Behavioral Interventions for the Cessation of Cigarette Smoking Behavior: A Literature Review

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BEHAVIORAL INTERVENTIONS FOR THE CESSATION OF CIGARETTE SMOKING BEHAVIOR: A LITERATURE REVIEW

by,

Russell David Matthews

A Thesis
Submitted to the Faculty of The Graduate College in partial fulfillment of the requirements for the Degree of Master of Arts Department of Psychology

Western Michigan University Kalamazoo, Michigan August 1984

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The negative impact of cigarette smoking on health has been medical knowledge for many years. This provides the behavioral investigator with a large population of subjects engaging in a maladaptive behavior which is easily defined and measured and highly resistant to extinction. This study critically reviews published accounts of behavioral interventions for cessation of cigarette smoking, which were listed in the Psychological Abstracts, and other published bibliographies, 1964-1984. Despite the volume of studies reviewed, very few demonstrated effectiveness over time. The author concludes while several techniques proved to be effective initially, their effectiveness diminished within months after application. However, several studies which provided supportive intervention during follow-up demonstrated the effects of treatment could be maintained. Further investigations should be directed at maintaining the results of already established cessation techniques.
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BEHAVIORAL INTERVENTIONS FOR THE CESSATION OF CIGARETTE SMOKING BEHAVIOR: A LITERATURE REVIEW

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University Microfilms International 300 N. Zeeb Road, Ann Arbor, MI 48106
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CHAPTER I

INTRODUCTION

Since the discovery of the New World, Western man has been exposed to the pleasures and displeasures of tobacco use. The New World natives were acquainted with tobacco's properties long before the early explorers. One property they were particularly familiar with was its habit forming quality. After regular use, they experienced an intense desire to use tobacco if discontinued. Western man began to use tobacco and, through trade, the tobacco habit spread throughout the world. In fact, no country has ever given up tobacco use once the practice had started (Brecher, 1972, pp. 209-13).

After the beginning of the 20th century, cigarette smoking rapidly became the most popular form of tobacco use. Because of its convenient size and milder tobacco, its use also spread to women and children. This meteoric rise of cigarette smoking also brought with it additional health hazards since cigarettes are more readily inhaled than cigars or pipes. Gradually, medical professionals became aware of the serious health hazards. In 1964, the Report of the Surgeon General's Advisory Committee on Smoking and Health, brought the message home to every American: cigarette smoking is dangerous to your health. Its publication also started a massive campaign to stop smoking (Brecher, 1972, pp. 229-34). However, as mentioned earlier, it is not easy to stop smoking once started. Brecher (1972) documents the extreme difficulty individuals have in trying to quit. In fact, comparisons of relapse
rates for cigarette smokers, heroin addicts and alcoholics have shown
that cigarette smoking is just as difficult to stop as the other two
(Hunt and Bespalec, 1974). Because of this, a variety of programs,
group therapy, smoking withdrawal clinics, drug therapy, and behavioral
interventions, have been initiated to help individuals quit (Keutzer
and Lichtenstein, 1968). Of particular interest to this author is the
contribution of behavioral psychology to the cessation of cigarette
smoking. To that end, this paper will review published accounts of be-
havioral techniques employed in the cessation or reduction of cigarette

The studies reviewed were obtained by this author through a year
by year review of the Psychological Abstracts, 1964-1984. Bibliogra-
phies of articles obtained through this process were reviewed carefully
for additional studies related to the subject. These articles were also
included. Of the 112 articles found by this author, 101 are reviewed
in this paper. This represents approximately 90% of all the published
studies in the subject area.

These techniques are of particular interest because of their suc-
cessful application in other areas of human behavior, and the need for
successful treatment of a behavior which has severe repercussions for
health and is particularly resistant to extinction. Furthermore, cigare-
ette smoking offers the behavioral investigator a behavior which is
easily identified and measured, occurs in many situations with great
frequency, and is maladaptive. Another benefit is the large population
from which to draw subjects because of the increasing pressure on in-
dividuals to stop.
The literature is reviewed according to the type of intervention used (aversive control, stimulus satiation, systematic desensitization, etc.), and chronologically within intervention. A summary of each study is given, significant results reviewed and then criticized. After reviewing all studies, this author will review each intervention and draw conclusions as to its viability as a treatment technique for the cessation of cigarette smoking. Finally, the author will suggest areas of further study which, based upon the review of the literature, seem to offer the most promise as treatment for the cessation of smoking behavior. Since the earliest intervention employed used aversive methods, that is where the literature review will begin.
The first study to employ aversive methods is that of Wilde (1964). In this study, two female and five male subjects were exposed to a treatment regimen in which hot, smoky air was blown in their faces when they lit a cigarette and continued until they put it out. When the cigarette was extinguished, they were instructed to say "I want to give up smoking", at which time mentholated air was blown in their faces and a peppermint candy was offered to them. The number of trials that subjects were exposed to depended upon each individual's tolerance. After the aversion trails, the subjects were asked to take a few inhalations of their cigarette (without aversive stimulation) to allow the cigarette to acquire aversive qualities. Between treatments, the subjects were instructed to call for a treatment session whenever the desire for a cigarette arose.

Of the seven subjects exposed to the treatment, the author claims that two discontinued treatment, one smokes two cigarettes a day, three have given up entirely and one changed to a pipe. The length of the follow-up period was not specified.

There are several problems with this study: no control group, no baseline record, and no adequate follow-up period. However, this study is admittedly a pilot study, and it does illustrate a novel method of aversive control which uses aversive stimulation that does approximate
some of the natural stimuli to which the individual is exposed when smoking. Because of the lack of control of the variables in this study, few concrete conclusions can be drawn concerning what variable actually caused the change in smoking behavior, although intuitively it would seem the aversive stimulus was responsible.

Green (1964)

Another early study undertaken at approximately the same time as the preceding study is that of Green (1964). In this study, 21 subjects (10 experimental and 11 control) were exposed to experimental sessions, 9 minutes a day for 5 days. In these sessions, subjects were placed in a small booth, which was equipped with earphones through which subjects were to listen to music for a "music appreciation test". Whenever subjects inhaled their cigarette, white noise was superimposed on the music. When they stopped inhaling the cigarette, the white noise was terminated. The dependent measure in this study was mean smoking response per minute.

Results of this study showed that instead of the anticipated reduction in mean smoking response/minute, there was actually an increase in these responses for the experimental group. No follow-up was attempted.

Despite the failure of the study to produce the predicted effect, this study did attempt to analyze, in a more scientifically controlled manner, the effects of aversive stimulation on the rate of cigarette smoking in an experimental situation. The author speculated the possibly irritating effects of the white noise actually may have caused the
increase in smoking behavior.

Koenig and Masters (1965)

Koenig and Masters (1965) were the first to employ electric shock as an aversive stimulus. In this study, 42 subjects were selected from a group of 53 volunteers. Of the 42 subjects, 14 were placed in the aversive therapy condition (the others were given systematic desensitization and supportive counseling.) Systematic desensitization will be considered later in the paper. All subjects were required to keep baseline data, and after baseline, a bearable but highly aversive shock level was determined. After this, subjects were coached in performing a chain of 18 separate behaviors connected with preparation to smoke a cigarette. Fifty percent of the time a shock was presented at some point in the chain of five inhalation-exhalation pairs. Two cigarettes were smoked per session. This treatment lasted for 9 weeks, three treatments the first week, two the second and one for the remaining weeks. The target behavior was to reduce or quit smoking.

At the end of treatment, all subjects across all treatments significantly reduced their cigarette smoking, but there was no significant difference between treatments. However, of interest in this study is a significant difference between therapists, which suggests that unidentified therapist variables contributed to the smoking reduction. At a 6 month follow-up, there was no significant difference between the treatment and the control group.

Although this study did not produce any significant effects for the treatment studied, it did try to control a number of variables in a scientific manner. An adequate baseline was taken; there was a larger
number of subjects than in previous studies; a control group was used; more sophisticated statistical analyses were used and adequate follow-up was employed. Since there was no significant difference between the aversion therapy, desensitization and supportive counseling, it seems other variables, yet to be explored, may have been responsible for the behavior change. However, the three treatment conditions may be equally effective therapeutically.

Franks, Fried and Ashem (1966)

In an attempt to improve upon the apparatus and study by Wilde (1964), Franks, Fried and Ashem (1966) recruited 23 adults by running an advertisement in a local paper. Of these 23, nine subjects (five male and four female) completed a 4 week treatment course.

The subjects were required to sit in front of an apparatus which would blow air into their faces when they smoked a cigarette. The subjects were told to look at a sign that had the word "smoke" on it while smoking. While doing this, smoky air was blown into their faces until they could stand it no longer and extinguished the cigarette. This procedure was repeated at varying intervals from 1 minute to 4 minutes, up to 10 cigarettes per treatment session. The 12 treatment sessions were completed over a 4 week period. A follow-up survey by mail was made 6 months after the treatment. Of the nine subjects who completed treatment, eight replied to the letter survey. Of the eight, four reported not smoking at all, one was smoking less, one switched to a pipe and two were smoking as much as at the onset of treatment.

This study had several weaknesses: 1) no baseline data were re-
ported, 2) a small sample size, 3) no control group was employed, and 4) the follow-up is possibly unreliable because there was no way of verifying the reports. While the authors claim they have improved upon the apparatus described by Wilde (1963), there is little other improvement beyond that already offered by Wilde.

Gendreau and Dodwell (1968)

Another study using electric shock as the aversive stimulus is that of Gendreau and Dodwell (1968). In this study, 13 volunteers from a maximum security prison were split into an experimental group of nine subjects and a control group of four subjects. All subjects were exposed to one treatment session where they were shocked for 2 seconds whenever they placed a cigarette in their mouth. For the control group, the shock was subliminal, but for the experimental group the shock was made increasingly painful but was omitted 25% of the time. If the subject terminated the smoking behavior before 2 seconds were up, the shock was stopped. Post treatment smoking rates were analyzed, and there was a significant difference between experimental and control groups for the first 9 days. After day 9, control subjects stopped recording so further comparison was impossible. Later, follow-up reports of the experimental group were, in this author's opinion, inconclusive because of the lack of the control group.

Many of the same problems cited about the other studies can be reiterated here: 1) small sample size, 2) no reliable follow-up reports and 3) no pretreatment baseline records. However, this study does offer support for the short term suppressive effects of aversive stimulation.
Further research is needed to offer concrete evidence to support the use of aversive stimulation on long term smoking cessation.

Powell and Azrin (1968)

Whereas the previous studies restricted their treatment to laboratory situations, Powell and Azrin (1968) employed a portable shock-giving cigarette case in their study of aversion therapy for cigarette smoking. Of the 20 subjects recruited, only three actually completed this experiment in which an electric shock was delivered to the upper arm of subjects every time they opened their cigarette pack. Every 1 to 3 days the intensity of the shock was increased until the subject stopped smoking or refused to experience a higher shock level. Using a digital counter on the cigarette case and independent observers, the authors report the number of cigarettes smoked per hour decreased as the intensity of the shock increased. However, for two of the subjects, the amount of time the apparatus was worn also decreased as a function of increasing shock intensity. There was a strong tendency for subjects to try to avoid the shock contingency in many ways, in addition to not wearing the shock apparatus. This study provides evidence that aversive stimulation appears to lead to reduction in smoking behavior, but no evidence is offered to demonstrate lasting effects.

Despite the small sample size and lack of follow-up, this study has admirable qualities. First, the use of independent observers added credence to the conclusion that smoking behavior decreased as a function of intensity of the shock. Also, the idea of using a portable shocking device extended the experiment beyond the confines of the laboratory

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and allowed the experimenter additional control over the subjects' behavior, and possible generalization of the aversive stimulation. An interesting and important finding from this study is the amount of avoidance behavior the subjects engaged in as the intensity of the shock increased. This suggests the possible limitations of aversive control as a means to affect permanent behavioral change if the subject can avoid the aversive stimulations in ways other than reducing smoking.

Keutzer (1968)

Keutzer (1968) compared the effects of three behavioral techniques (covariant control, breath-holding and massed practice) with a placebo drug treatment and a no treatment control. This section will consider the breath-holding technique. The covariant control technique will be considered in the operant methods section, and the massed practice in the section on stimulus satiation.

The breath holding technique consisted of a subject holding his/her breath until it became painful and vividly imagining inhaling a cigarette. This was repeated five times during the experimental sessions which occurred an hour a week for 5 weeks. Between the sessions, subjects were told to use the technique whenever they wanted a cigarette. Results indicated this treatment condition significantly reduced the smoking level from baseline, but did not differ from the other treatment conditions.

This was a well controlled study utilizing a large number of subjects, random assignment to a variety of treatment conditions and appropriate statistical analysis of the results. The main flaws of the study

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were failure to get third party verification of the subject reports, and a lack of control over the subjects' use of the intervention outside the therapeutic setting. A follow-up questionnaire 6 months after treatment indicated that the therapeutic effects had dissipated (Lichtenstein and Keutzer, 1969).

Ober (1968)

In a study of the relative effectiveness of operant aversion and transactional analysis approaches, Ober (1968) exposed 12 subjects of a sample of 50 to an aversive control procedure. These individuals were given portable shock devices (set to deliver a painful shock) and were instructed to shock themselves whenever they had a desire for a cigarette until they could no longer delay their smoking. A baseline period of 1 week was taken after an initial introductory session, and subjects were seen for 10 treatment sessions in the 4 weeks of the experiment. A 4 week follow-up period was instituted after treatment was over to determine if treatment effects would remain over time.

The results from the experiment showed no statistically significant differences between treatment groups, although all treatments were effective. At the end of the 4 week follow-up, the effects of the treatments were statistically significant in comparison to a no treatment control group.

The main criticism of this study is the length of the follow-up period. Four weeks is hardly enough time to determine the differential effectiveness of the treatments, as manifested by some of the earlier studies reviewed. It is significant, however, that the aversive control group did achieve total abstinence by the end of the 4 weeks, whereas
the other two treatments did not. The fact that none of the treatments was significantly different from each other at any point implies that other factors may have been responsible for the reduction in smoking rates, or that the treatments are equally effective in reducing cigarette consumption.

Grimaldi and Lichtenstein (1969)

In an attempt to build upon the pilot studies of Wilde (1964) and Franks et al. (1966), Grimaldi and Lichtenstein (1969) explored the use of contingent versus non-contingent hot, smoky air in reducing smoking behavior. Three groups (contingent smoky air, non-contingent smoky air and a control) were exposed to seven treatment sessions over a 3 week period. The contingent group received smoky air while smoking, the non-contingent received smoky air while not smoking, and the control received smoky air while not smoking, and the control received no smoky air.

The results did not support the hypothesis that contingent punishment would lead to a greater reduction in smoking. Surprisingly, all groups did approximately the same, which indicated that other factors may account for the reduction in smoking. The author concludes the punishment did not seem to be the causative factor in the reduction of smoking, and a 1 month follow-up period indicated the tendency toward relapse, as shown in other studies.

To the authors' credit, they did control factors not controlled in earlier case studies. However, technical problems in the delivery of the aversive stimulus may have skewed the results; thus, no support was offered for hot smoky air as a better smoking cessation treatment.
The tendency toward relapse was again noted, for example, the procedure
effected short term reduction but, when withdrawn, the reduction was
short lived.

Whitman (1969)

In a comparison of three approaches to modifying smoking behavior,
Whitman (1969) employed as one of those approaches an aversive condi-
tioning procedure. The other procedures were information on harmful
effects of smoking and a self control procedure (these will be discussed
later in the paper). The subjects were 73 individuals (34 male and 39
female) who smoked at least 15 or more cigarettes a day for a minimum
of 6 years. They were matched on variables of age, number of cigarettes
smoked, number of years smoked, and assigned to one of three experiment-
al groups or a control group. Treatment consisted of 1 hour sessions
weekly for a period of 5 weeks. All subjects kept a daily record of
their smoking behavior. In the aversive conditioning group, two aversive
agents were used: 1) electric shock and 2) quinine. For the initial 2
weeks, subjects were instructed to place quinine on their tongue before
smoking on a Fixed Ratio - 3 schedule. After 2 weeks, subjects were
given a portable shocking device, and were instructed to shock them-
selves when they decided to have a cigarette, but before they actually
took the cigarette out of the pack. Again, a Fixed Ratio - 3 schedule
was used. If they were not deterred from smoking, they were instructed
to use the quinine before they started smoking. During the group
sessions, rationale, previous uses of the aversion procedure, and pro-
blems with present usage were covered.
The results were based on analysis of number of cigarettes smoked before treatment, at the end of treatment, and at 1 week and 3 month follow-ups. The aversive group showed a significant difference from the control group at the 1 week follow-up, as did the other treatment groups. A comparison of the group's smoking rates at the beginning of treatment and at the 3 month follow-up indicated there was a significant difference for all the groups from baseline. However, their smoking rates were not significantly different from the control group at that time.

As in so many of these studies, little attempt was made to verify subjects' reports. In this respect, the results may be suspect. Furthermore, a questionnaire did ascertain that the aversive group did not employ the techniques consistently, possibly erasing any effects the treatment may have had. The study did illustrate the need for control groups and longer term follow-ups to accurately measure meaningful therapeutic change.

Roy and Swillinger (1971)

In a single subject study of the use of aversive conditioning to stop cigarette smoking, Roy and Swillinger (1971) treated a 30 year old woman who had been trying to quit for 4 years. The subject was seen in 10 minute sessions where any response in the cigarette smoking chain (picking up the cigarette pack, removing a cigarette, etc.) was followed immediately by a "somewhat painfully-annoying, but harmless electrical shock," for approximately 1 second. After a 2 week baseline was taken, the treatment sessions were begun. After six sessions, interspersed over a 15 day period, the subject's rate of smoking had dropped
to zero. After this, various non-specific methods were used to maintain the subject's abstinence.

As a single subject case history, very little attention was paid to experimental concerns. Consequently, limited inference can be made concerning the use of electrical shock as a smoking cessation tool.

Berecz (1972 a,b)

In a study of self administered aversive conditioning, Berecz (1972) matched subjects on sex and smoking level variables, and assigned them to one of four groups: a "wait" group, imagined-smoking group, placebo group, and an actual smoking group. A minimal contact control was also used. The wait group was told that treatment would be delayed a few weeks and that they should keep a record of the number of cigarettes smoked during that time. The imagined smoking group was to imagine smoking their favorite cigarette and administer a painful electric shock when the image was most vivid. Likewise, the placebo group was to imagine smoking, but subthreshold shocks were used. The actual smoking group did the same as the imagined smoking group, but actually smoked a cigarette. The minimal contact group was made up of subjects who failed to follow through with the study after the initial session. These individuals were contacted randomly during the 5 week study and asked to estimate their smoking rates.

After a week baseline, the subjects were seen in 10-15 minute treatment sessions, twice a week for 3 weeks. After the 3 weeks, placebo, imagined smoking and actual smoking groups recorded their smoking behavior for another week. The wait group began the imagined smoking treatment on the 6th week, and at the 9th week all groups recorded their smoking
behavior for another week. The wait group began the imagined smoking treatment on the 6th week, and at the 9th week all groups recorded their smoking for the final week.

Although a number of variables were considered in the analysis of this study, the following results were most interesting. Females used significantly less intense shock than did males, and while females showed a trend toward reduced smoking, the results were not significant. However, for moderately smoking males, both the actual smoking and imagined smoking treatments were effective, but not significantly different from each other. Heavy smoking males, in the imaged smoking group, did significantly better than the control or actual smoking group. This specific finding was later replicated by having the "wait" group undergo the treatment. In short, the major finding of this study was that imagined smoking followed by a painful electric shock seems to cause the most change in the smoking behavior of heavy cigarette smokers.

However, two points should be noted: 1) no check was made to test the accuracy of the subject's self reports and 2) a suitable follow-up period was not used to test the effectiveness of the treatments over a longer period of time. Otherwise, this study is scientifically sound and one of the best controlled investigations into the use of aversive conditioning in changing smoking behavior.

Schmahl, Lichtenstein and Harris (1972)

In another study using hot, smoky air as the aversive stimulus, Schmahl et al. (1972) studied 28 subjects in four experimental conditions: control - 2 week follow-up, control - 4 week follow-up, warm smoky air -
2 week follow-up, and warm, smoky air - 4 week follow-up. The purpose was to determine if warm, smoky air was an effective aversive agent, and to determine if more frequent follow-ups would increase the effectiveness of the aversive conditioning. Before the first session, subjects were asked to keep records on their smoking behavior for at least 3 days. In the first two sessions, the principles of behavior change were explained; historical review of smoking change research was given; a smoking assessment questionnaire was taken; and emphasis was placed on previous success from the programs. The typical conditioning session consisted of the subjects smoking while a blower forced warm, smoky air or metholated air into their faces. The subjects were required to smoke every 5 seconds, and the sessions continued until the subjects could not tolerate another cigarette. Also, subjects were asked not to smoke between sessions and to come to impromptu sessions if they felt they could not control their smoking. To aid in remaining abstinent, subjects were instructed to come in for booster sessions if they started smoking before the 5 month follow-up period. As mentioned before, half were contacted every 4 weeks. They were seen for 3 consecutive days at the beginning of the experiment and then according to their ability to control smoking.

All the subjects were abstinent at the end of treatment and were then called at 2 or 4 week intervals. At the end of 6 months, there were no significant differences due to treatment, but there was a significant difference due to follow-up procedures - subjects followed up at 4 week intervals were more successful. The most important result of this study, this author believes, is the fact that 64% of the subjects were abstinent at the 6 month follow-up. The authors point out
that this high figure could be criticized as being the result of the
confounding effects of the booster sessions. However, they discount
this because five of the seven subjects who received booster sessions
were not abstinent at the follow-up. The authors contend that the high
success rate was due to the fact that the experiment required rapid
smoking by all subjects. They also suggest this may indicate that rapid
smoking is just as effective as hot, smoky air and, they add, ultimately
more practical.

The main problem with this study is that non-specific factors pre-
sent in the initial introduction sessions were not controlled for, and
thus may add to the high percentage of subjects abstinent at 6 months.

Furthermore, the use of rapid smoking by all the subjects most
likely clouded the difference between control and experimental condi-
tions. Otherwise, the experiment is sound scientifically in that the
subjects were randomly assigned; several experimental and control con-
ditions were used; and proper subject report validations were employed.

Lichtenstein, Harris, Birchler, Wahl, Schmahl (1973)

Lichtenstein et al. (1973) sought to further refine the work of
Schmahl et al. (1972), by studying the two sources of aversive stimula-
tion that were confounded in the Schmahl study: rapid smoking and
warm, smoky air. The 40 subjects were assigned randomly to one of four
treatment groups: 1) warm, smoky air plus rapid smoking, 2) warm, smoky
air alone, 3) rapid smoking only, and 4) a control group. The proce-
dure used is the same as mentioned in the review of the Schmahl study.
Trials were ended when the subjects could not stand another inhalation,
and the session ended when the subjects reported they couldn't stand another cigarette. All subjects were asked to abstain between treatments. Initially, sessions were held for all subjects for 3 consecutive days and then were scheduled according to each individual's ability to abstain. As follow-up after treatment termination, subjects were contacted by phone at 2 weeks and 4 weeks and each month for 6 months. Informants were used to insure the validity of the date.

The results of this study indicated three important factors concerning the efficacy of these techniques for stopping cigarette smoking. All three experimental groups showed a definite difference in relapse rate from the control group. Subjects in the three treatment groups were smoking at approximately 20% of baseline at the 5 month follow-up, whereas the control subjects were smoking approximately 75% of baseline. In addition, there were no significant differences between the rapid smoking procedure, the warm smoky air, or the two combined, which implies these procedures maybe thought of as interchangeable. Further support for this notion is offered by the Schmahl et al. (1972) study reviewed earlier. Finally the monthly follow-up checks indicate the majority relapses occurred during the first 3 months; so a follow-up period of at least 3 months is indicated in smoking behavior control studies.

This study is well done. A sufficient number of subjects was used and randomly assigned to treatment groups. A control group was used and statistical tests of significance were employed. Furthermore, informant corroboration of follow-up data was employed.
Levine (1974)

In a study designed to test the effectiveness of negative practice with contingent and non-contingent electric shock, Levine (1974) studied 15 undergraduates, placing five students in one of the following experimental conditions: 1) contingent-shock/negative practice, 2) non-contingent shock/negative practice, and 3) no treatment control group. All groups were required to keep a 2 week baseline record. After baseline, the controls were sent home for 2 more weeks baseline, while the contingent and non-contingent groups were seen in individual sessions twice a week for 2 weeks. In each of these experimental sessions, the subjects were required to smoke by the timing of a metronome. The contingent group received an electric shock 1 second after they inhaled their cigarette. In the non-contingent group, shocks were only delivered when the cigarettes were in the ash trays.

The results indicated, at the end of the 2 week treatment, that the contingent shock group decreased its cigarette consumption significantly more than the other groups. The non-contingent group and the control group were not significantly different from each other. Levine interprets these results as meaning negative practice alone does not seem to have a significant effect on reducing cigarette smoking in itself. However, further support was given to the notion that contingent punishment via electric shock is an effective way to produce a short term reduction in smoking behavior.

The main problems with this study were the small sample size, the lack of informant checks on subject's record keeping behavior, and
the lack of any follow-up. The last criticism may not be valid if it was not the author's intention to determine a long term change.

Pope and Mount (1975)

The purpose of a study by Pope and Mount (1975) was to test a portable shock apparatus' effect on smoking behavior by paying special attention to the "principles of contiguity and avoidance conditioning". A total of 43 college students (21 male, 22 female) volunteered for the study. The apparatus was designed to deliver a shock and tone 2.7 minutes after the cigarette case was opened. The duration of the shock and tone was 8 seconds. After a baseline period of 10 days, a 20 day period with the shock apparatus on was initiated. A 3.2 milliamper shock level was used. At the 20th day, the third phase of the experiment was initiated by reducing the shock level to 1.5 milliamperes. This phase lasted for 14 days at which time the shock apparatus was removed for 10 days. After this, the subjects wore the apparatus for 10 days during which only the tone was delivered. At the end of the 10 days, the shock band was removed and only the tone was presented for the remaining 39 days of the study. During all phases of this study, subjects recorded their daily smoking frequency. Four subjects did not complete the final phase of the study.

Results indicated that at the end of phase two, the average smoking frequency had dropped to almost zero, and no appreciable increase was noted during phase three when the shock level was reduced. During phase four, when the apparatus was removed, there was an increase in smoking frequency, but this was significantly less than baseline. With the
introduction of phase five, the smoking frequency returned to almost zero and remained near zero throughout the remaining 39 days. At a year follow-up of 35 subjects, 27 reported complete abstinence, six reported significantly lower smoking frequencies than baseline, one returned to baseline level, and the other was smoking a pipe.

This study was an excellent example of using a portable shocking device to carry the aversive consequences of cigarette smoking to the natural environment. The results showed marked reduction in smoking during the experiment. However, one glaring fault is the lack of reliability checks in the subjects' reporting of cigarettes smoked. The honor system was used and the argument could be made that is an unreliable method to obtain accurate reports. The design of the experiment seems adequate, although a control group would have been useful. The amazing lack of relapse in the subjects indicates one of two things: 1) this method was extremely effective in reducing cigarette smoking, or 2) the subject's self-reports were unreliable. In light of the previous research reviewed, this author is skeptical of the results of the experiment. A replication would be welcome in which some reliability check on subject reports was incorporated in the study.

Lando (1975)

Because of the similarities in the techniques of rapid smoking and stimulus satiation, Lando (1975) compared these two techniques in a carefully controlled study. The subjects, 27 men and 18 women recruited by an ad in the local newspaper, were required to submit a $20.00 deposit to insure participation in the study. They were randomly assign-
ed to one of three groups: 1) a stimulus satiation group, 2) a rapid smoking group and 3) a control group. In the first group, subjects were informed the best way to stop smoking was to do more of it. They were to smoke as much as possible between treatment sessions and continuously for 25 minutes at each session. On the other hand, the rapid smoking group were required to puff every 5 seconds in 3 minute trails (divided by two, 8 minute "rest" periods) for each of the 25 minute sessions. These subjects were told to follow this smoking pattern outside the laboratory. The control group underwent the same conditions as the rapid smoking group, only they were required to puff every 30 seconds. All subjects were seen in six sessions over the period of a week. Baseline records were kept for 1 week preceding treatment. The validity of the records was checked against a carbon monoxide breath test which measured the amount of carbon monoxide in the blood stream. Follow-up assessments were taken 2 weeks, 1 month, 2 months, and 12 months after treatment ended. The results showed at 2 weeks that the experimental groups did not differ significantly from each other, while they did differ significantly from the control group at the 2 week follow-up. However, these results did not hold true at any of the subsequent follow-up periods.

As in many of the previous studies, the treatment effects faded rapidly after treatment was discontinued. However, two important contributions were made by this study: 1) the rapid smoking and excessive smoking groups did not differ significantly from each other, indicating that these two methods are equally effective, and 2) a new method of verifying subject's reports was employed - the carbon monoxide breath
test. Perhaps the greatest contribution of this study and the studies like it is the mounting evidence that cigarette smoking is particularly resistant to change, and further, more comprehensive approaches need to be explored.

The study was adequately controlled as far as size of sample, random assignment to groups, use of control groups, appropriate statistical analysis, verification of follow-up data, and an adequate follow-up period.

Dawley and Aurich (1975)

In a case study of aversion therapy with a 27 year old female smoker, Dawley and Aurich (1975) report positive results using three, 30 minute treatment sessions per week for 3 weeks. Dawley and Aurich employed three types of aversion: rapid smoking, hot smoky air, and handling cigarette litter. For the first session, they required their subject to smoke at her normal rate for 30 minutes while handling cigarette litter. In the second session she was required to smoke at a faster rate, while smoky air was blown in her face and she handled cigarette litter. The remaining sessions required rapid smoking. A counter-conditioning suggestion was also made. The experimenter recommended the subject replace smoking with the behavior of drinking water. Cessation of smoking occurred at 2 weeks. Follow-up booster sessions consisting of rapid smoking were given each month for 5 months after treatment. The subject was abstinent at the 5 month follow-up. Her self report was verified by reports of co-workers.

Within the limitations of a single subject case study, it does
offer further support for aversion type therapies for smoking cessation. The booster sessions are promising and should be explored further. Also, the counter-conditioning suggestion of a harmless substitute behavior should be examined further.

Levenburg and Wagner (1976)

Comparing the effects of rapid smoking versus systematic desensitization, Levenburg and Wagner (1976) recruited 54 subjects for placement in one of three treatment groups: rapid smoking, systematic desensitization, and relaxation. Subjects were placed in either the rapid smoking or systematic desensitization groups by a screening procedure designed to identify smokers who smoked in response to anxiety. These subjects were placed in the experimental groups in roughly equal numbers with non-anxiety smokers. The relaxation group was used as a control.

In the rapid smoking group, subjects met in nine member groups for 40 minute sessions where they were required to smoke every 5 seconds until they were unable to tolerate it any longer. Once everyone had smoked to toleration, the group started another trial. The systematic desensitization group used a fairly standard desensitization procedure (relaxation training and a hierarchy). The control group learned relaxation techniques and was given information on smoking and health.

Although all groups achieved a significant reduction in smoking, the rapid smoking group achieved the largest reduction. A second hypothesis, suggesting that smokers who smoked in response to anxiety would do better with systematic desensitization, was not supported. A 4 month
follow-up indicated an across the board tendency to relapse.

This study seemed to be soundly based with appropriate statistical analyses to test the significance of the results. However, data on smoking reduction were based on subject self report with no attempt made for third party verification. Since follow-up reports suggested a tendency toward relapse at the end of the study, this is really a moot point. Furthermore, the 4 month follow-up used would not have been a sufficient measure of long term success. However, if subject self reports can be relied upon, the study does suggest rapid smoking is an excellent technique to achieve short term cessation of smoking behavior, as is systematic desensitization, though to a lesser extent. The fact that all groups achieved significant reduction indicates non-specific factors may also come into play.

Dawley and Sardenga (1976)

The study was basically a replication of the earlier case study by Dawley and Aurich (1975). Twelve subjects completed 6 weeks of treatment consisting of rapid smoking, warm, smoky air and handling of cigarette litter. As in the case study, by the end of treatment, smoking was much lower than baseline with five subjects completely abstinent at the end of treatment. However, at subsequent follow-ups, the data suggest a progressive relapse for most of the subjects.

This study was not well controlled, and basically was just an expansion of the single subject case study mentioned earlier. The novel addition of cigarette litter is interesting and has possibilities as an adjunct to other aversive measures.
Danaher (1977)

Among other hypotheses which Danaher (1977) tested was the one that rapid smoking would be improved as a technique for long term cessation of smoking with the addition of training in self control techniques for smoking cessation. Fifty subjects were assigned to one of four treatment conditions: 1) rapid smoking plus self control, 2) rapid smoking plus filler discussion, 3) placebo smoking plus self control, and 4) placebo smoking plus filler discussion. Treatment was divided into two phases. The first week was preparation; subjects were either given a self control manual or had discussion designed to help them gain insight into their smoking habits. All subjects were told to delay quitting in this segment. The second phase consisted of 2 weeks of aversive smoking. Controls were told to smoke at a normal rate, whereas the experimental group experienced rapid smoking. All subjects were followed up for 13 weeks after treatment termination. Follow-up was accomplished by phone. Validity of self reports was assured by mail contact with previously selected informants.

Results from the study lend support for previous research showing rapid smoking as more effective than placebo controls. However, no support was offered for the hypothesis that self control training enhances the effect of treatment.

The study was interesting in that it takes a promising technique and explores ways to continue the therapeutic effect, which in the past had dissipated over time. The study employed a large enough sample size with random assignment of individuals to groups, and presented
many statistical analyses of the data. Informants were used to check on subject reports. However, as in many of the studies, the experimenter did not employ a long enough follow-up period. Since the results were not significant at the 13 week follow-up, further follow-up was probably not necessary.

Conway (1977)

In a study which compared a variety of aversion conditions (placebo shock, therapist-delivered shock, subject-delivered shock, imagined aversive scene, no aversive conditioning) followed by training in self management skills or no self management training, Conway (1977) placed 90 subjects in 10 groups, one of the aversion conditions followed by self management or no self management. Groups were balanced with respect to several factors, including baseline smoking levels and length of time smoking. All subjects kept data on their smoking behavior from baseline, treatment and for 2 weeks after. Independent observers were used to verify the data. Follow-up was conducted at the 8th and 20th weeks after treatment. Treatment occurred in six sessions over a 3 week period.

The 10 treatment conditions were one of the five aversion conditions followed by self management training or no self management training. Self management consisted of training in stimulus control, and contingency management. The aversion conditions were as follows: 1) no aversive conditions, 2) therapist-delivered shock, subjects received painful shocks contingent upon smoking, 3) subject-delivered shock, same as #2 only subjects shocked themselves, 4) placebo shock -
sub-threshold shock delivered by therapist and 5) an imagined aversive scene, therapist-delivered contingent upon smoking. In addition to these 10 groups, a no treatment control was used at the 8th and 20th week follow-ups. They were simply asked to estimate their rate of smoking.

In general, the results indicated a tendency for reduction in cigarette smoking during treatment for all conditions and toward relapse at the follow-up times. The author concludes that the reductions in smoking were due to non-specific factors and notes that none of the strategies produced any long term results. This seems consistent with the other studies mentioned thus far, and again emphasizes the need for techniques which help subjects maintain long term abstinence.

The study was well controlled, employed a large sample size, a number of treatment conditions, follow-up, third party verification of smoking rates, a sophisticated statistical analysis and control groups. More control over the application of the self management conditions would have been useful. Also, it would have been interesting to see if a rapid smoking condition would have produced better results than the other aversive condition used. In general, a well controlled study, but it is unfortunate it did not produce results of greater clinical impact.

Relinger, Bornstein, Bugge, Carmondy, and Zohn (1977)

In light of past successes with rapid smoking in the treatment of smoking behavior and the disappointing rates of relapse also documented, Relinger et al. (1977) studied the use of rapid smoking in groups and with two maintenance procedures designed to counteract the dismal
rate of relapse shown in earlier studies. Subjects were individuals smoking at least a pack of cigarettes per day, recruited through a local newspaper. After two orientation groups, 20 subjects recorded baseline smoking data for 2 weeks. All subjects were given the same treatment regimen: rapid smoking daily in three small groups, until abstinence, or until 2 weeks had elapsed. Each treatment session consisted of two rapid smoking trials divided by a 5 minute rest period. Upon achieving abstinence (three consecutive smoke-free days), subjects were assigned to either group aversive booster sessions 1, 2, 4, 8 and 12 weeks after treatment, telephone booster sessions occurring on a fading schedule for 13 weeks, or a no booster control in which subjects were told that a personality inventory indicated they did not need follow-up. All subjects recorded daily smoking rates and sent these to the experimenter at 1, 2 and 3 months following treatment. A refundable deposit insured compliance with reporting mechanisms.

Results indicated that of the 20 subjects, 18 achieved abstinence. Statistical analysis revealed no significant different between treatment groups at the end of treatment, but did reveal a significant treatment effect for all groups over time. However, the trend was for the groups to return to baseline smoking levels at the time of follow-up. Another interesting item in the follow-up data is that the control group's rate of relapse seemed to level off and was not a statistically significant rate of relapse in comparison to the other groups (the booster groups). One third of all the subjects were abstinent at the 3 month follow-up.

The study was interesting insofar as it took a fairly reliable smoking reduction technique - used it in groups and considered variables
involved in the maintenance of its effect. Subjects were selected in a standard fashion and randomly assigned to the different experimental group. Appropriate statistical analyses were used. The most disappointing aspect of the study is the relatively short follow-up period despite evidence that at least a 3 month follow-up is indicated. This study does provide additional support for rapid smoking as a viable short term smoking cessation procedure. However, it does not provide evidence for the use of booster sessions as a means of maintenance. Perhaps the use of cigarettes themselves in the booster sessions "triggered" a tendency to relapse in much the same way as the stimulus alcohol seems to contribute to relapse in an alcoholic population. The notion was supported by the no booster control doing better than the other two groups.

Barbarin (1978)

Seeking to compare the effectiveness of two different methods of aversive control, Barbarin (1978) compared rapid smoking, which he called overt aversion, with covert sensitization, which he called symbolic aversion. In his study, he placed 360 adults in one of three experimental groups: overt aversion, symbolic aversion, a combination of the two, or a control group. The groups did not differ significantly on major variables (age, sex, length of smoking, amount smoked, etc.). Each group took 1 week baseline data before the experiment. They then underwent treatment 1 hour per week for 10 weeks, after which they were followed up at weeks 1, 2, 4, 8, 12 and 52. Treatment in the overt aversion group consisted of 10 minutes relaxation, and then rapid smok-
ing at a rate of an inhalation every 5 seconds as long as it could be tolerated. For the symbolic aversion group, thoughts of common situations which elicited the desire to smoke were paired with aversive images. This was followed by an imagined scene where they refused a cigarette and experienced a pleasant scene. The combined group imagined an aversive scene while rapidly smoking. The control group was given self control procedures and was monitored weekly.

Results indicated the experimental groups did significantly better than the control at all points of treatment and follow-up, although they did not differ significantly from one another. However, it seemed that overt aversion was a more effective technique, and also lends support for covert sensitization as a therapeutic tool.

This study is valuable for a number of reasons: 1) an adequate number of subjects was used, 2) a number of treatment conditions were compared with a control, 3) caution was taken to analyze the results statistically to determine effectiveness, and 4) an adequate follow-up period was used. The major weakness is the lack of independent verification of subject's reports of smoking behavior. Otherwise this appears to be an adequate study of two behavioral methods to aide in smoking cessation.

Best, Owen and Trentadue, (1978)

In an attempt to develop a smoking cessation program which could be used in a public health setting, requiring a minimum of staff time, Best et al. (1978), compared the effectiveness of self-managed rapid smoking, satiation or a combination of the two. Sixty subjects were
placed in one of three treatment conditions: rapid smoking, satiation, or rapid smoking plus satiation. After the 1st week of baseline data recording, all subjects were seen in a treatment session where reasons for smoking were brought out and alternative behaviors suggested. Home-work applying these alternatives was assigned to all subjects for the next week. Satiation groups were told to smoke as many cigarettes as possible in the last 3 days of the week, at least doubling their intake. Rapid smoking subjects continued with their homework assignments. At the end of the week, all subjects were required to quit smoking; strategies were developed for anticipated difficult situations, and alternatives were planned. A variety of behavioral techniques were used as alternatives. Rapid smoking subjects were taught a rapid smoking exercise to be used at assigned times after the date of quitting. Two other group sessions were utilized to discuss progress and develop a reward program for not smoking.

Follow-up was accomplished by mail. Questionnaires were filed at 1, 2, and 6 month intervals after treatment. Phone interviews were conducted at the 3 month point. A refundable deposit was used to insure compliance with follow-up.

Results indicated there were no significant differences between the treatment groups, but an abstinence rate of 47% at the 6 month follow-up indicated the broad spectrum approach seemed to produce more favorable results than the usual, more singular approaches. The authors considered the study a hopeful sign for the development of an effective, self managed, smoking cessation program based on behavioral techniques.

The structure of the study seemed adequate, but its major flaw
seemed to be the lack of verified subject reports of smoking behavior. Such reports would enhance the value of this study. More studies of this type are needed in view of the lack of long term success of most programs. Furthermore, adding a year follow-up would provide even further empirical evidence of the long term effectiveness of the program.

Glasgow (1978)

Glasgow (1978) studied the effectiveness of self control versus rapid smoking while also investigating the effects of therapeutic contact on the outcome of treatment. Sixty-nine subjects, recruited through the local media, were assigned randomly to one of the four treatment conditions: 1) self management with little therapist contact, 2) self management with high therapist contact, 3) high therapist contact-rapid smoking, and 4) high therapist contact-normal smoking. The experimenters used a self help manual which included instructions on stimulus control, rapid smoking and relaxation techniques. The rapid smoking group performed in much the same way as in previously mentioned studies. The normal smoking group smoked at their normal pace, but focused on the aversive aspects of the experience. They were instructed to do this until 5 minutes had elapsed, or they could no longer stand to continue. Smoking rates were monitored over a 1 week baseline, followed by 3 weeks treatment, and a 1 week monitoring 3 months after treatment. The 3 month follow-up was supplemented by an unannounced carbon monoxide level test and informant reports. A 5 month telephone follow-up was also conducted.

Results indicated all groups reduced their smoking at the end of
treatment and, to a lesser extent, at the 3 month follow-up. The trend was, however, for all groups, to approach the baseline level of smoking. At the 6 month follow-up, the trend was more clearly approaching the baseline level of smoking. The results of this study are interesting in the fact that rapid smoking did not seem to differ significantly from the other treatments - something other studies also have suggested. The tendency toward relapse, again, emphasizes the need for long term follow-up, and further investigation into techniques which will aid in reducing relapse.

This is an example of a well controlled study employing an adequate sample size, random assignment of subjects, statistical analysis, and measures taken to validate subject reports. Had the trend not been for groups to return to the baseline level of smoking, one might suggest that the same follow-up procedure at 3 months be used at the 6 month follow-up as well. In addition, a year follow-up would have been interesting to note.

Berecz (1979)

In a study which employed a unique, simple method of aversion, Berecz (1979) had subjects snap their wrists with a rubber band while focusing on triggering thoughts leading to smoking each time they felt a desire to smoke. After applying the painful wrist snap, they were instructed to immediately verbalize alternative thoughts such as "drink a glass of water", and then engage in the behavior verbalized. This chain was repeated each time a desire for a cigarette was felt.

Subjects in this experimental group were compared to subjects in
two control conditions. In one condition, subjects were given the same instructions as the experimental group, but were told the rubber band was a reminder of their intention not to smoke. They were not given the instruction to apply the painful snap to their wrist. In the other condition, subjects did not use a rubber band and were not given any instructions.

The subjects for the study were recruited through the local media and were all placed in a 5 day stop-smoking clinic. Forty-four subjects completed the stop-smoking clinic and were randomly placed in either the experimental or control groups.

The results indicated there was a significant treatment effect for males in the aversion group at a 1 year follow-up. None of the other conditions reached significance.

This study was interesting in that it employed an inexpensive, easily self-administered, stimulus which could be carried into the natural environment. In addition, it employed control groups and statistical analysis of data to determine its significance. However, the follow-up, which was adequate in terms of time, was accomplished via phone and made no attempt at third party verification. Considering the simplicity of this technique and its adaptability to the natural environment, further study would be valuable.

Raw and Russell (1980)

Raw and Russell (1980) assessed the effectiveness of rapid smoking in comparison to "cue exposure" and "simple support". In this study, 49 individuals from a hospital smoking clinic were placed in one of three
treatment conditions: 1) rapid smoking, 2) "cue exposure" and 3) "simple support". All subjects reported their smoking behavior in an initial questionnaire, kept a baseline record for 24 hours and then continued monitoring their consumption for a week while attempting to reduce smoking on their own. After this baseline record, they were assigned to the experimental conditions.

The 16 subjects assigned to the simple support group were given supportive counseling. This included record keeping, reassurance, encouragement, and discussion of coping skills for not smoking.

The 17 subjects assigned to the cue exposure group received similar treatment as the simple support group, but also received training in cue exposure. Cue exposure consisted of exposing the subjects to various cues associated with smoking during the treatment session while they did not smoke. They were also instructed to also expose themselves to three favorite smoking situations and not smoke each day following treatment. This treatment was designed to extinguish smoking in response to a variety of cues.

The rapid smoking group was exposed to a rapid smoking procedure similar to others mentioned in the literature. All groups were seen for 3 weeks - three sessions in the first week, and two sessions in the second and third weeks. All sessions were 45 minutes in length. Checks on subject reports were accomplished by blood test to verify abstinence. Follow-ups occurred by mail at 3 months and 1 year, and at a 5 month interview where another blood sample was taken. Blood samples measured carboxyhemoglobin and blood nicotine levels.

Results indicated no significant difference in abstinence between
groups at the end of treatment or at any of the follow-ups. This outcome seems to contradict results cited earlier. The authors offer several possibilities for this ranging from differences in subject populations, use of objective data to avoid false subject reports, to non-specific motivating factors.

This study illustrates the importance of using control groups in smoking research, as well as employing objective measures to verify adherence to treatment objectives. The study seemed adequate in experimental design and follow-up procedures.

Lichstein and Stalgaitis (1980)

In a rather novel approach to aversion for cessation of smoking, Lichstein and Stalgaitis employed a technique they called "reciprocal aversion". Using this approach, the negative consequence for smoking was causing a loved one to engage in a behavior deleterious to his/her health. Recognizing that smoking sometimes occurs in situations where both a husband and wife smoke, Lichstein and Stalgaitis focused on the couple rather than the individual as the target of treatment.

Six married couples contracted to inform each other when a cigarette was smoked and the consequence was that the other was required to smoke a cigarette. It was hypothesized that the aversive consequence of causing the loved one to engage in the harmful behavior of smoking would lead to a reduction in smoking behavior for both husband and wife.

Results indicated smoking reduction occurred during treatment presentation, although partial relapse occurred within 6 months. The study did not control for other possible explanations of the effectiveness of
the contract, i.e. positive or negative social influence (mutual support for not smoking or criticism for smoking). This study, however, does explore the use of aversive consequences heretofore unexplored and expands the possibilities for further research in the aversive control of smoking.

Poole, Sanson-Fisher and German (1981)

In another study of the therapeutic effectiveness of rapid smoking for smoking cessation, Poole et al. (1981) assigned 75 smokers recruited by media advertising to one of four treatment conditions: 1) rapid smoking, 2) rapid smoking and relaxation training, 3) rapid smoking, relaxation and contingency contracting, and 4) contingent rapid smoking. Subjects were randomly assigned to one of the four treatment conditions, and completed a 7 day baseline of their smoking behavior.

Subjects in the rapid smoking group were exposed to a typical rapid smoking procedure described in earlier studies (Lichtenstein et al., 1973). The importance of not smoking between sessions was stressed. Treatment occurred in small groups of four to five individuals.

In the rapid smoking and relaxation group, subjects were exposed to rapid smoking sessions and were also trained in relaxation and self-control strategies for coping with the urge to smoke. Each session incorporated discussion of these strategies and ended with additional relaxation training.

In the third group, rapid smoking, relaxation and contingency contracting, the subjects were exposed to the same treatment as the second group with one addition. Subjects were required to name a significant
other who would meet with the therapist to gain an understanding of the treatment program and develop a contingency contract aimed at reinforcing abstinence. Arrangements were also made for monitoring the contract to ensure compliance.

In the above three groups, the first three rapid smoking sessions occurred on consecutive days. The fourth session occurred following a 1 day interval, the fifth following a 2 day interval and the sixth, 4-5 days after the fifth session. After the initial six sessions, subsequent sessions were determined by the subjects ability to remain abstinent for 7 days. If they did not remain abstinent for this period, subsequent rapid smoking sessions were applied until abstinence for 7 days was achieved or subjects received 12 sessions.

In the contingent rapid smoking condition, subjects met individually with the therapist. Otherwise treatment was similar to the above mentioned groups. Subjects were required to name an informant who could report on intersession abstinence, and to attend three rapid smoking sessions over a 6 day period. However, if intersession abstinence was not maintained, the sequence of three sessions was begun again. Once intersession abstinence was achieved, subjects were transferred to a maintenance condition of up to 9 weeks. If abstinence was not maintained, booster sessions were given.

Follow-up was done at 1, 2, 3, 6 and 12 months. The exact nature of the follow-up was not specified.

Results failed to reveal any significant difference between the groups at any of the follow-up points, thus indicating the addition of relaxation, self control and booster sessions had no significant impact.
upon the outcome of treatment. The data also indicated an across the board tendency to relapse seen in many of the other studies mentioned. The findings seem consistent with previous research.

This study seems to have been well controlled, utilizing adequate sample sizes, diverse experimental conditions and applying adequate follow-up time. However, the failure to specify follow-up procedures is a definite weakness.
CHAPTER III

STIMULUS SATIATION

A technique very closely related to some of the aversion techniques is that of stimulus satiation. Experimenters generally instruct their subjects to drastically increase their cigarette use for a period. The theory is that reinforcement value of a stimulus can be reduced by overexposure to it. In addition, with cigarette smoking, the aversive results of drastically increasing one's intake should not be overlooked.

Resnick (1968 a)

Resnick (1968a) required eight subjects, none of whom smoked less than a pack a day and all of whom had tried to quite before, to increase their rate of smoking to four packs a day within approximately 2 days. They were to do this for a week. Of the eight subjects starting the program, six were abstinent at a 4 month followup.

This study was a pilot study on stimulus satiation. However, the abstinence rate of approximately 77% indicated the need for further study of the technique of stimulus satiation.

Resnick (1968 b)

Building upon his previous study in stimulus satiation, Resnick (1968 b) took volunteer subjects from an undergraduate psychology course who had a desire to quit and had previously attempted to do so; they
were assigned to one of three conditions: 1) doubled normal use for a week, 2) tripled normal use for a week, and 3) a control group. If the subjects could not stand the satiation task, they were told to quit smoking then, even if they had not finished the required week of satiation. After the satiation week, follow-up interviews were done by phone at 2 weeks and 4 months.

Results indicated that at the 2 week follow-up the triple consumption group was significantly different from the control, while the double consumption group did not quite reach significance. However, the two experimental groups were not significantly different from each other. At the 4 month follow-up, both groups were smoking significantly different from each other. This change was constant for the experimental groups at both follow-up periods.

The only problem with the above mentioned study was the questionable character of the subject's self reports of smoking behavior. No checks were taken to determine the validity of the data. For this reason, the results of the experiment should be regarded with caution. On the other hand, if the reports were reliable, the study offers support of the finding of Resnick's earlier study on the effectiveness of stimulus satiation as a method for smoking cessation.

Keutzer (1968)

As mentioned previously in the section on aversive control, Keutzer (1968) also studied stimulus satiation, which she termed negative practice. Subjects were exposed to three, 1 hour treatment sessions in which stimulus satiation was practiced. Subjects were instructed to re-
call the satiation session anytime they experienced a desire for a cigarette. If they smoked a cigarette, they were to replicate the group satiation experience of smoking in a small group and with no less than two cigarettes. During all satiation trials, subjects were instructed to attend to negative physiologic and sensory stimuli.

Results indicated negative practice was also effective in reducing consumption compared to a no treatment control; however, there was no significant difference between any of the treatment conditions (coverant control and breath holding). Unlike Resnick's (1968) results, all treatments showed a tendency to relapse at subsequent follow-up periods.

Marrone, Merksamer, and Salzberg (1970)

Building upon the work of Resnick (1968 a & b), Marrone et al studies the effectiveness of short term stimulus saturation of cigarette smoking in a group situation. (The authors of this study used the term "saturation" instead of "satiation".) Thirty-two subjects were randomly assigned to one of three groups: 1) 20 hour treatment in a 48 hour period, 2) 10 hour treatment in a 13 hour period and 3) a control group. A $25.00 deposit was required to prevent subjects from leaving the experimental situations. In the two saturation groups, subjects were required to inhale a cigarette over 2 and 3 minutes, or they would be fined a dollar. Entertainment activities were provided during the saturation periods. At the end of the treatment, subjects were told to abstain from smoking and their $25.00 deposit was returned.

Follow-up data were gathered via telephone at 2 weeks, 4 weeks,
and 4 months after treatment. The subjects were asked to report their smoking frequency for the previous week. Attempts were made to validate subject reports by asking another responsible adult living with the subject to verify the information.

An analysis of the results indicated that the experimental groups did not differ from each other significantly at 2 or 4 weeks on a criteria of abstinence. The 10 hour saturation group was not significantly different from the control at 2 weeks, but it was at 4 weeks. The 20 hour group proved to be significantly different from the control at both 2 and 4 weeks. These results indicate that the saturation exercise can be effective on a short term basis.

As far as the long term effectiveness of the technique is concerned, the 20 hour group was significantly different from the control, but the 10 hour group was not, at the 4 month follow-up. However, if mean rate of smoking for each group is compared, there is evidence to show that the experimental groups were significantly different from the control at the 2 and 4 week follow up and at the 4 month follow-up. The authors suggest that further research into other variables should be made to explain why the 20 hour group had a significant abstinence rate, but did not have a significant decrease in mean rate of smoking.

Essentially, this study demonstrated that stimulus saturation is effective in removing the smoking behavior from the repertoire of a significant number of smokers. However, if the goal of therapy is to reduce the amount smokers smoke, this treatment does not appear to be effective on a long term basis.

The study seems to be adequate scientifically with the exception
that only a 4 month follow-up was used. A longer follow-up would give a true indication of the actual effectiveness of the treatment.

Marston and McFall (1971)

As a reaction to the lack of success with behavior modification approaches to produce specific and lasting changes, and to the methodological problems in many studies, Marston and McFall (1971) undertook a study of two behavioral approaches to cigarette smoking, one of which was stimulus satiation (the other being gradual reduction). Careful attempts were made to control the methodological problems that had plagued so many of the other studies.

A total of 65 subjects recruited thru the media were assigned to one of four treatment groups: 1) stimulus satiation, 2) gradual reduction, 3) a pill reduction program and 4) an immediate cessation control. A very detailed program for the stimulus satiation group was outlined. For 2 weeks, the subjects were to smoke at three times their normal rate. During this time, the following rules were given to the smokers: 1) every time they smoked they were to smoke three cigarettes, 2) all cigarettes used were to be purchased from the clinic, 3) all smoking was to be continental style, 4) cigarettes were never smoked automatically, and 5) a continuous record of the cigarettes smoked was to be kept. After 2 weeks of smoking in this fashion, subjects were instructed to try to quit smoking, but if they had to smoke they were to do so according to the preceding rules. After a week of this, all subjects were told to abstain from smoking for the follow-up period.

This type of treatment was compared with a gradual reduction treat-
ment (which will be discussed later in the paper), a pill control condition and a cold turkey control. Results indicated that none of these treatments differed significantly from each other at the last treatment session, a 1 month follow-up, or at a 6 month follow-up.

The study by Marston and McFall (1971) is interesting for one reason even though no significant results were reported: it is the only study on smoking thus far to try to analyze the process of behavior change in the different groups. However, another author (Lichtenstein, 1971) maintains that Marston and McFall (1971) have done this prematurely. In his opinion, an effective treatment should be found and then the process variables should be studied. At any rate, this study was an admirable attempt to control some crucial variables in the behavior change process.

Claiborn, Lewis, and Humble (1972)

Building upon the work of Resnick (1968) and Marston and McFall (1971), Claiborn et al. compared the behavior of smokers in three experimental conditions: 1) a control group, 2) a group instructed to double their smoking for a week (same as Resnick) and 3) a group instructed to smoke their usual amount of cigarettes, but on a fixed time schedule. All groups were given an explanation for why this treatment was effective, and independent observers were used to check the validity of subject reports. In addition, all subjects were told to try to quit after 1 week. Results indicated no significant differences between the groups at a 2 week or 5 month follow-up.

In this paper, the authors included a study comparing the effects
of stimulus satiation and stimulus control and the combined effects of these two variables. Sixty volunteers were assigned randomly to one of four groups: 1) smoking as normal, 2) smoking on a set time schedule, 3) double normal amount of smoking and 4) double amount on a set schedule. Follow-up reports showed no significant differences between the groups. Another study investigating the effectiveness of gradual reduction with treatment of cigarette smoking was reported in the paper, and will be dealt with later in this report.

The results of the two studies first reported cast doubt on the usefulness of the reports by Resnick and others mentioned previously. The authors recommend the insertion of placebo control conditions in behavior modification experiments. Perhaps expectations of success is an important variable in determining outcome of behavior modification treatments.

Sushinsky (1972)

In a replication of the study by Resnick (1968), Sushinsky (1972) compared the effects of stimulus satiation with minimal treatment and individual effort groups. The subjects studied were 48 college students who mailed in daily postcards on which they registered their consumptions. Although all groups evidenced a statistically significant decrease in smoking, there was no significant difference between the treatment groups. The author suggests procedural changes may have contributed to the failure to replicate Resnick's (1968) findings. However, the study does suggest other variables may be controlling reduction in smoking behavior. Further investigations into these variables
are needed.

Best and Steffy (1975)

Best and Steffy (1976), in an attempt to study the effectiveness of stimulus satiation and to study the interaction of this variable with that of locus of control in subjects, placed 50 subjects in five treatment groups - each group containing five internal and five external control subjects. An attempt was made to match the groups on several variables (sex, smoking level, pre-treatment questionnaire scores). The five treatment conditions were as follows: 1) satiation-therapist controlled rate of reduction, 2) non-satiation-therapist controlled rate of reduction, 3) satiation-client controlled rate of reduction, 4) non-satiation-client controlled rate of reduction, and 5) satiation and immediate quitting after satiation. The following treatment was applied to all groups: 1st week - baseline, 2nd week - all smokers cut smoking in half, 3rd week - instruction in behavioral analysis of smoking, satiation groups doubled intake, non-satiation groups continued record keeping at the reduced rate. Weeks 4, 5, and 6, all groups, with the exception of group five, were put on a reduction schedule either client or therapist controlled (depending on locus of control). Follow-up occurred at 2 weeks, 4 weeks and 4 months.

Results indicated all groups significantly reduced their smoking at the end of treatment. However, at the 4 month follow-up, only the internal satiation group continued to show a significant reduction in smoking. The study suggests support for previously mentioned studies
by Marston and McFall (1971), Sushinsky (1972), and Claiborne et al. (1972). It is suggested that Resnick's (1968) subjects may have been more internally controlled and this accounts for failure of the other studies to replicate his findings. It is suggested stimulus satiation may be a useful therapeutic tool depending upon client variables, one of which may be locus of control.

This study is interesting for several reasons: 1) the examination of subject variables as well as treatment variables, 2) attempts to match treatment groups, 3) longer follow-up than usual, and 4) sophisticated statistical analysis of the data. However, data are based on self reports without the benefit of independent observation. Furthermore, the 4 month follow-up is still not long enough to accurately rate the long term effectiveness of stimulus satiation as a smoking cessation technique. However, this study does offer support for stimulus satiation as a short term smoking cessation tool.

Sutherland, Amit, Golden and Roseberger (1975)

Another multi-technique study which included stimulus satiation as one of its techniques is that of Sutherland et al. (1976). The three techniques studied were relaxation, satiation, and a combination of the two. The purpose of the study was to investigate the possibility that the combination of the two techniques would be more effective than either of them alone. Fifty-three subjects were divided into five groups: relaxation, satiation, relaxation-satiation, motivated control and non-motivated control. In all groups, the subjects were seen in 30 minute treatment sessions, twice a week for 6 weeks. In the satiation
group, subjects were taught to inhale a cigarette deeply every 4 seconds for the whole cigarette. The procedure was carried out twice, with a 15 minute rest period, during the 30 minute treatment session. The subjects were instructed to also smoke every cigarette outside of the treatment session in the same fashion. The other experimental techniques will be discussed later in this paper.

The results indicated that while there was a reduction in smoking across all three experimental groups at the end of treatment, the only significant finding at a 3 month follow-up was for the relaxation-satiation group. A discussion of the results suggested that the satiation procedure was so punishing that only a few of the subjects were able to smoke in the experimental fashion outside of the treatment sessions. The authors indicated that this may have obliterated the effectiveness of the technique for the experiment.

The main criticism of this study is that it lacked verification of subject reports - they were told urine samples would be taken, but these were never analyzed. Furthermore, as evidenced in previous studies, a 3 month follow-up is not sufficient to determine the long term effectiveness of any technique. Also, the technique in this study seems to be more like rapid smoking than stimulus satiation.
CHAPTER IV

SYSTEMATIC DESSENSITIZATION

Koenig and Masters (1965)

The first published account of systematic desensitization is that of Koenig and Masters (1965). Three approaches were studied - aversion therapy, systematic desensitization, and supportive counseling. The systematic desensitization was presented as follows: first, a week's baseline measurement was taken, second, subjects were trained in a Wolpe-Lazarus type of relaxation, third, a 20 item hierarchy was developed and the first item was presented after a short relaxation period. The hierarchy dealt with situations in which the subject normally felt a desire to smoke. When the subject was able to imagine the scene without desiring the smoke for 15 seconds, and had no desire to smoke for 30 seconds immediately after he stopped imagining the scene, he was allowed to move on the next scene in the hierarchy. All subjects completed their hierarchy within nine treatment sessions.

The results indicated that there was no significant effect for treatments. However, significant main effects were found for therapists. It was also discovered that subjects' predictions of success and desire to stop smoking correlated highly with success. Another interesting correlation was that the more positively a therapist was seen, the less well the subject succeeded in changing his behavior. A follow-up study at 6 months yielded no significant treatment effects.

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The authors offer several explanations for the lack of treatment effects. They argue that the fact that finals were being given the week of the follow-up masked possible treatment effects. Other conclusions reached by the authors were that the therapist's behavior is a stronger factor in therapeutic change than previously thought. Also subjects' desire to stop smoking and their prediction of success are good indicators of future success in behavior change studies.

Pyke, McK. Agnew and Kopperud (1966)

In a comparison of systematic desensitization with two other control groups, Pyke et al. (1966) paid 55 students to participate in a pilot study on smoking. In the systematic desensitization group, the subjects were exposed to a treatment program which also included other non-specific procedures (information, group discussion and feedback on progress relative to the group and to themselves). The subjects in this experimental group were required to keep a daily record of their smoking behavior. The data were used in the 11 group sessions to give the subjects feedback on the progress made by the individuals and the group as a whole. In addition, these data were used to aid in the construction of hierarchies to be used in the desensitization procedure in individual sessions. The subjects were in treatment for 10 weeks and were asked to continue keeping records for 3 weeks after termination of treatment. The other control groups kept records for 8 weeks or at the 1st and 8th week respectively.

The results suggested that the experimental subjects did reduce their smoking significantly in comparison to the control. However, the
cluttering of the desensitization procedure with other non-specific factors made it difficult to attribute the reduction solely to the desensitization. After 4 months, the experimental subjects were asked to record their smoking behavior for another 17 days which yielded no significant results. However, the study did find a significant difference in the amount of signaling of anxiety between heavy smokers and light smokers. Heavy smokers tended to signal anxiety more frequently than did their light smoking counterparts.

The study appeared to use appropriate sample sizes, control groups against which therapeutic progress was measured and, for the experimental group, a follow-up study. The major flaw in the study is the failure to control for the non-specific factors used in addition to the systematic desensitization. Also, no effort was made to verify subject reports.

Kraft and Al-Issa (1967)

In an attempt to determine if desensitizing social anxiety would help reduce an individual’s rate of smoking, Kraft and Al-Issa (1967) studied the behavior of five subjects in individual case studies. The general manner in which each case study was done is as follows: an informal estimate of baseline smoking rate was obtained from the subjects, a stimulus hierarchy of specific social fears was created, and subjects were exposed to desensitization sessions of varying lengths. Informal follow-ups (of varying lengths of time since treatment) were taken. The results indicated that none of the subjects were abstinent at follow-up time, although all of them were reported to have dramatically reduced
their cigarette consumption.

Because of the lack of adequate controls in the study, it is difficult to pinpoint the variable which may have accounted for the reported decrease in rate of smoking. In addition, no care was taken to validate the subjects' reports. It is an interesting premise that social anxiety may influence the smoking rate, but more controlled studies are needed to verify it.

Morganstern and Ratliff (1969)

Attempting to control some of the extraneous variables which plagued two of the previous studies, Koenig and Masters (1965) and Pyke et al. (1966), Morganstern and Ratliff (1969) studied eight undergraduate students who desired to quit, but were unable to do so. Subjects were instructed in deep muscle relaxation and record keeping, in addition to an explanation of the experimental procedures. A hierarchy of smoking situations was developed and subjects were exposed to four to five 50 minute individual desensitization sessions. The results indicated that seven of the eight experimental subjects reduced their smoking. Of these, five reduced by 50% or more, three subjects completely stopped smoking and one subject reduced by 75%. Of 32 subjects in the non-treatment control group, five reported an increase in smoking, 26 subjects said no change, and one reported a reduction in his rate of smoking. The authors conclude that while the results are not conclusive they do suggest that systematic desensitization may be a useful tool to help individuals to curtail their smoking behaviors. However, better controlled research is still needed.
The authors admit this is merely a preliminary report, and thus lacks many features which would have made it a valuable study—adequate sample size, third party verification of subject reports and adequate follow-up. Despite the problems, the study does suggest systematic desensitization helps reduce cigarette smoking on a short term basis.

Levenburg and Wagner (1976)

As mentioned before in the aversive control section, Levenburg and Wagner (1976) found that systematic desensitization did produce a reduction in cigarette smoking. However, the hypothesis that smokers who smoked in response to anxiety would do better with systematic desensitization was not supported. The fact the relaxation control group also reduced their level of smoking indicates relaxation in itself may help smokers reduce their smoking level. Again, no long term effects were reported.
CHAPTER V

STIMULUS CONTROL

The object of using stimulus control for smoking behavior is to bring the behavior under the control of a single stimulus rather than having it controlled by a variety of stimuli. It is theorized smoker's desire for cigarettes would extinguish in situations other than those in which smoking was permitted.

Azrin and Powell (1968)

Azrin and Powell's (1968) study of stimulus control uses a time-out procedure in which no cigarettes were available. The experimenters selected seven subjects from individuals they knew. After 10 days, the number was reduced to five subjects. A special cigarette case which locked shut for variable periods was used to provide the necessary time-out from smoking. Initially, the timers were set at a 5 minute interval to orient the subjects to apparatus without having it actually interfere with their smoking. Every 3 days the experimenters called the subjects to see if they wanted the timer's duration lengthened. The durations were increased until the maximum duration for the timer. The subjects spent from 1 to 3 weeks at maximum, and then the timers were reset at 6 minute intervals for four subjects and 30 minutes for one. In addition to these five subjects, a control was used employing a timer in which no programmed lengthening of the time out was possible, and no auditory or tactile stimulus was available.

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Curves were plotted comparing the number of cigarettes smoked per day with the duration of the timer. The number of cigarettes smoked lessened as the duration of the timer was increased in all five subjects. However, when the timers were reset most of the subjects returned to near baseline frequency. Reports from independent observers validate the subject's report of their smoking behavior. The two control subjects did not reduce their level of cigarette smoking.

The main problem of this study is the lack of a large sample of subjects elected randomly from the population of cigarette smokers. In addition, the fact that the experimenters were acquainted with the subjects also presents another extraneous variable. The small control group and rather haphazard method of increasing the duration of the timers could be better controlled. However, despite these faults, it is interesting to note the reduction in rate of smoking as the intervals increased. However, since the occasion to smoke was eliminated, it is only logical that the amount of cigarettes smoked would be reduced. It would be interesting to see what effect increasing the duration for longer periods would have. Perhaps abstinence could be achieved by gradually increasing the timing to a level at which a cigarette would be available only once a week. However, this type of procedure seems very closely related to gradual reduction which will be discussed later.

The next study in stimulus control presents a more realistic manner in which stimulus control over cigarette smoking can be achieved.
Although this study is a single subject preliminary report, it does present a novel and easily achieved manner in which stimulus control may be accomplished in cigarette smoking. The subject in this study is the experimenter's wife. The method used to accomplish stimulus control was very simple. The subject was instructed she could smoke all she wanted as long as she smoked in a chair placed in such a way that she could neither conveniently watch T.V. nor carry on a conversation. Her family was instructed not to talk with her while she was in the chair, and no reading material was available. The subject kept a record of the number of cigarettes smoked and the amount of time spent in the chair. After 7 days, the subject's smoking rate was cut in half, stabilizing at around 12 cigarettes per day. In order to reduce this further, the chair was moved to the cellar and for the next 7 days, her smoking rate dropped to five cigarettes per day. However, at this time, the subject became discouraged and quit recording the number of cigarettes smoked. About 14 days later she became disgusted that she could not stop and quit altogether. At a 5 month follow-up, she was still abstinent.

Although the study was only a single subject design and no concrete conclusions can be drawn from it, it still presents a novel approach to stimulus control which should be studied further in a larger multiple subject study. The author hypothesizes that the chair became the main cue for smoking behavior and when that cue forced the subject to withdraw further from other strong reinforcers, the cigarette response
weakened. His hypothesis was that cigarettes may actually be very weak reinforcers, and that the pairing of cigarettes with other reinforcers in the environment actually helped maintain the behavior.

Roberts (1969)

In a replication of Nolan's (1968) study, Robert (1969) applied the same procedure to his own smoking behavior. The author had been smoking a pack or more a day for 23 years, and experienced depression whenever he tried to quit. He began by taking a 7 day baseline and found his average smoking rate to be 22.6 cigarettes per day. During baseline, the author noted he rarely smoked in the bathroom, so he restricted his smoking to that area. After 1 week, he placed further restrictions on his smoking by allowing no talking or reading while smoking. This condition was continued 16 days at which time the author became ill and stopped smoking. At a follow-up period of 7 months, the author was still abstinent. Results show the author's smoking rate was cut more than half during the first restriction, and was reduced a little more after the second phase was initiated.

Although the study was a single subject design, further credence is given to the possibility of this technique being effective to help cigarette smokers quit smoking. However, the fact that the author quit during an illness adds a confounding factor which could possibly account for the cessation of smoking. In addition, as in the Nolan study, no reversal of conditions was made to determine if the stimulus control was the decisive factor.
Upper and Meredith (1970)

The first published account of an attempt to investigate stimulus control on a larger scale is that of Upper and Meredith (1970). However, rather than trying to bring the behavior under the control of natural situations in the subjects' environment, this study sought to bring the smoking behavior under the control of a buzzer on a portable timer. The subjects chosen for this study were 51 volunteers from the staff of a VA hospital who were placed in three groups, each with 17 subjects. The one group was a hold-control group which was made up of individuals who were told there was no room for them in the study. It was suggested to this group that they should try stopping on their own. The second group was placed in an attention placebo condition. This group was asked to take a baseline consisting of recording the time, situation and desire for each cigarette. However, they were not to try to change their behavior. (The same instructions were given to the treatment group.) After the week of baseline, they were instructed to continue recording and try to eliminate one less desired cigarette every other day. They were also supplied with two reprints on smoking from *Reader's Digest*. In the third group, subjects were placed in a treatment regimen. From the baseline data, the mean smoking frequency and mean time between cigarettes were calculated. Each subject was told to set his timer for his own mean time between cigarettes, and was instructed to only smoke at the end of the present interval. In addition, the subject was required to smoke every time the buzzer sounded or forfeit the cigarette. The beginning interval was to be used for 4
days, and then increased by 5 minutes after 1 to 3 days and so on. Subjects in the attention-placebo and treatment groups were told to continue until the response was extinguished. After 5 weeks, the subject's progress was evaluated by the experimenters.

The results showed a mean decrease of 53% for the treatment group, 16% for the attention placebo group, and 15% for the control group. There were no significant differences between abstinence rates in any of the groups. However, the authors did note some other interesting differences in the groups. The drop out rate was lower for the treatment group than for the attention-placebo group. No increases were reported for the treatment group as compared to the attention-placebo and control groups. No follow-up data were reported.

Despite the obvious flaws in this experiment, no participant observer validation of the subjects behavior and the lack of follow-up data, this study offers a method for bringing the cigarette smoking behavior under the control of a single stimulus. The authors suggest that stimulus control should be the first step in modifying smoking behavior, since this would eliminate the need to extinguish the behavior in a large number of situations initially. They conclude by saying that stimulus control is a promising method for the reduction of smoking behavior. However, since there was no third party verification of the subjects' smoking behavior, it is highly possible the subjects did not adhere to the prescribed treatment regimen.

Sachs, Bean and Morrow (1970)

In a comparison study of the effects of a self control procedure
using stimulus control versus the effects of covert sensitization, Sachs et al. (1970) selected 49 volunteer subjects and instructed them to chart their smoking behavior, and also record information about the situational and subjective stimuli surrounding it. Of the 49 subjects who began the study, 37 returned after the initial baseline period of 1 week. They were then divided into three groups: placebo attention, self control, and covert sensitization. (The covert sensitization group will be described in the next section.) The self control group was instructed to rate the stimuli, both external and internal, according to the presence of such stimuli. They were then instructed to stop smoking in the least difficult situation and progress to the most difficult situation, thus narrowing the number of situations in which smoking was allowed to occur. The subjects were allowed to smoke at any time as long as they did not smoke in the specified stimulus situation. This procedure was continued for 3 weeks. The results indicated that this was a significant effect for time in treatment and that all groups changed significantly from their baseline level during treatment. However, only during the 3rd week of treatment did the groups differ significantly from each other with the covert sensitization having the lowest mean number of cigarettes smoked. A chi square analysis of the number of subjects who quit at the 3rd week, indicated that covert sensitization had significantly more subjects abstinent than the other two groups. At the 1 month follow-up, both self control and covert sensitization were significantly different from their baseline, while the control group was not. The number of subjects abstinent at the follow-up depended upon treatment condition. Covert sensitization was significant-
ly different from the two groups on their criterion.

Although the covert sensitization did appear to be the most effective treatment in this study, it should be noted that the self-control stimulus control did achieve a significant reduction in the number of cigarettes smoked at the end of treatment and also at the 1 month follow-up. However, it should also be noted that all groups showed a tendency to regress toward baseline. Nonetheless, this study does offer support for both covert sensitization and stimulus control as possible treatment methods for cigarette smoking on a short term basis.

Possible flaws in the study which may account for some of the results in the study include: 1) the use of students in the study which could bias the results due to the prestige effect of the professors running the study, 2) the lack of randomness of the sample although the subjects were assigned to the groups randomly, and 3) the failure of the experimenters to obtain independent observations of their subjects to validate the reported change in smoking behavior. In this same vein, the follow-up report was done by phone and is open to question. Another problem in the study was the rather brief time allowed to elapse between the end of treatment and follow-up. Since there was definitely a tendency to regress to the baseline level, a longer follow-up period may have been more informative.

Shapiro, Tursky, Schwartz and Schmidman (1971)

A study using almost the identical procedure as described earlier is that of Shapiro et al. (1971). As in the previous study, they employ a neutral, mechanically produced stimulus rather than using a stimulus
situation in natural environment. The subjects used in this study were recruited via a local newspaper story which described the use of stimulus control in reduction of cigarette smoking. Of the 1,000 responses the authors received, 40 subjects were chosen by random selection. Those people who weren't in good health and/or used drugs or medication on a regular basis were eliminated. The authors divided these subjects into three categories according to daily cigarette consumption.

The 1st week of the program the subjects were told to smoke at their normal rate. Each week after the initial week, the subjects were to reduce smoking by four cigarettes each week until they reached 12 cigarettes, at which time they would reduce their smoking by two cigarettes per week. As in the previous study, they were requested to smoke only on cue and not to make up missed cigarettes. A control group of 19 subjects was instructed to adhere to a similar schedule and report their progress weekly through the mail.

The results of this experiment show a number of important things. The median reduction for subjects who completed the 8 week program was 75% as compared to a median reduction of 2% for the control group. There was also evidence to suggest a direct relationship between percent of program completed and percent reduction in cigarettes smoked. Twenty-four subjects remained in treatment for the duration of the program and 13 of the 19 controls were still available at the time of the follow-up 6 weeks later. No attempt was made to achieve abstinence in this study, although some subjects chose to make this move.

The obvious flaws in this study are the lack of validation of sub-
ject reports by the experimenters and the exclusion of drop outs from the final analysis of the results. In addition, only median percentages were reported and nothing but the simplest of statistical analyses were made.

However, the authors do make several interesting observations about the use of stimulus control as a means to aid cigarette smokers in managing their habit. They suggested the reduction process could be made more successful if paced according to readiness of client to reduce smoking further. Another suggestion was that subjects return to a higher rate of smoking (but on signal) in times of stress. Those subjects who felt compelled to smoke more, should return to a higher level, but continue to use the signal until they can reduce their smoking again. In this manner, stimulus control could still be maintained. Furthermore, the authors suggested that stimulus control could be used in conjunction with more traditional modes of therapy. The authors concluded by saying more research was needed to compare the results of this approach to gradual reduction without stimulus control.

Levinson, Shapiro, Schwartz and Tursky (1981)

Although this study is entitled "Smoking Elimination by Gradual Reduction", I have included it in the section on stimulus control because the main difference between groups is that of having to smoke in response to a timed buzzer versus merely gradually reducing cigarette consumption. Another variable studied was that of group interaction versus no group interaction.

The authors selected subjects from a group of individuals who had
been recruited via a newspaper article, for an earlier experiment, but were not used. All subjects had to smoke 30-45 cigarettes per day. The final group of 52 subjects was divided into four groups matched on age, sex and smoking rate.

The subjects were placed in one of four treatment conditions: 1) gradual reduction with timer, 2) gradual reduction with timer and group interaction, 3) gradual reduction, and 4) gradual reduction with group interaction. Group interaction with defined as two non-directive group meetings, one at the 8th week and one at the 12th week of the study. As in previously mentioned studies, the subjects in the timer conditions were instructed to smoke only when the buzzer on the timer was triggered. The subjects in the timer condition were to start at 32 cigarettes per day and reduce this number by four cigarettes each week. The gradual reduction only subjects were to do the same except they would not be required to smoke on cue. The experiment continued for 12 weeks with a 3 month follow-up. Subjects smoking rates were monitored weekly via postcard.

The results indicated that less than half of the subjects completed the program with a higher number of dropouts in the timer conditions. At the 3 month follow-up, only the timer conditions had any subjects not smoking. The timer group condition had a significantly higher success rate than all other groups combined. General conclusions drawn by the authors suggested that some element in the timers and group conditions was responsible for the changes observed. However, the loss of a number of subjects in the study made these conclusions rather shaky. In addition, no independent observer reporting was used to validate subject reports,
thus causing one to question the results further.

The authors do mention one interesting point. They make reference to a possible "core level of smoking" beyond which their subjects had difficulty in passing. They note that Shapiro et al. (1971) and Upper and Meredith (1970) also mention this and suggest a possible physiological factor involved in this "core level". The authors suggested that this may have been the reason for their large dropout rate, and suggested that added strategies be used to help subjects past this level.

Bernard and Efran (1972)

In a study designed to replicate and provide follow-up data for the Upper and Meredith (1970) research, Bernard and Efran selected 30 students from an undergraduate psychology course to participate. In addition to replicating Upper and Meredith's (1970) study, the author also sought to compare the success of those individuals whose objective was abstinence with the success of those who sought merely to reduce their cigarette consumption. The subjects were divided into three groups: a "timer-elimination group", a "timer-reduction group", and a control group. The procedure used for the two treatment groups was that used by Upper and Meredith (1970). The control group subjects were given a gradual reduction schedule which prescribed reducing consumptions by one or two cigarettes daily. The experimental conditions were imposed for 28 days; after this the subjects recorded their behavior for 7 days and then resumed taking data 2 months later for a week.

The results show a significant decrease in smoking behavior for those subjects in the abstinence and reduction groups in comparison to
base rates. However, there were no significant differences between the
three groups at the post treatment assessment. The timer reduction
group was significantly different from the control at the 2 month follow-
up, but nonetheless there was a small increase from the post treatment
to the follow-up.

The surprising finding of this study was that the only group which
could claim any members abstinent at the 2 month followup was the reduc-
tion group. In addition, this group showed the least tendency to re-
turn to baseline smoking levels. The authors believed that this may
have come about because the subjects received a bit of self-reinforce-
ment for surpassing the goal of the program. The higher standard set in
the other groups did not allow them to feel good about themselves.

The major flaws of this study were the lack of third party verifica-
tion of subject reports, small number of subjects per group (10) and
the lack of a sufficient follow-up period (2 months). As in many of
the other studies, there seems to be an across the board tendency to
relapse at the time of the 2 month follow-up.

Claiborn, Lewis and Humble (1972)

In a study presented earlier in the section on stimulus satiation,
Claiborn et al. (1972) described three studies employing a stimulus
control technique in which the subjects are required to smoke on a fixed
time schedule. In the first study, the subjects were required to smoke
on a fixed time schedule for a week and then try to stop smoking com-
pletely. The smoking rate was taken after the 2nd week and at a 6 month
follow-up. The results were not at all surprising; there were no signi-
ficant differences between groups at either follow-up. Independent observer reports were used to validate subject reports.

In the second study reported by Claiborn et al. (1972), 66 volunteer undergraduate students were exposed to four treatment conditions: 1) control, 2) stimulus satiation, 3) scheduling and 4) stimulus satiation and scheduling. The same conditions were imposed as before; a 2 week report and a 4 month follow-up (rather than 5 month follow-up) were used. No significant results were reported for any of the groups.

Because of the apparent failure of the above mentioned studies, the authors decided to use a gradual reduction technique coupled with a scheduling procedure. Sixty volunteers were recruited from the faculty and staff of the university and were randomly assigned to one of four groups: 1) control, 2) gradual reduction, 3) scheduling and 4) gradual reduction with scheduling.

As expected, those using scheduling were told to smoke on a fixed schedule each day, and those using tapering were placed on a program which led to a zero smoking level at the end of the treatment. Gradual reduction and stimulus control group combined the two above techniques. The experimental period was 3 weeks, after which the subjects were required to report their smoking behavior. There was also a 4 month follow-up. The results showed no significant differences between groups.

Although these studies do not offer support for either stimulus satiation or stimulus control, they perhaps do offer support for the notion that treatment for cigarette smoking is a longer term process than that of 1 week or 3 weeks. It is entirely possible that some of the effects of the techniques may have become more apparent if they were
carried out for a longer period of time. In addition, it is possible that time is not a "distinct" enough stimulus situation for smoking to be brought under its control, since smoking would still continue in the presence of more "distinct" stimuli. This study is discussed further in the section on gradual reduction.
CHAPTER VI

COVERT SENSITIZATION

The technique of covert sensitization is offered as a treatment for cigarette smoking by Cautela (1970). The purpose is to produce avoidance behavior. In general, the procedure involves imagining performing a maladaptive behavior and then imagining an aversive stimulus following the behavior. It is based on assumptions that manipulation of imagined situations can affect overt behavior (Cautela, 1970).

Sachs, Bean and Morrow (1970)

The first published account of covert sensitization being used in an experiment for reducing cigarette smoking was that of Sachs et al. (1970) (mentioned earlier). The technique used was that of pairing the image of smoking with a noxious image. However, a hierarchy was also used in which subjects listed the most pleasurable characteristics of smoking in descending order. Beginning with the most pleasurable scene, the therapist taught the subject to pair the smoking image with the noxious image until he could do the technique on his own. After 10 successful pairings on the strongest scene, the subject moved down to the next item and so on until the hierarchy was completed.

The results (discussed earlier) indicated that covert sensitization was the most effective of the three experimental conditions (placebo, and self-control being the remaining two) on two criteria: mean number of smokers abstinent at follow-up and mean number of cigarettes per day.
The results from this study suggest that covert sensitization may indeed be a viable treatment technique for cigarette smoking.

Lawson and May (1970)

In this study, effectiveness of three behavioral techniques was compared: covert sensitization, contingency management and contractual management (the latter two will be discussed later in the paper). The authors selected 12 male undergraduate psychology students from a group of 32 volunteers. The subjects were randomly assigned to one of three treatment conditions or a counting control. Subjects in the covert sensitization group were taught to relax during the first three sessions and covert sensitization was begun in the fourth session. The subjects were asked to list the details of the three most common situations in which they smoked, so the experimenter could set up the imaginary scenes for the covert sensitization. The covert sensitization was continued for nine, 25 minute sessions. For all groups, the operant level was determined by averaging cigarette consumption for 5 days prior to the initiation of the experiment. Progress in treatment was expressed as the percentage of this baseline average. Subjects kept a graph of their daily consumption, and an average of this consumption was made each week for the 5 weeks of the experiment. No follow-up was taken.

The results indicated no significant differences between groups, although all groups displayed at least a 65% reduction from baseline level at the end of the experiment. The authors cited the small size of each group (three subjects each) and the lack of follow-up data for the non-significant results. The approximate 70% reduction achieved by the
covert sensitization group does offer some hope for the future of the technique. However, the small sample size, lack of follow-up and lack of independent observers of subject behavior make the results, at best, questionable.

Sipich, Russell and Tobias (1974)

In a comparison of covert sensitization with other "non-specific" control groups, Sipich et al. (1974) randomly assigned 10 subjects to each of five experimental conditions: covert sensitization, attention-placebo, self control suggestion, monitoring control and no contact control. All the subjects gathered baseline data for 1 week, after which the covert sensitization, attention-placebo and self control suggestion groups entered a 2 week period of treatment. The monitoring control subjects were informed that treatment would be delayed, but they should continue gathering data. After the 2 weeks, the three treatment groups were contacted weekly for 10 weeks, and then at 6 months, for their smoking rate.

Treatment subjects were seen in six sessions over the 2 week period. The covert sensitization procedure used relaxation and imagery of mal-adaptive behavior followed by noxious imagery. Attention-placebo subjects were told that subliminal messages presented via tachistoscope would help them stop smoking. In the self control suggestion group, subjects were told they could quit smoking by using their own resources; they didn't need any "tricks or gimmicks". The monitoring control group merely kept records of their smoking behavior during the time of the experiment, and the no contact control subjects were used for pre and
The results indicated the "experimental groups" did differ significantly from the other controls, but were not significantly different from each other at the end of treatment. At the 5 month follow-up the three groups were significantly different from baseline, but were not significantly different from each other. As in many of the other studies covered in this review, there was a definite regression toward baseline smoking at the end of 6 months. The authors conclude that the non-specific factors of attention and suggestion would be the most parsimonious explanation for the similarities in results across the three groups. These results underscore the need for attention placebo controls, in addition to non-attention controls, to compare with experimental groups, so the possibility of non-specific factors can be ruled out.

Barrett and Sachs (1974)

While testing the classical conditioning explanation of covert sensitization, Barrett and Sachs also inadvertently added to the literature on behavioral approaches to the treatment of cigarette smoking. Forty-seven subjects with a mean age of 21 were placed in one of four treatment groups: 1) a forward group in which an imagined smoking scene was followed by an imagined aversive scene, 2) a backward group in which the aversive scene was presented before the smoking scene, 3) a backward interval group which was the same as the previous group with the exception that a 60 second interval was placed between the scenes and 4) the aversive scene alone was presented. After collecting baseline for 1 week, the subjects were exposed to three, 10 minute treatment sessions over the
next 2 to 4 weeks. Subjects were also required to practice their imagery 10 times daily. After the 3rd week of treatment, subjects were told a follow-up evaluation would be made 1 month after treatment.

Despite the fact a $2.00 deposit was required from all subjects over half the subjects did not complete the experiment. In addition, none of the results of the experiment were significant, suggesting that covert sensitization may be effective for reasons other than the traditional conditioning explanation of it. Also, in view of Sipich et al. (1974) results, it seems that non-specific factors could have played a large part in the results obtained from this study.

Wisocki and Rooney (1974)

In a study comparing covert sensitization with thought stopping and an attention placebo group, Wisocki and Rooney assigned 11 subjects to one of three treatment groups. The groups met twice a week for 20 minutes over a 5 week period. The procedure employed the presentation of three standardized scenes of smoking stimuli followed by covert sensitization, thought stopping, and relaxation. At the end of treatment, the covert sensitization group, as well as the thought stopping group, displayed a significant reduction in smoking behavior. At a 4 month follow-up, there were no significant results.

This study is interesting insofar as it offers further evidence for the use of covert sensitization as a therapeutic tool. However, the small sample sizes and lack of third party verification weaken any conclusion drawn from the study.
Barbarin (1978)

In this study, mentioned earlier in the section on aversive control, it was found covert sensitization also led to a significant reduction in cigarette smoking, although it was not superior to overt aversion. However, this well-controlled study does offer support for covert sensitization as a therapeutic tool of smoking cessation.
CHAPTER VII

GRADUAL REDUCTION

Another technique used to control smoking behavior is gradual reduction. The rationale is gradually "weaning" the smoker from the undesired behavior thereby extinguishing the stimulus-response pairing.

Levinson, Shapiro, Schwartz and Tursky (1971)

In a study mentioned previously, Levinson et al. (1971) compared the effects of stimulus control with gradual reduction. The results of this experiment do not point favorably to the use of gradual reduction as a technique to stop cigarette smoking and offer more credence to the stimulus control approaches.

Marston and McFall (1971)

As mentioned earlier, Marston and McFall studied stimulus satiation, versus gradual reduction and two control conditions. While all the conditions showed a reduction in smoking, no significant reductions were noted at a 6 month follow-up.

Claiborn, Lewis and Humble (1972)

Claiborn et al. (1972) examined the effects of gradual reduction versus scheduling versus a combination of gradual reduction on a fixed schedule. Sixty subjects from the staff of the University of Kentucky were assigned to one of the above groups or a control group. All sub-
were given the rationale and instructions for the program in a 30 minute orientation session. Those subjects in the scheduling group were to smoke at scheduled intervals over a 20 day period. Those subjects in the tapering group were told to reduce their cigarette smoking every 3 days on a schedule that would lead them to zero in 20 days, and those in the tapering and scheduling group were to combine these two techniques. At the end of the 3 weeks, all subjects were to stop smoking and then report their smoking behavior at 1, 2, 3 week and a 4 month interval. Controls were also followed up at the same intervals. The results indicated that there were no significant treatment differences at any of the follow-up periods. The main problem in this experiment was the reliance on subject reports for the data. As with many of the studies, this is a particularly difficult problem which investigators must address.

Bernard and Efran (1972)

Comparing two stimulus control conditions with gradual reduction, Bernard and Efran found no significant results for the gradual reduction group. (See comments on study in section on stimulus control.)
CHAPTER VIII

COUNTERCONDITIONING

The objective of counterconditioning is to substitute another incompatible response to the smoking eliciting stimuli. In this way, it is considered that the subject will learn to control his/her smoking behavior by establishing a new stimulus response chain to replace the old smoking stimulus response pairing.

Whitman (1969)

In a study mentioned in the section on aversive control, Whitman (1969) compared three procedures for the modification of smoking behavior, information on the harmful effects of smoking, aversive conditioning and a self control procedure. This self control procedure involved educating the subjects on simple principles of behavior change. Focus was placed on the clients learning behaviors that were not compatible with the smoking behavior. The authors did not specify the exact conditions for the counterconditioning group. As mentioned earlier, the results indicated that in comparison to the controls, all treatment groups displayed a significant reduction in their smoking behavior at the end of the study, but there were no significant differences between any of the groups at the 3 month follow-up.
CHAPTER IX

DEPOSIT CONTRACTS

Elliot and Tighe (1968)

Employing a deposit of money, the threatened loss of it, or the ability to recoup it, Elliot and Tighe studied 25 subjects who wanted to stop smoking. The procedure involved a deposit of money which was held by the experimenters. Subjects could either re-earn it by receiving successively longer abstinence periods, or lose it by failing to remain abstinent. The experimenters hoped to use several behavioral principles: punishment - loss of money, positive reinforcement - re-earning the money, negative reinforcement - avoiding loss of money, counter-conditioning - non-smoking behavior becoming paired with smoking cues, and shaping - by using successively longer abstinence periods required. They were aware of generalization when they focused on total abstinence from all tobacco use.

Results indicated a high rate of abstinence while the deposit contract was in place. Variable length follow-ups indicated approximately 38% of the subjects contacted were abstinent.

Major problems with this study were lack of independent verification of reported abstinence, and the lack of a control group to compare treatment subjects. However, the deposit contract method seems to offer an excellent way for "artificial" aversive consequences and reinforcers to be delivered to the subject. If the subject reports can be
believed, the method seems to yield a high rate of abstinence while the contract is in effect. Afterward, the effects seem to dwindle as with many of the techniques reviewed. Because of the haphazard method of follow-up in the study, this method does not seem more effective than others on a long term basis.

Winett (1973)

In a test of the hypothesis that clients whose return of a money deposit was contingent on successful completion of a smoking reduction schedule would do better than those whose deposit was not contingent upon successful completion of the program, Winett assigned 70 subjects to one of four treatment groups in a "quasi-random" manner. By the 3rd week, this number had fallen to 45 subjects. The subjects were assigned to one of four groups: a non-contingent non-abstinence maintenance group, a contingent abstinence maintenance group, a contingent, non-abstinence maintenance group and a non-contingent, abstinence maintenance group. The contingent groups had to achieve a zero smoking level by the end of the experiment, and the abstinence maintenance groups were to maintain abstinence for 2 weeks after the experiment. The groups were similar in reference to demographic data, desire to stop smoking and other related variables according to a questionnaire filled out at the beginning of the study. The basic procedure required the subjects to gradually reduce their smoking according to a pre-set time schedule.

The results showed the contingent deposit return did lead to greater cooperation in adhering to the time schedule and in stopping smoking. However, the maintenance variable did not have any significant effect on
the smoking behavior. At 3 and 6 month follow-ups there were no significant differences between any of the groups. However, the data tended to support the observation that smokers who were low frequency users at the beginning of the experiment did better than high frequency users.

Spring, Sipich, Trimble and Goeckner (1978)

In an attempt to study the effect of a contract involving threatened loss of money if subjects failed to quit, Spring et al. (1978) assigned 42 subjects to one of three contract conditions: 1) contingency contract - subjects signed an agreement stipulating loss of money if they didn't quit smoking, 2) non-contingency contract - subjects signed a pledge to stop smoking, and 3) no contract. All subjects were involved in a 4 week smoking modification program utilizing a variety of interventions. Informants were used to verify reported smoking levels.

Results indicated the contingency contract group had a significantly higher rate of abstinence in comparison to the other groups. However, at a year follow-up the difference between groups was not significant.

This study was well organized and a simple, straightforward design. The use of third party verification and adequate follow-up add validity to the results which seem consistent with those of the previous studies. The authors conclude that further studies are needed extending the length of contracts to produce longer term abstinence. They also suggest there may be a critical abstinence period to be passed before lasting results can be achieved.
Paxton (1980)

In a similar study to the previous one reported by Spring et al. (1978), Paxton (1980) compared the effects of a deposit contract versus no deposit contract. Sixty subjects involved in a smoking control program were assigned to a deposit contract group or a no deposit group. All subjects were exposed to the same treatment with the exception of the deposit conditions. The treatment consisted of various self control procedures and rapid smoking. The contract group deposited a specific amount of money which was returned over a 4 week period if abstinence was maintained. If subjects failed to maintain abstinence, the money was forfeited. At the end of the 4 weeks, subjects were asked to make another deposit which would be returned over two, 2 week intervals contingent upon abstinence. A nicotine urinanalysis was used to verify subject reports.

The results indicated a significant effect for the contract group at the 1 month follow-up, but by 3 months, the groups were not statistically different from one another. The authors concluded further study is needed extending the length of contracts to achieve more permanent abstinence rates.

This study was adequate in design and sample size. Furthermore, an objective means of verifying subject reports was employed thus increasing the validity of the data.

Paxton (1981)

In a study utilizing some of the data from the previous study
(Paxton, 1980), Paxton (1981) investigated the effects of varying the frequency and amount of repayment in deposit contracts. He sought to prove three hypotheses: 1) the shorter the delay between repayment, the stronger the effect on abstinence, 2) the larger the amount of deposit return, the stronger the effect on abstinence, and 3) increasing the frequency of repayments should increase effectiveness - even when the amount of money repaid in each installment is decreased. In order to test these hypotheses, Paxton (1981) compared the deposit contract group mentioned in his 1980 study with two other deposit contract groups. In one group, the deposit conditions of the previous study were reversed; that is, the 1st month the deposit was returned in two payments on a 2 week interval, and then a second deposit was returned in equal amounts weekly for 4 weeks. All returns were contingent upon abstinence.

In the other group, 25% of the deposit was returned very 2 weeks for a period of 4 rather than 2 months. As in the other conditions, abstinence was required or the repayment was forfeited. Urinalysis was used to verify subject reports.

The results indicated the only hypothesis which was supported was two, the larger the amount of the deposit, the stronger the effect on abstinence. There was a trend noted supporting hypothesis one, but it was not statistically significant. Any significant effects for treatment across all the groups disappeared after about 10 weeks, a trend which is noted in many of the smoking studies. The main implication from this study, however, is that larger amounts of money should be involved in deposit contracts. Paxton (1981) states that a balance should
be found which would provide a sufficient amount of money while also not producing avoidance of the treatment in the subjects. Further investigation would also be useful in studying the effect of frequency of repayment.

Paxton (1983)

Continuing his study of deposit contracts, Paxton (1983) reported on three experiments. The same basic smoking cessation program described in Paxton (1980) was used in these experiments. The differences in the experiments were in the parameters of the deposit contracts. As with all the other experiments, repayment of the deposit was contingent upon total abstinence for the specified interval. In the first experiment, Paxton (1983) tested the hypothesis that long term abstinence would be higher for groups whose deposit is returned over a 4 month rather than a 2 month period. This is based on the assumption that the probability of relapse will decrease over time, therefore if relapse can be prevented with the use of longer contracts, abstinence rates should be higher. The experiment compared groups whose deposits were returned over a 2 month period or a 4 month period. Some of the data reported were derived from the earlier studies of Paxton (1980, 1981).

The results indicated a significant difference between the groups at 6 months, but not at the year follow-up. Thus the hypothesis was not supported.

The second experiment compared the effects of thinning the repayment schedule over a 4 month period versus keeping the repayments on a fixed interval. The hypothesis being that the thinning would yield better
results that the fixed interval.

While the results indicated the "thinning" group's rate of abstinence was greater throughout the year, the difference between the groups was not significant at the 1 year follow-up.

The third experiment reported in this study investigated three hypotheses: 1) more individuals will provide deposits if they are allowed to do so in weekly payments, rather than in a lump sum, 2) the abstinence rate of these two groups should be equal at a 1 year follow-up, and 3) attendance at the smoking cessations meetings should be the same for both groups.

The basic smoking cessation program was used for this experiment as with all the other Paxton studies (Paxton, 1981, 1981, 1983). The repayment procedure for both groups was a 4 month, thinning repayment schedule. The difference between the groups was in the way the subjects had to make their deposits. One group was required to make the deposit in a lump sum, while the other group made it in installments.

The results were as follows. The first hypothesis that cumulative deposits should increase participation was supported. The second hypothesis that the abstinence rates would not differ was also supported. The third hypothesis that attendance rates should not differ between the groups was also supported.

In general, the results of this study still support the short term usefulness of deposit contracts for smoking cessation, but the effects dissipate over time. However, the length of the contracts studied may not have been adequate. Perhaps longer contracts could be used. It seems, based on the third experiment, that the use of deposit contracts
can be made more attractive by having subjects place their deposits in installments rather than in lump sums.
CHAPTER X

OPERANT METHODS

Keutzer (1968)

In this study mentioned in aversive control and stimulus satiation, Keutzer (1968) also studied a technique called covariant control in which subjects were taught to think thoughts incompatible with smoking and follow the thoughts with some high probability behavior. This would increase anti-smoking thoughts and thereby reduce the subjects' level of smoking.

Results indicated subjects reduced smoking significantly as compared to a no treatment control, but not significantly different from the other treatment conditions. A follow-up showed the tendency to relapse with time.

Ober (1968)

In a study mentioned earlier, Ober (1968) compared an operant method with aversion and transactional analysis. Eleven subjects from a total of 79 were placed in the operant group. The procedure used in this group entailed subjects being taught principles of behavior shaping and then being told to apply these principles to their smoking behavior. No further details were given.

The results showed a reduction in smoking across all groups, but no differences between groups. There was an increase in the amount
smoked at a 4 week follow-up, but no significant difference between groups. Criticisms mentioned earlier still hold in reference to the operant part of this study.

Lawson and May (1970)

In a study mentioned previously in the section on covert sensitization, Lawson and May (1970) compared covert sensitization with contingency management and contractual management. The contingency management technique consisted of merely making a high probability behavior, entering buildings, contingent upon the performance of such low probability behaviors as thoughts about the negative results obtained from smoking. At the fourth session of treatment, the clients were instructed to initiate this sequence of behaviors whenever they experienced a desire to smoke.

After 1 week of baseline and 5 weeks of the above described conditions, the results showed (as in the previous experiment) there was a significant effect for time on the reduction of smoking across all groups, but there was no significant difference between the three treatment conditions.

Miller and Gimpl (1971)

In another study of operant conditioning methods applied to the cessation of smoking behavior, Miller and Gimpl (1971) tried to reduce the rate of cigarette smoking by instructing students in operant self control. Twenty students were selected from a group of 100 volunteers, who smoked a pack of cigarettes a day for at least a year. The ex-
Experimental treatment lasted for 3 weeks. In the 1st week of treatment, a baseline rate was taken. The only intervention used in the 2nd week of treatment was the clients instructing themselves 3 times daily of their goal for that part of the day. Goals were pre-determined based on average level of smoking at baseline. When the clients reached the 3rd week of treatment, they were instructed to do one of three things: 1) return to baseline record keeping, 2) continue in the self instruction phase, or 3) institute a new phase on positive reinforcement for using self instruction and achieving the pre-arranged daily goal. The reinforcer was points earned toward a final grade in General Psychology.

The results of the experiment showed 12 smoking subjects remaining at the end of the experiment; there was a significant effect for time, but none for treatment. Thus, no conclusions could be drawn as to the effectiveness of the operant conditioning method employed. However, it was noted that recording itself did seem to aid in reducing the number of cigarettes smoked. As with many of the studies reported, lack of random sample, poor independent observer reporting, and the lack of any follow-up information makes this study rather weak in making inferences about the effectiveness of the procedure.

Barmann, Burnett, Malde and Zinik (1980)

In the only study employing token economy as a means to reduce smoking behavior, Barmann et al. (1980) studied its effect with a group of 30 psychiatric patients at a day treatment center. The goal of the study was to reduce the number of cigarettes smoked daily by the entire
group. Since the center was a closed environment and the staff could restrict smoking by anyone except the patients, the number of cigarette butts collected at the end of each day was the dependent variable. The butts were counted by two independent observers who were aware of the design of the study.

The study occurred over a 4 week period with the following conditions imposed each week: week 1 - baseline, week 2 - token economy, week 3 - baseline, week 4 - token economy. The token economy condition consisted of staff members awarding tokens at randomly selected, unannounced times during the day to patients who were not smoking. These tokens could then be exchanged for pre-selected merchandise.

The results indicated a significant reduction in the number of cigarette butts from baseline during the token economy weeks. The authors also noted the treatment gains had been maintained at 3 month follow-up intervals for a year. However, they do not specify the means of follow-up or if any measures were taken to verify the data. Considering results of previous studies reviewed in this survey, these data are highly suspect. Third party verification or some chemical measure would enhance the believability of the data.

This study provides an interesting application of token economy in the reduction of smoking. However, its usefulness in other than controlled environments is questionable. The use of positive reinforcement in maintaining reduction or cessation of smoking has already been demonstrated in the use of contracts. This would seem to be a much more viable means of achieving behavior change in the natural environment.
Stitzer and Bigelow (1983)

In a study similar to those in which deposit contracts were used, Stitzer and Bigelow (1983) employed contingent reinforcement for reduction of cigarette smoking. Utilizing a device which measured the level of carbon monoxide in a breath sample, the researcher paid volunteers for achieving reduction of carbon monoxide levels. The stated aim of the study was not to help subjects stop smoking, but simply to achieve reduction in carbon monoxide levels.

Sixty regular smokers volunteered and were randomly assigned to one of four contingent payment levels: a $0 pay group who received encouragement to cut down and a target carbon monoxide level to achieve, and a $1, $5, or $10 group who received payment daily for attaining a 50% reduction in carbon monoxide level from baseline. All subjects underwent 2 week preintervention (baseline) and 2 weeks intervention followed by 2 week postintervention. In the pre and post intervention phases, subjects were instructed to smoke in a normal fashion.

The results, based on carbon monoxide levels, indicated the contingent reinforcement significantly reduced the carbon monoxide levels with the $10 group achieving the largest reduction in carbon monoxide levels. A tendency was noted for the level of carbon monoxide to decrease with an increase in the magnitude of payments. During the postintervention phase, there were no significant differences between groups.

This study was a valuable contribution to the literature in so far as it offered an objective measure to gauge smoking behavior. It also provided some evidence that monetary reinforcers can aid in reducing

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smoking behavior. It would be interesting to see the carbon monoxide monitor used over a longer period to determine if longer lasting results can be achieved. In fact, carbon monoxide testing could be useful in verifying reduction achieved via other behavioral interventions.

The authors concluded that contingent reinforcement was successful, but that longer maintenance periods might be warranted to maintain abstinence. They also pointed out that the contract procedure was more successful with low frequency smokers. However, as in other studies, the tendency to relapse to pre-experimental levels was again evident at the follow-up.

This study employed a large number of subjects, across several experimental conditions and used statistical analysis for determining significance of results. Furthermore, it employed third party verification of the results. Adequate follow-up times were used. Further, controlled investigations into the use of longer contracts would be useful in determining the long term viability of the procedure.
CHAPTER XI

THOUGHT STOPPING

Wisocki and Rooney (1974)

One study, Wisocki and Rooney (1974), employed thought stopping as a technique for smoking cessation. Results indicated a significant effect at the end of treatment; however, at a 4 month follow-up, these effects had dissipated. (See section on covert sensitization for further description of this study.)

This study lacked sufficient sample size and independent observer verification of smoking behavior to draw any conclusions. However, it did suggest that further investigation into thought stopping would be useful.
CHAPTER XII

NICOTINE FADING

The technique of nicotine fading was developed on the assumption that cigarette smoking is a dependence maintained by physiological and psychological factors. The aim of treatment is to address the subjects physiological dependence on nicotine by gradually reducing the nicotine thereby minimizing the symptoms of nicotine withdrawal. In nicotine fading this is accomplished by switching to cigarette brands with progressively lower levels of tar and nicotine.

Foxx and Brown (1979)

Foxx and Brown (1979) studied the effects of nicotine fading and self monitoring in the treatment of smoking. The study had two goals: 1) to have a significant number of subjects achieve abstinence, and 2) for those unable to attain that goal, to smoke cigarettes with the lowest tar and nicotine available. The 44 subjects in the study were recruited via advertising and were screened to assure no one smoked below a predetermined level per day. Subjects were randomly assigned to one of four treatment groups after being matched according to cigarettes smoked per day and nicotine content of cigarettes. The four treatment groups were 1) nicotine fading, 2) self-monitoring, 3) nicotine fading and self-monitoring, and 4) a modified American Cancer Society stop smoking program which was used as a control. Subjects were required to keep detailed records and compliance was assured through the use of a
refundable deposit.

The nicotine fading group was required to reduce consumption of nicotine by switching to lower tar and nicotine cigarettes on a preset schedule. The 1st week was baseline followed by 3 weeks of nicotine fading. Each week nicotine content was reduced by 30%, so by the 4th week, a 90% reduction in nicotine content was achieved. The 5th week of treatment it was recommended the subjects quit smoking. The type cigarette smoked and the schedule of reduction was strictly controlled by the experimenter.

The self monitoring group was given the rationale that plotting their treatment progress would help them reduce their smoking until they could quit. They were taught to plot their progress using intake of tar and nicotine as the dependent variables.

The combined nicotine-fading and self monitoring group received a combination of the above mentioned treatment. The modified American Cancer Society stop smoking program group utilized a modified version of the Cancer Society's smoking cessation program. It was considered the control group. All groups were seen in 1 hour treatment sessions which utilized a variety of nonspecific factors and told the treatment was designed so they would quit by the fifth session. Follow-up was accomplished at 1, 3 and 6 months by contacting the subjects by telephone. In addition, two significant other informants were used to verify the data. Data from these reports were used in final data analysis.

Results indicated, at the 6 month follow-up, 50% of the nicotine
fading self monitoring group was abstinent compared to the other groups which did not exceed 10%. If nicotine and tar were considered, the nicotine-fading self-monitoring group also showed the greatest reduction on that measure. These were the two goals of the experiment mentioned earlier.

This study was sound scientifically and provided further direction in searching for an effective nonaversive stop smoking technique. The authors use of two significant other informants was useful in helping verify the data. Perhaps the only improvement could have been the use of some biochemical indication of smoking reduction. Foxx, Brown and Katz (1981) also report a 2 1/2 year follow-up of this study and indicate that the nicotine fading self monitoring group still maintained the greatest reduction in cigarette consumption. It appears this technique warrants further investigation.

Foxx and Axelroth (1983)

In a further investigation of nicotine fading and self monitoring, built upon Foxx and Brown (1979), Foxx and Axelroth attempted to replicate and extend that study. The basic study was extended by adding a cigarette fading procedure to the nicotine fading for those subjects who could not remain abstinent. Cigarette fading consisted of reducing the number of cigarettes smoked as well as the number of stimulus situations in which they were smoked.

Subjects were recruited via the media and were screened to eliminate those who smoked less than 15 cigarettes a day or cigarettes less than 0.7 milligrams of nicotine. Twelve subjects matched on variables
of age, number of years smoking and daily nicotine intake were randomly assigned to one of two groups. The difference between the groups was simply that Group II kept a 2 week baseline record as opposed to a 1 week baseline.

After baseline, both groups were placed in the nicotine fading, self monitoring procedure used by Foxx and Brown (1979). At the 4th treatment week, all subjects were told to quit smoking. Those subjects unable to abstain from smoking were placed in the cigarette fading treatment for 3 weeks. Subjects were required to make a 30% reduction in the number of cigarettes smoked each week for 3 weeks. At treatment week 7, they were told to quit smoking because their daily smoking level was at a level that they could do so without discomfort.

Follow-up was accomplished by telephone at 1 week, and 1, 2, 3, 6, and 12 months. The same method of significant other verification was employed as in Foxx and Brown (1979).

Results indicated at the end of treatment, 47% of the subjects were abstinent and at the year follow-up, the number had dropped to 33%. For those subjects who did not abstain, every follow-up indicated they were smoking lower tar and nicotine cigarettes. The authors considered the possibility the subjects may simply be smoking more of the lower tar and nicotine cigarettes and found this was not the case up to the 6 month follow-up. The authors conclude their results are similar to those of Foxx and Brown (1979). In so far as the addition of the cigarette fading technique in enhancing the effect of treatment, the results indicated it did not.
CHAPTER XIII

MISCELLANEOUS PROCEDURES

Gutman and Marston (1967)

Methods used by Gutman and Marston (1967) to help individuals in the experimental group control their smoking were successive approximation, counterconditioning and reinforcement. The general procedure of the study was as follows. The subjects were divided into small groups of five to eight couples. All couples were required to keep a week baseline record after which all subjects were asked to remain abstinent for 4 days. Those subjects who did not reduce their smoking rate to at least 25% of baseline rate were eliminated from the study due to lack of motivation. While the control group continued to keep records and try to reduce their smoking behavior, the experimental group applied the techniques of successive approximations via a stimulus hierarchy, counter-conditioning, and contingent reinforcement over a 4 week period. Through the baseline records, the subjects developed stimulus hierarchies and eliminated smoking in easiest situations first and progressed up the hierarchy. As far as the counter-conditioning, the subjects substituted stretching and deep breathing for smoking. The reinforcement in the form of cigarettes or other things, was contingent upon reaching daily smoking criterions. In the final week of the experiment, all subjects returned to regular record keeping.

Results indicated that both control and experimental groups re-
duced their mean smoking behavior significantly by the 4th week, but both showed evidence of relapse at the 1 month follow-up.

Several elements of this study shed doubt on its scientific usefulness; for example, there was a significant drop in number of subjects during the study. Of the 29 couples who returned after baseline, only seven remained at the end of the experiment. In addition, as in many of the experiments, no independent observer reports were used, although the pairing of couples probably did control somewhat for honest reports. Perhaps the greatest criticism of the study is the failure of the authors to control the interventions used; the subjects were allowed to control their own treatment, which made it difficult to determine whether the techniques were being used appropriately. In addition, the use of cigarettes as reinforcers for achieving control over smoking behavior is highly questionable.

Tooley and Pratt (1967)

In a case study in which a variety of behavioral techniques were applied to help subjects change their smoking behavior, Tooley and Pratt (1967) applied the techniques of contingency management, covert sensitization and contract management to their two subjects (husband and wife). The progression of treatment began with an introductory session in which the experimenters explained the rationale of the study and required the subject to monitor their smoking behavior. In the second and third sessions, relaxation training was given to the subjects in preparation for the covert sensitization phase of the study. Beginning with session four and continuing thru session six, covert sensiti-
zation was used. After session six, contingency management was added. Low probability behavior, negative thoughts about smoking, were reinforced with a high probability behavior like drinking water or coffee. After 5 days of contingency management and one more sensitization session, a contract management condition was imposed. The contract was for the subjects to give up the first cigarette of the day and not to smoke in each other's presence.

The results of this case study indicated that the covert sensitization brought the number of cigarettes smoked down to 10 and 11 cigarettes per day from a baseline of 50 and 35. When the contingency management was applied, the subjects' daily smoking dropped to five and one cigarettes respectively. Further contractual management reduced both subjects smoking levels to zero eventually. No concrete follow-up data were reported.

While this is admittedly a case study, it would have been interesting to have a longer follow-up to determine if the treatment applied had any long term effect. Also, third party verification of subject reports would be useful.

Chapman, Smith and Layden (1971)

Chapman et al. (1971) combined aversive conditioning via electric shock with self management training. The subjects, four males and eight females who had all previously tried to stop, were exposed to an aversive treatment which consisted of five consecutive daily treatments, 60 minutes a day, in which the subjects sat in a room with various smoking stimuli around (ads, burnt cigarettes, etc.). While in the room,
they were shocked at any time during the chain of smoking behaviors. In addition, if the subjects desired, they could choose an alternative behavior, having coffee or tea and discussing self management skills with the experimenter. These self management skills consisted of some covert thought exercises, stimulus control, role playing, in refusing cigarettes and alternative activities to smoking. All subjects were told they were expected to be abstinent by the end of treatment.

The results indicated only one of the subjects failed to reach a zero level of smoking by the end of treatment. However, by the 1 month follow-up only 1/3 of the subjects were still not smoking. The authors concluded the results were disappointing in terms of long range cessation of smoking. On the other hand, they did believe that the aversion therapy was instrumental in reducing the rate of smoking to zero during the treatment period. Due to a pre-paid deposit contract, all subjects completed treatment. Participant observers were used in most cases and there seemed to be high agreement between subject and observer.

The authors also report a replication of this study in the same article. The only differences between the initial study and this replication were: 1) a longer time in reporting daily smoking, 2) more stringent use of participant observer, 3) subjects were told that treatments would be continued until they did not smoke for 48 hours, and if they smoked more than two cigarettes in a 48 hour period during the post treatment reporting period, they would have to return for further treatments, and 4) a longer follow-up reporting period.

At the end of treatment, all but one of the subjects was not smoking. At the 12 month follow-up, six of the subjects were still absti-
The authors seem to believe the longer term data reporting was responsible in increasing the number of abstinent subjects over the first experiment.

This experiment was well controlled in terms of participant observer reports and in keeping subjects in treatment via the deposit contract. However, since no attempt was made to apply aversion techniques separate from the self management skills, it is difficult to indicate which is responsible for the changes in behavior. In addition, no control group was used, so it is entirely possible that non-specified factors played a large role in producing the behavior change. A more stringently controlled experiment is necessary to make any strong inferences from this study.

Harris and Rothberg (1972)

Harris and Rothberg (1972) conducted a pilot study in which a variety of basic behavioral self control techniques were taught in a series of eight written lessons to five subjects. As in many of the other studies, the authors reported a reduction in amount of smoking by subjects, but a tendency towards relapse at a 2 month follow-up. The authors concluded more data were needed to draw any conclusions.

Gerson and Lanyon (1972)

Gerson and Lanyon (1972) designed a study to evaluate covert sensitization as a treatment for smoking when followed by systematic desensitization or small group discussion. They hypothesized that the covert sensitization would result in a temporary reduction in smoking,
but those who did not receive systematic desensitization would fail to maintain the change in smoking behavior by a 13 week follow-up. The subjects studied were seven males and 14 females who were randomly assigned to the covert sensitization and systematic desensitization group, or the covert sensitization and general discussion group. All subjects were screened for emotional disturbance and honesty in reporting data. During the first six sessions, all subjects received training in relaxation and covert sensitization. In the remaining four sessions, the desensitization subjects went thru a 20 item hierarchy based on desire to smoke in a situation. The remaining subjects had a general discussion about issues around smoking. Prior to beginning treatment a 2 week baseline was taken.

The results showed that both groups reduced their smoking significantly at end of treatment, but only the systematic desensitization group remained significantly different from baseline at a 13 week follow-up. However, both groups showed a tendency to return to baseline level of smoking by the time of the last follow-up. Considering evidence from previous studies, the effects of both treatments would be non-significant if a longer follow-up had been used.

The main criticism of this study is the failure of the experimenter to use independent observers and an adequate follow-up time. However, the study did employ baseline data and compared two experimental groups. The results obtained seemed consistent with those obtained from other experimenters in their procedures.
Another study in which multiple techniques were used is that of Gordon and Hall (1973). In this case study, a fee paying 52 year old female who was experiencing physical difficulties thru smoking was the subject. Treatment entailed gathering baseline data, a $100 deposit (to ensure completion of treatment), stimulus control, punishment, tearing up a $1 bill whenever she smoked out of an approved stimulus situation. These procedures produced a rapid drop in smoking behavior over a 10 day period. When the rapid smoking procedure was introduced, the subject's smoking gradually decreased to zero. At a 3 month follow-up, the subject was up to 13 cigarettes daily, approximately half of the baseline data.

This case study is interesting in that the therapeutic interventions were tailored to the needs of the subject and seemed to aid the subject in achieving abstinence. However, as in many previous experiments, after 3 months the effects of treatment seemed to wane. Perhaps the techniques used, if extended over a longer period of time, would be more effective.

Carignan (1974)

In another case study, Carignan (1974) reports a student nurse who used a gradual reduction program in conjunction with the use of selected activities to reinforce adherence to the gradual reduction program. At the end of 60 days, Carignan (1974) reports the nurse had achieved abstinence, but no follow-up was reported. In addition, no detailed
description of the program is given to evaluate exactly the types of intervention used. The lack of follow-up and detailed description in this study makes it of little use in developing long term smoking control techniques.

Rozensky (1974)

Many of the techniques described in this paper have used clients monitoring their own behavior as a useful measure of behavioral change. In a case history, Rozensky (1974) manipulated this variable by having his 49 year old female subject follow this treatment regimen. First, she was asked to estimate her daily consumption for 2 weeks. After the 2 weeks, she was to continue estimating her daily consumption, but try to quit on her own for 3 weeks. After 3 weeks, she was told to record time and place of the cigarette smoked after she indulged. Having done this for 6 weeks, she then was instructed to monitor her behavior before she smoked for the remaining 8 weeks.

Results indicate a sharp reduction in smoking when pre-monitoring phase was instated. Authors did attempt to have the subject reverse to post-monitoring but she refused. At a 50 week follow-up, the subject reported no smoking since the termination of the experiment.

While this is a simple case study, it does suggest record keeping itself seems to have had an effect in reducing smoking behavior. More controlled comparison studies would be useful to explore this variable further.
Lando (1976) attempted to study the use of contingency management (in conjunction with aversive conditioning) as a means of obtaining better long term effects from behavioral approaches to smoking cessation. Forty-nine subjects were assigned to a contingency management group, a follow-up control or a no follow-up group. Half of each group underwent a rapid smoking procedure and half a low smoking control. Abstinence was required from the start of the study. The contingency management and follow-up subjects attended four, 45 minute follow-up sessions over a 16 week period. The contingency management subjects who were abstinent received partial refunds of a $50 deposit at each session.

The only significant finding was for the contingency management group to have more abstinent subjects at the end of treatment and at the 2 month follow-up than the other groups. As with many other studies in this paper, the results were not significant at the 6 month follow-up.

The description of this study was rather brief, but it does seem adequate care was taken in sampling, assignment to groups, and having a control group. However, no mention is made of how subject reports were validated. If the reports are accurate, the study does offer evidence for the use of contingency management for smoking cessation. However, support is not given for the superiority of rapid smoking versus the smoking group.
Believing that smoking cessation studies in the past years have already shown much promise in short term cessation of smoking behavior, Lando (1977) turned his attention to preventing or minimizing relapse from treatment gains. In a test of the hypothesis that a broad spectrum behavioral approach would be more successful than a short term aversive control treatment, Lando assigned 34 subjects to a control and experimental group. Both groups kept baseline data for a week prior to treatment. Both groups were then exposed to a week (six sessions) of aversive conditioning consisting of 25 minutes of continuous smoking. Control subjects were then told they would be responsible for being abstinent on their own and were given the suggestion that this had been effective in the past. After the initial treatment period, the experimental group underwent seven maintenance sessions during the 2 months after aversion conditioning. Maintenance sessions consisted of group discussions where problems and alternative solutions were discussed. In addition, contracts were drawn up promising forfeiture of money and booster aversive sessions for any smoking at all. All subjects were encouraged to create their own reward contracts for "good" behavior. Subjects kept data continually throughout the experiment. In addition, subjects also had to list informants who could be contacted later.

The results reported by the author supported his initial hypothesis. At the end of 6 months, the experimental group registered a significant reduction in smoking compared to the controls. However, even more impressive was the abstinence rate of the experimental group (76%) com-
pared to the controls (35%).

This study was a simple straightforward comparison of two treatment conditions. There seemed to be an adequate sample size, random assignment of subjects, baseline and experimental data kept and appropriate statistical analysis. One flaw, admitted by the author, is that informant data were not sufficient to draw any conclusions. However, if these results can be replicated in a future study, the program is a beginning at reaching a successful long term behavioral intervention for cigarette smoking. The author points out that once effective programs are found, the process oriented investigation can take place.

Lando and McCullough (1978)

In basically a duplication of Lando (1977), Lando and McCullough (1978) exposed 17 subjects to a very similar treatment regimen as the experimental groups of Lando (1977). Results indicated a 71% abstinence level at a 6 month follow-up which closely resembles the findings of Lando (1977). The authors still encourage more attempts at replication in other settings to verify these findings. Within the study, attempts were made to help non-abstinent smokers maintain their smoking at a reduced level. The number was too small to draw any firm conclusions. However, the concept is of interest for those smokers seemingly unable to achieve or maintain abstinence.

Colletti and Kopel (1979)

Recognizing that many previous studies had been effective in reducing or eliminating cigarette smoking behavior on a short term basis,
and realizing that long term results remained elusive, Colletti and Kopel (1979) studied three strategies for the maintenance of behavior change. Forty-two subjects were presented a treatment package consisting of self monitoring, stimulus control and information about the health hazards of smoking. The treatment package lasted 4 weeks and was preceded by 1 week of gathering baseline data. After treatment, the subjects were randomly assigned to one of three maintenance strategies: 1) a modeling group where treated subjects served as models for new subjects about to enter treatment, 2) participant observer - subjects were encouraged to participate in treatment groups, but not as models for the other subjects, and 3) self-monitoring. The latter two groups were considered controls. The hypothesis was that the modeling group would produce better maintenance of treatment effects than the other two groups.

The results reported by the authors suggest that all groups had significant reduction of smoking from baseline at a 1 year follow-up. No significant differences were found across maintenance strategies. Two subsequent follow-up studies of the data indicated the behavior change seemed to hold for up to 4 years after treatment (Colletti and Stern, 1980; Colletti, Supnick and Rizzo, 1982).

While these results sound impressive, the major fault is that no attempt was made to obtain verification of the subjects self reports with the exception of the study by Colletti, Supnick, and Rizzo (1982), where subjects interviewed in person were given carbon monoxide level tests. In view of the need for stringent verification of subject self reports, this author believes that study offers little to the knowledge of main-
tenance and cessation of smoking behavior.

Hills (1982)

In an investigation of self control technique of target setting, Hills (1982) studies the relative effectiveness of therapist paced versus client paced reduction. Sixty subjects assigned to one of three groups (self paced, therapist paced and control) were studied over an 11 week period (1 week-baseline, 10 weeks-target setting reduction). Subjects were also given instructions on tips to avoid smoking. Two months after treatment subjects were contacted for follow-up. Third party verification was used whenever possible. Results did not yield any significant difference between groups.

Despite the lack of significant results, the study did attempt to provide a good sample size, match subjects and use third party verification in follow-up. Several trends were noted which indicated the therapist paced group tended to do better. It would be interesting to see further research on this subject. Another trend was noted - that of a point at which smokers seem to get "stuck" in reducing their cigarette intake. This has been noted in other studies, and it may be an indication of some physiological dependence which causes resistance in treatment beyond a critical point.

Glasgow, Klesges, Godding, and Gegelman (1983)

Glasgow et al. (1983) studied the effectiveness of a treatment package they called "controlled smoking" for the reduction of smoking behavior. This consisted of a 5 week program which focused on modifying
the various dimensions of smoking behavior: 1) nicotine content, 2) number of cigarettes smoked per day, and 3) the percentage of cigarettes smoked. One goal of their study was to compare the effectiveness of controlled smoking with a waiting list control group.

In addition to the controlled smoking condition, Glasgow et al. (1983) also sought to study the effect carbon monoxide feedback would have in aiding subjects to reduce and control their smoking behavior. Carbon monoxide feedback consisted of providing subjects with information about the level of carbon monoxide in their blood at various points in the study.

The experimenters randomly assigned 60 subjects, recruited via media, into one of three groups: 1) controlled smoking, 2) controlled smoking plus carbon monoxide feedback and 3) a waiting list control. Treatment consisted of five weekly group meetings approximately 50 minutes in length. An initial orientation meeting was utilized to describe the self-monitoring procedures, administer a smoking pattern questionnaire, and to obtain carbon monoxide levels. A 1 week baseline record was taken.

Subjects in the controlled smoking group were exposed to the following treatment regimen. The 1st week, subjects were instructed to reduce their nicotine intake by half. This was accomplished by switching to a cigarette whose nicotine content was 50% of their previous brand. The 2nd week, treatment focused on decreasing the number of cigarettes smoked. This was accomplished by three methods: 1) controlling access to cigarettes, 2) controlling times allowed to smoke, and 3) controlling situations in which smoking was allowed. Subjects chose methods used
and essentially these were applied individually by each subject. The 3rd week, the percentage of each cigarette smoked was reduced by 50%. Subjects were instructed to mark each cigarette at the appropriate length. During the forth session, progress was evaluated and subjects chose which of the previous components they wished to develop (nicotine content, number of cigarettes or percentage of cigarettes). Week 5 was devoted to discussion of maintenance and relapse issues.

The controlled smoking plus carbon monoxide feedback group was exposed to the same treatment program described above, but also received carbon monoxide assessments and feedback at the beginning of each session. All treated subjects received follow-up assessments at 3 and 6 months where 1 week of self monitoring was done, carbon monoxide samples were collected and a smoking pattern questionnaire was completed. No third party verification was used.

The waiting list control group was told there would be a delay of 5 weeks before treatment could begin. After 5 weeks, subjects began a treatment program similar to the controlled smoking group. The initial orientation carbon monoxide levels, smoking pattern questionnaire and baseline provided data to compare with the two experimental groups.

Results indicated the controlled smoking yielded significant reduction at the end of treatment in comparison to the control. Follow-up data indicated these reductions were maintained up to the 6 month follow-up. The addition of the carbon monoxide feedback did not seem to enhance the treatment effect of controlled smoking. The authors concluded the additional time and expense of the feedback was not warranted.
This seemed to be a well controlled study which utilized interventions that modified several dimensions of smoking behavior. However, the authors mentioned the results obtained could have been validated further by the use of informant reports or some other objective measure. The carbon monoxide level is apparently only an indirect check on self-monitoring reports.

**Glasgow, Russell, Klesges, and Vasey (1983)**

This study replicated the study by Glasgow, Klesges, Godding and Gegelman (1983). Their results supported the findings of the previous study, thus offering further evidence for usefulness of controlled smoking in achieving reduction of smoking behavior.

**Glasgow, Klesges, Godding, Vasey and O'Neill (1984)**

Glasgow et al. (1984) continued to investigate controlled smoking as a viable means for cigarette smoking abstinence or reduction. In this study, they investigated the effects of gradual weekly reduction goals as compared to the abrupt reduction goals in the two previous studies (Glasgow, Klesges, Godding and Gegelman, 1983; Glasgow, Russell, Klesges and Vasey, 1983). In addition, they studied the effect of providing subjects with daily feedback on their nicotine intake.

Thirty-six subjects were randomly assigned to one of three experimental conditions: 1) abrupt reduction, 2) gradual reduction, or 3) gradual reduction plus feedback. All subjects followed the controlled smoking program described by Glasgow, Klesges, Godding and Gegelman (1983) with the following differences: the abrupt condition was the same, but was
extended to 7 weeks, the gradual reduction condition employed more gradual reduction goals (25% versus 50% of baseline). The gradual reduction plus feedback differed only in that subjects received daily feedback on their nicotine intake. Levels of smoking were monitored by carbon monoxide tests and self monitoring of subjects. At the 6 month follow-up, subjects also collected butts of all the cigarettes they smoked for the day.

The results indicated more subjects were abstinent in the gradual reduction condition than the abrupt condition at the 6 month follow-up. However, the nicotine feedback did not seem to enhance the effectiveness of treatment.

This study seems well controlled and adds to the two previous studies mentioned. It seems adding more gradual reduction goals in the controlled smoking program increases its effectiveness. This would seem consistent with results of the nicotine fading studies mentioned earlier in the paper (Foxx and Brown, 1979; Foxx and Axelroth, 1983). However, as in many of the other studies there was a tendency toward relapse in all groups, thus reinforcing the need for investigation into techniques for maintenance of abstinence.
CHAPTER XIV

CONCLUSIONS

Since the earliest studies on behavioral interventions for cessation of smoking behavior, we have witnessed growth in both the complexity of the studies and in the scope of techniques used. In the category of aversion therapy we have seen the use of electric shock, rapid smoking, hot smoky air, stimulus satiation, covert sensitization and other methods. The non-aversive methods are systematic desensitization, stimulus control, gradual reduction, contingency management, counterconditioning, self-control and a variety of others. In this section, each method will be briefly reviewed and evaluated for usefulness in smoking cessation.

By far, the greatest body of literature on smoking cessation has dealt with aversive techniques. The earliest account of aversion therapy employed hot, smoky air (Wilde, 1964). Since that time, there have been a few studies (Frank et al., 1966; Dawley and Aurich, 1975; and Dawley and Sardenga, 1977) which suggest hot, smoky, air may be an aversive technique which aids in reducing or abstaining from cigarettes. However, these have been primarily case studies and not controlled experimental investigations, and they offer little concrete information. Two other studies, Schmahl et al. (1972) and Lichtenstein et al. (1973), have offered further evidence for hot, smoky air as a suitable aversive agent. However, Schmahl et al. (1972) confounded the effects of rapid smoking with the hot, smoky air (as did Dawley and Aurich, 1975; and Dawley and

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Sardenga, 1977, who also added the aversive agent - cigarette litter). Lichtenstein et al. (1973) refined the work of Schmahl et al. (1972) and determined that hot, smoky, air may be thought of as an interchangeable technique with rapid smoking.

Of the aversive techniques used, rapid smoking has been the most thoroughly studied. All of the studies reviewed with the exception of Raw and Russell (1980) indicate rapid smoking is an excellent tool to achieve short term cessation of cigarette smoking. (Schmahl et al., 1972; Lichtenstein et al., 1973; Lando, 1975; Levenburg and Wagner, 1976; Danaher, 1977; Barbarin, 1978; Glasgow, 1978; Lando, 1976; Lando and McCullough, 1978; Dawley and Aurich, 1976; Dawley and Sardenga, 1977; Lando, 1977; Relinger et al., 1977; Best et al., 1978; and Poole, Sanson-Fisher and German, 1981.) However, several studies also indicate that the effects of rapid smoking are prone to the typical relapse patterns found with other techniques (Lando, 1975; Levenburg and Wagner, 1976; Glasgow, 1978; Relinger et al., 1977; Dawley and Sardenga, 1977; and Poole Sanson-Fisher and German, 1981). On the other hand, some other studies suggest the effect of rapid smoking may be longer lasting than other techniques (Schmahl et al., 1972; Lichtenstein et al., 1973; Barbarin, 1978; Dawley and Aurich, 1975). Perhaps the most exciting investigations are those which seek to maintain the therapeutic gains of rapid smoking by following it with a broad spectrum maintenance program. These studies offer much hope for rapid smoking in conjunction with other behavioral tools as an effective treatment for smoking cessation (Best et al., 1978; Lando, 1977; Lando and McCullough, 1978). One caution in the use of rapid smoking is that it can be a dangerous technique if indivi-
duals are not adequately screened for cardiovascular problems.

Of added note are the studies comparing stimulus satiation with rapid smoking (Lando, 1975; Best et al., 1978). These studies indicate that stimulus satiation and rapid smoking produce equal results and may be interchangeable treatment techniques.

As with rapid smoking, stimulus satiation has been studied more thoroughly than many of the other techniques. However, stimulus satiation has not yielded as consistent results as has rapid smoking. Studies by Resnick (1968, a and b), Marrone et al. (1970), Sutherland et al. (1976), Lando (1975), and Best et al. (1978) have indicated that it is a valuable technique for smoking cessation. On the other hand, studies by Marston and McFall (1971) and Claiborn et al. (1972) suggest stimulus satiation does not produce results vastly different from control groups or other techniques. However, when used in conjunction with rapid smoking, it seems to be an effective technique for short term cessation (Lando, 1977; Lando and McCullough, 1978). These effects are confounded with rapid smoking, so it is difficult to determine the extent of stimulus satiation effect. The best that can be said of stimulus satiation is that it shows promise, but further research is indicated.

Another widely studied method of aversive control is the use of electric shock contingent upon some aspect of smoking behavior. Of the studies reviewed in this paper, Koenig and Masters (1965), Gendreau and Dodwell (1968), Powell and Azrin (1968), Roy and Swillinger (1971), Berecz (1972), Ober (1968), Levine (1974), Pope and Mount (1975), Whitman (1969), and Conway (1977), most provide evidence that electric shock is effective in reducing or eliminating smoking behavior during experiment-
al conditions. However, there is little evidence to suggest it has long term therapeutic effects. This is true even with attempts to move the aversive effects into the natural environment (Powell and Axrin, 1968; Ober, 1968; Whitman, 1969). The one exception to this is the study by Pope and Mount (1975); however, there was no check on the reliability of subject reports, so the results are suspect in the light of other research. Of the studies employing larger sample sizes, only this one shows evidence that electric shock alone has long term therapeutic effect.

The studies employing more novel aversive approaches to smoking, the wrist snapping of Berecz (1979) and reciprocal aversion by Lichstein and Stalgaitis (1980), are interesting, but need more investigation. However, they remind us that other aversive techniques can be developed and explored.

Of the studies reviewed that included some aspect of covert sensitization, only three, Sachs et al. (1970), Gerson and Lanyon (1972) and Barbarin (1978), suggest covert sensitization offers hope as a therapeutic technique for smoking cessation. In two of these, Gerson and Lanyon (1972) and Barbarin (1978), other techniques or combination of techniques seemed to be more effective. In this author's opinion, covert sensitization does not offer as much promise as other aversive techniques. However, in view of possible health hazards associated with rapid smoking (and possibly satiation or hot, smoky air), it may be a substitute for actual aversion.

Considering the major aversive techniques of electric shock, rapid smoking, stimulus satiation, covert sensitization and hot, smoky air,
the techniques which most closely approximate the actual aversive stim-
uli of the smoking situation itself offer the most promise for future
smoking cessation, namely, rapid smoking and stimulus satiation. There
is a clear body of evidence suggesting their viability. Also, they re-
quire no specialized apparatus for employment. As mentioned before, they
take advantage of the naturally aversive elements of the cigarette it-
self. The two studies by Dawley and Aurich (1975) and Dawley and
Sardenga (1977) also offer another aversive element, cigarette litter,
as a possible source of aversion. A general conclusion by this author
is that aversive control is useful in obtaining short term cessation of
smoking behavior. However, other elements need to be added to maintain
the behavior change. It should be noted in studies where this was done,
long term effectiveness of treatment was increased dramatically (Best et
al., 1978; Lando 1977; Lando and McCullough, 1978). Thus, aversive con-
trol is a useful tool in the behavior therapist's repertoire of therapeu-
tic techniques.

A generally accepted technique in behavior therapy is systematic
desensitization. Of the studies reviewed, none offer any evidence that
systematic desensitization by itself is a useful tool in smoking cessa-
tion. Furthermore, the premise that smokers who smoke in response to
anxiety would do better with systematic desensitization was not support-
ed by Levenburg and Wagner (1967). The study which indicated desen-
sitizing social anxiety reduced smoking behavior (Kraft and Al Issa, 1967)
was not well controlled enough to draw any concrete conclusions. Fur-
thermore, Levenburg and Wagner's (1976) work suggests relaxation train-
ing itself may contribute to the behavior change obtained with systema-
tic desensitization. In short, this technique has failed to produce results which would support it as a treatment of choice for smoking reduction.

In attempts to narrow the stimuli associated with cigarette smoking and bring it under control of one stimulus, experimenters tried to manipulate stimuli associated with smoking. These studies can be grouped in two categories: 1) an artificial stimulus such as a tone paired with the availability of a cigarette, and 2) the situations in which smoking takes place are gradually narrowed. Of the three studies in category 2, Nolan (1968), Roberts (1969), Sachs et al. (1970), all offer some evidence for the usefulness of narrowing the stimulus situations in which smoking occurs. However, since two of these studies were single subject case studies (Nolan, 1968; Roberts, 1969) and the third offered only weak support for this approach to stimulus control, one can only suggest that this is a technique which warrants further investigation.

Of the studies which attempted to bring smoking behavior under the control of an artificial stimulus, Azrin and Powell (1968), Upper and Meredith (1970), Shapiro et al. (1971), Levinson et al. (1971), Bernard and Efran (1972), Claiborn et al. (1972), two of the studies used timeout from the availability of cigarettes or smoking on a fixed schedule (Azrin and Powell, 1968; Claiborn et al., 1972). Azrin and Powell's (1968) study suggest timeout from the availability of cigarettes was effective. However, a more detailed and better controlled study is needed. Claiborn et al. (1972) reported no significant results using fixed schedules for smoking.

The remaining studies, Upper and Meredith (1970), Shapiro et al.
(1971), Levinson et al. (1971), and Bernard and Efran (1972), employed some type of timed auditory stimulus which signaled the availability of a cigarette. Upper and Meredith (1970) suggest this is a reliable technique, but due to weaknesses in the experimental design further generalization is presumptuous. In a better designed study, Shapiro et al. (1971) found significant results for the stimulus control approach at the end of treatment. However, due to weaknesses mentioned previously it is difficult to draw strong conclusions from the study. Levinson et al. (1971) also suggest that the stimulus control of buzzers and times significantly reduce the amount of smoking. Replicating Upper and Meredith's study, Bernard and Efran (1972) found little difference between a "timer-elimination", "timer-reduction" and gradual reduction control group, with the exception that the "timer-reduction" group was significantly different from the control at a 2 month follow-up. However, that group was also showing a tendency toward relapse.

In short, the stimulus control approaches show limited promise in helping with the cessation of smoking behavior. While the evidence has been only in the form of case studies, the stimulus control approaches, which gradually narrow the situations in which smoking takes place, seem to be the preferable direction for further study. The "naturalness" of this approach and the ease of implementation from a clinical standpoint would make it preferable in comparison to the use of an artificial stimulus. Furthermore, it is questionable whether such an ingrained behavior as smoking can really be brought under the control of an artificial stimulus, when it has been paired many more times with stimuli in the smokers environment. The research, thus far, has not
suggested otherwise. Common wisdom from self help groups, like Alcoh­
holics Anonymous, suggest that reducing exposure to environmental sti­
umuli which previously have been paired with drinking, aids members to
stay abstinent from alcohol. This principle of "people, places and
things" seems to lead to a gradual reducing of the strength of the
stimulus-response pairing. While stimulus control has thus far shown
limited effectiveness in cessation of smoking, it would be interesting
to see it used in some fashion as an abstinence maintenance tool.

Of the four studies cited on gradual reduction, none offered any
outstanding results to suggest its use as a long-term smoking cessa­
tion tool (Levinson et al., 1971; Marston and McFall, 1971; Claiborn
et al., 1972; Bernard and Efran, 1972). On a short term basis, it also
did not appear to be superior to any of the techniques with which it
was compared: stimulus control and stimulus satiation (Levinson et al.,
1971; Marston and McFall, 1971; Bernard and Efran, 1972).

The technique of nicotine fading, on the other hand, offers another
promising area of investigation. The studies cited by Foxx and Brown
evidence for its usefulness. These data seem to be supported further by
the controlled smoking study by Glasgow, Kesges, Godding, Vasey and
O'Neill (1984) which incorporated nicotine fading in its "gradual re­
duction" group. Further investigation of the technique is warranted.

The use of alternative behaviors, substituted for smoking behavior,
in the presence of smoking eliciting stimuli has not been widely studied.
Whitman (1969) suggests counterconditioning was as effective as other
methods (aversive control, and education) in short term smoking reduc­
tion, but produced no long term results. Dawley and Aurich (1976)
suggested utilizing the behavior of drinking water instead of smoking
to their subjects. However, this was confounded with other techniques,
so it is not possible to infer anything about counterconditioning from
that study. The most that can be said about counterconditioning is that
it warrants further research.

Of the studies utilizing deposit contracts, all seemed to indicate
that deposit contracts were helpful in reducing smoking behavior or in
maintaining abstinence (Elliot and Tighe, 1968; Winett, 1973; Spring et
al., 1978; Paxton, 1980; Paxton, 1981; Paxton, 1983). The research
seems to be directed now at varying the parameters of contracts to de­
termine what is most effective (Paxton, 1980; Paxton, 1981; Paxton, 1983).
In addition to varying the amounts of contracts, it is this author's
opinion that varying the type of deposit may be useful. In other words,
substituting valued personal items like radios, rings, etc. In general,
deposit contracts seem promising and should be studied further.

Of the studies using operant methods, Keutzer (1968) and Lawson
and May (1970) studied the use of the Premack principle to reinforce
negative thoughts about smoking behavior. These studies suggested this
was as effective as the intervention with which it was compared. Follow­
ups again indicated the tendency toward relapse. Miller and Giml's
(1971) study utilizing positive reinforcement was not well controlled
enough to make any concrete inferences. Barmann et al. (1980) utilized
token economy with reported success, but lack of verified follow-up
information makes further inferences tentative.
The most interesting of the operant studies is that of Stitzer and Bigelow (1983) in which monetary rewards were contingent upon reduced carbon monoxide levels. While the contingency was in effect, carbon monoxide levels were reduced. I believe this offers support for the use of some objective means of verifying behavior change. As tests are refined and made more easily accessible, they should be used to back up data from self reports. In addition, it offers further support for contract type interventions.

Wisocki and Rooney (1974) is the only study which employed thought stopping as a smoking cessation technique. As with many of the studies described, the results indicated a significant effect at the end of treatment, but a tendency to relapse at a 4 month follow-up. Further investigation of thought stopping is warranted.

Of the miscellaneous studies which employed a variety of interventions, the two that yielded significant long term results are Lando (1977) and Lando and McCullough (1978). These studies, employing rapid smoking, aversive maintenance sessions, group discussion and contractual management, provide the most promising results to date for behavioral interventions for smoking cessation. No attempt was made to determine which interventions, beyond the initial rapid smoking, accounted for the significant abstinence rate at the 6 month follow-ups. Future research can address these process oriented questions.

Finally, the studies involving controlled smoking offer another multi-faceted approach to altering smoking behavior (Glasgow, Klesges, Godding, and Gegelman, 1983; Glasgow, Russell, Klesges, and Vasey, 1983; and Glasgow, Klesges, Godding, Vasey and O'Neill, 1984). This
procedure uses many of the techniques studied earlier in combination, and suggest it may be useful in reducing and eliminating smoking behavior. The procedure is also non-aversive and therefore may be useful for subjects whose health contraindicates the use of rapid smoking type interventions.

In reviewing the whole body of research covered by this paper, several issues surface. First, the achieving of short reduction or cessation of smoking behavior via behavioral interventions has been demonstrated. Most of the procedures studied produced reduction or cessation in comparison to baseline rates. The most effective technique seemed to be that which utilized the naturally aversive qualities of cigarettes themselves - rapid smoking. Other techniques also lead to reduction in smoking behavior, but to a lesser extent. In view of possible health hazards associated with rapid smoking, other techniques such as covert sensitization, stimulus control, contractual management, nicotine fading or controlled smoking, may be useful in achieving short term cessation.

The major issue noted throughout the paper is the problem of achieving long term cessation of smoking behavior. The majority of the studies reviewed indicated a tendency towards relapse at follow-ups. The two notable exceptions to this were Lando (1977) and Lando and McCullough (1978). It seems the broad spectrum approach taken by them is indicated in order to produce longer term results. Contractual management may have been particularly helpful in achieving these results. In addition, the group discussion mya have also functioned in much the same way that self help groups aid individuals to remain.
abstinent from mood altering substances. Future investigations would do well to utilize a variety of interventions to maintain behavior change.

In light of the tendency to relapse, it is also essential that studies utilize at least a 6 month follow-up to prove effectiveness of treatments. A one year follow-up would be even more useful. Furthermore, third party verification of smoking behavior is essential in order to increase confidence in research results.

In view of the difficulties in achieving and maintaining smoking cessation, it is this author's opinion that complete abstinence is the only reasonable goal for smoking modification studies. The research does not offer support for the maintenance of smoking at a reduced level. It appears, as is the case with other substance abuse disorders, anything short of total abstinence will eventually result in a return to smoking at pre-treatment levels.

In summary, behavioral interventions for the treatment of smoking behavior have produced promising results on a short term basis, but few studies have demonstrated long term effectiveness. The direction of further research should concentrate on developing strategies to maintain long term abstinence. Aversion therapy (in the form of rapid smoking) seems to produce consistent results on a short term basis. Contractual management seems to aid in longer term behavior change. Other interventions which have shown promise also warrant further study as aids in producing long term behavior change.
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