Shaping and maintenance of reductions in cigarette smoking via stimulus satiation

William Henry Costello
The University of Montana

Follow this and additional works at: https://scholarworks.umt.edu/etd
Let us know how access to this document benefits you.

Recommended Citation

This Thesis is brought to you for free and open access by the Graduate School at ScholarWorks at University of Montana. It has been accepted for inclusion in Graduate Student Theses, Dissertations, & Professional Papers by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.
SHAPING AND MAINTENANCE OF REDUCTIONS IN CIGARETTE SMOKING VIA STIMULUS SATIATION

by

William H. Costello
B.A., Merrimack College, 1970

Presented in partial fulfillment of the requirements for the degree of

Master of Arts

UNIVERSITY OF MONTANA

1972

Approved:

Chairman, Board of Examiners

Dean of the Graduate School

Date

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
ACKNOWLEDGMENTS

I wish to express my deep and sincere appreciation to Dr. James R. Ullrich who in the capacity of chairman gave generously of his time and enthusiasm from the very inception of this research venture. I also extend my heartfelt thanks to Dr. H. A. Walters, Dr. Janet P. Wollersheim, and Professor Robert Gambs each of whom afforded their particular expertise in the formation and final restructuring of this research endeavor. Special appreciation is extended to Dr. John M. Atthowe whose initial guidance made the project possible.

I also wish to extend my gratitude to Roberta Frank for her time and patience in the typing of this project's final copies. Last, but not least, I would like to thank my wife, Annette Costello, who not only shared one year of her marriage with a demanding research schedule, but also afforded the necessary consoling and moral support to a very tired and distraught experimenter.
TABLE OF CONTENTS

| LIST OF TABLES ................................................... | iv |
| LIST OF FIGURES ................................................... | v |

Chapter

I. INTRODUCTION .............................................. 1
   Problem of Definition ..................................... 1
   Early Evidence for Massed Practice ...................... 2
   Elimination of Tics ...................................... 3
   Stuttering ................................................ 4
   Other Language Behaviors .................................. 7
   Hoarding .................................................. 7
   Smoking ................................................... 8
   Present Study ............................................ 11

II. METHOD ................................................... 14
   Design .................................................... 14
   Subject Recruitment ...................................... 14
   Procedure ............................................... 15
   Base-line ................................................ 15
   Treatment ................................................ 16

III. RESULTS ............................................. 20
   Questionnaire Analysis ................................... 25

IV. DISCUSSION ............................................... 30
   Implications for Future Research ....................... 34
   Treatment Application .................................. 36

V. SUMMARY ................................................. 38

REFERENCES .................................................. 40
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Analysis of Variance on Mean Reduction of Cigarette Consumption for Each S</td>
<td>21</td>
</tr>
<tr>
<td>II</td>
<td>Analysis of Variance on Percentage Reduction of Cigarette Consumption for Each S</td>
<td>22</td>
</tr>
<tr>
<td>III</td>
<td>Analysis of Variance on Total Cigarette Consumption for Each S</td>
<td>23</td>
</tr>
<tr>
<td>IV</td>
<td>Means and Standard Deviations of Reductions in Cigarette Consumption for Each Group At Each Time Period</td>
<td>24</td>
</tr>
<tr>
<td>V</td>
<td>Tukey's HSD Comparisons Among the Means Expressed in Units of Mean Reductions of Cigarette Consumption Where C32 Represents the Control Group's Data Collected 32 Weeks After Treatment</td>
<td>26</td>
</tr>
<tr>
<td>Figure</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>1</td>
<td>Experimental Time Line for the Delivery of Treatment Instructions and the Collection of Data</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>Graphical Depiction of Time x Treatment Interaction Expressed in Units of Mean Reduction in Cigarette Consumption for Each S</td>
<td>27</td>
</tr>
</tbody>
</table>
Problem of Definition

Satiation may be loosely defined as a decrease in a behavior's probability of occurrence following repeated exposure to the reinforcer (S^R) maintaining that behavior. The underlying rationale is that a S^R loses its potency to maintain behavior when an excessive amount of that S^R is made available (Ayllon, 1963). Two types of satiation may be distinguished according to whether the S^R's are response independent or response contingent. Response independent satiation is defined as the situation in which the presence of the S^R is not contingent upon the S performing some behavior; Ayllon and Michael (1959) and Ayllon (1960, 1963) working on towel hoarding are examples of these types in which the overpresentation of the S^R (towel) was provided by psychiatric nurses. Response contingent satiation occurs when the presence of the S^R is contingent upon the S performing some particular behavior; Resnick's work on smoking behavior (1968a, b) is an example of this variety in which the overpresentation of the S^R was made contingent upon the S's smoking behavior.

An ensuing problem arises in the difference between response contingent satiation, massed practice, negative practice, and adaptation. The traditional distinction between the last three of these techniques was employed by Yates (1970) while investigating stuttering behavior. He
recorded the length of time intervals between repetitions of the problem behavior. According to his definition, massed practice occurred when there was a short time interval between repetitions as, for example, when the S was required to repeat only the stuttered word. Negative practice had an intermediate time interval as the S repeated the entire sentence containing the stuttered words. Adaptation had the longest time interval as the S repeated a number of sentences in a passage which contains stuttered words. Massed practice, negative practice, and adaptation may be conceptualized as techniques of habit breaking when the undesirable behavior is deliberately and extensively repeated for some period of time. If there is a concomitant exposure to the consequences of that behavior, then these techniques may be regarded as forms of response contingent satiation. Because of the overlap between all three techniques, selected research on massed practice, negative practice, and adaptation will be included, along with the satiation literature.

**Early Evidence for Massed Practice**

Ebbinghaus (1913), English, Wilborn, and Killiam (1934), Kientzle (1946), Kimble (1949), Archer (1953), Jost (1954), Cook (1957a, b), and others found that spaced practice produced significantly fewer errors on learning tasks than massed practice. Karsten (1935) using five Ss on a specified task, i.e., making strokes in a certain rhythm until the S would no longer continue under the condition of slight verbal pressure from the E, found that repeated execution of the act influenced the inclination to execute that act again. These studies mark early evidence that massed practice inhibited performance. Hull postulated a number of
mechanisms to explain this phenomenon. These constructs included reactive inhibition ($I_r$) which is a function of the number of trials presented and results in a temporary inhibition of responding, conditioned inhibition ($sI_r$) which is the learned habit of not responding, and drive reduction which results from repeated reinforcement. The theory maintains that behavioral decrements occur whenever $I_r$ and $sI_r$ accumulate, or whenever drive reduction occurs from repeated presentations of reinforcements.

**Elimination of Tics**

Dunlap (1932) outlined a procedure for the expulsion of tics based on massed practice, which Yates (1958) later criticized for the lack of procedural details and experimental demonstration of its validity. Yates attempted to extinguish four tics (stomach contraction, nasal explosion, coughing, and eye-blinking) in a twenty-five year old female through massed practice. At the end of a 160 day treatment period, the last three tics showed a decrease in frequency, while the stomach tic was minimally affected. Jones (1960) continued treatment with the same patient and found no recovery of the tics on transfer to another therapist as well as a marked reduction in the patient's capacity to reproduce the stomach tic following further massed practice.

Rafi (1962) reported similar findings concerning the involuntary movements of two patients, when he found that the tics were not entirely eliminated. Walton provided the first long term follow-ups for tic behavior. In the first study he (1961) maintained reductions in both voluntary and involuntary evocation of multiple tics for one year after
treatment for a twelve year old male. In the second study Walton (1964) maintained a reduction in tic evocation over a five month follow-up for a child with three tics of 11 years duration. Lazarus (1960) and Clark (1966) also reported decreases in tic evocation for one and two patients, respectively; Clark's patients remained symptom free and with no symptom substitution for four years.

Although poor research methodology prevailed, the above studies suggest the possible efficacy of massed practice in obtaining initial treatment reductions. In addition, Yates (1958) and Jones (1960) found that additional sessions, booster sessions, produced further decrements in the occurrence of the undesirable behaviors. Not all of the case histories report successful reductions following massed practice. Feldman and Werry (1966) used massed practice on a thirteen year old male patient with multiple tics of the face, neck, and head. Not only did they fail to find any evidence for a decline in the frequency of voluntary evocation of these tics following massed practice, but both voluntary and involuntary responding markedly increased. Furthermore, a previously extinguished tic reappeared. Again, the lack of proper research methods prevents any conclusion from being reached, and suggests a closer inspection of massed practice treatment techniques.

**Stuttering**

Fishman (1937) used a negative practice procedure on five Ss and reported that two Ss (with speech blockage) increased stammering during practice, while three Ss (with repetition of words, initial letters, and syllables) showed almost no stammering after one month of negative practice.

Adaptation procedures have also evidenced a margin of success. Van 55) had 31 Ss read a passage of 133 words (containing
every speech sound in the initial position of at least one word) five times with a one minute rest between readings. This procedure was repeated until each S attained a criterion of three successive readings in which the number of spasms did not vary by more than one from the mean of three readings. The result was adaptation of stuttering in which each S's number of spasms progressively decreased from one reading to the next until a relatively stable plateau was reached. Johnson and Knott (1937) had 121 Ss read a 180 word passage with the number of readings varying from two to twelve times; Williams (1955) employed four Ss reading a 250 word passage five times biweekly; Cullinan (1963) had 23 Ss read a 300 word passage five successive times on each of three days. These three research ventures all found a significant decrease in the frequency of stuttering behavior.

Donohue (1955) had 10 Ss read magazine pages for three consecutive hours and found a consistent decrement in the percentage of stuttered words over the three hour period. This substantiated the previous findings of Johnson and Millsapps (1937) and Harris (1942) that the frequency of stuttering decreased with continued or repeated oral readings. Golub (1955) using 30 Ss reading five successive 100 word lists (in which half of the words are the same for all readings while the other half are new in each reading) found significantly more adaptation of stuttering on the constant word lists than on the varying words. These studies demonstrate that the amount of stuttering adaptation is a direct function of the number of repetitions of the oral reading material.

The next three research findings, however, evidence a pattern which also arises in the smoking literature (i.e., spontaneous recovery).
Jamison (1955) had 10 Ss read an 80 word paragraph until the Ss stuttered three or fewer times during one reading. He found that the stuttering response recovered following rest periods of .5, 1.5, and 4.5 hours after adaptation. Jones (1955) reported that intraday reductions of stuttering were followed by a spontaneous recovery on the first reading of the following day when 24 Ss read five different passages, five times each.

Frick (1955) attempted to show that spontaneous recovery decreases as the degree of adaptation increases. Twenty Ss were present for each of two experimental conditions. The first condition consisted of Ss reading a 200 word passage three consecutive times; the second condition had Ss read a 200 word passage ten consecutive times 48 hours later. One hour after each condition, the S read the passage five more times. Frick found that there were no differences in the amount of spontaneous recovery following the two conditions, suggesting that the number of practice sessions delivered at any one time does not affect recovery. A second finding was that adaptation trials following recovery brought about a further reduction in the mean number of stuttered words. This latter finding suggests that the spacing of practice trials does affect recovery, and furthermore, points to the efficacy of well placed booster sessions.

Although poor research methodology prohibits any absolute statements, the following points are suggested by Frick's study. First, the repeated and massed practice of a particular behavior decreases the probability of occurrence of that behavior; and secondly, additional repeated and massed practice of that particular behavior following a recovery period, a booster session, further decreases the probability that the behavior will occur.
Other Language Behaviors

Meyn, Moore, and Smith (1966) found a significant decrease in the occurrence of misspelled words when a program of negative practice was instituted. Wolff (1971) applied a satiation procedure to the delusional verbiage of a fifty-eight year old patient diagnosed as a paranoid schizophrenic. The dependent variable was the amount of verbal behavior recorded via time-sampling and classified by three judges as delusional, non-delusional, or neutral. The treatment consisted of two Es eliciting and maintaining the S's delusional verbiage for one hour each morning, five days a week for 48 days. Amount of delusional behavior was recorded for twelve days at the conclusion of treatment and one year after treatment. The results indicated a behavioral decrement immediately after treatment and maintenance of this decrement one year later. However, the lack of non-treated control group and appropriate statistics, uncontrolled judging errors, and the confounding of satiation treatment with five hundred electroconvulsive treatments prohibit any firm generalizations from this study.

Hoarding

The most notable effort to include procedural controls were those of Ayllon and Michael (1959) and Ayllon (1960, 1963) regarding the hoarding behavior of a forty-seven year old female diagnosed as a chronic schizophrenic. From 1959 to 1961, the S's problem behaviors of food stealing, towel hoarding, and the use of excess clothing were controlled through food withdrawal, stimulus satiation, and food reinforcement, respectively. This paper will focus on the second target behavior (towel hoarding) and treatment (response non-contingent satiation).
Ayllon instituted a base-line of about seven weeks in which the
towels in a patient's room were counted three times a week. The number
of towels hoarded in this period ranged from 19 to 29. Then treatment
was applied for four weeks in which the nurses simply handed a towel to
the patient without comment. The number of towels handed to the S daily
averaged from seven in the first week to sixty in the third week. The
result was that for the first week, 50 towels were in the patient's room; the second week there were 150 towels; the third week there were 420
towels; and the fourth week there were 600 towels in her room. The pa-
tient's response to treatment was a cessation of the towel hoarding be-
havior. When the number of towels in her room reached 625, the patient
started to remove them from her room. During the next twelve months, the
mean number of towels in her room were 1.5 per week.

In his discussion of the above technique, Ayllon explained that the
reinforcer lost its effect when an excessive amount of that reinforcement
was made available; and accordingly, the responses maintained by that re-
inforcement were weakened. Ayllon also noted that, contrary to most of
the criticism leveled at behavior modification, no other behavior problem
replaced hoarding. However, lack of proper controls prohibit the charac-
terization of results as due to response non-contingent satiation.

Smoking

Drawing upon Ayllon's theoretical framework, Resnick (1968a, b) ex-
tended the technique of stimulus satiation to response contingent stimulus
satiation of smoking behavior. His initial research procedure (1968a) used
eight Ss whose baseline daily consumption rate ranged between 1.0 and 1.5

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
packages of cigarettes with a mean length of previous smoking time of 2 3/5 years. The first week of treatment consisted of elevating the S's daily consumption rate to four packages of cigarettes. This consumption rate was maintained for a second week after which the Ss were to cease smoking entirely. The results indicated that one S could not increase his level of consumption, and after one day of extinguishing smoking, he resumed smoking; another S followed the satiation program, but resumed her previous smoking rate two days after stopping; while the six remaining Ss ceased smoking, and maintained non-smoking behavior within four months of follow-up. Methodological problems of small sample size, absence of controls and inadequate statistics prohibit generalization of this research.

Resnick's second research project (1968b) is tighter with respect to methodological considerations affording more reliable findings. Sixty Ss were assigned at random to each of three groups. At the outset of the experiment each S was interviewed individually in which eight minutes were devoted to discussion and two minutes to instructions. The discussion's sole purpose was to ensure face validity of instructions and encompassed the following topics: smoking habits, reasons for wanting to stop smoking, health hazards of smoking, and the like. The treatment instructions were as follows: group one was to double their normal daily consumption for one week; group two was to triple their normal daily consumption rate for one week; while group three was to continue their normal daily consumption rate for one week. At the end of the treatment week, all Ss were told to extinguish smoking entirely, and to chew gum if they had a desire to smoke (waiting ten minutes between the desire and gum chewing).
The rate of smoking was collected for a base-line period prior to treatment, two weeks after treatment, and four months after treatment. The results indicated that the double and triple satiation groups did not differ at the two week or four month follow-up periods (similar to Frick's 1955 findings concerning the degrees of adaptation programs), and that at two weeks after treatment both groups experienced a drop in the mean number of cigarettes smoked relative to the control group. No further mean change was observed from two weeks to four months (similar to Van Riper and Hull's 1955 finding of a "stable plateau" of behavior). Furthermore, both double and triple satiation groups were more effective in reducing smoking behavior than the normal daily consumption group at the four month follow-up period.

Keutzer (1968) contrasted a negative practice technique to the four other techniques of coverant control therapy, breath-holding technique, placebo drug therapy, and a non-treated control group promised later treatments. In the negative practice treatment group the Ss attended three sessions in which they smoked three cigarettes at a faster than normal pace as the E provided a running description of the stimuli. The stimulus variable being manipulated was smoke in the room; and, if the Ss smoked outside of the laboratory setting, they were required to repeat a negative practice session at home. The Coverant Control group were reinforced for antismoking thoughts (the coverants) by arranging for some high probability behavior (already in the S's response repertoire) to be made contingent on such thoughts. The Breath Holding group paired desire to smoke with a self-administered breath-holding consequence (i.e., holding one's breath until it is mildly painful). The
Placebo Drug group received an alleged tobacco substitute, which in reality offered no physiological substitute for tobacco. The Non-Treated Control group were smokers who were motivated to stop and were promised later treatment (i.e., they received no treatment during the experimental period).

No significant differences were found between the various methods of treatment, although the non-behavioristic treatments ranked lowest in effectiveness. At the end of treatment (Keutzer, 1968) Negative Practice, Coverant Control, Breath Holding, Placebo, and Non-Treated Control Ss were smoking 37.7, 47.7, 47.6, 43.5, and 92.6 percent of their baseline smoking rates, respectively. A six month follow-up on the same Ss (Lichtenstein and Keutzer, 1969) revealed a marked increase in smoking from the end of treatment to the follow-up time. Ss were smoking 79.2, 70.9, 90.9, 78.5, and 93.7 percents of their base-line smoking rates, respectively.

Present Study

The purpose of this study was to explore the effectiveness of a response contingent satiation program in shaping and maintaining reductions in smoking behavior. Three different levels of satiation instructions and four data collection periods were employed. Both the Satiation (S) and the Satiation plus Booster (SB) Groups smoked double their baseline consumption rate for one treatment week. The pseudo treated Control Group (C) smoked their base-line consumption rate for one treatment week. Four weeks after initial treatment, SB smoked double their base-line consumption rate for an additional three days. Data were collected 2, 6, 16, and 32 weeks after initial treatment.
As previously noted, Resnick (1968b) found that Ss who doubled or tripled their normal smoking rates for one week were smoking less at 2 weeks post treatment than Ss who continued smoking normally for one week. It was also evident that there were no differences between the double and triple smoking groups. Thus, comparisons of S and C will attempt to replicate Resnick's findings, that is, all Ss who double their base-line cigarette consumption for one treatment week should smoke significantly less cigarettes two weeks after an initial treatment than Ss who continue their base-line cigarette consumption for one treatment week.

Furthermore, the data of Keutzer (1968) and Lichtenstein and Keutzer (1969) have demonstrated that initial treatment reductions may not be maintained when assessed beyond four months post treatment. Bernstein (1969), Keutzer, Lichtenstein, and Mees (1968), and Lichtenstein and Keutzer (1971) reviewed the smoking literature and found this deterioration of initial treatment to be a consistent trend after four months. The four notable exceptions were those of Franks, Fried, and Ashem (1966), Kraft and Al-Issa (1967), McGuire and Vallence (1964), and Nolan (1968). This suggests that Resnick's response contingent satiation program (1968b) may have regressed toward base-line had the follow-up period been extended beyond the four month level. The second major interest of this study was the maintenance of initial smoking reductions by the presentation of an additional three day satiation period, a booster period. McGuire and Vallence (1964) studied the smoking behavior of a thirty-seven year old school teacher, and reported a zero smoking rate maintained for six months after treatment by employing electric shock booster treatments. Lublin
and Joslyn (1968) demonstrated that 40 out of 78 Ss extinguished smoking entirely when a treatment package of heater-blower, massed sessions, and increased smoking rate (increased puffing) was presented. Furthermore, they report that with the addition of booster sessions 15 Ss ceased smoking while an additional 16 Ss smoked less than 50% of original baseline one year after treatment. These findings, supplemented by Yates (1958) and Jones (1960), suggest that smoking reductions may be maintained beyond the critical four-months-plus follow-up period with the addition of a booster treatment. Thus, it was predicted that the addition of a three day double smoking period one month after a satiation program would result in significantly fewer cigarettes consumed than both a Control Group and a Satiation Group when measured 6, 16, and 32 weeks after initial treatment.

In order to circumvent any artifacts associated with a particular dependent variable, each hypothesis was investigated by the three different dependent variables of mean reduction of cigarette consumption (base-line mean minus treatment mean), percentage reduction of cigarette consumption (with arcsine transformation), and mean raw data. A high mean reduction score and a high percentage reduction score both reflect low cigarette consumption. A high mean raw score, on the other hand, reflects a high cigarette consumption.
CHAPTER II

METHOD

Design

The experimental design was originally a Split Plot Factorial (SPF) 3 x 4, with three levels of satiation (Control Group, Satiation Group, and Satiation plus Booster Group) and four different post treatment times (the repeated measure). Each level of the second factor represented one week of self-report required at two weeks, six weeks, 16 weeks, and 32 weeks after treatment. The third data collection period was discarded due to 95% mortality. This reduced the design from a SPF 3 x 4 to a SPF 3 x 3 for both mean reduction of cigarette consumption and percentage reduction of cigarette consumption. For the total number of cigarettes smoked, the design was a SPF 3 x 4 by the inclusion of the initial baseline period.

Subject Recruitment

Seventy-eight Ss were recruited via teacher announcements in non-psychological classes, and an advertisement in the student newspaper. Two Ss from each of the three groups quit the program prior to the first data collection period. Their data were deleted from further analyses. The mean number of years spent smoking for the remaining 72 Ss was 5.47 years with a standard deviation of 3.65.
Procedure

An organizational meeting followed recruitment (ascertaining which brands each smoked) in which the following points were covered for all Ss:

1. instructions on record keeping and familiarization with record keeping forms;
2. the need for accuracy in record keeping;
3. an overview of the experiment specifying appointment dates, due dates for self-report data, and receptacle for all forms;
4. scheduling of five meetings for each S (to be carried out on a one-to-one basis with the E);
5. distribution of base-line record forms;
6. completion of a questionnaire (see Appendix A).

Base-Line

A two week base-line period was conducted in which all Ss reported their daily cigarette consumption. The Ss were free to choose their daily tabulation method from one of the following: starting each day with a fresh package and subtracting from 20 the cigarettes remaining at day's end, marking each cigarette consumed on a tally card carried inside the cigarette package, or any other technique which did not rely on sheer memory. The forms were returned to a pre-designated receptacle.

The Ss were randomly assigned to each of the three treatment groups with the restriction that equal numbers of heavy and light smokers appeared in each group. An analysis of variance (Completely Randomized -3; Kirk, 1968, 105-106) was performed on each of the two pre-test measures, base-line cigarette consumption and total tar levels. No hint of group
differences were found prior to experimental treatments, $F(2, 69) = 0.472$ and $F(2, 69) = 0.088$, respectively.

**Treatment**

Each S met individually with the E for five meetings throughout the experiment. The initial meeting lasted for ten minutes. The first eight minutes attempted to increase the face validity of treatment instructions (see Resnick, 1968a and b) by discussing: the reasons why the S had been unable to quit previously, what excuses the S would be likely to employ in order to support a desire to resume smoking once he had stopped, how much cigarettes cost the S each year, and how many smoking health hazards the S knew.

The final two minutes of the initial meeting were devoted to issuing the S's treatment group instructions and self-report forms (copies of which are found in Appendices B, C, and D, respectively). Treatment instructions were not read to the S; they were presented in an informal, conversational manner. The Control Group was asked to smoke their base-line rate for one week while paying special attention to their physiological reactions (hoarseness of throat, coughing, etc.). Both Satiation Groups were instructed to double their base-line cigarette consumption for a week while paying special attention to their physiological reactions. Because of ethical considerations, Satiation Ss were allowed to stop treatment prior to the conclusion of the treatment week when they thought the technique was too aversive. The Ss were further instructed to contact the E when this condition arose by depositing a note in a prearranged receptacle.
All Ss met with the E again on the third and seventh day of treatment in order to check the S's adherence to treatment and to afford all Ss with an added opportunity to terminate treatment. On the seventh day of treatment each S met individually with the E and rated the aversiveness of treatment and somatic complaints on a seven point scale (see Appendix E). All Ss were then instructed to resist smoking by employing substitute behaviors when the desire to smoke arose.

Four weeks after treatment, Ss attended their fourth meeting to receive booster instructions. The Control Group and Satiation Group Ss had their "treatment" instructions redelivered to them, with the explanation that this procedure would remind them of "what direction the therapy program was taking". They were then instructed to continue their non-smoking regimen. This was done to ensure that all Ss received exposure to instructions, while the explanation attempted to ensure the face-validity for instructions redelivered to the Control and Satiation Groups. The second Satiation Group received instructions to smoke double their original base-line rate for an additional three days. These instructions were exactly the same as their original treatment instructions (see Appendix C), except that the smoking period was reduced from seven to three days. As in treatment, these Ss were given the option to terminate the program whenever it became too aversive to handle (with the stipulation of contacting the E when this condition arose). They were then instructed to continue their non-smoking regimen following the conclusion of their satiation period.
All Ss attended their fifth and final meeting with the E two weeks after the delivery of booster instructions. This meeting involved distribution of 16 and 32 week follow-up forms.

Four weeks of self-report data were interspersed throughout the experimental period. Each S tabulated his daily consumption for one week (by one of the methods described above). Data collection periods began two weeks after treatment, six weeks after treatment (i.e., two weeks after booster), 16 weeks after treatment, and 32 weeks after treatment. As mentioned previously, the 16 week data collection period was discarded due to large mortality. The high mortality rate at this period was probably due to its occurrence at the very end of the Spring Quarter, a time when most students depart from campus for Summer vacation. To offset further mortality, each S was contacted by phone at the conclusion of the 32 week data collection period. Ss were instructed to deliver their data during this conversation, as well as, to deposit their record forms in the pre-designated receptacle.

Figure 1 contains the proper sequence of each treatment group's activities required throughout the experimental period.
<table>
<thead>
<tr>
<th>Assignment</th>
<th>Treatment Instructions</th>
<th>Booster Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>Dummy-------------------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td>Baseline</td>
<td>Satiation Group--------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td></td>
<td>Satiation-------------</td>
<td>Dummy---------------</td>
</tr>
<tr>
<td></td>
<td>Data-------------------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td></td>
<td>Data-------------------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td></td>
<td>Data-------------------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td>Satiation + Booster Group</td>
<td>Satiation------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td></td>
<td>Data-------------------</td>
<td>Booster-------------</td>
</tr>
<tr>
<td></td>
<td>Data-------------------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td></td>
<td>Data-------------------</td>
<td>Data-----------------</td>
</tr>
<tr>
<td></td>
<td>Data-------------------</td>
<td>Data-----------------</td>
</tr>
</tbody>
</table>

**FIGURE 1**

Experimental Time Line for the Delivery of Treatment Instructions and the Collection of Data
CHAPTER III

RESULTS

Each comparison was investigated by three different dependent variables. The mean reduction of cigarette consumption (base-line minus self-report mean) was the major variable of interest. The percentage reduction of cigarette consumption (with arcsine transformation) and mean total number of cigarettes consumed were also employed to ensure the absence of any artifact attributable to a specific dependent variable. Since the results of the three dependent variables are virtually identical, data will be discussed primarily in terms of mean reduction of cigarette consumption with appropriate references to the other dependent variables. A Split Plot Factorial (SPF) 3 x 3 Analysis of Variance was computed on the mean reduction of cigarettes; a summary of these results is presented in Table I. An inspection of this table reveals that the effects of treatment, time, and the treatment x time interaction were all significant (p < .05), F(2,69) = 8.65, F(2,138) = 99.06, F(4,138) = 7.92, respectively. Identical results were also obtained from the Anova's on percentage reduction of cigarette consumption (Table II) and total cigarette consumption (Table III).

The means and standard deviations for each cell grouping of reduction scores are presented in Table IV, and graphical representation of the means is presented in Figure 2. Individual comparisons among the means were conducted using Tukey's HSD test (Kirk, 1968, p. 88).
TABLE I
ANALYSIS OF VARIANCE ON MEAN REDUCTION OF CIGARETTE CONSUMPTION FOR EACH S

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>5517.25</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (A)</td>
<td>1106.89</td>
<td>2</td>
<td>553.44</td>
<td>8.65**</td>
</tr>
<tr>
<td>Subj. W. Groups</td>
<td>4410.36</td>
<td>69</td>
<td>63.91</td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>8695.38</td>
<td>144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time (B)</td>
<td>4683.71</td>
<td>2</td>
<td>2341.85</td>
<td>99.06**</td>
</tr>
<tr>
<td>AB</td>
<td>749.16</td>
<td>4</td>
<td>187.29</td>
<td>7.92**</td>
</tr>
<tr>
<td>B x Subj. W. Groups</td>
<td>3262.15</td>
<td>138</td>
<td>23.64</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
**p < .01
<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between Subjects</strong></td>
<td>73.79</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (A)</td>
<td>17.63</td>
<td>2</td>
<td>8.81</td>
<td>10.87**</td>
</tr>
<tr>
<td>Subj. W. Groups</td>
<td>56.16</td>
<td>69</td>
<td>.81</td>
<td></td>
</tr>
<tr>
<td><strong>Within Subjects</strong></td>
<td>156.11</td>
<td>144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time (B)</td>
<td>96.52</td>
<td>2</td>
<td>48.25</td>
<td>146.24**</td>
</tr>
<tr>
<td>AB</td>
<td>46.59</td>
<td>138</td>
<td>.33</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05  
**p < .01
"TABLE III
ANALYSIS OF VARIANCE ON TOTAL CIGARETTE
CONSUMPTION FOR EACH S"

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td>7776.83</td>
<td>71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment (A)</td>
<td>1650.51</td>
<td>2</td>
<td>825.25</td>
<td>9.29**</td>
</tr>
<tr>
<td>Subj. W. Groups</td>
<td>6126.32</td>
<td>69</td>
<td>88.78</td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td>11539.99</td>
<td>216</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time (B)</td>
<td>6188.02</td>
<td>3</td>
<td>2062.67</td>
<td>98.88**</td>
</tr>
<tr>
<td>AB</td>
<td>1032.41</td>
<td>6</td>
<td>172.06</td>
<td>8.29**</td>
</tr>
<tr>
<td>B x Subj. W. Groups</td>
<td>4319.56</td>
<td>207</td>
<td>20.86</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
**p < .01

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
# TABLE IV

MEANS AND STANDARD DEVIATIONS OF REDUCTION IN CIGARETTE CONSUMPTION FOR EACH GROUP AT EACH TIME PERIOD

<table>
<thead>
<tr>
<th></th>
<th>Control Group</th>
<th>Satiation Group</th>
<th>Satiation and Booster Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean = 5.70</td>
<td>Mean = 14.19</td>
<td>Mean = 15.37</td>
</tr>
<tr>
<td></td>
<td>S.D. = 5.70</td>
<td>S.D. = 9.59</td>
<td>S.D. = 8.79</td>
</tr>
<tr>
<td>2 weeks</td>
<td>Mean = 1.06</td>
<td>Mean = 1.16</td>
<td>Mean = 6.90</td>
</tr>
<tr>
<td></td>
<td>S.D. = 1.44</td>
<td>S.D. = 1.51</td>
<td>S.D. = 10.77</td>
</tr>
<tr>
<td>32 weeks</td>
<td>Mean = .58</td>
<td>Mean = .61</td>
<td>Mean = 1.67</td>
</tr>
<tr>
<td></td>
<td>S.D. = .93</td>
<td>S.D. = .57</td>
<td>S.D. = 3.18</td>
</tr>
</tbody>
</table>
represents these comparisons expressed in units of mean reduction in cigarette consumption. Each of the three dependent variables yielded virtually identical results and revealed that at two weeks post treatment both the Satiation (S) and the Satiation plus Booster (SB) Groups smoked significantly less than the Control Group (C). Furthermore, there were no significant differences between S and SB. Six weeks after the administration of treatment and 2 weeks after Booster, SB had a greater reduction than either the S or C, and there were no differences between the S and C. There were no significant differences between each of the pairs of the three groups at 32 weeks after experimental treatment; C and S, C and SB, and S and SB.

Further comparisons revealed that each of the three treatment Groups were smoking significantly more cigarettes at 6 and 32 weeks post treatment, than at 2 weeks post treatment. There were no differences in smoking rates between 6 and 32 weeks post treatment for either C or S. However, the SB smoked more at 32 weeks post treatment, than at 6 weeks post treatment. Again, results were identical using each of the other dependent variables. Thus all groups deteriorated back to their previous base-line smoking rates, while the addition of a Booster session appears to have retarded this deterioration effect.

Questionnaire Analysis

From the questionnaire (Appendix A) presented to all Ss at the organizational meeting, five measures were isolated for investigation: (1) the number of previous smoking years, (2) the number of days prior to treatment in which the S attempted to quit on his own, (3) the number of
TABLE V
TUKEY'S HSD COMPARISONS AMONG THE MEANS EXPRESSED IN UNITS OF MEAN REDUCTIONS
OF CIGARETTE CONSUMPTION WHERE \( C_{32} \) REPRESENTS THE CONTROL
GROUP'S DATA COLLECTED 32 WEEKS AFTER TREATMENT

<table>
<thead>
<tr>
<th></th>
<th>( C_{32} )</th>
<th>( S_{32} )</th>
<th>( C_6 )</th>
<th>( S_6 )</th>
<th>( S_{B32} )</th>
<th>( C_2 )</th>
<th>( S_{B6} )</th>
<th>( S_2 )</th>
<th>( S_{B2} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_{32} )</td>
<td>.58</td>
<td>-</td>
<td>.48</td>
<td>.58</td>
<td>1.09</td>
<td>5.12*</td>
<td>6.32*</td>
<td>13.61*</td>
<td>14.97*</td>
</tr>
<tr>
<td>( S_{32} )</td>
<td>.61</td>
<td>-</td>
<td>.45</td>
<td>.55</td>
<td>1.06</td>
<td>5.09*</td>
<td>6.29*</td>
<td>13.58*</td>
<td>14.76*</td>
</tr>
<tr>
<td>( C_6 )</td>
<td>1.06</td>
<td>-</td>
<td>.10</td>
<td>.61</td>
<td>4.64*</td>
<td>5.84*</td>
<td>13.13*</td>
<td>14.31*</td>
<td></td>
</tr>
<tr>
<td>( S_6 )</td>
<td>1.16</td>
<td>-</td>
<td>.51</td>
<td>.54*</td>
<td>5.74*</td>
<td>13.03*</td>
<td>14.21*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S_{B32} )</td>
<td>1.67</td>
<td>-</td>
<td>4.03*</td>
<td>5.23*</td>
<td>12.52*</td>
<td>13.70*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( C_2 )</td>
<td>5.70</td>
<td>-</td>
<td>1.20</td>
<td>8.49*</td>
<td>9.67*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S_{B6} )</td>
<td>6.90</td>
<td>-</td>
<td>7.29*</td>
<td>8.47*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S_2 )</td>
<td>14.19</td>
<td>-</td>
<td>1.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( S_{B2} )</td>
<td>15.37</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( q_{9,.05,138} = 4.43^* \)
FIGURE 2

Graphical Depiction of Time x Treatment Interaction Expressed In Units of Mean Reduction in Cigarette Consumption For Each S
non-smoking days resulting from a previous attempt to quit, (4) the rated fear of contracting cancer, and (5) the rated desire to quit smoking. A sixth variable measuring rated expectancy for change was discarded due to ambiguous wording. A Completely Randomized ANOVA analysis of variance (Kirk, 1968, 105-106) on each of these dependent variables revealed that none of the five analyses attained significance at the .05 level. The obtained F (2,69)s were .09, .0002, .0009, 1.26, and .13 respectively. It may be concluded that differences among groups were not attributable to any concomitant variation in these extraneous variables.

A Pearson product-moment correlation was computed between rated aversiveness of treatment at the seventh treatment day and the mean reduction in cigarette consumption for S and SB combined at two weeks post treatment, and found to equal .35. This significant correlation (p < .05) suggests that the more aversively the treatment is rated, the more cigarette consumption is reduced. The correlations between all Ss' mean reduction in cigarette consumption at two weeks post treatment (N = 72) and the Ss' pre-base-line rated desire to quit (r = -.13, p < .05), as well as, the Ss' pre-base-line reported number of smoking years (r = +.20, p < .05) were not significant. The correlation between the rated desire to quit and rated fear of contracting cancer (r = +.11, p < .05) before the treatment was also not significant.

A correlation between the number of days practicing a satiation regimen during the initial treatment week and the mean reductions of cigarette consumption for the combined S and SB Groups (N = 48) at two weeks post treatment was significant (p < .05) and equal to -.56. This suggests an upper limit of effectiveness, insofar as the longer one
spends on a satiation regimen (i.e., the more one approaches seven days), the less one reduces smoking at two weeks post treatment. The sixth and final correlation investigated the relationship between the number of days practicing a satiation regimen during a booster period (i.e., a maximum of three days), and the mean reduction scores for SB Ss (N = 24) at six weeks post treatment (i.e., two weeks post Booster). This positive, significant correlation (r = +.92) suggests a lower threshold of treatment effectiveness, such that the more one approaches three days of satiation, the more one reduces his cigarette consumption at six weeks post treatment.

In addition the raw data was examined to determine how many Ss ceased smoking completely. Ten Ss in each of the two satiation groups reported zero smoking rates at two weeks post treatment; by six weeks post treatment all Satiation Ss had resumed smoking with an average smoking rate of 19.7 cigarettes per day. Of the ten SB Ss, six Ss reported a zero smoking rate six weeks after treatment; while, the remaining four Ss resumed smoking with an average smoking rate of 15.85 cigarettes. By eight months post treatment all Ss had resumed smoking. Furthermore, Appendix F provides a table which contains the number of days each S remained on initial treatment and the number of days SB Ss remained on booster treatment. An inspection of Appendix F reveals that only a small number of Ss continued smoking the full seven days of initial treatment. Resnick (1968b) in contrast reported that four Ss stopped smoking prior to the end of his satiation week.
CHAPTER IV

DISCUSSION

The results indicate an interaction between Satiation Instructions (S) and Time such that satiation reduces smoking for 2 weeks but the effects deteriorate at 6 weeks. Furthermore, the addition of a satiation booster (SB) moderates this deterioration at 6 weeks but is ineffective at 32 weeks. These findings represent a replication of Resnick's study (1968b) insofar as the S and SB groups smoked less than C at the 2 weeks post treatment test period. However, Resnick reported that his double and triple Satiation Groups showed no further mean changes between 2 weeks and 4 months post treatment. The reconciliation for these discrepancies is not quite clear; one possibility is that Resnick used phone contacts to retrieve data whereas this experiment relied on self report forms for data retrieval (for both 2 and 6 weeks post treatment). It may well be that Resnick's introduction of expected E contact may have been a powerful maintenance variable in and of itself.

The results are also consistent with the findings of Lublin and Joslyn (1968), McGuire and Vallence (1964), Yates (1958) and Jones (1968) insofar as the addition of a booster session did maintain initial reductions when measured 6 weeks post treatment. However, all of the present groups failed to maintain initial treatment reductions when measured 32 weeks post treatment. This deterioration of initial treatment effects...
was the most consistent finding in the reviews of the smoking literature by Bernstein (1969), Keutzer, Lichtenstein, and Mees (1968), and Lichtenstein and Keutzer (1971).

The significant correlations between Satiation Ss' reductions of cigarettes at 2 and 6 weeks post treatment with the number of days spent on a satiation regimen suggest a critical period of satiation effectiveness. A lower bound of this critical period is suggested by the correlation between the number of SB S's smoking days during the booster period and their mean reduction of cigarettes. Thus, the more one approaches the limit of 3 days of satiation booster the more one tends to reduce cigarette consumption. An upper bound of satiation effectiveness is suggested by the negative correlation between the number of initial smoking days for S and SB and their mean reduction of cigarettes. Thus, the more one approaches the limit of 7 days of satiation, the less one reduces cigarette consumption.

A significant correlation was also found between aversiveness of the treatment rated at the seventh (and, final) day of initial treatment and smoking reductions reported two weeks post treatment. On the surface this finding suggests that the more the S rates the treatment to be aversive, the more smoking reductions are obtained. This observation is theoretically explained by the contingent pairing of the former reinforcing stimulus (cigarette) with the aversive consequences. Through this pairing, the valance of the stimulus is altered so that it now becomes an aversive stimulus.

However, there is serious question concerning the validity of the rated aversiveness index. Two nuisance variables were present during
the rating operation. First, the S had to rely on memory over 7 days regarding the aversiveness of treatment. The second nuisance variable concerns the environment within which the actual rating process transpired. Each S was individually presented a seven point scale upon which to rate each of the aversiveness data. The E may have communicated more information to the S (via facial expressions, postural gestures) than desired in this face to face encounter.

An attempt was made to identify what treatment aversiveness meant in terms of physiological data (perceived nausea, headaches, hoarseness of throat, etc.) rated along a seven point continuum. However, these data on somatic complaints were incomplete due to E error. A cursory inspection of the somatic data demonstrated a consistent trend. Control Ss consistently rated treatment low in aversiveness, while also reporting low levels of somatic complaints. However, the six Control Ss who reported strong (i.e., rated score of five) treatment aversiveness also reported a low level of somatic complaints. They stated that, although they were smoking the same amount of cigarettes, the E imposed mandate to daily smoke a given amount of cigarettes reduced the pleasure associated with smoking; the smoking task then became a chore. Data received from both groups of Satiation Ss revealed that high ratings of treatment aversiveness were followed by high ratings of somatic complaints. Given the significant correlation between rated aversiveness of treatment and initial reductions scores, and the consistent trend between rated treatment aversiveness and rated somatic complaints, a theoretically sound but empirically unsubstantiated process emerges. The effect of increasing daily cigarette consumption creates an aversive consequence by
setting the occasion for pronounced somatic discomfort. This pairing of the previous reinforcer (cigarette) with an aversive consequence (somatic discomfort) changes the valence of the stimulus from a positive reinforcer to an aversive stimulus. The behavior change observed (i.e., reductions in smoking) may be viewed as an avoidance response and as an escape response.

Thus, a theoretical model for satiation may be fashioned through inferences which must be subjected to further experimental validation. Ayllon (1963) has stated that by increasing the reinforcer's quantity, behavioral decrements are observed; the reinforcing value of the stimulus has been decreased. It may well be that the reinforcing value of a cigarette is decreased by massing aversive somatic consequences through repeated exposure to the stimulus cigarette. If this is so, then the break down of satiation effects experienced when the S approaches 7 days of doubled smoking may be explained as a process through which the S adapts to the aversiveness of the somatic consequences. Without these aversive consequences, the satiation program becomes an extended acquisition period in which the S receives a greater quantity of reinforcers over time.

A second point is culled from Ayllon's model. The logical extension of this model can be employed to explain the observed deterioration of initial treatment effects. If increasing the quantity of a reinforcer decreases its reinforcing value, it may well be that the reinforcing value of a stimulus may be increased by decreasing the reinforcer's quantity. If this is so, then the reduction in smoking rates following a satiation treatment would tend to increase the reinforcement value of that
stimulus. As soon as the S takes his first post treatment cigarette, smoking behavior receives strong reinforcement from a stimulus which has increased in its reinforcing value. This reinforced behavior tends to be repeated, thereby evidencing the observed increase in smoking 6 and 32 weeks after treatment for S and SB.

**Implications for Future Research**

The fact which emerges from reviewing all of the smoking literature is that we do not as yet understand the critical factors in initial behavior change. It seems logical that the factors for this change must first be empirically examined before any meaningful inspection of maintenance variables can occur. This research suggests that initial change is dependent upon the number of days spent on satiation and the Ss' rated aversiveness of the satiation treatment. The veridicality of these variables must receive further empirical support insofar as only correlational statistics were employed. The possibility should be eliminated of an additional confound in the form of an article which appeared in the student newspaper (see Appendix G) prior to the first data collection period, which may have provided unequal demand characteristics for some groups and more information to the Ss than desired.

An important aspect of the satiation conditioning theory postulated above appears to rest upon the Ss' perception of aversive somatic consequences. A scale rating the aversiveness of somatic consequences is suggested as a way of differentiating the factors of satiation days and somatic aversiveness. Furthermore, differences may result from variations in the actual rating process, i.e., whether the S is face to face with the E or whether the S is isolated from the E.
Another variable which may affect change is expectancy for success, i.e., how much does the S feel that this treatment technique will be successful in reducing his cigarette consumption. The desire to quit variable, (how much the S wants to change), although theoretically important, has received minimal attention due to the type of Ss included in experiments. Most research ventures require volunteers to complete their sample size. It would seem illogical for a S to volunteer without having a strong desire to quit smoking, as well (unless Ss are receiving credit hours or pay for participation). Its pragmatic importance should also require empirical inspection as a possible independent variable.

An interesting finding was a nonsignificant correlation between rated fear of contracting cancer and rated desire to quit. The American Cancer Society has invested a large amount of time and money in mass media advertisements. Their aim was to decrease cigarette consumption via an increase in fear of cancer. This research venture, however, does not confirm their approach. It may well be that the lack of a significant correlation is due to the lack of a proper alignment between fear arousal and acceptance of precautionary recommendations (desire to quit smoking). Janis (1967) has suggested that there is an optimal level of fear at which the facilitating effects of fear arousal are most powerful and outweigh the interfering effects. It appears that the specification of this optimal level of fear regarding the contraction of cancer from smoking is of the utmost social importance (i.e., given the high base-rate problem of smokers).
Another proper match is needed in the area of smoking. Once the variables for initial change are identified, then the variables responsible for the maintenance of that change can also be specified. At this writing, it appears that the optimal booster will arise from the proper match between type of technique and quantity of the technique, (i.e., number of days) as well as, the specification of the post treatment time most suited for the appearance of a booster technique.

**Treatment Application**

Although there is a lack of an appropriate technique to maintain initial reductions from a satiation treatment, a number of relevant treatment variables can be specified. The target behavior must be so structured that the overpresentation of its reinforcing stimulus sets the occasion for aversive consequences. The theoretical model offered is that the pairing of aversive consequences with the former reinforcing stimulus results in a decrease of the inappropriate behavior.

Within this paradigm, one may speculate that the optimal environment for satiation treatment is an environment in which therapeutic agents have maximum control over environmental contingencies. Thus, a continuum for probable treatment effectiveness may range from inpatients comprising most probable behavior change, to outpatients comprising the lower ranges of probable treatment effectiveness, with children comprising the mid-regions. This continuum is simplistic, indeed, as it overlooks many crucial change variables such as expectancy and desire for change, cooperation, and the like. One of the most noted obstacles in the implementation of a behavior modification program is the acceptance of its
treatment value by the therapeutic agents, psychiatric attendants, nurses, orderlies, parents. Once an appropriate maintenance variable has been isolated, satiation may be a justifiable initial treatment. Support for such a program may then be generated by a demonstration of treatment effectiveness requiring minimal staff and/or parent time.

Outpatients are specified on the lower ranges of the treatment effectiveness continuum because of the widely cited avoidance response to aversive conditioning. It may well be that continuance in such a program requires a high desire and expectancy for change in order to withstand short-term pain. Once isolated, these variables of change can be maximized to produce significant changes in even the outpatient population.

Throughout this entire Chapter two unanswered questions have emerged:

1. what are the variables responsible for initial change? and

2. what are the variables responsible for maintenance of change?

In answering these questions, future researchers would do well to acknowledge Paul's (1969, p. 44) assertion that the most appropriate answer in behavior therapy research is one which encompasses "what treatment, by whom is most effective for this individual with that specific problem, under what set of circumstances, and how does it come about?".
CHAPTER V

SUMMARY

The present research attempted to explore the effectiveness of response contingent satiation in shaping and maintaining reductions in cigarette smoking behavior. A Split Plot Factorial design was employed with three levels of treatment instructions (Control, Satiation, and Satiation plus Booster) and three levels of time (two, six, and 32 weeks post treatment). The 72 Ss reported weekly consumption records for each of the three levels of time. Three dependent variables (mean total number of cigarettes consumed, mean reduction of cigarette consumption, and percentage reduction of cigarette consumption) were employed to ensure that obtained results were not due to an artifact of a particular measure. Data were also compiled from a pre-treatment questionnaire, as well as ratings of treatment aversiveness and partial somatic data compiled during the seventh day of treatment.

Results obtained indicated that Satiation affected significant initial cigarette reductions; and, although the addition of a booster group retarded deterioration effects, all groups were smoking just below their base-line rates at 32 weeks post treatment. Significant correlations between rated treatment aversiveness and initial reductions, and between number of days spent on satiation and subsequent reductions were employed in fashioning a theoretical basis for observed findings.
Suggestions were made for encompassing a larger number of potential change variables in future research; while possible usages for satiation as a treatment were also discussed. The conclusion reached was that the process of change must be further understood prior to manipulation of maintenance techniques.
REFERENCES


Cook, T. W. Distribution of practice and size of maze pattern. *British Journal of Psychology, 1957, 27, 303-312 (b).*


Lichtenstein, E. & Keutzer, C. S. Experimental investigation of diverse techniques to modify smoking: A follow-up report. Behavior Research and Therapy, 1969, 7, 139-140.


Wolff, R. The systematic application of the satiation procedure to delusional verbiage. The Psychological Record, 1971, 21, 459-463.


SELF-REPORT QUESTIONNAIRE

Name:
Address:
Phone #:

1. How long have you smoked? ________ years

2. Have you ever smoked another brand of cigarette before? _________
   If YES, what brand was it? _____________________________________

3. Did you ever smoke more cigarettes per day than you do now? ______
   If YES,
   a. How many ________ per day.
   b. How long ago did you reduce to your present level? _________

4. Have you tried to quit smoking before? ______________________
   If YES,
   a. How long ago was it? _____________________________________
   b. How long did you go without smoking __________________________
      years/months/days.

5. Rate your desire to quit smoking by circling the number which best fits:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>not</td>
<td>very</td>
<td>slightly</td>
<td>moderately</td>
<td>strong</td>
<td>very</td>
<td>strongest</td>
</tr>
<tr>
<td>at all</td>
<td>slightly</td>
<td>slightly</td>
<td>strongly</td>
<td>strong</td>
<td>ever</td>
<td></td>
</tr>
</tbody>
</table>

6. Did either/both of your parents smoke?
   mother __________
   father __________
If YES, did either/both of your parents attempt to quit smoking?
mother __________
father __________
If YES, were either/both successful?
mother __________
father __________

7. Did any of your brothers and/or sisters smoke? (Please enter the number in the blank line.)
brother/s __________

sister/s __________
If YES, did any of your siblings attempt to quit smoking?
brother/s __________

sister/s __________
If YES, were any of your siblings successful?
brother/s __________

sister/s __________

8. If any of your brothers and sisters smoked, were they older/younger?
brother/s __________

sister/s __________

9. How would you rate your fear of contracting cancer from continued cigarette smoking?

1 2 3 4 5 6 7
not at all very slightly moderately strong very strongest
at all slightly moderately strong ever

10. How would you rate your expectancy that this technique will help you to quit smoking?

1 2 3 4 5 6 7
not at all very slightly moderately strong very strongest
at all slightly moderately strong ever
PSEUDO-TREATMENT INSTRUCTIONS

You are about to engage in an exercise designed to aid you in eliminating your smoking behavior. The key point is that the responsibility for carrying out this program rests solely on you. This means that the program will be effective only if every instruction is carried out in every detail. Now listen carefully!

Most of what we see other people doing represents something they have learned. Talking, dressing, playing, and working at tasks are all things that are learned. It is also true that smoking, fingernail biting, and other problem behaviors are learned. The reason why a person continues to act in a certain way is that the action is rewarded. For example, the reason a man goes to work every morning, to a job he particularly dislikes, is that he is rewarded, he gets something out of it — money. In the same way that the man performs his unliked job, you perform a habit which you would like to quit — smoking. Furthermore, as the man continues to work because he is getting rewarded for it, you continue to smoke because you are still getting something out of it — you are still being rewarded for smoking.

If the man described above no longer received money for working, he would no longer continue with that job; rather, he would look for some other kind of job that pays him money. Thus, if you no longer received something pleasurable from smoking, you would not continue to smoke. This program, if followed exactly, is designed to remove the pleasurable aspects from smoking, so that you will be able to quit smoking.

For the next seven days (E gives the exact days to the S, e.g., from Monday morning to Sunday evening) you are to smoke as many cigarettes as you usually do. Thus, if you are now smoking one pack a day, do not increase or decrease by even one the number of cigarettes smoked per day. Another point is that you should not smoke more or less of each cigarette than you normally do; so that if you usually smoke your cigarette to the very end, then continue to do so, and vice versa. It is equally important that you finish all of your assigned quota of cigarettes for a particular day, on that day, do not even leave one cigarette for the next day (E tells S his exact quota which has been computed from "baseline week"). It is also very important you smoke your cigarettes at times during the day when you would normally smoke.

The key point to be maintained for these seven days is that when you light your cigarette think of how harmful cigarette smoking is to your health — think of your physiological reactions to smoking, e.g., hoarseness of your throat, excess mucus in your nose and throat, excess coughing, excessive bad breath, and the like. Think of all of these things again when you extinguish your cigarette. Repeat this procedure for every cigarette that you will smoke during the next seven days.
After the seven day period is concluded (E tells S the exact day), you are not to smoke even one cigarette. At this time you will have a stronger desire to quit smoking than you ever had before. Take advantage of this situation and make a determined effort never to smoke again. Whenever you have an urge to smoke, do something else, e.g., chew gum, etc. This is very important. Remember the example of the man described above, when he quit one job because he was not getting rewarded, he found another job to fill the vacuum left in his life. The same applies to you. There will be a huge vacuum left in your normal behavior pattern, and we want to fill this space with some other behavior.

Just four more points before you leave:

1. During the next eight months, there will be four times when you will be asked to record your daily cigarette consumption for a week. Please fill out these forms as accurately as possible.

2. Three days from today (E gives S the exact date and time) you are to meet with me again.

3. If for any reason, you are unable to complete seven days of smoking your normal amount, please contact me by depositing a note in the data box.

4. And finally, remember to take a record form before you leave, today.

Thank you for coming, and remember that the program is only as effective as you make it.
SATIATION TREATMENT INSTRUCTIONS

You are about to engage in an exercise designed to aid you in eliminating your smoking behavior. The key point is that the responsibility for carrying out this program rests solely on you. This means that the program will be effective only if every instruction is carried out in every detail. Now listen carefully!

Most of what we see other people doing represents something they have learned. Talking, dressing, playing, and working at tasks are all things that are learned. It is also true that smoking, fingernail biting, and other problem behaviors are learned. The reason why a person continues to act in a certain way is that the action is rewarded. For example, the reason a man goes to work every morning, to a job he particularly dislikes, is that he is rewarded, he gets something out of it -- money. In the same way that the man performs his unliked job, you perform a habit which you would like to quit -- smoking. Furthermore, as the man continues to work because he is getting rewarded for it, you continue to smoke because you are still getting something out of it -- you are still being rewarded for smoking.

If the man described above no longer received money for working, he would no longer continue with that job; rather, he would look for some other kind of job that pays him money. Thus, if you no longer received something pleasurable from smoking, you would not continue to smoke. This program, if followed exactly, is designed to remove the pleasurable aspects from smoking, so that you will be able to quit smoking.

For the next seven days (E gives the exact days to the S, e.g., from Monday morning to Sunday evening) you are to smoke twice as many cigarettes as you usually do. Thus, if you are now smoking one pack a day, you will smoke two packs a day for the next seven days. Another point is that you should not smoke more or less of each cigarette than you normally do; so that if you usually smoke your cigarette to the very end, then continue to do so, and vice versa. It is equally important that you finish all of your assigned quota of cigarettes for a particular day, on that day; do not even leave one cigarette for the next day (E tells S his exact quota which has been computed from "baseline week"). It is also very important that you smoke your cigarettes at times during the day when you would normally smoke.

The key point to be maintained for these seven days is that when you light your cigarette think of how harmful cigarette smoking is to your health -- think of your physiological reactions to smoking, e.g., hoarseness of your throat, excess mucus in your nose and throat, excess coughing, excessive bad breath, and the like. Think of all of these things again when you extinguish your cigarette. Repeat this procedure for every cigarette that you will smoke during the next seven days.
After the seven day period is concluded (E tells S the exact day), you are not to smoke even one cigarette. At this time you will have a stronger desire to quit smoking than you ever have had before. Take advantage of this situation and make a determined effort never to smoke again. Whenever you have an urge to smoke, do something else, e.g., chew gum, etc. This is very important. Remember the example of the man described above, when he quit one job because he was not getting rewarded, he found another job to fill the vacuum left in his life. The same applies to you. There will be a huge vacuum left in your normal behavior pattern, and we want to fill this space with some other behavior.

Just four more points before you leave:

1. During the next eight months, there will be four times when you will be asked to record your daily cigarette consumption for a week. Please fill out these forms as accurately as possible.

2. Three days from today (E gives S the exact date and time) you are to meet with me again.

3. If for any reason, you are unable to complete seven days of smoking double your normal amount, please contact me by depositing a note in the data box.

4. And, finally, remember to take a record form before you leave, today.

Thank you for coming, and remember that the program is only as effective as you make it.


RECORD FORM

NAME: 728-2921
ADDRESS:
PHONE #:

Please record the number of cigarettes you have smoked on each day of the seven day Record Week. This is to be accomplished by entering the day, date, and number of cigarettes smoked.

<table>
<thead>
<tr>
<th>DAY</th>
<th>DATE</th>
<th># OF CIGARETTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>The date this form is to be passed in</td>
<td></td>
</tr>
</tbody>
</table>

After this form has been completed, please pass this in on the 8th day by depositing this form into the recepticle located in the hall of the Psychology Department. Note: If any problems arise, please feel free to contact me at the above phone number.
SEVENTH TREATMENT DAY

AVERSIVENESS SCALE

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>not at all</td>
<td>very slightly</td>
<td>slightly</td>
<td>moderately</td>
<td>strong</td>
<td>very strong</td>
<td>strongest ever</td>
</tr>
</tbody>
</table>

1. Rated Aversiveness of Treatment

2. Rated Aversiveness of Somatic Complaints:
   a) perceived nausea
   b) headaches
   c) hoarseness of throat
   d) sore throat
   e) coughing

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
NUMBER OF SMOKING DAYS FOR INITIAL TREATMENT
AND BOOSTER PERIODS

<table>
<thead>
<tr>
<th>Initial Treatment</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td>12</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>SB</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Booster</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SB</td>
<td>16</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
72 Join Study to Quit Smoking

An experiment to stop or significantly reduce cigarette smoking is being directed by Bill Costello, clinical psychology graduate student, for his M.A. thesis.

Costello divided 72 volunteers who wanted to stop smoking into three groups for the experiment.

Costello said the methods he is using have had national success, but he, "can't divulge the methods used on the effectiveness of treatment given until next Fall Quarter".

"To release anything at this time; Costello continued, "would ruin the experiment because the subjects would know what is happening".

The experiment started two weeks ago and will continue until Fall of 1972. The treatment lasts for seven days, and one month later there is a booster session to check the smoker's progress. Each subject will record his smoking record for four weeks at designated points of treatment to assess the effectiveness of treatment being given, Costello said.

"Normally the subjects are volunteers from the Psychology 110 class who need to pick up five experimental hours", Costello said. "Since this experiment extends for a long period of time, I asked departmental deans to distribute handouts to professors, and of the professors who wanted to cooperate, I was able to get volunteers for the experiment".