SATIATION COMBINED WITH A "RITUALIZED" ALTERNATE RESPONSE IN THE REDUCTION OF CIGARETTE SMOKING: A COMPARATIVE STUDY

Ze'ev Rosberger

A THESIS
In
The Department of
Psychology

Presented in Partial Fulfillment of the Requirements for the Degree of Master of Arts at Sir George Williams University, Montreal, Canada

September, 1974

© Ze'ev Rosberger 1973
Abstract

Zeev Rosberger

Satiation Combined With a "Ritualized" Alternate Response in the Reduction of Cigarette Smoking: A Comparative Study

Two techniques for reducing smoking were studied either alone or in combination. A satiation procedure was used which required the subject to smoke rapidly in order to produce nausea. It was hypothesized that this technique, which had the advantage of pairing the smoking act and the smoke itself with nausea, combined with teaching the subject to use an alternate response (a "ritualized" relaxation procedure) would prove to be an effective method for reducing smoking. In this study, 45 subjects were placed in one of four groups: combined Relaxation-Satiation (R-S); Satiation (S); Relaxation (R); or Minimal-Treatment Minimal-Contact Control. A fifth group of nine subjects, unaware of the above study, recorded daily cigarette intake only. The R-S Group showed greater smoking reduction than the other four groups. The R and S groups showed significant smoking decrement compared to controls. However, at three-month follow-up, there was no significant difference between groups. The failure of subjects to treat extra-therapy cigarettes as experimental (i.e., smoke them rapidly), as well as their need to clarify their commitments to smoking reduction were the main reasons for poor long term results.
Acknowledgements

It goes without saying that an undertaking of this magnitude cannot be accomplished by a single person. To wit, I must thank my supervisor, Zalman Amit, for his ideas and support throughout the course of this study; Ann Sutherland for her advice and her supporting role; and Horrie Golden, for his supporting role in running many of the subjects. I must also thank the members of my committee, Bill Breder, Cam Perry, and John Wright for their advice and support as well as Jane Stewart for helping to make the oral thesis defense an interesting and non-threatening event. In addition, many thanks to Tannis Waag, for her assistance with the statistical analysis.

Last (but certainly not least), my eternal gratitude to my wife-to-be, Gabrielle, for her ceaseless support and encouragement during the course of this study, and for her tireless typing of all the drafts of this thesis. It would never have been done without her.
## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>ii</td>
</tr>
<tr>
<td>List of Figures</td>
<td>iv</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Method</td>
<td>27</td>
</tr>
<tr>
<td>Results</td>
<td>33</td>
</tr>
<tr>
<td>Discussion</td>
<td>39</td>
</tr>
<tr>
<td>References</td>
<td>47</td>
</tr>
<tr>
<td>Appendix A</td>
<td>57</td>
</tr>
<tr>
<td>Appendix B</td>
<td>59</td>
</tr>
<tr>
<td>Appendix C</td>
<td>61</td>
</tr>
</tbody>
</table>
List of Figures

Figure                                                                 Page

1. Mean Number of Cigarettes Smoked Per Day for All Groups During Baseline, Treatment, and Follow-up 35

2. Mean Percent of Baseline Smoked for All Groups During Baseline, Treatment, and Follow-up 36
Introduction

In recent years, an intensive and multi-faceted research program has been initiated into the area of cigarette smoking and health. Reports published have included epidemiological, clinical, experimental, and theoretical approaches. All of these reports have contributed to the vast amount of knowledge presently known about smoking and have elevated public concern over the dangers of smoking to a great degree.

Epidemiological studies in the 1950's have demonstrated the relationship between chronic use of tobacco products and the incidence of mortality due to severe disease (Surgeon General's Report, 1964). This report indicates that chronic smokers are almost eleven times more likely to acquire lung cancer or, twice as likely to contract coronary disease, as compared to non-smokers. The desirability of research directed toward effective cigarette smoking cessation methods, is evidenced by the fact that these diseases account for eighty-five percent of the higher death rate among smokers. The Surgeon General's Report also demonstrates that the frequency of these diseases rises with the increased individual consumption of cigarettes. Low levels of cigarette use (less than 10-12 cigarettes per day) are not as highly related to the incidence of disease as higher levels of intake, indicating that maintenance of a low level of consumption may be advantageous for the individual smoker. Because of this relationship, maintenance of lowered smoking frequency

1
null
Other lines of research have attempted to demonstrate that smoking is related to certain personality characteristics. A review of research on personality variables in smokers by Smith (1970), summarizes those characteristics which distinguish smokers from non-smokers. Smith's general conclusions, (in reviewing relevant studies which utilized psychological tests, questionnaires, and interviews), were that smokers were more extroverted, more anti-social, impulsive, and more externally controlled, i.e., more likely to attribute what happens to them as fate, luck, etc., rather than to what they themselves do. He also suggests that smokers tend to exhibit poorer "mental health", a vague concept for which no adequate definition is offered. These correlations, although significant in many cases, have failed to be predictive of successful therapeutic outcome (Keutzer, 1963; Lichtenstein and Keutzer, 1959; Best and Steffy, 1971). Large-scale studies, correlating different personality variables, with diverse, successful therapeutic modes, need to be carried out to discover whether these variables can be utilized in a useful predictive manner.

TREATMENT PROGRAMS

Although extensive medical research continues into the nature of the relationship between cigarette smoking and disease, and new techniques of curing these diseases, other research has delved extensively into the prevention and treatment of smoking. Preventative measures have been instituted in schools, down to the early elementary grades, with the
Other approaches have involved the treatment of smoking behaviour itself in an attempt to discover and change the variables which may initiate and those which may maintain the behaviour. Many different methods have been attempted in the drive to discover these variables and eliminate them. These have included public smoking clinics, offering both drug (e.g., Ejrup, 1964), and non-drug (e.g., Lawton, 1962) therapies; group therapies (e.g., Tamerin, 1972); hypnosis (Johnstone and Donoghue, 1971); use of nicotine substitutes (Kernstein, 1969); education and information dissemination (e.g., O’ Keeffe, 1971); and behavioural therapies, (e.g., Koenig and Masters, 1965). All of these approaches have indicated success to one degree or another, but few have demonstrated successful abstinence which is perhaps the most important criterion for a treatment program.

One uniform aspect of most of these studies lies in their poor experimental design. Outcome is of reduced significance, if active treatment variables cannot be accurately related to a sound theory of cigarette smoking maintenance, so that replication and productive clinical use can be achieved.

Early examples of treatment approaches were strictly clinical in design and scope. One of the best examples of the "clinic" approach was the multi-faceted treatment of Ejrup (1964). Although he showed dramatic improvements—as high as eighty-eight percent abstinence—his results are not easily attributable to any specific treatment variables. This occurred because at any given point in the study, a combination of any or all of the following were employed: informa-
In a similar experiment, a large number of rats were observed over a period of 3 months. It was noted that the control group showed no significant differences in behavior. However, the experimental group displayed a significant increase in activity, especially in the late hours of the day. This result was consistent with previous findings in the field.

In another experiment, a similar procedure was followed. A group of rats was divided into two groups, control and experimental. The experimental group was subjected to a novel environment, while the control group remained in their usual surroundings. The results showed a significant increase in exploratory behavior in the experimental group, indicating a positive effect of the novel environment.

In a third experiment, the effects of sleep deprivation were studied. Rats were divided into two groups, control and experimental. The experimental group was deprived of sleep for 24 hours, while the control group slept for the same period. The results showed a significant decrease in performance in the experimental group, indicating the importance of sleep in cognitive function.

In conclusion, these experiments suggest that environmental factors and sleep deprivation have significant effects on behavioral and cognitive function. Further research is needed to understand the underlying mechanisms.
(For example, the correct nomenclature is that "cooperator" should be an individual, not a group, etc.)

In such cases, the social behavior is not a function of the

individual's own behavior but rather of the interactions between them. This is evident in the kindergarten, in which children's behavior is largely determined by the behavior of their peers. The child who is prone to aggression may learn to control his impulses by observing and imitating the behavior of his peers. In this way, the child is able to develop more mature social skills.

For example, the study by Bandura (1965) found that children who observed adult models engaging in prosocial behaviors were more likely to exhibit prosocial behavior themselves. Similarly, children who observed aggressive behavior were more likely to exhibit aggressive behavior. This suggests that social behavior is not solely a function of individual characteristics, but is also influenced by the behavior of others in the social setting.

In conclusion, the study of social behavior requires an understanding of the complex interactions that occur within social groups. By examining the role of the individual and the group, we can gain a more complete understanding of the factors that influence social behavior.
shortcomings by creating paradigms in which the punishing stimuli used to suppress the smoking act were more closely related to the smoking act itself. Thus, blasts of hot, smoky air were used in several experiments as an aversive stimulus (Wilde, 1964; Franks, Fried, and Ashen, 1966; Grimaldi and Lichtenstein, 1969). The best controlled of these studies (Grimaldi and Lichtenstein, 1969) has shown that this technique is of limited value in that groups receiving both contingent and non-contingent blasts of air did not differ from each other or a control group.

Another approach to the elimination of maladaptive behaviour, was developed by Allyn and Michael (1958). Using a satiation technique, they eliminated magazine hoarding behaviour in a mentally defective patient by filling his room so that it overflowed with magazines. The positively reinforcing value of the hoarding response became aversive, so that the patient began to actively remove magazines from his room. Social reinforcement (attention) was given for the emitting of non-hoarding behaviour. Allyn (1963) used a similar method in successfully eliminating towel hoarding behaviour.

Resnick (1969) applied this idea to the development of an aversion to smoking. One group of subjects was instructed to increase their smoking rate to three times the base rate, while another increased their rate to twice the normal. The treatment period was one week. Both groups showed highly significant smoking decrements at a four-month follow-up, with 63% having remained abstinent. Both were significant-
three active treatment groups maintained a smoking level at between 20-30% baseline at a six-month follow-up, whereas the attention-placebo group returned to approximately 70% of baseline cigarette intake.

The development of a conditioned aversion to cigarette smoking has shown varied results. The relative degree of success may be, for the most part, attributed to the utilization of an aversive stimulus, which has progressively possessed properties more closely related to those effective in the maintenance of the actual smoking act itself. Thus the strongest aversions have been created when the smoking act has been manipulated in order for it to produce aversive properties rather than positively reinforcing properties (i.e., through the use of rapid smoking or satiation).

However, it has been noted that although punishment may adequately suppress behaviour, the behaviour is not, in reality, extinguished. Cigarette smoking is more than simply the inhaling of smoke, as it has been shown that nicotine plays a relatively minor role in reinforcing smoking behaviour (Jarvik, 1970). Smoking has been characterized as a habit or "ritual", as "something else to do in a social situation"; for example, when there is a lull in a conversation (Hunt and Vatarazzio, 1970). The chain of behaviours involved in smoking (i.e., taking out the pack, opening it, taking out a cigarette, lighting a match, etc.) make up this "ritual". In a sense, this then becomes a social "crutch". When smoking behaviour is suppressed through punishment or conditioned aversion, a large gap occurs in the
behavioural repertoire of a chronic cigarette smoker. Wagner and Braga (1968) overcome this problem by dealing with both the positive aspects of smoking and the negative aspects of smoking cessation. Covert sensitization was used to suppress smoking, whereas systematic desensitization taught the subjects to relax in situations where they imagined they wanted a cigarette. One control group was taught relaxation as an alternate response to smoking with little comparative success. Resnick (1968) instructed his subjects to chew gum if they felt that they still wanted a cigarette after the treatment period. Sushinsky (1972) has suggested that the use of an alternate response may have accounted in part for Resnick's significant findings.

Chapman, Smith, and Layden (1971) made tea or coffee drinking an unpunished alternate response to the extinguishing of a cigarette in their paradigm. Further evidence includes that of Katz (1973) who demonstrated that in a concurrent response situation, the greatest suppression of one response (due to an aversive stimulus; in this case, white noise) occurred when the relative reinforcement rate for the alternate behaviour was equal to that of the punished behaviour. No suppression was obtained when the alternate response was not reinforced at all. The necessity of a highly reinforced alternate response in a punishment paradigm, in order to maintain behaviour change, is certainly manifest.

It has been demonstrated that two major considerations must be made in order to maintain long term smoking
abstinence. First, suppression of the smoking act can be attained through an aversion paradigm where the smoking act itself acquires aversive properties, thus creating maximum suppression. Second, once the smoking act is extinguished, another highly reinforcing behaviour or series of behaviours must be discovered which will adequately fill in the "space" left in the subject's behavioural repertoire, due to the absence of the smoking act.

It is hypothesized here that a combination of a conditioned suppression, obtained through the use of the satiation technique, in combination with a positively reinforced alternate response, (in this case, a "ritualized" relaxation procedure) will bring about the greatest reduction in cigarette intake and the best long term maintenance of this reduction. Nausea, produced by sufficient doses of cigarette smoke was the punishing stimulus in the satiation paradigm. A ritualized, shortened version of the relaxation procedure was used as an alternate response to fulfill several criteria: it is highly positively reinforcing in itself; it is non-satiating; and it is simple, expedient, and inconspicuous.

Five groups were run to adequately test this hypothesis. Four of these were selected from a population who had been solicited through a publicity program to join a stop-smoking clinic and thus were motivated to change. One group received both relaxation and satiation treatment; the second received satiation only; the third received relaxa-
tion alone, in a paradigm where exposure to treatment sessions was equalized across the groups. The fourth group was a minimal-contact control who were instructed to essentially stop on their own, but were given several techniques to help the subjects try and cut down. This group controlled for extraneous variables such as motivation and effort and partials out the effect of essentially having a subject stop on his own, variables which may confound the outcome of the active treatment groups (Bernstein, 1969).

The fifth treatment group was an unsolicited or non-motivated group. Subjects were selected from a group of known smokers and told that the experimenters were interested in discovering how smoking rates varied over time. Thus, they were asked simply to record their daily cigarette intake for the same period of time as the subjects in the other groups. None of the subjects in this group were aware that the experimenter was involved in a stop-smoking research program. The purpose of this group was to account for the reactive effects of inobtrusive recording in a non-motivated group (Bernstein, 1969; McFall, 1970).

It was expected that the three treatment groups would achieve significantly lower rates of smoking than the two control groups; that the combined relaxation-satiation group would demonstrate significantly lower smoking frequency than either the relaxation or satiation group alone, and also would maintain this decrease at follow-up. No difference was expected between the two control groups.
Subjects

Volunteer subjects were recruited through advertisements placed in the local newspapers as well as by posters which were exhibited in strategic areas around several universities in Montreal, stating that smokers who wished to "kick the habit" were invited to join a study conducted by the Centre for Research on Drug Dependence at Sir George Williams University. Subjects who contacted the centre were then telephoned and asked to one of the several introductory sessions. Subjects for one of the control groups were selected from a different population. Since non-motivated subjects were desired for this group, (i.e., subjects who had not expressed any desire to quit smoking) these were chosen from a group of people who were known to smoke, but had no knowledge whatsoever of the smoking cessation study.

Approximately 60 people answered the advertisements for the smoking study. Of these, 49 were able to actually participate in the study. Twenty-seven of this group were females and 22 were males. Of these people, approximately 50% were students, and 50% of the subjects had no relation to the university. Nine subjects were solicited from the non-motivated subject population, six females and three males.

Procedure

During the introductory session for the volunteer
subjects a short talk as given on the rationale for the study. Subjects were told that the experimenters were interested in comparing a number of different smoking cessation procedures, which had all proved to be effective in the past, so that the relative efficacies of these procedures might be ascertained. Subjects were also informed that they would be required to keep daily records of their cigarette consumption for a period of nine weeks (1 week baseline, 6 weeks treatment and two weeks of follow-up); submit urine samples periodically (for analysis of nicotine content); and have their weight recorded. In addition, to control for the high rate of attrition so frequently encountered in similar studies a $25.00 deposit was required of each subject. This sum was refunded to each subject at the end of the nine-week period, provided that all sessions were attended and all data submitted. It was explained that the money had no relation to whether the subject quit smoking or not.

A smoking history questionnaire (See Appendix B) and the Eysenck Personality Inventory-Form A (Eysenck and Eysenck, 1963) was administered to each subject. The Eysenck was used to screen out any highly neurotic individuals from the study.

Subjects from the pool of volunteers were randomly assigned to each of the three active treatment groups and the minimal treatment-contact group.

Subjects for the non-motivated control group were
invited to a separate introductory session. They were asked to fill out the Eysenck Personality Inventory as well as the smoking history questionnaire and told that the reason they had been asked to participate was that the experimenters were interested in how smoking rates changed over time and wished them to record their cigarette intake over a short period of time. (Details to be given below.)

**Relaxation Group (R)**

Subjects in this group were given training in progressive relaxation (Jacobson, 1938). This was done in half-hour sessions, twice weekly for three weeks. (Sessions were never held on consecutive days.) The sessions were carried out in small, dimly lit rooms. Subjects reclined in a comfortable lounge chair for the training session. Approximately 20 minutes of each session was spent in the practice of the relaxation technique. The other ten minutes were used for collecting data sheets, urine samples and weighing in. Beginning at the second session, the subjects were taught a shortened version of the relaxation procedure or "ritual". This continued for five sessions. The subjects were asked to practice the entire relaxation procedure and the "ritual" in the following way: whenever they felt like having a cigarette, they were asked to wait a minute or two, and then perform the practiced "ritual", instead of reaching for a cigarette. This "ritual" then was to cue the heightened state of relaxation achieved during the relaxation sessions. The subject was then seen once a week for three weeks in order to collect data.
urine samples and weight. They were then asked to record
daily consumption for two weeks, at which point they were
seen for the last time. At this session, deposits were re-
funded, if all subject requirements were filled. They were
also told that they would be contacted for follow-up re-
ports in the near future. (See Appendix C.)

Satiation Group (S)

Subjects in this group were seen according to the
same schedule as those in the Relaxation Group. Treatment
sessions took place during twice-weekly sessions, each ses-
sion lasting one half-hour, for the first three weeks. At
the beginning of each session, the subject was required to
smoke a cigarette (his own brand) at a quick rate; one com-
plete inhalation every four seconds, until the cigarette
was completed. The rate was maintained by the beat of a
metronome which sounded a "click" every second. Every fourth
"click" was accompanied by the sound of a bell. This cued
the onset of a new inhalation. The subject was encouraged to
complete at least one cigarette. When this was completed, the
remainder of the cigarette was extinguished and the subject
began a 15-minute rest period. After this period, the sub-
ject was instructed to light another cigarette in a manner
similar to the previous one. The subject was instructed to
treat any cigarette that he smoked on the outside as an "ex-
perimental" cigarette, i.e., he was to smoke it as quickly
as possible, approximating the frequency used in the labora-
tory. The subject was told not to talk, eat or engage in any
activity while smoking a cigarette in this manner.

In the following three weeks and two-week follow-up were carried out in exactly the same manner as in the Relaxation Group.

**Relaxation-Satiation Group (R-S)**

During the first three weeks of treatment, subjects in this group were trained in the relaxation procedure and given the same instructions as the Relaxation Group. During the next three weeks, each subject received the satiation treatment in exactly the same manner as described previously. However, the instructions as to extra-treatment procedures were different at this point. At the initial satiation session, the subject was told that from that point on, whenever he felt like having a cigarette, he should use the relaxation "ritual" as an alternate response, instead of reaching for a cigarette. If he still wanted to have a cigarette, then the subject was instructed to smoke in the same way as previously described for the Satiation Group. The two-week follow-up was the same as for the aforementioned groups.

**Minimal-Treatment Minimal-Contact Control Group (M-T)**

As stated previously, subjects in this group came from the same subject pool as the above three groups and attended the same introductory sessions. These subjects were told that smoking, for most smokers, had become an "automatic" act and that by recording their daily cigarette consumption and thus becoming aware of their smoking habits, that they would be able to reduce their cigarette consump-
tion frequency. Subjects were contacted by phone each week (mailed reports were negated due to a threatened mail strike) and asked for their previous week's details. This group was designed particularly to control for individual "effort" plus recording as possible confounding effects in treatment.

Non-Motivated Recording Only-Control Group (R-3)

In this group, the subjects came from a second pool of subjects, as previously described. At the end of their initial session, they were told that the experimenters were interested in the variability in individual smoking rate over time and relating them to certain characteristics of each subject as obtained from questionnaires. They were instructed not to change their smoking habits, but to record as carefully as possible their daily cigarette consumption for a period of nine weeks (corresponding to the amount of time the subjects in other groups had to record). This group was designed to control for the reactive effects of record-keeping alone in a non-motivated group of subjects.
Results

The variable used for analysis was the mean daily number of cigarettes smoked per week, which was computed from the record sheets handed in weekly by the subjects. This mean was computed for baseline, the six treatment weeks, and the two-week continuous recording follow-up. (Only the second week of the two-week follow-up was used for analysis.) The actual consumption data for the six-week and three-month follow-up was collected in a slightly different manner. Subjects were contacted by phone or mail, and asked to report their current daily consumption. Because these data were obtained through self-report, they were analyzed separately from the rest. Mean percent change from baseline smoking rate was also calculated for each period.

Since the subjects were randomly assigned to the treatment groups, a one-way analysis of variance was performed across groups over baseline to discover whether any differences existed between the groups at this point. The five treatment groups: Relaxation-Satiation (R-S), Satiation (S), Relaxation (R), Minimal-Treatment Minimal-Contact Control (M-T), and Non-Motivated Recording-Only Control (R-C), contained n's of 14, 13, 10, 3, and 7, respectively. Four subjects dropped out during the course of the study: one from the R-S group, two from the S group, and one from the M-T group. The analysis demonstrated no significant differences between groups at baseline (F = 0.975, df = 4/49, p > .05). (See Appendix A, Table 1.)
An overall two-way analysis of variance with repeated measures on one variable (time) was performed on the data (excluding the six-week and three-month follow-up, as previously explained). (See Appendix A, Table 2.) This analysis yielded a significant group effect ($F=30.892, \text{df}=7/34$, $p<.00001$), and a significant groups by trials interaction ($F=6.8323, \text{df}=28/34$, $p<.00001$). This differential effect of groups over time can easily be seen from Figure 1; and the percentage change over time can be viewed more dramatically in Figure 2. The Tukey (a) test (Winer, 1971), utilizing the modification suggested by Cicchetti (1972), was applied to make post hoc comparisons between pairs of cell means, both between and within groups. The R-S and R groups showed significant reductions ($p<.05$) in smoking frequency from baseline (20.6% and 59.32% of baseline respectively) at the end of the six-week treatment. Surprisingly, although the S Group did show a decrease to 69.66% of baseline, this did not reach significance ($p>.05$). (The percentage figures given here refer to the percent consumption of baseline cigarette intake.) Neither control group showed any change (X-T=27.16%, R-C=101.02%). However, the R-S and S groups were significantly better than both controls, with the R-S Group better than either the R or S groups in reducing smoking frequency ($p<.05$). These differences were maintained at two-week follow-up, with percentages rising to 23.56% for the R-S Group, 79.24% for the S Group, and down for the R Group, to 57.11%. The controls remained the same.
Fig. 1. Mean Number of Cigarettes Smoked Per Day for all Groups During Baseline, Treatment, and Follow-up.
(Legend: Open Squares=Relaxation-Satiation Group; Open Circles=Satiation Group; Closed Triangles=Relaxation Group; Closed Squares=Recording-Only Control Group; Closed Circle=Minimal-Treatment Minimal-Contact Control Group.)
Fig. 2.
Mean Percent of Baseline Smoked by Group and Follow-up.
- Open Circle = Baseline
- Closed Circle = Treatment Only
- Open Triangle = Treatment + Social Support
- Closed Triangle = Control Group
- Open Square = Control + Social Support
- Closed Square = Baseline
A one-way analysis of variance across groups was performed at the six-week follow-up, as previously mentioned (See Appendix A, Table 3). This yielded a significant between group component ($F=6.13$, df=4/48, $p<.01$). The R-S Group had relapsed to 31.86% of baseline; the R Group to an only slightly higher 60.85%. However, the S Group showed a decrement from the two-week follow-up, its percentage lowered to 61.57%. A closer look at the data indicates that nine of 13 subjects reduced their smoking rates, with one having quit completely. This result could not be attributed to any known extraneous factor. The control groups fluctuated downward only slightly (N-T=97.38%, R-T=96.71%). The Tukey Test was again applied to this data. Only the R-S Group was significantly different from both control groups ($p<.05$). The R and S groups differed significantly only from the N-T control ($p<.05$). Although, the R-S still maintained an approximately 30% less decrease over the R and S groups, this result did not achieve significance.

At the three-month follow-up, a one-way analysis of variance demonstrated no difference between groups ($F=1.09$, df=4/48, $p>.05$). (See Appendix A, Table 4.) Both the R-S and the R groups still maintained 62.49% and 67.50% of baseline intake respectively, while the S Group returned almost to baseline (93.53%).

Looking more closely at the success of the individual subject, it may seem that at the end of treatment, 12 of 14 R-S subjects were smoking under the "safe" limit of 10-
12 cigarettes per day (Surgeon General's Report, 1964). Of these 12, four were abstinent. This may be compared to the other two groups, where seven of 13 subjects were under this limit with none abstinent in the S Group; and four of ten subjects, one of whom was abstinent in the R Group. At three-month follow-up, seven of 14 subjects in the R-S Group remained in this category, with four still cigarette free; three of ten subjects, with one abstinence, comprised the R Group; but the S Group dropped markedly to two of 13 subjects remaining under the "safe" level.

There is little doubt that the combined Relaxation-Satiation (R-S) Group was the most effective and long lasting treatment, in terms of both reducing cigarette intake and maintenance of this reduction for a protracted period.
Discussion

The results of this study demonstrate that the use of satiation in combination with the learning of an alternate response is an effective method of reducing cigarette intake (See Figures 1 and 2). The short term effects of this method, up to a six-week follow-up, indicate that the R-S Group maintained significantly reduced cigarette intake, when compared to the S or the S groups. However, this difference was not significant at the three-month follow-up, as the R-S Group doubled its cigarette intake, from 31.86% of baseline intake at treatment end, to 62.49% of baseline at a three-month follow-up. No significant changes occurred in either control group. The hypothesis that long term smoking cessation could be maintained was not supported.

Several factors may have accounted for this poor maintenance. First, the aversion created by the present procedure may have lacked intensity. The hypothesis had been put forward that the aversion to smoking would be strongest when the aversive means were most closely related to the smoking act itself. In this case, the smoking act was manipulated (by having subjects smoke rapidly) so that it created nausea, dizziness, etc. The degree to which subjects experienced this state was difficult to gauge, except on a subjective level. Only one subject vomited (on one occasion) and even this may have been due to the fact that she had the flu. Successful methods such as those used by Schmahl et. al., (1972) and Lichtenstein et al., (1973), utilizing rapid smok-
ing with the presence of warm, smoky air would aid in intensifying the conditioned aversion. The subjects in the satiation group in this study, decreased smoking frequency most dramatically (30% from the first to the second treatment session), demonstrating the power of this procedure, but also showed the poorest maintenance at a three-month follow-up, indicating the transient nature of this procedure. The subjects, although instructed to treat extra-therapeutic cigarettes as experimental (i.e., to smoke them as rapidly as they could), evidently did not follow this procedure. Reports from these subjects indicated that they found it difficult to apply this method, as rapid smoking is not socially adaptable, and could not always be performed either at work or in other social situations.

In contrast to this, the relaxation "ritual" procedure appeared to have a more lasting, if weaker, effect on smoking frequency. The R Group demonstrated greater stability in smoking decrement when compared to the S Group. At the three-month follow-up, subjects in the R Group still maintained 67.80% of baseline (number of cigarettes smoked), whereas the S Group had returned to almost baseline (96.55%). Thus relaxation, as a reinforcing alternate response appears to be an important stabilizing factor in smoking reduction, and may have accounted strongly for the large reduction in smoking by the R-S Group. Subjects found the relaxation training extremely valuable and desirable; most practised the procedure daily, as directed. The "ritual" i.e., "doing
something else in lieu of reaching for and lighting a ci-
garette" (Hunt and Yatarasso, 1970), was found, by most
subjects, as simple and socially acceptable as it was unob-
trusive. With practice, most subjects discovered that they
were able to achieve a profound state of relaxation, by
utilizing this "ritual" as an alternate response to smoking
a cigarette. Although this procedure was intrinsically rein-
forcing and desirable, it may have suffered from the same
deficiencies as those found in the aversive procedures men-
tioned earlier. That is, the reinforcing aspects of the state
of relaxation were not similar enough in their stimulus pro-
erties to adequately replace those associated with smoking
itself.

The two control groups used in this study were de-
signed to control, as accurately as possible, for the non-
specific factors, which have been cited by several authors,
as factors which contaminate experimental variables in most
studies (Bernstein, 1969; Keutzer et al., 1969; Hammel, 1971;
Sushinsky, 1972). Of greatest importance in this study, was
the use of a non-motivated control group, the first applica-
tion of such a control in a comparative smoking treatment pro-
gram. The reactive effects of self-recording behaviour has
been noted in a study by McFall (1970). He noted that sub-
jects who simply recorded their smoking intake, tended to de-
crease their smoking frequency. That is, when they were pay-
ing unusually close attention to their smoking behaviour, it
decreased. The group of non-motivated smokers in this study
failed to demonstrate any appreciable decrement in smoking
behaviour, even though some of the subjects reported abhorrence at the number of cigarettes they were smoking, when confronted with their own data. This lends further support to the previously stated fact that smokers appear to be able to cope with high states of dissonance, i.e., expressing the desire to stop, but still continuing to smoke (Dobitsky and Schwartz, 1969).

The Minimal-Contact Minimal-Treatment Control Group consisted essentially of motivated smokers, who tried to give up smoking through individual effort. It is likely that any smoker who joins a cigarette smoking treatment program, may try slowly to "cut down", regardless of the type of treatment he is in, and this reduction may not be a function of the salient treatment variables. It would appear, from the results of the present study, that even motivated smokers, will not respond to suggestions and encouragement to quit on their own (with no promise of future treatment), unless they are exposed to externally imposed, formal and plausible therapeutic procedures. This notion lends credence to the hypothesis that most smokers feel that smoking is not under their own control (Smith, 1970).

There are several aspects of this study which warrant further consideration and examination. It has already been stated that the conditioned aversion paradigm might be manipulated in order to create a stronger suppression of the smoking response. Successful methods might include the increase of the smoking rate in the experimental rapid smoking procedures, or the use of simultaneously introduced blasts of
hot, smoky air (Schnall et al., 1972; Lichtenstein et al., 1973). In comparing the present study to the Lichtenstein et al. (1973) report, one may observe that our satiation group achieved poorer smoking reduction than either Lichtenstein et al.'s rapid smoking group or a group treated with blasts of hot, smoky air; or another group treated with a combination of the two procedures. Each of these latter three groups did not differ significantly from each other. Although both studies used approximately the same number of active treatment sessions (X=7.8 vs 6 in the present study), Lichtenstein et al. had subjects smoke slightly more cigarettes per session (X=2.7 vs 2 in the present study). Lichtenstein et al.'s rapid smoking group had ten subjects abstinent at treatment termination compared with no subjects in the present study. The reason for this difference may lie in the fact that subjects in Lichtenstein et al.'s study were seen initially for three consecutive days and then only at the request of the subject, whereas in the present study, treatment sessions were spaced bi-weekly over a three-week period. The development of a strong and lasting conditioned aversion may be greater under "massed practice" conditions as opposed to temporally distributed practice conditions. This hypothesis counters traditional learning theory principles, but may best be explained by Hullian Learning Theory, (Kistl, 1961). Hull's theory states that every response of an organism "left an increment of reactive inhibition" and "was assumed to decay with rest" (Kistl, 1961, p. 242). It was further pos-
tulated that this reactive inhibition was a primary negative drive which very closely resembled fatigue. Thus, under this formulation, extinction will occur more rapidly with "massed" rather than "distributed" practice. Under massed trials, reactive inhibition would tend to build in the organism until extinction occurred. Under distributed trials, recovery (i.e., loss of reactive inhibition) would occur more easily, so that extinction would be more difficult. In this study, some subjects may have found that the several-day interlude between treatment sessions, acted as recovery periods during which the temporarily-induced aversion extinguished and smoking-eliciting cues re-attained their previous significance. This may have accounted, to a great degree, for the large discrepancy between the two similar treatment methods.

The rationale for the use of an alternate response in this study has been previously described here and elsewhere (Katz, 197). Here are certain related and important considerations attached to this thesis which deserve consideration with regard to the implementation of such a technique. The application of an alternate response implies the necessity for self-regulation or self-control of behaviour. Once smoking behaviour is successfully suppressed through some contingent aversive process, the onus is placed on the subject to actively implement the alternate response. Since smoking is cued by a myriad of stimuli and situations (conceivably both covert and overt) the question arises as to whether a single response, e.g., relaxation, will ade-
quately act as a reinforcing agent, it is conceivable that some control for the execution of the alternate response is necessary. There is a definite need for appropriate socially and interpersonally acceptable alternate responses which will "structure" time or be "something else to do" in situations where smoking behaviour previously was the reinforced response. If this behavioural "space" is not filled, then one may assume that either the satiation will extinguish or that the smokers will be reinforced vicariously by seeing other smokers smoking (Bandura, 1969) or that both situations may occur. In order to combat this, it is conceivable that an array of alternate responses should be available to the subject, so that he might choose the appropriate one in a given situation. These might include gum-chewing (Resnick, 1968), control of discriminative stimuli (Solan, 1968; Roberts, 1969), relaxation as in this study, behaviour rehearsal and covert verbalizations (Steffy, Veichenbauer, and Fett, 1972); or any one of a plethora of possible alternate behaviours (both covert and overt).

In developing self-control skills, the subject must first make a commitment to change previous behavioural patterns, so that they include these new procedures. One method of ensuring this commitment may be the utilization of a contingency contract. The nature of contracts related to smoking reduction has been explored by several authors (Tookey and Pratt, 1967; Elliot and Tice, 1969; Winett, 1973). In these studies, subjects made explicit contractual obligations to have partial amounts of their money deposits re-

45
turned contingent on reducing, and eventually eliminating their smoking intake. The contract can be seen as an initial step in the development of self-control. The use of a contract, as a commitment or promise of performance, as well as a guide to how self-control may be achieved in terms of certain proven methods (Harford & Caroly, 1972), may function as an integral component of a smoking reduction program.

Thus a general model for the successful elimination of maladaptive behaviour, in general, and smoking, in particular, may be presented as follows:

It is generally necessary to manipulate external variables initially in order to change behaviour. One such method could be aversive control. Subsequently or concurrently, the subject must develop skills so that he may identify environmental and mediational ("internal") cues which may initiate the smoking chain. Then the subject must learn the contingent self-application of both positive and negative reinforcers—both symbolic (Bandura, 1960, and environmental—which will increase the probability of non-smoking, on the one hand, and decrease the probability of smoking on the other. In this way, it is hoped that successful long-term abstinence will be obtained.
References


Arrone, M.L., Keranen, V.A., & Salzberg, P.W. A short
curation group treatment of smoking behaviour by
stimulus saturation. *Behaviour Research and Therapy*,

Harston, A.R., & McFall, R.W. Comparison of behaviour modi-
fication approaches to smoking reduction. *Journal of
Consulting and Clinical Psychology*, 1971, 36(2), 153-
162.

McFall, R.W. Effects of self-monitoring on normal smoking
behaviour. *Journal of Consulting and Clinical Psycho-

McFarland, J.R., Sirbel, M.R., Donald, W.A.J., & Folken-
berg, R.J. The five-day program to help individuals
stop smoking. *Connecticut Medicine*, 1964, 28, 385-
390.

Muir, J.C., & Muir, V. Aversion therapy by elec-
tric shock: A simple technique. *British Medical Jour-
nal*, 1969, 1, 14-23.

Posner, M.I., & Gottlieb, I.S. Systematic desensiti-
zation as a technique for treating smoking behaviour:
A preliminary report. *Behaviour Research and Therapy*,

Solar, D.J. Self-control procedures in the modification of
smoking behaviour. *Journal of Consulting and Clinical
Psychology*, 1968, 32, 92-93.

Ober, D.C. Modification of smoking behaviour. *Journal of


Wittte, I.E. Aversive control of smoking behaviour in a group context. *Behaviour Research and Therapy*, 1972, 10(2), 17-16.


Appendix A

Table 1
Summary of One-Way Analysis of Variance of All Groups During Baseline

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5234.10</td>
<td>53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>337.22</td>
<td>4</td>
<td>86.37</td>
<td>0.976*</td>
</tr>
<tr>
<td>Error</td>
<td>4866.22</td>
<td>49</td>
<td>99.91</td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05

Table 2
Summary of Two-Way Analysis of Variance of all Groups During Baseline, Treatment Period and Two-Week Follow-up

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>44836.6459</td>
<td>431</td>
<td>104.0293</td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>3236.6456</td>
<td>53</td>
<td>610.7291</td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>9475.0457</td>
<td>4</td>
<td>1958.5514</td>
<td>3.9124*</td>
</tr>
<tr>
<td>Error</td>
<td>24953.9536</td>
<td>42</td>
<td>500.6793</td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>1936.0074</td>
<td>31</td>
<td>32.9841</td>
<td></td>
</tr>
<tr>
<td>Trials</td>
<td>1735.4915</td>
<td>3</td>
<td>512.2116</td>
<td>30.892**</td>
</tr>
<tr>
<td>Groups X Trials</td>
<td>1395.2449</td>
<td>20</td>
<td>114.1158</td>
<td>6.8823**</td>
</tr>
<tr>
<td>Error</td>
<td>5457.7275</td>
<td>349</td>
<td>16.5309</td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05

** p < 0.0001
Table 3
Summary of One-Way Analysis of Variance of all Groups at Six-Week Follow-up

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5111.18</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>1727.86</td>
<td>4</td>
<td>431.94</td>
<td>6.13*</td>
</tr>
<tr>
<td>Error</td>
<td>3383.32</td>
<td>48</td>
<td>70.50</td>
<td></td>
</tr>
</tbody>
</table>

* p<.01

Table 4
Summary of One-Way Analysis of Variance of all Groups at Three-Month Follow-up

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>Degrees of Freedom</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5057.74</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>646.35</td>
<td></td>
<td>121.49</td>
<td>1.09*</td>
</tr>
<tr>
<td>Error</td>
<td>4411.39</td>
<td>48</td>
<td>114.91</td>
<td></td>
</tr>
</tbody>
</table>

* p>.05

58
Appendix 2

BEHAVIORAL RESEARCH ON SMOKING DEPENDENCE
PACK 1 HISTORICAL QUESTIONNAIRE

GENDER .................................. GENDER STATUS .........................
ANALYSIS .............................. +. OR. DEPENDENTS .....................
RELIGION ......................... RACE OR ETHNICITY .......................
AGE .................................. YEAR OF AGNITION .....................
GAY'S AGE ..............................

1. How old were you when you began to smoke? .....................

2. How many years have you been smoking?.........................

3. How many cigarettes do you smoke per day? .....................

4. When do you smoke?

- In the morning or when relaxed ..................

- In the afternoon or with others .................

- In the evening or when drinking ...............

5. Do you consider your smoking a problem? ......................

6. How many times have you tried to stop smoking before? ...... If yes, in what years? .........................

7. How long did each attempt last?

1. .......................... ..........................

2. .......................... ..........................

3. .......................... ..........................

4. .......................... ..........................

8. What else did you use to help you stop smoking? (e.g., colt, Gaw's, cutting down etc.)

..............................................

59
9. Do you have any health problems? If so, please elaborate

10. What times are most convenient for you to come to SGWU?

<table>
<thead>
<tr>
<th></th>
<th>Sun</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afternoon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: I am at SGWU on Wednesdays.
Appendix C
Relaxation "Ritual"

The relaxation "ritual" that was taught to subjects in the R-S and R groups consisted of a chain of tensing-relaxing exercises as follows:

1. Clench teeth and push tongue against roof of mouth.

2. Take in deep breath and hold it, almost to the point of it being aversive, then breathe out completely.

3. Breathe deeply twice more.

4. Draw stomach muscles in toward spine.

5. Breathe deeply once.

6. Tighten leg muscles by either squeezing knees together or by making a type of forward and downward movement with muscles of thigh.

7. Breathe deeply, hold it, breathe out.

8. Breathe deeply once more.