indicates the need for depth research on smoking and experimental attempts to modify or control it.

Although the practice cuts across lines of culture and demography, it appears to prevail in circumstances of instability, stress, anxiety, or chronic dissatisfaction. It also characterizes downward social mobility and underachievement, especially among men, and perhaps social status striving among women, who recently have taken up the habit in rapidly increasing numbers. A consensus of research reviews indicates that factors associated with starting to smoke, (such as adolescent curiosity, conformity, and rebellion), are different from those associated with its habituation (impulse gratification, affect management, and ritualization), and that social environmental influences are particularly strong in the beginning phases of smoking.

The correlational search for a typical "smoker's profile" has yielded ambiguous findings due to the diversity of methods employed and populations studied. Nevertheless, a number of personality characteristics appear more prominently in smokers
(especially heavy smokers) than nonsmokers. Such traits include orality, impulsiveness, gregariousness, extraversion and sensation-seeking behavior patterns sometimes labelled "antisocial" by peers and authorities. Also common are a fatalistic orientation of external control coupled with a life-style of chronic stress and emotional instability. More likely, this description applies primarily to a subcategory of psychologically dependent heavy smokers than it does to the broad spectrum of people and personalities included in the classification "smoker".

Nicotine appears to be the psychoactive drug most responsible for the continued practice of smoking. Research to date indicates that this stimulant mediates arousal level and assists in affect management to maintain an optimal level of stimulation for any given situation.

In terms of factors correlated with ex-smokers or those who succeeded in quitting smoking in nonexperimental and experimental studies, little can be predicted. On the other hand, it seems that heavy psychological dependence on cigarettes, life situations of stress, and disorganized and ineffectual patterns of coping with problems interfere with success in discontinuing smoking. Nevertheless, only one study has accurately predicted success in an experiment on the basis of subject variables (Jacobs, 1972) and this was conducted on the basis of male heavily-habituated Ss only; this study needs further validation to demonstrate a valid general screening criterion. Until then, there are no proven differences in subject characteristics predictive of
good prognosis in smoking cessation. Thus whatever subject variables can contaminate outcome research interpretation are as yet undefined and thus relegated to assume control by the randomization procedure.

Nearly all organized programs and techniques devised to induce smoking cessation have proven to be ineffective for the majority of smokers treated. Where changes in smoking have been reported, consistently replicated differences between treatments have been found lacking, the variance largely attributable to non-specific factors, e.g., expectancy, effort-placebo, self-monitoring, etc.

Educationally-oriented approaches such as antismoking campaigns continue to yield diminishing returns as the audience susceptible to direct rational persuasive approaches has long since been removed from the target population. Smokers in the 1970's persist in a habit they already know is unhealthy, tolerating considerable guilt and cognitive dissonance rather than change their behavior in response to the health-scare tactics of concerned agencies. Smoking withdrawal clinics, again based on the fallacious premise of rationally-motivated behavior, but supplemented by the crutches of group support, fare little better, with typical cessation rates between 10 and 20% at follow-up. Contractual and group approaches seem to shift Ss' dependency from smoking to an external support for cessation. When the group or contract expires, so generally does the resolve to remain quit that was based on its reinforcement. The commitment and
consequences apparently still remain tentative and remote to such Ss. Even the provision of role-playing doctors and patients victimized by respiratory diseases does not seem to significantly alter long-term cessation success rates. While hypnosis seems to offer some promise, all evidence in its favor comes only from uncontrolled and often preselected case studies; its efficacy awaits empirical validation.

Research on behavior therapy approaches to this problem has been more impressive regarding its methodological sophistication than its ability to generate effective treatment prescriptions. Psychologists have not been lax in exploiting opportunities to use this model pathology as a test-bed for therapy analog research. Until recently, however, their efforts have been exercises in elaborated futility.

The technique of systematic desensitization has not been proven effective in eliminating smoking. Apparently the anxiety or craving-reduction model does not apply to the majority of smokers. Other response substitution and stimulus control procedures (e.g., breath-holding, hierarchical gradual reduction) also based on the classical conditioning model have yielded little success. A number of self-control techniques such as contingency management, although perhaps helpful as treatment supplements, have not shown any independent promise of efficacy.

Behavior therapy approaches featuring aversive conditioning have relied on somewhat complicated and artificial procedures, or punishing agents (e.g., electric shock) extrinsic to the act of
smoking. "Human Ss appear to be all too capable of discriminating between shock and no-shock situations, and the hoped-for generalization never materializes" (Lichtenstein & Keutzer, 1971, p. 63). Attempts to remedy this shortcoming with portable aversive stimulators have been unsuccessful. However, the use of imagery, either combined with shock training or the form of covert sensitization plus desensitization has been demonstrated to have some short-term utility in reducing smoking, although further research is needed to support the findings of exploratory research. Another recent development is aversion training with an apparatus blowing cigarette smoke in Ss' faces when they smoke. The result of research on this method is the conclusion that its favorable cessation rates (40 - 65%) at follow-up may be due primarily to the fact that Ss are forced to inhale cigarettes rapidly (every 6 seconds) during treatment.

Until the last five years behaviorists have generally overlooked or underestimated the potency of the cigarette itself in eliciting noxious reactions. Nevertheless several applications of oversatiation, such as doubling smoking rates for a week prior to quitting, have yielded encouraging if inconsistent results. Efforts to apply the principle of oversatiation have not been thorough enough in ensuring sufficient, consistent, overlearned, overgeneralized, cognitively integrated and adequately-spaced aversion training sessions.

In an effort to remedy these shortcomings, the author developed a method combining oversatiation and covert behavior
rehearsal. The procedure consists of 6 1-hour sessions spaced over a 3-week period. During sessions Ss chain-smoke 8 cigarettes while listening to recorded instructions focusing their attention on body reactions and instructing them in rehearsed responses to imagined smoking situations. Smoking is punished by the oversatiation effect while non-smoking responses are negatively reinforced by escape from oversatiating. Based on promising results (91% cessation at end-of-treatment, 43% at 3-month follow-up) in an earlier pilot study, a factorial experiment was conducted to assess the contribution of three process variables to the efficacy of treatment. Oversatiation, covert behavior rehearsal, and a homework instruction (to chain-smoke 8 cigarettes on all smoking occasions) were identified as the independent variables in a $2 \times 2 \times 2 \times 7$ repeated measures design for analysis of variance on smoking rates in the baseweek, and weeks 1, 2, 3, 4, 8 and 16 during the experiment.

A total of 65 Ss were randomly assigned to 8 groups of which six featured active treatment combinations; the remaining two were attention-placebo (discussion group) and self-monitoring controls. Six Es were fully rotated through the 6 treatment groups. Attendance at the sessions was regular, with only 4 Ss failing to come to at least 5 of the 6 sessions as required by the treatment contract.

Results generally failed to support the investigator's hypotheses. In the analysis of raw data (cigarettes smoked per subject per week of observation), no significant effects emerged
except an Oversatiation x Time interaction (p > .01) showing slightly better performance for groups (including controls) that did not oversatiate. This result apparently was due to the reduction of smoking in follow-up for two groups featuring covert behavior rehearsal combined with imagined smoking. A trend short of significance (p > 0.1) reflected this pattern. The effect of the homework instruction (for which no significant pattern emerged anyway) was unable to be assessed because a random observer spot check revealed that it was not uniformly followed.

Analysis of the data converted to percentage-of-baserate smoking confirmed the Oversatiation x Time interaction (p < .001) showing the inferiority of the oversatiation treatment. The inclusion of the covert behavior rehearsal procedure facilitated the reduction of smoking throughout the experiment (p < .01) and at follow-up (p < .01 for interaction with time). Again an OS x CBR trend (p < .05) was observed, reflecting the significant performance in follow-up of the same two groups. Further testing with Sheffe post hoc comparisons of means indicated that the smoking rates of these groups were lower than those of the control groups at the follow-up observations at week 4 (p < .001), at week 8 (p < .01), and at week 16 (p < .005). Cessation rate data again confirmed the performance of these two groups at the last follow-up (over 40% of Ss totally abstinent) compared to other groups (0 to 20% abstinent). Moreover, these data revealed a 38% cessation rate for the group most closely approximating
pilot study conditions, a finding obscured in the smoking-rate data.

The relatively poor performance of oversatiation groups was explained in terms of the disruption of self-reinforcement patterns required by the method and the resistance of adult Ss to the rationale for this paradoxical treatment. That is, the fact that Ss had to smoke at every session regardless of smoking between sessions dissipated motivation to remain abstinent since there was no reward for such behavior and because treatments would also be more noxious. Moreover, such subjects throughout the experiment were deprived the self-reinforcement and social praise for abstention for "records" of continuous days of non-smoking. Secondly, in contrast to the student Ss of the pilot, adult Ss in the general population apparently have greater difficulty in grasping the rationale for the treatment. Given minimal exposure to the cognitive elements of treatment, Ss who oversatiated without the CBR procedure performed uniformly poorly.

On the other hand the CBR procedure seems to have considerable merit as a treatment, even independently of the OS condition for which it was designed. Although the present investigator cannot completely reject the possibility, he considers it highly unlikely that the superior performance of three of the four CBR groups could be ascribed to demand characteristics or social interaction contaminants. That is, he regards the CBR effects as a genuine experimental phenomenon attributable to treatment input, and worthy of further investigation. It remains to be researched
whether some experience with OS, either direct or vicarious, is necessary for the adequate operation of the covert sensitization, alternate responses training, and cognitive inputs that the CBR tapes provide.

Upon integrating the findings of the present experiment with an overview of the research literature, the investigator has arrived at the following conclusions:

1. Behavior therapy approaches are beginning to provide viable treatments for the control of smoking in volunteering subjects.

2. Treatments of greatest promise combine aversion training with some form of self-control training in alternative responses in smoking situations. Among these combinations are covert sensitization plus systematic desensitization, and oversatiation plus covert behavior rehearsal or a similar response substitution procedure.

3. The use of imagery appears to have excellent potential in enhancing generalization of training beyond the confines of the laboratory.

4. For aversion training, the most suitable unconditioned stimulus is likely the cigarette itself smoked in a rapid manner or in sufficient consecutive numbers to establish a condition of oversatiation.

5. The Chain-8 method tested in the present research would likely have yielded results supportive of the OS principle
had provision been made for avoidance of punishment plus self-reinforcement for abstention between sessions.

6. A homework instruction to apply an aversive contingency to all between-session smoking apparently cannot be followed or policed sufficiently to warrant its inclusion in further research.

7. The covert behavior rehearsal procedure has potential for further development together with and perhaps independent of oversatiation.

8. A likely application of the CS-CBR combination would be a leaderless group attending 8 sessions of covert behavior rehearsal from recorded instructions. Subjects would oversatiate using directed rapid inhalations in situations where they imagine themselves to yield to smoking temptations. Although all Ss would be required to smoke in the first session, thereafter they would only smoke if they had failed to stop smoking between sessions. Abstaining Ss would spend these sessions imagining (but not actually) smoking. By this provision of avoidance of punishment and reward for cessation, treatment would be sufficiently popular for widespread public acceptance. Moreover, its automated nature would free public health agency staff for other coordination rather than treatment functions.

9. Research on this application could investigate such questions as the need for oversatiation versus completely
vicarious (imagined) training, the possible desirability of a homework instruction applying treatment in natural settings on a selective basis, the provision of booster treatments, and the comparison of success of the OS-CBR combination versus the pure OS treatment of rapid-smoking developed by Lichtenstein et al. (1973).

Thus culminates 18 months of research that has reached, if not surpassed, the writer's point of satiation. Now that the smoke surrounding the central issues has cleared somewhat, he can breathe a little easier.
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MEMO FOR IMMEDIATE RELEASE

TO: City and County Newspaper Editors

FROM: Tom W. McFadden, Program Coordinator, Essex County Windsor Tuberculosis and Respiratory Disease Association.

RE: Smoking Withdrawal Clinics

"ACTIVE APPROACH NEEDED TO QUIT SMOKING"

"Most smokers who try to quit fail because they lack the confidence needed to take an active approach", says University of Windsor psychologist, Frank Young. Mr. Young has been doing research in new techniques for smoking cessation in the last year.

Smokers who succeed in quitting are those who make a firm resolve to stop for personally important reasons. The decision has to come from the person himself, rather than pressure from family or friends. He thinks ahead of time about the day that he has chosen to stop. He decides that he will make it a serious effort, rather than a half-hearted try. He sees not smoking as a positive act and a change for the better in his personal habits, an end to slavery to the tobacco habit. Finally, the person who succeeds takes an active approach in seeking out former smoking situations, constantly testing and proving his ability to stay quit in increasingly difficult circumstances.

In contrast, the unsuccessful quitter does not have a strong resolve, makes a weak and tentative try, and believes that quitting
smoking is depriving himself of a very important pleasure. He rather passively avoids smoking situations, telling himself that he is still powerless to resist the urge to smoke. He literally convinces himself of his vulnerability, and later confirms his "lack of will power" by resuming smoking.

Although some smokers are able to quit on their own, many find it helpful to attend smoking withdrawal clinics for professional assistance and support. Usually these clinics provide an educational program featuring filmstrips, guest lecturers, and helpful hints and techniques for quitting, as well as an opportunity to share their experience of conquering the smoking habit with other group members. The program is designed to make quitting more meaningful, and less difficult.

The Essex County Windsor TB and RD Association is sponsoring two Smoking Withdrawal Clinics. The first is in conjunction with the University of Windsor and will be held at the University Centre on January 29, January 31, February 2, 5, 7 and 14. The six sessions will be held from 7:30 - 8:30 p.m. For those who are unable to attend during the evenings a second clinic is to be held at the Jewish Community Centre, 1641 Ouellette Ave., during the day from 9:30 to 11:00 a.m. on February 12, 13, 14, 15, 16, 20, 22, and 27.

Persons wishing to register for either clinic are asked to call 254-4972, at which time further details will be supplied.
### Nightly Room Assignment

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Pat</th>
<th>Kathy</th>
<th>Chris</th>
<th>Bob</th>
<th>George</th>
<th>Mary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Session 2</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Session 3</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Session 4</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Session 5</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Session 6</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
E BRIEFING

1. Do you know what room you are in tonight? Check assignment chart.

2. Do you have the right tape recorder (color coded). Have you checked to see that it works?

3. Do you have the right tape for your room (color coded) and SESSION?

4. Get the FOLDER for your room (color coded) and make sure you have the attendance list, master check list, pen, (and craving scales where applicable), and door list.

5. If you have rooms 1, 2, 5 or 6 tonight, look at the completed craving scales shelf, and check for green cards.

BEFORE SESSION

Check to ensure that:

1. All materials on hand and all equipment tested and working.

2. NAME LIST for your room is posted.

3. CHECK attendance list for everyone as they arrive, record number of minutes late where applicable.

DURING SESSION

1. Play tapes and modulate volume.

2. Distribute, and collect craving scales where applicable, check that all are named.

3. Discourage talking.

4. Encourage smoking (short of vomiting).

5. Check master data list and hassle Ss to get in lacking data.
E DEBRIEFING

1. All materials and equipment returned to office and filed correctly (observe color codes).

2. Craving scales filed color coded.

3. Any extra completed forms filed and checked on master data list.

4. Extra materials put in EXTRAS TAKE ALONG box.

5. Return color-code pens to Frank's desk shelf, plus tape cassettes on shelf above it.

6. UNWIND!

COMPLETED CRAVING SCALES

1. USE CORRECT COLOR for your room tonight.

2. Mark the session number (as B₁, B₂, B₃, B₄, B₅ or B₆) on every page you collected tonight.

3. Check attendance list to make sure no data is missing (the attendance list is in the BOX for your room).

4. FILE all forms collected under MASTER CARD for your room; check off master card to record forms collected.

5. IF ANY DATA MISSING (e.g., S attended and did not submit craving scale) make a note stating details on a green card and PUT IT ON TOP OF MASTER CARD.

FRANK'S LIST

1. All tapes cut and rewound.

2. All equipment here and ready.
3. All E's read list and know jobs.
4. All Folders prepared, including craving scales.
5. Is each E briefed on announcements.
6. Are all returning and filing data correctly?
7. GROUP 7 Attendance.

SESSION FIVE

- All Ss receive white form G (schedule for data returns) today.
- All Ss receive their first data reminder card today
  - scored in green if week 1 data is all up to date. This
    is merely positive feedback.
  - scored in red if there are deficiencies. If week 1 data
    is missing, a warning card is issued and extra green
    cards are stapled on.
  - if nearly all data is missing, you are to personally ask
    S why he and his O's are not returning data. Check that
    he understands instructions and realizes that he will be
    fined if this data is not submitted the end of this week.

Where Ss bring in data, score your room master list and S's
data reminder card appropriately. Detach any extra yellow
or green cards if data has been collected. Check that forms
have been filled in correctly.
CIGARETTE SMOKING: THE FACTS

...a product advertised as certain to make you happy, relaxed, popular, attractive, appealing?

Of course. Why not?

But what if the ads also told you this product was certain to...
leave a foul taste in your mouth...
give you bad breath...
smell up your clothes...
discourage your fingers and teeth...
AND...
INCREASE YOUR CHANCES OF ILLNESS...
DISABILITY AND EARLY DEATH?
WINDSOR SMOKING WITHDRAWAL PROJECT

FORM A: INTRODUCTION

The Windsor Smoking Withdrawal Project is a smoking cessation research clinic jointly sponsored by the Essex County Windsor TB and RD Association and the Department of Psychology, University of Windsor. The clinic will be held on the second floor of the University Centre on the evenings of January 29, and 31, and February 2, 5, 7 and 14, 1973, from 7:30 to 8:45 p.m.

Although there is no charge for this service, all participants are required to fill out the confidential smoking questionnaires distributed by the clinic staff. In addition all participants MUST bring to the first session a $20.00 cash deposit which is fully refundable at the end of the project regardless of their success or failure to quit smoking. The deposit merely ensures punctual attendance at the sessions and adherence to the instructions given, plus submission of weekly then monthly reports of their rates of smoking. To check on the accuracy of these reports, each participant names two friends as "observers" or "witnesses" who also record his rate of smoking.

Before the clinic begins, you should fill in and mail the enclosed questionnaire (FORM A) immediately in the stamped self-addressed envelope provided. Secondly, contact two persons who spend a lot of time with you during days and or evenings and are willing to help you by being "observers" of your smoking in the next few months. Obtain their addresses and phone numbers and record them on Form C to be handed in on January 29 at the first clinic meeting. Third, read the pamphlets provided before the first meeting. Fourth, begin today to record the number of cigarettes you smoke every day. Try to smoke as many as you normally would. DO NOT TRY TO CUT DOWN your smoking until the clinic begins. Finally, begin to prepare yourself mentally for the clinic - think about the prospect of ending your slavery to the tobacco habit at the end of January.

Again, do not forget to bring the $20.00 cash deposit to the second floor University Centre on January 29 at 7:30 sharp. You will not be permitted entry without the deposit.

Frank Young, H.A.
Coordinator,
Windsor Smoking Withdrawal Project.
W.S.W.P. FORM B: SMOKING HISTORY QUESTIONNAIRE

(Note: All information obtained will be kept confidential. Only statistical summaries will be used.)

Please Print

1. Name ________________________________
   Last, ____________________
   First, ____________________
   Initial ____________________

2. Home Address ________________________________

   Phone: ________________________________

3. Date of Birth __________________
   Day: __________
   Month: _________
   Year: _________

4. Sex (circle one)
   M or F

5. Marital Status (circle one)
   Single  Married  Separated  Divorced  Widowed

6. Number of Children or Dependents __________________

7. Education (total sum of years in school and/or college) ________

8. Occupation ________________________________

9. Does (Did) Your Father Smoke? ________________

10. Does (Did) Your Mother Smoke? ________________

11. How Many Sisters Do You Have? ________________
    How Many Smoke? ________________

12. How Many Brothers Do You Have? ________________
    How Many Smoke? ________________

13. Does Your Current Roommate (wife, husband, etc.) Smoke? ________________

14. Age At Which You Smoked Your First Cigarette ________

15. Number of Years Smoking ________

16. Average Number of Cigarettes Smoked Per Day ________

17. Do You Inhale? ________________
18. List, in order of importance to you, the three things you enjoy most about smoking:

(a) 
(b) 
(c) 

19. In the following smoking situations, rate your craving for a cigarette on the five point scale below:

-2 strong dislike for smoking
-1 mild dislike for smoking
0 indifferent to cigarettes
+1 mild impulse or desire to smoke
+2 intense desire or craving for a smoke

<table>
<thead>
<tr>
<th>Situation</th>
<th>DISLIKE</th>
<th>DESIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) waking up in the morning</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(b) at breakfast</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(c) driving or going to work</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(d) while working (if student, while studying)</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(e) while working under pressure (cramming)</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(f) at coffee breaks</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(g) at meetings</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(h) before speaking or presenting in front of a group</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(i) at social gatherings not using alcohol or intoxicants</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(j) while drinking or intoxicated</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(k) when a friend offers a smoke</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(l) after a meal</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(m) while driving or riding in a car</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(n) when bored or waiting for somebody</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(o) when frustrated</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(p) when angry</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(q) when tired</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(r) when nervous or anxious</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(s) when you have not smoked a cigarette for the last hour</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(t) while relaxing</td>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>(u) before going to sleep</td>
<td>-2</td>
<td>0</td>
</tr>
</tbody>
</table>

20. How many times have you made a genuine decision to quit by actually trying to stop smoking?

What is the shortest period that you remained off smoking? 

What is the longest period that you remained quit?

21. Have you changed your smoking habits in the last years? Yes ______ No ______

If yes, in what ways have you changed? (check one)

- Stopped and started once or more
- Cut down from _____ to _____ cigarettes per day.
- Increased from _____ to _____ cigarettes per day.
22. LIST, IN ORDER OF IMPORTANCE TO YOU, YOUR THREE MAIN REASONS FOR QUITTING SMOKING:

(a) 
(b) 
(c) 

23. WHAT IS YOUR EXPECTATION REGARDING SUCCESS THIS TIME:
(Circle one of the following)

a. I expect to fail, I'm no good at quitting 

b. I am not sure, but I might be able to quit for a couple of days anyway 

c. I'm pretty sure I can last for at least a week this time 

d. I feel confident that this time I will be able to stop for a long time, perhaps forever.
H.S.W.P. FORM C: OBSERVER CONTACT FORM

PARTICIPANT'S NAME: ______________________________ last, first, initial

HOME ADDRESS: _______________________________________________

PHONE: ______________________________________________________

BUSINESS ADDRESS: ____________________________________________

PHONE: ______________________________________________________

The two persons I have selected to report on my smoking behavior during the project are listed below:

OBSERVER #1 NAME: ______________________________ last, first, initial

HOME ADDRESS: _______________________________________________

PHONE: ______________________________________________________

BUSINESS ADDRESS: ____________________________________________

PHONE: ______________________________________________________

RELATIONSHIP (e.g. spouse, friend, business associate, etc.): ___________

OBSERVER #2 NAME: ______________________________ last, first, initial

HOME ADDRESS: _______________________________________________

PHONE: ______________________________________________________

BUSINESS ADDRESS: ____________________________________________

PHONE: ______________________________________________________

RELATIONSHIP (e.g. spouse, friend, business associate, etc.): ___________
W.S.W.P. FORM S: SESSION SCHEDULE

Treatment sessions are to be held according to the following schedule. You are required to attend at least five of the six sessions.

Wed. Jan. 31 7:30 - 8:45 Rms. 1-6 Univ. Centre
Fri. Feb. 2 7:30 - 8:45 Rms. 1-6 Univ. Centre

Mon. Feb. 5 note time: 7:00 - 8:00 Rms. 1-6 Univ. Centre
Wed. Feb. 7 7:30 - 8:30 Rms. 1-6 Univ. Centre

Mon. Feb. 12 7:30 - 8:30 Rms. 1-6 Univ. Centre
Wed. Feb. 14 note time 7:00 - 8:00 Assumption Lounge
8:00 - 9:00 Rms. 1-6 Univ. Centre

On Wed. Jan. 31, 1973, please arrive a few minutes early to avoid confusion. Your name will appear on a list on the door of the room to which you have been assigned. You will be admitted to this room only if your name appears on the list. Attendance will be recorded.

Notice that the sessions on Feb. 5 and Feb. 14 begin at 7:00 sharp. All others begin at 7:30.

KICK THE HABIT! Good luck.
WINDSOR SMOKING WITHDRAWAL PROJECT

FORM D: DEPOSIT REFUND CONTRACT

1. This contract acknowledges that I, the undersigned, have today placed $20.00 cash on deposit with the Windsor Smoking Withdrawal Project.

2. I expect to receive a $10.00 refund at the last treatment session, February 14, 1973, if I punctually attend at least five of the six scheduled sessions of this clinic and that I comply with all treatment instructions given during the sessions.

3. I expect to receive the other $10.00 refund by the end of May, 1973, provided I have submitted reports on my smoking in the first week of treatment, and in the second, third, fourth, eighth and sixteenth week after the clinic begins. I also agree to ensure that the two “witnesses” I name in Form C (or their authorized substitutes) report regularly at these aforementioned intervals on my smoking behavior. I know that every report sent by me or my witness is due within one week of the last day of the week being reported, and I will adhere to this deadline.

4. I realize that each time a violation of the conditions mentioned in Sections 2 and 3 above occurs, a fine of $2.00 will be deducted from my deposit. I understand that any attempt to distort or falsify reports of smoking behavior will result in forfeiture of the entire balance of the deposit to the clinic.

5. I hereby release and forever discharge the staff of the Windsor Smoking Withdrawal Project, and its sponsors, (i.e. the Essex County Windsor TB and Respiratory Disease Association, and the Department of Psychology, University of Windsor) from all responsibilities, actions, suits, debts, claims and demands whatsoever resulting from or sustained in connection with my participation in this smoking withdrawal clinic.

Date __________________________ Signature of Participant ________________________

Signature of Witnessing W.S.W.P. Staff Member ____________________________

CHRISTMAS SEALS FIGHT TUBERCULOSIS . . . EMPHYSEMA . . . AIR POLLUTION . . . IT'S A MATTER OF LIFE AND BREATH

"An Associate of the Ontario and Canadian TB ED Associations"
WINDSOR SMOKING WITHDRAWAL PROJECT
PARTICIPANT SMOKING RECORD CARD

**NAME**
(PRINT, last name, first name)

During the past week, I have smoked the number of cigarettes indicated:

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>No. Cigs. Smoked</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Wednesday</td>
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<td>Thursday</td>
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<td>Friday</td>
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<td></td>
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<tr>
<td>Saturday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I swear that the above numbers are accurate and that I have made no attempt to distort or falsify this report.

Date __________________ Signature __________________

---

WINDSOR SMOKING WITHDRAWAL PROJECT
WITNESS RECORD CARD

During the past week, I have noticed that the person I have agreed to observe, named [person's name], has smoked the following cigarettes while I was able to observe:

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>No. of Cigs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td></td>
<td></td>
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<tr>
<td>Thursday</td>
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<tr>
<td>Friday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunday</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the best of my knowledge, the above observations are accurate and honest. I now estimate that this person smokes [number] cigarettes/day.

Date of report __________________ Witness __________________

Signature __________________
### EXPERIMENTAL DESIGN FOR FACTORS IN THE NEGATIVE PRACTICE METHOD FOR CIGARETTE SMOKING CESSATION

<table>
<thead>
<tr>
<th>NP SMOKING DURING SESSION</th>
<th>NO NP SMOKING DURING SESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G₁ ENRICHED TREATMENT</strong></td>
<td><strong>G₅ EXTERNAL PRACTICE</strong></td>
</tr>
<tr>
<td>CONTINGENT SMOKING INSTRUCTION</td>
<td>- attend 5 NP sessions</td>
</tr>
<tr>
<td></td>
<td>- cognitive enrichment</td>
</tr>
<tr>
<td></td>
<td>- tape played</td>
</tr>
<tr>
<td></td>
<td>- instruction &quot;whenever you have to smoke, chain-smoke 8.&quot;</td>
</tr>
<tr>
<td><strong>G₂ CONFINED TREATMENT</strong></td>
<td><strong>G₆ PURE COGNITIVE TREATMENT</strong></td>
</tr>
<tr>
<td>AVOID SMOKING INSTRUCTION</td>
<td>- attend 5 sessions</td>
</tr>
<tr>
<td></td>
<td>- no smoking or mention of NP</td>
</tr>
<tr>
<td></td>
<td>- alternate cognitive</td>
</tr>
<tr>
<td></td>
<td>- tape played, deleting all references to NP</td>
</tr>
<tr>
<td></td>
<td>- instruction &quot;avoid all smoking outside of clinic sessions&quot;</td>
</tr>
<tr>
<td><strong>G₃ PURE AVERTION TREATMENT</strong></td>
<td><strong>G₇ MINIMAL TRAINING (Educative + NP Suggestion)</strong></td>
</tr>
<tr>
<td>CONTINGENT SMOKING INSTRUCTION</td>
<td>- attend only orientation session, receive same materials</td>
</tr>
</tbody>
</table>
|                            | - "Our clinic is filled, but basically the method we use is having our participants chain-smoke 8 cigarettes on each smoking occasion. Would you please send us data on your attempt to quit on your own using this method?"
<table>
<thead>
<tr>
<th><strong>G</strong> CONFINED AVERSION TRNT.</th>
<th><strong>G</strong> SELF-MONITORING CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVOID</td>
<td></td>
</tr>
<tr>
<td>SMOKING</td>
<td></td>
</tr>
<tr>
<td>INSTRUCTION</td>
<td></td>
</tr>
<tr>
<td>- attend 5 NP sessions</td>
<td>- attend only orientation</td>
</tr>
<tr>
<td>- Ss close eyes, remain</td>
<td>- session, receive materials,</td>
</tr>
<tr>
<td>silent, told to think</td>
<td>- &quot;Our clinic is full, but</td>
</tr>
<tr>
<td>about their body reactions</td>
<td>would you please send us</td>
</tr>
<tr>
<td>to smoking</td>
<td>data on your attempt to</td>
</tr>
<tr>
<td>- instruction &quot;avoid all</td>
<td>quit on your own?</td>
</tr>
<tr>
<td>smoking outside of clinic</td>
<td>(no mention of negative</td>
</tr>
<tr>
<td>sessions</td>
<td>practice)</td>
</tr>
</tbody>
</table>

**DESIGN:** $2 \times 2 \times 2 \times 7$ with repeated measures on the last factor (time); data collected for baseline, week 1, week 2, week 3, week 4, week 8, and week 16.
Diagram for Configuration of Treatment Rooms
WSWP FORM F: CIGARETTE CRAVING SCALE

1. Name:

2. I expect the experience of smoking the first cigarette today will be: (circle one)

-2    -1    0    +1    +2
-2 (extremely unpleasant)  0 (neutral)  +2 (extremely pleasant)
-1 (mildly unpleasant)  +1 (mildly pleasant)

3. My desire to smoke the first cigarette is now:

-2    -1    0    +1    +2
(strong dislike)  (neutral)  (intense craving)

The clinic participant now lights up first cigarette when instructed to do so, takes about five drags, and continues questionnaire.

4. Using the "pleasure" scale of question #2, my experience smoking the first cigarette is:

-2    -1    0    +1    +2

5. My desire to finish smoking the first cigarette is now:

-2    -1    0    +1    +2
(strong dislike)  (strong desire)
IN THE FOLLOWING SMOKING SITUATIONS, RATE YOUR CRAVING FOR A CIGARETTE ON THE FIVE POINT SCALE BELOW:

-2 strong dislike for smoking
-1 mild dislike for smoking
0 indifferent to cigarettes
+1 mild impulse or desire to smoke
+2 intense desire or craving for a smoke

<table>
<thead>
<tr>
<th>DISLIKE</th>
<th>DESIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) waking up in the morning</td>
<td>-2</td>
</tr>
<tr>
<td>(b) at breakfast</td>
<td>-2</td>
</tr>
<tr>
<td>(c) driving or going to work</td>
<td>-2</td>
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<tr>
<td>(d) while working (if student, while studying)</td>
<td>-2</td>
</tr>
<tr>
<td>(e) while working under pressure (cramming)</td>
<td>-2</td>
</tr>
<tr>
<td>(f) at coffee break</td>
<td>-2</td>
</tr>
<tr>
<td>(g) at meetings</td>
<td>-2</td>
</tr>
<tr>
<td>(h) before speaking or presenting in front of a group</td>
<td>-2</td>
</tr>
<tr>
<td>(i) at social gatherings not using alcohol or intoxicants</td>
<td>-2</td>
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<tr>
<td>(j) while drinking or intoxicated</td>
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</tr>
<tr>
<td>(k) when a friend offers a smoke</td>
<td>-2</td>
</tr>
<tr>
<td>(l) after a meal</td>
<td>-2</td>
</tr>
<tr>
<td>(m) while driving or riding in a car</td>
<td>-2</td>
</tr>
<tr>
<td>(n) when bored or waiting for somebody</td>
<td>-2</td>
</tr>
<tr>
<td>(o) when frustrated</td>
<td>-2</td>
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<tr>
<td>(p) when angry</td>
<td>-2</td>
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<tr>
<td>(q) when tired</td>
<td>-2</td>
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<tr>
<td>(r) when nervous or anxious</td>
<td>-2</td>
</tr>
<tr>
<td>(s) when you have not smoked a cigarette for the last hour</td>
<td>-2</td>
</tr>
<tr>
<td>(t) while relaxing</td>
<td>-2</td>
</tr>
<tr>
<td>(u) before going to sleep</td>
<td>-2</td>
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</table>

List, in order of importance to you, the three things you still enjoy most about smoking:

(a) __________________________________________

(b) __________________________________________

(c) __________________________________________

It has now been _______ days since my last treatment session.

Since my last treatment I have experienced a moderate temptation (that is, it took more than a minute but less than three minutes to get it off my mind) to smoke ______ times per day.
Since my last treatment, I have experienced a severe temptation (it took more than three minutes to deal with it, or it felt unusually strong) to smoke ____ times per day.

Since my last treatment session, I have smoked ____ cigarettes per day.
Selected Transcripts from Taped Material

Room 6 - Group 1  Session 1  (This segment is the same for groups 2, 5, 6)

Hello, and welcome to your first session of treatment using the chain-8 negative practice method of smoking withdrawal. (8""). My name is Frank Young and I'll be your unseen voice throughout this clinic which consists of 6 sessions each of them 1 hour long. (10"") I'm sure you have several questions about the method or misgivings about what's about to happen and a number of other things you want to know about the chain-8 procedure... well in a few minutes I'll be doing my best to explain to you what's involved in the procedure, how it developed, why it has been successful, and how it can be successful for you... first of all though I'd like to get down to business... in front of you, you see Form F - cigarette craving scale, now could you take a pen or a pencil and fill in your name, please print,... now next, question 2, here I want you to imagine you are about to smoke your first cigarette in this session, now just imagine this first cigarette, "I expect the experience of smoking this cigarette today will be,"... and here you rate, from -2 which means extremely bad, extremely unpleasant, you're going to have a terrible time smoking this first cigarette in the clinic, all the way through 0 which means the experience might be pleasant, might be unpleasant, you don't really know, all the way to a +2 which means extremely pleasant you think if you light up a cigarette now its just going
to be to remember only those times that are positive... so if you cut down smoking, you know, so that you only smoke about 2 or 3 a day, well those 2 or 3 cigarettes are going to be very enjoyable to you, well at least very meaningful to you because you've rationed yourself down to such a few, well you're punishing yourself, you're working against yourself if you cut down in cigarette smoking. Because you're making those cigarettes an awful lot more rewarding to you than they should be, than they would be if you were smoking normally. So when you quit smoking, quit it altogether, stop it entirely, don't horse around with this, well I'll cut down a bit... it just doesn't work, it works for very very few people statistically, maybe 1 in 20 is able to successfully quit this way. Think of all the times and all the people you know who have tried to quit using this method and they just haven't. They haven't been successful. Its just generally not very effective at all... (10)" so cut out cigarette smoking altogether, cut it out completely and these negative-practice sessions are intended to help you while you're cutting out cigarette smoking to build up an image of smoking as being something that is personally distasteful, its not bad because your wife says its bad or because your doctor says its bad, smoking will become bad because you personally can't stand it anymore, its revolting and disgusting to you and thats what these negative practice sessions are for, to help you build up these attitudes. It's having these attitudes on a long-term basis that is going to prevent you from going back to smoking...
(25") at this point in the clinic I want you to again focus on your body reaction, focus on what is happening to your body right now... (10") start with your head, the taste in your mouth, the smell, smell your fingers, the fingers of your smoking hand, look at the tar stains, smell if you can, probably by now your nose is pretty well adapted to the smell of cigarette smoke but you probably can smell some tar on your fingers... not very pleasant is it... move your tongue around in your mouth, try to taste, taste your mouth, that's not very pleasant either, you can imagine all the tar stains on your teeth, the unpleasant breath, bad taste in your mouth... tonight or tomorrow you'll be able to sniff the clothes you're now wearing and see how disgustingly smoky they are, or have a look at a few clothes you've ruined with cigarette burns, imagine how your head might ache right now, it may ache, just focus on that ache for a moment, now focus on your throat, your sore, sore feeling in your throat - also the need to try and clear (E clears throat) all the congestion back there, and perhaps you feel that you are about to cough - (sound of coughing) I'll bet you, you couldn't take a deep breath right now without breaking out into a coughing fit... imagine also, focus on the feeling of sickness in your whole body, the poison that nicotine is doing, and the tar is doing to you. (10") O.K. now take out your clinic reminder card, this is a small card that is just big enough that you can write on and see your own handwriting and small enough that you can put it in your cigarette package... now on the first side of the clinic reminder
card it says - I chose not to smoke, or I choose to not smoke because, and then it has a, b and c there, what I want you to do is fill out your reasons why you've decided to quit smoking,... go ahead (30")... leave it so they offer you one and you say "Watch this you guys," and you light up and you taste it and sure enough it tastes lousy so you say "Well, I don't need anymore of this" and you have a few more drags and you probably put the cigarette out when it's half smoked and nothing happens but you think a little bit about it. Then you get into a situation a few days later. Somebody's having a cigarette and they offer you one and again you could kill yourself with this over-confidence "Well, I can take it or leave it but you're offering, oh well, alright. Now that I've gotten over the habit, over the addiction part, well of course I can afford to be sociable." So you light up and have another and then next thing you know a few days later you're kind of hoping that your buddy will offer you a cigarette which of course you accept and then if you start getting a little bit uptight that you might be getting back into smoking well you just ask for a drag or two. But in a few days this type of thing wears off. People just don't like offering drags of their cigarettes around, generally and so you accept entire cigarettes. Then you realize that you're really looking forward to these cigarettes. The next thing you know you're bumming cigarettes but you keep on telling yourself "Well at least I haven't bought any. I'm still a non-smoker. I haven't bought any cigarettes." And that's the last way you kind of compromise your pride, okay, but it starts to be
a pain, a real pain for everybody around you, okay, because you're starting to mooch cigarettes from them and you're too proud to buy your own, well, you start to make a fool of yourself. Finally, your pride can take it no longer. You say "Well, I guess I really need cigarettes and I can't bum them from people anymore" so you go out and you buy a pack and then you realize that there you are back where you started four or five months ago smoking. Yes, it can happen. It's happened to me several times. It's so easy to fall into those traps. So easy to be over-confident and what do you do instead of that? Well first of all, I think, above all, resist totally and completely all urges to smoke from now to the rest of your life and they'll die—those urges will die. Secondly, if by any chance you do smoke a cigarette, don't take it as an admission of defeat. Just stop there and reassess this whole clinic and what you put into it and what you got out of it and all that investment of time and energy and then get your resolve up again and then say "Okay, maybe I smoked that one but that's the last cigarette I'm ever going to smoke," and you start all over again to count. Most of you who've quit, eh, count the number of days that you've been off cigarettes. Well, if ever you break your resolve and have even a drag well then you have to start your count all over again. It's worth it because it's necessary for you to reinforce yourself for not smoking because you're the only person that's going to be always there at every smoking opportunity. So you are the only person who can really make you feel good all the time for non-smoking so it's up to you. (pause 15 sec.)
Okay, now focus back on what's happening in your body. Do you have a sore throat? (pause 3 sec.) How does your mouth taste? How does your mouth feel? (pause 3 sec.) How does your head feel? Your stomach? The rest of your body? (pause 3 sec.) This is the poisoning, the personal pollution that you're doing to yourself. (pause 8 sec.) Let's go through a few of the smoking situations. Stop smoking for a minute. Just hold your cigarette in your hand and don't take a drag. (pause 6 sec.) Okay, imagine that you've just finished a nice meal. (pause 8 sec.) You have a craving for a cigarette. Imagine that. (pause 5 sec.) But you resist it. Now think of how relieved you feel right now that you don't have to smoke. You don't have to smoke a cigarette to enjoy a meal. For everybody else who smokes they have to have a cigarette after a meal in order to make the meal complete. You don't. (pause 4 sec.) Feel good!... Switch that scene off. Now imagine again that you have just finished a good meal and you have a terrific urge to have a cigarette and you decide to break down and indulge that urge. Okay now take the cigarette that you're holding in your hand and have a few drags. That's it. Now imagine you're just lighting up and having a cigarette after a meal and you're having those drags now. How does it feel? Feel good? How do you feel about breaking down your resolve to stay off cigarettes now? Was it worth it? (pause 3 sec.) Okay, switch that scene off. Stop smoking. Just hold the cigarette out in front of you. (pause 10 sec.) Now imagine you're bored. (pause 8 sec.) You're just bored. You're just
tired of everything. You need a cigarette to give you a lift. Give you something to do with your hands or something like that. But instead of having a cigarette you turn your mind to other things—other things like whatever pleases your mind. (pause 6 sec.) Think about whatever pleases your mind right now... Okay, now switch those scenes off. Now imagine once again that you are bored. Say you're waiting for somebody and there's nothing to do. You just gotta hang around and wait. You're kind of bored. (pause 11 sec.) Okay, imagine you can't stand this boredom any longer and you have to light up a cigarette to calm your nerves, to stimulate you, to do something, anyway—anything for relief from this boredom. Okay, now have a few drags. Imagine you're lighting up a cigarette. Now have a few drags. (pause 8 sec.) Imagine now you've got your coughing and everything that's happening in your throat to keep you from being bored. It's too bad that you had to resort to poisoning to relieve your boredom, however, now that you are suffering all the effects of personal poisoning you have some relief from your boredom. What a price to pay! (pause 5 sec.) Okay, switch that scene off. Now imagine that you are drinking. (pause 5 sec.) You are drinking. You need a cigarette. Okay, you think you need a cigarette but you tell yourself "Nah, I'm just saying that to myself, I need a cigarette. I don't really need a cigarette. I've gone this far drinking without one. There's no need to have one. What's more it'd taste terrible if I had one anyway and I'd feel lousy if I did. So I won't." Imagine how happy you feel with yourself
right now resisting that impulse to smoke. (pause 8 sec.) Okay, 
now imagine this scene. You've been drinking for a while. You 
feel very happy--kind of intoxicated, kind of in a frivolous mood. 
You feel giddy maybe, or at any rate the person smoking across from 
you really makes you feel like having a cigarette and they're offering 
you one. Yes, that's right, they're offering you one and you 
just say "Man, I can not do without a cigarette when I'm drinking. 
Drinking, man, that's a real bad situation to do without a ciga-
rette." Okay, you indulge your impulse. Go ahead now, light up. 
(pause 6 sec.) How does it feel? Have a few drags. (pause 4 
sec.) Are you glad that you had a cigarette while you're drinking? 
What a bring down! (pause 5 sec.) It certainly wasn't as plea-
sant as you thought it would be, right? RIGHT! You didn't need 
that after all. What a fool you made of yourself by smoking. 
(pause 11 sec.) Okay, switch that scene off and now go to this 
scene. You're really nervous. Imagine yourself uptight now. 
Think of a situation at home or at work that really makes you 
uptight. You're feeling very anxious. Very anxious. You think 
you need a cigarette. (pause 4 sec.) But you don't. Instead 
you just sit back and focus all the tension in your stomach muscles. 
Tighten up your stomach muscles right now. Very tight. Tighter. 
Alright now, relax. Let go, just relax. All the tension that 
you focused on your stomach muscles is now gone away. Let it 
go away. (pause 3 sec.) Breath deeply and slowly. (pause 14 
sec.) There. Now the problem of course hasn't gone away but 
maybe your method of dealing with the problem has gone away.
You've resisted the impulse to smoke. Okay, now think of the same situation. Again, get yourself uptight. Think of the situation that really makes you nervous, really makes you anxious—all the things that are really worrying you. Okay, now get yourself into a worried state. Worry and imagine the scene that is making you worried. Imagine the scene. Okay, fix it in your imagination and now I want you to imagine that you're lighting up a cigarette to calm yourself down. Okay, now take a drag. (pause 4 sec.) That's it, now take another drag. (pause 5 sec.) Keep dragging. How do you feel? Yech! Terrible! Ooh terrible! Has your problem gotten any better? Or maybe the fact that you're feeling terrible right now might distract you from it but it's still there. (pause 10 sec.) Okay, now switch that scene off. (pause 5 sec.) Now think of the last situation that I'll describe and that's the one where somebody else is offering you a cigarette. Take the cigarette that you have in your hand, okay, and butt it out. Right now. Put it out. (pause 5 sec.) Okay, now look around the group and offer your cigarette to somebody else and have them offer cigarettes to you. Be very insistent when you offer it to somebody else. Be very insistent, and when somebody offers you a cigarette just say "No thanks. I've quit. I don't have to smoke." Now do that right now. All around the group. (pause 8 sec.) Okay, now stop that. Now, capture the situation again and I want you to offer cigarettes to other people in the group and have them offer cigarettes to you and I want you to accept and light up. Accept their cigarette and light up and have
a few drags. (pause 7 sec.) And how does that feel? Aren't you glad you accepted the cigarette from a friend? Aren't you glad you accepted that cigarette? How does it feel, eh? (pause 4 sec.) Now you can compare and contrast the feelings that you felt before when you resisted the impulse and how good you felt about yourself. Contrast it right now with how sickish you feel and how ashamed you feel. (pause 5 sec.) Okay, switch that scene off. (pause 5 sec.) Now go to a scene where you're very frustrated, really mad about something. (pause 6 sec.) Okay, now rather than smoke take a few deep breaths and just relax. (pause 20 sec.) Okay, now that's how you might deal with it. But supposing you once again imagine that you are in a frustrating situation—really mad about something, okay, and you feel that you just have to have a cigarette to calm down, to cool your nerves, okay. Have to have a cigarette, have to have a cigarette. Okay, have a drag. Take it in. Come on, drag harder. How does that feel? How does that feel? (pause 4 sec.) Do you really need all that poisoning? Is it making you feel better? (pause 7 sec.) Okay, switch that scene off. (pause 3 sec.) And now take the most important craving situation you can think of—the one that really bugs you the most. Imagine it. (pause 4 sec.) Now imagine resisting the impulse to smoke, in that situation. (pause 5 sec.) Smile, congratulate yourself for resisting it. Feel good. Feel good that once again you've vanquished that rotten cigarette habit. Switch that off now. (pause 3 sec.) Imagine the same situation, where you wrestle with the impulse to smoke. Now you give in to that
impulse. Now light up, and take a drag. How do you feel about yourself now? (pause 4 sec.) Take another drag. (pause 4 sec.) Continue smoking now as we finish off the tape, unless of course you've reached your eighth cigarette already.

Instruction Group 1, 3, 5, 7

Now don't forget as we sign off that outside the clinic session you are, if to smoke at all, you must smoke eight in a row. Eight in a row or to the point of actual physical illness. (pause 5 sec.) Now, make sure you do this otherwise you're watering down the effectiveness of the method and don't forget once more that the method is only effective to the extent that you yourself are committed to making it effective. It will work for you if you work for it. So avoid all smoking if possible. If impossible make sure you stick to the method and chain-eight. I'm looking forward to seeing you at our next meeting and I think you'll enjoy that, certainly if for no other reason than all the torture you've subjected yourself to will be over. But I think you'll find a very worthwhile session so we'll see you there. In the meantime, good luck and continue kicking the habit. Don't let it kick you! Bye bye for now.

And now it's come time to close off the session and I want to remind you to avoid smoking at all costs. Avoid smoking outside the sessions. (pause 10 sec.) It is important that you make sure that all your last associations with cigarette smoking are negative and that's smoking inside this clinic but not outside
of it. Avoid smoking altogether. If you do break down and have one just stop dead. Stop dead. Don't have any more. You're working against yourself if you have any more. Stick to this method and it'll work well for you. Violate the method and you're working against yourself to weaken all the good work that you've put forward already. We'll see you next session and I think you'll be able to look forward to our last. It's a good one. I think you'll enjoy it. So, bye for now and kick the habit. Don't let it kick you.

Groups 5 & 6 lead-in

First of all, I imagine that right now you are lighting up. In order to do this take the cigarettes that you are carrying around. Open up the package and take one out or take it partly out of the package so that the cigarette is showing. (pause 6 sec.) As you do this now you can close your eyes for the remainder of the session or when you open your eyes look and stare at the cigarette package. (pause 4 sec.) Okay, now imagine you are moving your cigarette and putting it to your lips and striking a match or a lighter and lighting up. (pause 5 sec.) Imagine the first drag. The taste of the smoke, the quickening of the heartbeat, the sort of buzzing sensation, maybe slightly dizzy sensation as well, the bitter taste of the smoke, the slight tickling or irritation in your throat. Now concentrate, concentrate on these things happening. (pause 7 sec.) Don't forget, as I pointed out in the earlier sessions, that the body can not discriminate between
real and imagined states so that, if you concentrate very hard you can go through the physiological conditioning that the other rooms are going through as effectively without having to actually go through the aversive experience that they're receiving right now, by actually having to smoke. For you it is sufficient if you concentrate to smoke no cigarettes but merely imagine that you are. (pause 6 sec.) Remember, as in last week, that there are a number of examples where the body cannot discriminate between real and imagined states, for example, dream states or in hypnosis or the so-called pleasurable effects in drug research, where people think they have what is the effect of the drug only to find out later on, that they hadn't received the drug at all but a harmless substance made to mimic the drug and the only thing that made them feel the way they felt was not the chemical involved, it was their expectations, their imagination and nevertheless their body reacted in the same way. (pause 5 sec.) So keep these ideas in mind as we imagine that we are smoking along with the other groups.
CLINIC REMINDER CARD

I choose to not smoke because:

(a) 
(b) 
(c) 

(over)

CLINIC REMINDER CARD

If I smoke now, I will feel:

(a)  
(b) 
(c) 

So I won't! I am no longer a slave to tobacco!
WINDSOR SMOKING WITHDRAWAL PROJECT

FORM C: SCHEDULE FOR DATA RETURNS

By now you have received an envelope containing three sets of cards. These cards are stamped self-addressed reports on your smoking rate. You have given the two green card sets to two friends of yours who are now reporting your smoking rate on a regular basis. They have been given a mailing schedule to which they must adhere or else a penalty will be deducted from your deposit (see contract).

You are required to submit your yellow cards according to the same schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Start Date</th>
<th>End Date</th>
<th>Report Date</th>
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<tbody>
<tr>
<td>1</td>
<td>January 29</td>
<td>February 4</td>
<td>February 9</td>
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<tr>
<td>2</td>
<td>February 5</td>
<td>February 11</td>
<td>February 16</td>
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<td>3</td>
<td>February 12</td>
<td>February 18</td>
<td>February 23</td>
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<td>4</td>
<td>February 19</td>
<td>February 25</td>
<td>March 2</td>
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<tr>
<td>8</td>
<td>March 19</td>
<td>March 25</td>
<td>March 30</td>
</tr>
<tr>
<td>16</td>
<td>May 14</td>
<td>May 20</td>
<td>May 25</td>
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On May 25 you will be refunded the balance of your cash deposit, with no deductions provided your observers and you mail your weekly reports before the deadlines cited above.

Keeping track of the cigarettes you smoke helps you remain aware of your commitment to break the tobacco habit, and thus assists you in stopping smoking. For your sake and ours, please report accurately and promptly. The tobacco industry will hate you for it, but you and your friends will breathe easier. Good luck to all of you.

The Windsor Smoking Withdrawal Project.
TO ALL OBSERVERS:

Your friend has named you as a witness to his smoking behavior. He is now taking part in a cigarette smoking withdrawal clinic and is actively attempting to abandon the smoking habit.

The clinic staff need accurate objective reports on your friend's smoking rate, regardless of whether or not he succeeds in quitting. Therefore, we ask that you merely fill in the enclosed stamped self-addressed green cards for these four weeks, and then at two months and four months, and deposit them in the mail. On each card you mark the number of hours you spent with your friend each day and how many cigarettes you noticed him (or her) smoking during that time. At the end of the card you estimate the number of cigarettes you now think he is smoking per day.

The mailing schedule is as follows:

<table>
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<tr>
<th>Week</th>
<th>January 29 - February 4</th>
<th>report by February 9</th>
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<tr>
<td>Week 2</td>
<td>February 5 - February 11</td>
<td>report by February 16</td>
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<td>Week 3</td>
<td>February 12 - February 18</td>
<td>report by February 23</td>
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<td>Week 4</td>
<td>February 19 - February 25</td>
<td>report by March 2</td>
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<tr>
<td>Week 5</td>
<td>March 16 - March 25</td>
<td>report by March 30</td>
</tr>
<tr>
<td>Week 6</td>
<td>May 14 - May 20</td>
<td>report by May 25</td>
</tr>
</tbody>
</table>

On May 25 your friend is refunded the balance of his (her) cash deposit, provided (s)he and you mail your weekly reports before the deadlines cited above.

Please help your friend and yourself put an end to the pollution of tobacco smoke by reporting accurately, honestly, and punctually. I am sure (s)he is grateful for your concern.

THE WINDSOR SMOKING WITHDRAWAL PROJECT.

Christmas Seals Fight Tuberculosis and other Respiratory Diseases
Dear [Name],

As we advised you by telephone, we are unable to accommodate you in this clinic. We realize how disappointed you are, and regret that because we are oversubscribed and our facilities are limited, we had to exclude some of our participants. To make this fair to everyone concerned, we selected this group in a random fashion, and it was by chance that your name was among the excluded. This does not mean, however, that you should forget about quitting smoking. Most people who quit, do it on their own with sheer will power; you can be one of them! The fact that you attended the registration session is proof that you have the desire to quit, and that’s half the battle. The rest is up to you.

We at the clinic are still concerned about your smoking. We hope that you and your observers will voluntarily continue to send reports in on your smoking rate in the next few months. Most of your group has chosen to leave their deposits with us (as further incentive to quit) during the project. In this case you can expect to receive a $10.00 cheque on February 15 and another on May 28. In the meantime we will gather and record your mailed reports and keep them on file. Thank you for your help in letting us know how you are doing in your struggle against smoking.

Again, we regret our inability to accommodate you in person at the clinic, and wish you good luck in quitting on your own.

Sincerely yours,

THE WINDSOR SMOKING WITHDRAWAL PROJECT
Letter to self-monitoring controls

Dear Friend:

We are sorry that you were unable to attend our most recent Smoking Withdrawal Clinic.

However, we are enclosing the standard materials that we gave to all clinic members in hopes that they may be helpful in your effort to stop smoking on your own. In return for this material, we are requesting that you send in self addressed stamped post cards reporting on the number of cigarettes you smoked in the week of January 22 to 28, the week of January 29 to February 4 and so on reporting for the next three consecutive weeks and then a month after and finally two months after that. The schedule is included in the envelopes containing the cards for you (yellow) and two friends who will report on your smoking behavior (green).

As we are interested in the ability of people to quit smoking cigarettes on their own, we deeply appreciate your volunteering accurate reports.

Thank you very much for your cooperation.

Yours truly,

fy-ac

Frank Young, M.A.
Windsor Smoking Withdrawal Project

encs.
May 25, 1973

Dear Smoking Clinic Participant,

We have just received your record and your witness report cards, so that the data on your rate of smoking in the last few months is now complete.

Enclosed is a cheque returning the balance of your deposit made at the clinic. In most cases the amount refunded is the full $10.00, although for some participants penalties were incurred for late submission of data cards.

We hope that the clinic was helpful to you in terminating the smoking habit. For those who have relapsed back into your old smoking patterns, we urge you to remember the initial success you had in quitting as an example of your ability to quit for good.

Finally, let me convey our thanks for your faithful reporting of your smoking over the last four months. It was essential to collect information in order to conduct our smoking research project to refine the Chain-0 Procedure. Your assistance has supported our continuing efforts to tackle Canada’s number one health problem, cigarette smoking, the major cause of respiratory disease. You can both breath easier.

Yours sincerely,

Frank Young, M.A.
Coordinator, Windsor Smoking Withdrawal Project.

Enclosed $10.00 refund, minus

(A) 0 penalties for late data submission = $10.00
(B) 1 penalty " " " " = 8.00
(C) 2 penalties " " " " = 6.00
(D) 3 " " " " = 4.00
(E) 4 " " " " = 2.00
(F) 5 " " " " = 0.00

"An Associate of the Ontario and Canadian TB Associations"
Observer Random Spot Check

- contact by phone one observer for each participant (if possible the first listed observer on form C).

- contact observers for two participants for each group (the third is a spare in case you have no luck with one of the first two).

- this way we have at least 2 participants per group being checked.

- "Hello, I'm (your name) from the Windsor Smoking Withdrawal Project. A friend of yours, _____ Name of PARTICIPANT, is taking part in a quit-smoking clinic and has named you as an observer to record his smoking rate.

- we are conducting a spot-check survey by phone to check on the accuracy of the cards sent in to the clinic.

- Could you tell us about how many cigarettes you think _____ now smokes per day?

- Have you ever noticed ________ chain smoking several cigarettes in a row? How many does he chain smoke?

- (if observer answers "yes") How often does he do this? Does he ever smoke any cigarettes one at a time? (if participant no longer smokes, ask all questions in the past tense).

- (if observer answers "no") Okay, well thank you very much then for helping us, keep a record of _____'s smoking rate. Please keep on reporting to us by mail according to the mailing schedule with your green cards. You will be helping your friend to kick the tobacco habit by doing this. Thanks again. Goodbye."

Record all responses to questions on a separate sheet of paper listing S's name, observer name contacted, estimated smoking rate, chain-smoke or not, how many smoked at a time, how often, any singles.

- If your observers ask "Is he supposed to chain smoke several in a row?"
answer "Yes he is supposed to chain smoke 8 in a row" (if participant is in:

room 6
room 4
room 2
room 7

answer "No, he is supposed to avoid smoking completely" (if participant is in:

room 5
room 3
room 1
room 1
control group
<table>
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<tr>
<th></th>
<th>est. rate</th>
<th>Chain-on</th>
<th>How many Chain</th>
<th>How often Chain</th>
<th>Single Smoke</th>
<th>How often Single</th>
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<td>S₆</td>
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<td>No</td>
<td>NA</td>
<td>Yes</td>
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(above participant asked to leave clinic due to it being full)

Concluded that:

Chain-8 instruction was not consistently followed therefore C effects are generally inoperable.
Subject versus Observer reports: at 10% sample

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(out of town)
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| EX  | 1991  | 769   | 962                 | 1179                | 1729                |
### Analysis of Variance: Test for Baseline Randomization

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<th>Source</th>
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<th>MS</th>
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<td>Oversatiation (A)</td>
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<td>Covert Behavior Rehearsal (B)</td>
<td>1/59</td>
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<td>Homework Instruction (C)</td>
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**Note:** All F ratios are nonsignificant according to the comparison ratios of $F_{.99} (1/60) = 7.08$ and $F_{.95} (1/60) = 4.00$ (Winer, 1972, p. 868), although a trend short of significance shows some variation across cells.
### A x C and B x C Interaction Effects Across Time for Mean Cigarettes Smoked per Subject Week

<table>
<thead>
<tr>
<th>Factor</th>
<th>D&lt;sub&gt;1&lt;/sub&gt; (base week)</th>
<th>D&lt;sub&gt;2&lt;/sub&gt; (Week 1)</th>
<th>D&lt;sub&gt;3&lt;/sub&gt; (Week 2)</th>
<th>D&lt;sub&gt;4&lt;/sub&gt; (Week 3)</th>
<th>D&lt;sub&gt;5&lt;/sub&gt; (Week 4)</th>
<th>D&lt;sub&gt;6&lt;/sub&gt; (Week 8)</th>
<th>D&lt;sub&gt;7&lt;/sub&gt; (Week 16)</th>
<th>× across time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A&lt;sub&gt;1&lt;/sub&gt; × C&lt;sub&gt;1&lt;/sub&gt;</td>
<td>183</td>
<td>91</td>
<td>60</td>
<td>75</td>
<td>86</td>
<td>124</td>
<td>129</td>
<td>107</td>
</tr>
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<td>A&lt;sub&gt;1&lt;/sub&gt; × C&lt;sub&gt;2&lt;/sub&gt;</td>
<td>196</td>
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<td>44</td>
<td>51</td>
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<td>89</td>
<td>58</td>
<td>46</td>
<td>55</td>
<td>86</td>
<td>106</td>
<td>89</td>
</tr>
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<td>192</td>
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<td>48</td>
<td>57</td>
<td>97</td>
<td>99</td>
<td>88</td>
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<tr>
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<td>70</td>
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<td>43</td>
<td>59</td>
<td>89</td>
<td>89</td>
<td>80</td>
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<td>87</td>
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<td>115</td>
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Main Effects and $A \times B$ Interaction Effects Across Time for Percentage of Baseline Smoking

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<tr>
<th>Factor Level</th>
<th>$D_1$ (Baseweek)</th>
<th>$D_2$ (Week 1)</th>
<th>$D_3$ (Week 2)</th>
<th>$D_4$ (Week 3)</th>
<th>$D_5$ (Week 4)</th>
<th>$D_6$ (Week 8)</th>
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<td>Week 2 (D₃)</td>
<td>Week 3 (D₄)</td>
<td>Week 4 (D₅)</td>
<td>Week 8 (D₆)</td>
<td>Week 16 (D₇)</td>
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<td>Week 3 ($D_4$)</td>
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VITA AUCTORIS

1945
- Born in Toronto, Ontario to Frederick and Mary Young.

1951-1963
- Educated at Our Lady of Perpetual Help School, and De La Salle College, Toronto, Ontario.

1967
- Graduated with the degree of B.A., St. Francis Xavier University, Antigonish, Nova Scotia.
  Registered as a full-time graduate student in the Master of Arts program in Clinical Psychology at the University of Windsor, Windsor, Ontario.

1970
- Graduated with the degree of M.A., University of Windsor, Windsor, Ontario.

1974
- Candidate for the degree of Doctor of Philosophy in Psychology, University of Windsor, Windsor, Ontario.