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Extinguishing or Modifying Smoking Behavior: A Comparison of Four Therapeutic Techniques

Alcid M. Pelletier
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EXTINGUISHING OR MODIFYING
SMOKING BEHAVIOR: A COMPARISON
OF FOUR THERAPEUTIC TECHNIQUES

by

Alcid M. Pelletier

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

Western Michigan University
Kalamazoo, Michigan
December, 1972
ACKNOWLEDGEMENTS

I wish to express sincere appreciation to Dr. Malcolm Robertson, to Dr. Paul Fuller and to Dr. William Carlson for their encouragement and guidance in the preparation of this thesis. My thanks also are expressed to Dr. Bradley Huiitema for his suggestions and guidance in statistical design and to Mrs. Sandra Borgman for typing the results of the present study.

Alcid M. Pelletier
MASTERS THESIS

PELLETIER, Alcid M.
EXTINGUISHING OR MODIFYING SMOKING BEHAVIOR:
A COMPARISON OF FOUR THERAPEUTIC TECHNIQUES.

Western Michigan University, M.A., 1972
Psychology, experimental

University Microfilms, A XEROX Company, Ann Arbor, Michigan
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INTRODUCTION

Survey of Literature and Results

Since the United States Surgeon General's report (Advisory Committee, 1964, 1971), many smokers' clinics have come into being and an increasing number of studies have been conducted on related techniques to assist persons in eliminating the tobacco habit. Bernstein (1969) and Keutzer, Lichtenstein, and Mees (1968), in their reviews, report an extensive variety of treatment techniques which have been utilized in attempts to treat tobacco addiction. Many of the studies, while carried out in clinical settings, have lacked a sufficient amount of subjects (Ss) or failed to adequately specify and control many variables. Others were conducted in too brief a period with not enough treatment sessions. Still others failed to test for hold over effects of treatment techniques by simply neglecting to follow-up over a period of weeks. Thus, many studies fail to show if there was a reversal of smoking behavior after treatment had stopped.

McFarland (1969) asserts philosophically that the tobacco habit can be eliminated in five days but fails to provide any supporting clinical data in evidence. Bernstein (1969), Cahoon (1971), and Keutzer,
Lichtenstein, and Mees (1968) report that most of the important variables which control smoking behavior are either unknown, or not adequately brought under control in treatment schedules. They conclude that the three most effective variables functioning in the majority of the treatment schedules are anxiety arousal, the power of suggestion, and placebo effects. It is noted that many deficiencies in specificity of design, controls, statistical analysis or post-tests, limit the value of many studies appearing in the literature.

Not too much success has been reported from the use of automated equipment. Azrin and Powell (1968) developed a specially designed cigarette case which automatically locked for a period of time when a S took a cigarette from it. Smoking was reduced to less than half the baseline rate; however, only five Ss were used in the experiment. Franks, Fried, and Ashem (1966) were no more successful with their automated machine which blew hot smoke into the S's face when he puffed on a cigarette, and cool air when he refrained from smoking. Only nine Ss were used in their experiment. While Green (1964) used 30 Ss, his experiment, using automated music, was restricted to retardates who merely took more drags to smoke as many cigarettes as they had previously consumed.
Considerable research reports the effectiveness of punishment as aversive-conditioning in treating undesirable behaviors (Azrin & Holz, 1966; Bandura, 1969; Campbell & Church, 1969; Solomon, 1964). Self-administered aversive stimuli in the form of electric shocks was shown to be an effective therapeutic technique in experiments conducted by Butcher (1968), McGuire & Vallance (1964), Mees (1966), and Ober (1966), but faulty designs and insufficient numbers of Ss make the findings generally inconclusive. Berecz (1971, 1972) in an experiment with 44 Ss found self-administered painful shock for imagined and actual smoking successful in treating both imagined and actual moderate smoking among males, successful for imagined heavy smoking, but unsuccessful in treating actual heavy smoking males. However, results were inconclusive for female Ss. Several earlier experiments also reported that shocking actual smoking behavior among heavy smokers was an ineffective treatment (Bernstein, 1969; Koenig & Masters, 1965; Ober, 1966, 1968; and Powell & Azrin, 1968).

Resnick (1968) used a satiation technique successfully with three-fourths of the Ss treated in one experiment. However, the fact that he used only eight Ss may limit the results. In a later experiment using 60 Ss, Resnick (1968 b) applied satiation techniques
and succeeded only in reducing the smoking level.
Marston & McFall (1971) also failed to show any lasting success in modifying smoking behavior through the satiation method.

Experiments employing contingency management techniques have met with varied and contradictory results. Hall (1971) reported continued success with one graduate student. However, a study containing only one S has limited generalizing value. Lawson and May (1970) reported contingency management to be effective to a point of statistical significance (P < .001) in reducing smoking behavior. However, treatment effects, when compared with three other treatment techniques, showed no statistically significant difference. Interaction between treatment effects and the five weeks of the experiment also failed to show statistical significance.

While techniques employing contractual management report some success in reducing the number of cigarettes consumed, one study (Lawson & May, 1970) failed to include follow-up data to measure post-treatment effects. The experimental design of another (Tooley & Pratt, 1967) did not permit a study of differential effects, since their treatment techniques combined a sequence of covert sensitization, contingency management, and contractual management.
A technique which has gained widespread publicity is the therapeutic utilization of imagination (Cautela, 1966, 1967, 1970; Gold & Neufeld, 1965; Homme, 1965; Mees, 1966; Wolpe, 1969). Several studies have shown the practice of visual imagery to have a sub-hypnotic effect, and to induce muscular relaxation effectively in treating phobic behaviors (Davison, 1968; Lang, Lazovik, & Reynolds, 1965; Schubot, 1966). In several experiments imagery has been shown to be an effective treatment technique for varied maladaptive behaviors, such as transvestism and fetishism and in treating deaf-mutes (Jacobsen, 1931; Malmo, 1962; Marks & Gelder, 1967; Max, 1935, 1937).

Unfortunately, many of these reports have not clearly specified the variable issues which are involved in the process of transferring effects from imagined responses to real life responses, thus, making it difficult for an investigator to replicate the findings of these studies.

The technique of imagination has been shown to be effective in two forms of treatment, (1) covert sensitization, and (2) systematic desensitization. Hogan & Kirchner (1967) used covert sensitization effectively in extinguishing learned phobic behaviors. The use of this treatment has reported success in treating compulsive

Since Wolpe's (1958) descriptions of systematic desensitization have become widely known, there have appeared a number of studies using the method with varying degrees of success. The extent of its success can generally be traced to the effectiveness of the person using it, rather than the method by itself, underscoring again the vital importance of variables related to therapist competency. On the other hand, several well designed studies can be cited which give credence to the placebo influences of systematic desensitization in treating phobias and learned maladaptive behaviors (Davison, 1968; Geer, & Katkin, 1966; Koenig & Masters, 1965; Lang, Lazovik & Reynolds, 1965; Marcia, Rubin & Efran, 1969; Marston & McFall, 1971; McGlynn, Mealiea & Nawas, 1969; McReynolds & Tori, 1972; Oliveau, Agras, Leitenberg, Moore & Wright, 1969; Paul, 1969; Pyke, Agnew & Kopperud, 1966; Schubot, 1966; Wolpe, 1961, 1968, 1969). Paul (1969) and Rachman (1967) combining systematic desensitization with relaxation techniques compared

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the approach with other behavioral therapies and reported that systematic desensitization had attention-placebo effects consistently more effective than did other techniques. A two year follow-up study, one of the longest known, of systematic desensitization in group therapy showed a maintenance of effectiveness in the use of this technique (Paul, 1968).

The apparent success of the utilization of imagination therapeutically has evoked an interest in combining the two methods that employ it. Wolpe (1958) explored the sequential use of the two methods by employing aversive conditioning through imagination to eliminate some undesired behaviors or phobias. Upon achieving success, he desensitized the clients so they would stop imagining the aversive stimulus. Cautela (1966) hypothesized that by alternating the methods of systematic desensitization and covert sensitization, cues which have been associated with aversive stimuli will become discrimination stimuli for avoidance behavior. A combination of the two methods has been shown to be more effective in treating hospitalized alcoholics than using aversion therapy alone (Lanyon, Primo, Terrill & Wener, 1972). The combination of the two methods in treating habitual smoking has been supported by research. Wagner & Bragg (1970) treated smokers for a total of less than three hours. After a
90-day follow-up, they suggested the advantage of combining covert sensitization, systematic desensitization, and instructions. Gerson & Lanyon (1972) reported a significant reduction (P < .05) in smoking was maintained even 13 weeks after treatment had stopped.

One of the most recent hypotheses on the reasons for tobacco addiction is proposed by Cahoon (1971) who writes,

"... that chronic cigarette smoking may lead to a vicious circle of CO₂ depletion due to atypical breathing habits related to chronic smoke inhalation and exacerbated by the influence of nicotine, followed by a high CO₂ intake through cigarette smoke inhalation [pp. 248-249]."

Evidence to support this hypothesis is presented by the Advisory Committee to the Surgeon General of the Public Health Service (1964) which notes that there is a 9.5% CO₂ concentration in the gases inhaled in tobacco smoke and that there may be a continuing need for this concentration once the habit is formed. The Advisory Committee's Report also denies that habitual smokers develop a tissue or physiological need for tobacco since there are no withdrawal symptoms found among those who stop smoking as there are among those who stop using narcotics. It has been shown that CO₂ concentrations of 10% and over breathed for 10 or more minutes most generally results in loss of consciousness in humans (Brown, 1930).
Heath (1958) supports the CO₂ hypothesis as a result of his research. He concludes that heavy smokers breathe more rapidly, inducing a CO₂ deficiency similar to that experienced in hyperventilation. Thus heavy smokers, like hyperventilators, suffer a loss of alveolar CO₂ resulting in dizziness and feelings of anxiety. The nicotine content may also have an effect resulting in more rapid breathing, and, in turn, CO₂ deprivation.

Meduna (1958), who has done extensive research with CO₂ therapy among those suffering nervous disorders, reports that CO₂ concentrations of 10% or less have narcotic effects on mammals in general.

Several studies indicate that CO₂ therapy has met with favorable results. The technique has been successfully employed in treating anxiety, psychosomatic problems and conversion reactions (McGraw & Oliver, 1959) and alcohol addiction (Thompson, 1959). Carbon dioxide build-up in the lungs may be accomplished by breath-holding practice, thus preventing the hyperventilation syndrome of CO₂ loss. One study, using the breath-holding technique, found that it served as a temporary substitute for smoking behavior, but it was not successful in breaking the smoking habit (Mees, 1966). Reliable data supporting systematic experimentation with respect to CO₂ therapy in treating smoking behavior is lacking.
The Present Problem

A review of the literature reveals varying degrees of success in treating tobacco addiction. The present study utilized and compared two behavioral techniques in addition to CO₂ inhalation and the psychodynamic technique. The two behavioral techniques utilized some traditional supportive counseling as reinforcement. Other studies have reported the benefits of this approach in decelerating compulsive and maladaptive behaviors (Carter & Stuart, 1957; D'Alessio, 1968; Hersen, 1970; Kanfer, 1966; Leventhal, 1968; Pelletier, 1971).

One of the purposes of this study was to explore Cahoon's (1971) CO₂ hypothesis, using a modification of Mees (1966) observation concerning the possible benefits of practicing breath holding. The hypothesized benefits of combining covert sensitization and systematic desensitization (Cautela, 1966) provided some incentive to explore its possibilities as was done in the present therapeutic study. The hypothesis of Tooley & Pratt (1967) that contractual management would prove effective in modifying the tobacco habit served as a third point of investigation. The fourth area researched the effects of merely counting cigarette smoking frequency (Lawson & May, 1970; McFall, 1970; Ober, 1968), combined with
psychodynamic supportive counseling (Koenig & Masters, 1965). Finding the best technique to help the client occupied a major interest rather than attempting to prove the effectiveness of a specific technique (Munro, 1951).

The present study was designed to explore, clarify and compare some of the issues noted in the literature. It was hypothesized that a combination of covert sensitization and systematic desensitization would be the most effective treatment technique, and counting interaction combined with supportive counseling would be the least effective. It was also expected that contractual management would be more effective than CO₂ as a treatment technique. However, the hypothesis did not occupy as intense an interest in the study as did a concern to discover techniques which could be applied to treating the present problem. It was felt that this concern would serve to minimize experimenter bias.
METHOD

Subjects

The Ss employed in this study came to the Human Development Ministries Center\(^1\) in response to a brief newspaper article appearing in the *Grand Rapids Press* (see Appendix A), an announcement in two issues of *Rapport*\(^2\) (see Appendix B), posters placed in 30 business establishments, health food stores and church foyers (see Appendix C), and general person-to-person announcements.

A total of 30 persons requested information concerning the "Smokers' Clinic," some in personal interviews and others over the telephone. All inquirers were screened by a series of questions concerning the extent of their desire to quit smoking. Those who reported they were simply "curious," or who felt they could "meet new people by going to the clinic," or who wanted to give up smoking only "for a short time" to prove they could do it were not accepted for treatment. Only those who reported

\(^1\)An affiliate agency sponsored by the Grand Rapids, Michigan District of the Reorganized Church of Jesus Christ of Latter Day Saints.

\(^2\)A monthly 16-page newspaper of the above mentioned district edited by the experimenter of the present study.
a sincere desire to completely give up the smoking habit were enrolled in the therapeutic sessions. All Ss reported smoking only cigarettes. There were nine males and seven females (N = 16) who enrolled. Information on each of the Ss was obtained in individual orientation interviews and is noted in Table 1.

The ages of the Ss are noted (Range = 16-58 years, $\bar{X} = 34.5$ years). It can be seen that the greatest number of Ss had continued the tobacco habit for many years (Range = 1.5-40 years, $\bar{X} = 16.22$ years). All but one of the Ss had made earlier attempts to give up smoking (Range = 0-10 times, $\bar{X} = 6$ times). With only one exception, all Ss in earlier attempts to give up the tobacco habit had refrained from smoking for less than two weeks (13 Ss had quit for only one week or less).

Design

The 16 Ss who were accepted were pre-tested prior to the beginning of the actual treatment. Each S was instructed to conscientiously keep an accurate daily record of the amount of total cigarettes smoked for a period of one week while deliberately maintaining his regular smoking habit. The Ss were provided with individual daily recording sheets, 8 1/2 by 11 inches (see Appendix D) which had designated places to include the S's name, date of beginning of recording, a daily date

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Table 1

Data Obtained in Interviews With Sixteen Subjects Enrolling in a Smokers' Clinic

<table>
<thead>
<tr>
<th>N</th>
<th>Sex</th>
<th>Age</th>
<th>How Many Years With Habit?</th>
<th>Every Try To Quit?</th>
<th>How Often?</th>
<th>Longest You've Stopped?</th>
</tr>
</thead>
<tbody>
<tr>
<td>n1</td>
<td>M</td>
<td>16</td>
<td>1.5</td>
<td>Yes</td>
<td>5</td>
<td>5 days</td>
</tr>
<tr>
<td>n2</td>
<td>M</td>
<td>58</td>
<td>30</td>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>n3</td>
<td>M</td>
<td>57</td>
<td>40</td>
<td>Yes</td>
<td>8</td>
<td>2 weeks</td>
</tr>
<tr>
<td>n4</td>
<td>F</td>
<td>46</td>
<td>24</td>
<td>Yes</td>
<td>6</td>
<td>2 weeks</td>
</tr>
<tr>
<td>n5</td>
<td>F</td>
<td>27</td>
<td>13</td>
<td>Yes</td>
<td>10</td>
<td>6 months</td>
</tr>
<tr>
<td>n6</td>
<td>F</td>
<td>16</td>
<td>3</td>
<td>Yes</td>
<td>8</td>
<td>2 days</td>
</tr>
<tr>
<td>n7</td>
<td>F</td>
<td>46</td>
<td>26</td>
<td>Yes</td>
<td>9</td>
<td>1 week</td>
</tr>
<tr>
<td>n8</td>
<td>M</td>
<td>28</td>
<td>11</td>
<td>Yes</td>
<td>5</td>
<td>3 days</td>
</tr>
<tr>
<td>n9</td>
<td>F</td>
<td>35</td>
<td>16</td>
<td>Yes</td>
<td>7</td>
<td>6 days</td>
</tr>
<tr>
<td>n10</td>
<td>M</td>
<td>41</td>
<td>22</td>
<td>Yes</td>
<td>9</td>
<td>1 week</td>
</tr>
<tr>
<td>n11</td>
<td>M</td>
<td>35</td>
<td>19</td>
<td>Yes</td>
<td>6</td>
<td>1 week</td>
</tr>
<tr>
<td>n12</td>
<td>M</td>
<td>29</td>
<td>10</td>
<td>Yes</td>
<td>5</td>
<td>5 days</td>
</tr>
<tr>
<td>n13</td>
<td>F</td>
<td>32</td>
<td>13</td>
<td>Yes</td>
<td>4</td>
<td>4 days</td>
</tr>
<tr>
<td>n14</td>
<td>M</td>
<td>28</td>
<td>10</td>
<td>Yes</td>
<td>7</td>
<td>5 days</td>
</tr>
<tr>
<td>n15</td>
<td>M</td>
<td>33</td>
<td>14</td>
<td>Yes</td>
<td>5</td>
<td>3 days</td>
</tr>
<tr>
<td>n16</td>
<td>F</td>
<td>25</td>
<td>7</td>
<td>Yes</td>
<td>2</td>
<td>4 days</td>
</tr>
</tbody>
</table>

N=16 \[ \bar{X} = 552 / 259.5 = 96 \]

\[ \bar{X} = 34.5 / 16.22 = 6 \]

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column, a column for recording smoking frequency and a column for comments the S might care to include. These recording sheets were returned to the therapist to compute individual S baseline of daily cigarette consumption.

Homoscedasticity was accomplished from the data obtained in baseline pre-tests by assigning each S to one of four groups representing the level of cigarette addiction. These were (1) Low (range = 10-23 cigarettes smoked daily, \( \bar{X} = 17.5 \)); (2) Low-Moderate (range = 29-30, \( \bar{X} = 29.5 \)); (3) Moderate (range = 35-36, \( \bar{X} = 35.25 \)); and (4) Heavy (range = 39-45, \( \bar{X} = 41.5 \)) levels of smoking. Several other studies included those who smoked 20 cigarettes a day in the heavy smokers category (Bernstein, 1969; Koenig & Masters, 1965; Ober, 1966; Powell & Azrin, 1968). In each of the four levels, \( n = 4 \). This assignment of Ss was similar to one used by Lawson and May (1970), although they used only three levels.

Stratified sampling was accomplished by taking the Ss from the four homogeneous populations and randomly assigning them to four different treatment groups. Care was taken to see that each treatment group received but one S from each of the four levels of addiction. There were four Ss in each treatment group. A matrix of these S assignments and treatment techniques is noted in
Table 2. It can be noted, when comparing Table 2 and Table 1, that the Ss were fairly evenly distributed according to age, sex, total years of addiction, and earlier attempts to quit smoking.

The mean daily baseline of addiction was quite similar in each treatment condition as a result of stratified sampling. This latter measure was the most important, since the study was primarily interested in studying the possible effects and interaction of four different treatment techniques applied over a period of four weeks. A random block factorial design was employed. No attempts were made to study the effects of S age or sex on extinguishing the tobacco habit.

To graphically view the possible effects of treatment techniques across a four week period plus an eight week follow-up, means of cigarettes smoked per day were computed and plotted on a graph.

Procedure

Four different treatment methods were employed. Each treatment technique contained randomly assigned four Ss, one from each of the four baseline operant levels of daily cigarette consumption. All treatment sessions were conducted with individual Ss. There was no group therapy in the present study, although the results from the treatment schedules were statistically
TABLE 2
Data Comparing Sixteen Subjects Assigned to Four Different Treatment Groups in a Smokers' Clinic

<table>
<thead>
<tr>
<th>Treatment Techniques (TT)</th>
<th>N</th>
<th>Age</th>
<th>Sex</th>
<th>Years Smoking</th>
<th>Times Tried To Quit</th>
<th>Number of Cigarettes at Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TT1</strong></td>
<td>n5</td>
<td>27</td>
<td>F</td>
<td>13</td>
<td>10</td>
<td>30 (Low-Mod)</td>
</tr>
<tr>
<td></td>
<td>n8</td>
<td>28</td>
<td>M</td>
<td>11</td>
<td>5</td>
<td>23 (Low)</td>
</tr>
<tr>
<td><strong>CO2</strong></td>
<td>n10</td>
<td>41</td>
<td>M</td>
<td>22</td>
<td>9</td>
<td>42 (Heavy)</td>
</tr>
<tr>
<td>Inhalation</td>
<td>n13</td>
<td>32</td>
<td>F</td>
<td>13</td>
<td>4</td>
<td>35 (Mod)</td>
</tr>
<tr>
<td><strong>TT2</strong></td>
<td>n1</td>
<td>16</td>
<td>M</td>
<td>1.5</td>
<td>5</td>
<td>10 (Low)</td>
</tr>
<tr>
<td>Covert Sensitization</td>
<td>n7</td>
<td>46</td>
<td>F</td>
<td>26</td>
<td>9</td>
<td>45 (Heavy)</td>
</tr>
<tr>
<td>Systematic Desensitization</td>
<td>n9</td>
<td>35</td>
<td>F</td>
<td>16</td>
<td>7</td>
<td>29 (Low-Mod)</td>
</tr>
<tr>
<td></td>
<td>n15</td>
<td>33</td>
<td>M</td>
<td>14</td>
<td>5</td>
<td>36 (Mod)</td>
</tr>
<tr>
<td><strong>TT3</strong></td>
<td>n2</td>
<td>58</td>
<td>M</td>
<td>30</td>
<td>0</td>
<td>35 (Mod)</td>
</tr>
<tr>
<td>Contractual Management</td>
<td>n4</td>
<td>46</td>
<td>F</td>
<td>24</td>
<td>6</td>
<td>30 (Low-Mod)</td>
</tr>
<tr>
<td></td>
<td>n12</td>
<td>29</td>
<td>M</td>
<td>10</td>
<td>5</td>
<td>22 (Low)</td>
</tr>
<tr>
<td></td>
<td>n14</td>
<td>28</td>
<td>M</td>
<td>10</td>
<td>7</td>
<td>39 (Heavy)</td>
</tr>
<tr>
<td><strong>TT4</strong></td>
<td>n3</td>
<td>57</td>
<td>M</td>
<td>40</td>
<td>8</td>
<td>35 (Mod)</td>
</tr>
<tr>
<td>Counting Interaction</td>
<td>n6</td>
<td>16</td>
<td>F</td>
<td>3</td>
<td>8</td>
<td>15 (Low)</td>
</tr>
<tr>
<td>Supportive Counseling</td>
<td>n11</td>
<td>35</td>
<td>M</td>
<td>19</td>
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<td>F</td>
<td>7</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td><strong>29.75</strong></td>
</tr>
</tbody>
</table>

* A comparison of cigarette consumption at baseline yielded an $F_{3,12} = 0.06$ (not significant).
computed by grouping the Ss of each treatment category.

One experimenter (E) conducted all the treatment sessions in the entire experiment. Each S met twice a week for 30 minute sessions at the Human Development Ministries Center. In the first session, after assignment to a treatment schedule, each S was given a copy of a "Prescription for Smokers" (see Appendix E), a modification of McFarland's (1969) five day plan. The same "Prescription" was given to each S in all treatment conditions after it was read aloud and the E asked the S if there were any questions. No specific instruction was given on relaxation; the Ss simply were left on their own to practice relaxation as instructed in the "prescription." The rest of the first session was spent in explaining the treatment schedule and generally discussing the S's reasons for wanting to stop smoking as well as the general health hazards associated with tobacco. During the initial session the S was also told that the treatment schedule about to be employed in an attempt to eliminate smoking behavior could also be generalized to dealing with other maladaptive behaviors.

The remaining seven sessions were spent in a more complete application of the treatment techniques. The Ss were also instructed to continue recording the number of cigarettes smoked daily and to report the number to
the E. A twenty-five dollar registration fee was collected to insure attendance at the treatment sessions as well as continued record keeping. The registration fee was returned after the experiment was complete without being made contingent on giving up the tobacco habit.

Treatment Techniques (TT)

$\text{CO}_2$ Inhalation $= \text{TT}_1$. Each of the four Ss in this category was given simple instructions on basic breathing exercises and how to retain more $\text{CO}_2$. They were read specific instructions which were prepared by the E, given an opportunity to discuss the instructions, and handed a personal copy to refer to at home from time to time. The instructions as written were:

1. First thing upon arising each morning, you are to practice deep breathing exercises for a period of about five minutes.
   a. Breathe in as much air as possible, breathe very deeply and fill your lungs as completely as possible.
   b. Hold the air in your lungs for at least 5-10 seconds.
   c. Let all the air out very slowly.
   d. Repeat steps a, b, c until five minutes have passed.
      (As you practice, you will discover you will be able to hold your breath longer and longer. You are to hold it as long as you can. Whenever you feel yourself becoming quite dizzy to the point of swooning, you are to slowly let the air out of your lungs.)

2. Every time you want to smoke during the day, breathe into a small paper or plastic bag.*
   Hold bag over your mouth, but keep your nose uncovered by the bag. With the bag held over your mouth, breathe through your nose
and mouth for one minute, remove the bag and breathe normally for 30 seconds, replace the bag and breathe through your nose and mouth for another one minute period. Repeat this several times then stop the exercise and go on your way. Repeat this step every time you get the urge to smoke again.

3. Whenever it isn't convenient to use a bag, such as when in public places, simply practice deep breathing and holding your breath until you can hold it without discomfort. Keep on repeating this process several times until you begin to feel dizzy.

* A small plastic bag is provided for you. If you lose it or it is destroyed, we will furnish you with another or you may substitute any paper or plastic bag of comparable size.

After the instructions were read and explained, the E demonstrated exaggerated deep breathing to encourage the S in practicing. The S was then instructed to practice deep breathing while the E timed him with an Apollo Stop Watch. The E reinforced the S's practice with praise, i.e., "good"; "hm, hm"; "excellent"; "beautiful"; etc. The S's response to E reinforcers was evidenced in greater ease in practice resulting in longer periods of breath holding. A number of other studies have shown how E reinforcers of praise in therapy sessions prove to be very effective (Bartz & Loy, 1970; Namenek & Schuldt, 1971; Pelletier, 1971; Traux, 1966).

The remaining seven therapeutic sessions were
devoted to continuing breath control exercises, practice breathing into a plastic bag, and discussing and reinforcing the S's progress. The Ss were also advised of the general health advantages of practicing deep breathing and good breath control.

Covert Sensitization-Systematic Desensitization = TT2. The first session was devoted to explaining the technique and to teach each S in this category how to relax employing an abbreviated form of Jacobson's (1925) progressive relaxation technique. Lawson & May (1970) used a similar relaxation technique in a covert sensitization treatment of smokers. The E demonstrated the relaxation technique, and discussed its general advantages when applied to many issues of daily living, before helping the S to practice the exercises. About ten minutes in each of the remaining therapeutic sessions were devoted to leading the S into a relaxed state.

In the first session the E read aloud a sheet of specific instructions which he had prepared for the S. He answered any questions the S asked and then provided the S with a copy of the instructions with directions for the S to practice at home. The instructions as written were:

1. For the first two weeks:
   a. Daily practice relaxation the first thing in the morning. (Use the relaxation tech-
niques learned in the clinical sessions.)
Do this for ten minutes.
b. After being relaxed, imagine yourself
enjoying a cigarette, and practice the
imagery of nausea, vomiting, extreme
stench, and dizziness as we've imagined
in the clinical sessions. Do this until
you feel sick or for about 10 minutes,
whichever comes first.
c. During the day, every time you desire to
smoke, repeat, "I choose not to smoke"
and try to recall the sickness imagined
in your early morning session noted in
item b. above.
2. For the last two weeks:
a. Continue the same practice noted in 1a
above.
b. After being relaxed, practice the
hierarchy of 15 items of imagery agreed
upon and written down in the clinical
sessions. These 15 images include 15
situations in which you can imagine
yourself wanting to smoke, beginning
with the least desired and ending with
the image of your greatest desire for a
smoke. During the recall of these 15
images, imagine yourself without ciga-
rettes, thus unable to smoke. Do not
rush through the imagery, take time to
imagine each item vividly. During this
imagery, practice repeating, "I choose
not to smoke."
c. During the day, every time you desire to
smoke, repeat, "I choose not to smoke,"
and try to recall the hierarchy of 15
images.

In the clinical sessions, the E, by interviewing
the S, was able to determine situations in which the S
enjoyed a cigarette. He helped place the S in a relaxed
state and then told the S to visualize (with his eyes
closed) lighting a cigarette, breathing the smoke deeply,
lazily and enjoyingly, then letting it all out slowly.
While the S repeated this visualized smoking behavior, the E noted smiles of pleasure on the S's face after a few "puffs." It could also be noted that the S was actually going through the physical process of deep inhaling and slow relaxed exhaling while pursing his lips as though breathing out the smoke. After a few "puffs" the E stopped talking about the deep breaths of smoke satisfyingly filling the S's lungs. Generally the S continued the physical process of inhaling and exhaling reflecting his smoking imagery. On the rare occasions when the S did stop, the E resumed talking in a soft monotonous voice to suggest the image of satisfying smoking.

When the S continued to breathe deeply as though he were taking satisfying puffs on a cigarette, without the E's vocal suggestions, the E permitted him to continue for two or three more "puffs." At that point, the E introduced the imagined aversive stimuli which was most noxious to the S according to his reports in the earlier interview.

A typical introduction of the imagined aversive stimuli might find the E saying in a soft but firm voice,

"That last puff sure tasted great, get ready to take another very, very deep drag on the cigarette. Now you take a deep hungry puff and you hear a crackle and smell a terrible stench. As you inhale,
it burns and you have a terrible taste in your mouth. What was that? You don't know so you take another drag to get rid of that awful taste. There's another crackling noise and the stink is worse, your lungs are on fire and your mouth is sour and slimy. You feel something crawling on your lip and you brush it away. You look at your cigarette and see maggots crawling out of it. The crackling noise was burning maggots. Somebody packed maggots in your cigarette and you've been inhaling cooked stinking slimy maggots. Your stomach is churning and your mouth is full of slimy sour saliva. You try to throw the cigarette away, but it is stuck to your fingers. More maggots are crackling. The stink is almost unbearable, the smoke is going up your nose making you sick and dizzy. Maggots are crawling out the other end of the cigarette, onto your hands, up your arm, across your shoulder, you can't move to rub them off. The cold slimy maggots are crawling up your neck across your lips and up into your nose. You feel them in your nasal passages going down into your mouth while the stink and smoke are getting worse and worse. The sour saliva in your mouth stinks and your stomach is churning uncontrollably. You feel maggots crawling down your throat. You can't stand it anymore so you vomit. You vomit out the maggots, but now you've got a new stink, the stink of vomit is making you sicker and sicker. Relief finally comes as you vomit, the maggots are gone now, your stomach is settling and the stink has subsided. Only a slight bad taste remains in your mouth as you repeat, 'You won't find me smoking again. You won't find me smoking again.' Okay, open your eyes. How do you feel?"

The foregoing is an abbreviation of a typical E vocal input during the sessions. Whatever was reported the most noxious to the S was used as a referent in the imagery. The E found that ab libbing through the vocal
suggestions was most effective because he could zero in on images that appeared to be getting the most aversive reactions from the S. In all cases, the Ss reported actually having the viscergenic sensations described by the E in the imagery sessions.

In preparing the hierarchy of 15 items of imagery for the last two weeks of treatment, the E simply wrote down the list as reported by the S, thus each 15 step hierarchy was unique to the specific S. Variations in the number of items have been used by others with equal success. Gerson & Lanyon (1972) used 20 items while McReynolds & Tori (1972) used only 10 items. The images were quite similar as reported by the four Ss in TT₂, however, the order of hierarchal arrangement varied from S to S. Some of the images included smoking "upon arising in the morning," "after meals," "at a coffee break," "at a party," "socially with friends," "after awakening in the middle of the night," "when nervous or uptight," "while driving the automobile," "resting at the beach," "waiting for someone," etc.

The procedure in evoking imagery during the last two weeks of sessions involved E vocal ab libbing similar to that done during the two weeks of covert sensitization. The difference, of course, was imagining the unavail-ability of cigarettes and the S's acceptance of not
smoking, ending with the S's positive affirmation which the E had him repeat several times, "I choose not to smoke." The Ss reported that the repeating of that phrase made them feel like they were actually conquering the habit and that the aversive images earlier induced were becoming less and less intense until by the time the experiment was over, the matter of not smoking was influenced by the S's own desire to abstain. All Ss reported this increased their self-concepts, a matter found to be of vital importance in extinguishing mal-adaptive behaviors (Blount & Pederson, 1970; Braucht, 1969, 1970; Carter & Stuart, 1970; Fischer et al, 1971; Goldiamond, 1965; Montgomery & Parton, 1970; Omwake, 1954; Seitz, 1970; Stuart, 1967).

**Contractual Management = TT₃.** The Ss assigned to this treatment were read specific instructions prepared by the E:

1. Keep daily records of the time and the place where you smoke each cigarette. Add the total cigarettes smoked per day.
2. Determine which cigarettes you would least mind giving up. Write down on paper which cigarettes these are. Sign your name to a contract as follows:

   Date_________________
   I contract between A. M. Pelletier and myself to daily give up cigarettes number_____________________
   in return for approval and praise as well as to improve and/or preserve my health.
3. Tell your friends and family of your desire to give up smoking and daily tell them how much you are cutting down.
4. At our next session, we'll review your progress and contract to give up additional cigarettes if you care to.
5. We'll plot your progress on a graph and review it in our sessions.
6. Every time you feel like smoking the cigarettes you contracted to give up, repeat, "I choose not to smoke. I made a promise, I signed a contract. I choose not to smoke."

The E answered any questions the S cared to ask and then spent the remainder of the first session discussing the hazards of smoking, the nature of the contract and the benefits in refraining from the use of tobacco. The first contract was also drawn up during the first session since operant baseline smoking behavior had already been established during the previous week. A copy of the contract was retained by the E and one by the S.

In every subsequent session the frequency of smoking and the results of contractual management were discussed. The matter of electing to write up a new contract to eliminate even more smoking behavior was discussed and left up to the S to decide. In every instance, the S elected to negotiate new and more extensive contracts. Each subsequent session found them negotiating new con-
tracts with more ease and anticipation.

Counting-Interaction and Supportive Counseling. The Ss assigned to this condition which served as a control group, had also kept records for one week to determine operant baseline smoking behavior. In the first treatment session the S was instructed to continue daily record keeping of his cigarette consumption and to bring the records to the E at each subsequent session. Frequency of smoking behavior records were discussed in the sessions. No contracts were discussed and no criterion level to decelerate smoking behavior was established or suggested. The E simply told the S that his wanting to give up smoking and his counting the cigarettes actually smoked would have a favorable effect on the S's kicking the tobacco habit or at least reducing cigarette consumption. In each session, the E offered motivational reinforcement such as, "You can do it," or "Who is bigger, you or that cigarette?", etc.

The approach in this technique was similar to the supportive-counseling therapy used by Koenig and Masters, (1965) where the E was, "supportive and encouraging when the subject reported improvement, and understanding and non-punitive when the subject reported no improvement or regression to earlier stages of the habit [p. 238]."

The technique was also similar to that used by Lawson and
May (1970) who combined counting-interaction with supportive counseling where, "Regular meetings with E, however, were to maintain their motivational level [p. 155]."

The Ss in all treatment conditions were also instructed to continue recording daily cigarette consumption frequency (if they had not succeeded in totally abstaining) and report these to the E at the end of two, four, six and eight weeks following the termination of treatment. This allowed for substantial follow-up information to be gathered to test for hold over effects of treatments.
RESULTS

Table 3 shows the percentage of the operant level of cigarettes smoked for each of the 16 Ss. The left hand column identifies the Ss noted in Table 2. Data were obtained from S self-reports during the four weeks of treatment and for the eight weeks of follow-up after clinical treatment had stopped. The reliability of the Ss' self-reports as to whether there was a lessening of cigarette consumption was confirmed by the reports of significant others of Ss. It can be seen that each of the treatment methods was generally successful in a weekly deceleration of cigarette consumption during actual treatment weeks. By the end of treatment, three Ss had completely stopped smoking, another five Ss were smoking less than 10 percent of baseline, another four Ss were below 25 percent of baseline, and only three Ss were still consuming over one-half of the amount of cigarettes smoked at operant level. The lessening of cigarette consumption continued during the follow-up period for all but four of the Ss. By the end of the follow-up period, eight Ss reported extinction of the tobacco habit and only two Ss were consuming over one-half of the amount of cigarettes smoked at operant level. It can also be seen in Table 3 that by the end of the
TABLE 3
Percentage of Baseline of Cigarettes Smoked by Sixteen Subjects in Four Treatment Categories Over Four Weeks of Treatment and Over Eight Weeks of Follow-Up Without Treatment

<table>
<thead>
<tr>
<th>S identified in Table 2</th>
<th>TREATMENT WEEKS</th>
<th>FOLLOW-UP WITHOUT TREATMENT</th>
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<tbody>
<tr>
<td></td>
<td>1st Week</td>
<td>2nd Week</td>
</tr>
<tr>
<td><strong>TT1</strong></td>
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<td></td>
</tr>
<tr>
<td>n8</td>
<td>78.26%</td>
<td>52.17%</td>
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<tr>
<td>n5</td>
<td>62.0</td>
<td>35.33</td>
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<tr>
<td>n13</td>
<td>85.71</td>
<td>64.57</td>
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<td>n10</td>
<td>76.19</td>
<td>63.33</td>
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<tr>
<td><strong>TT2</strong></td>
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<td></td>
</tr>
<tr>
<td>n1</td>
<td>21.0%</td>
<td>3.6%</td>
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<tr>
<td>n9</td>
<td>78.02</td>
<td>47.24</td>
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<tr>
<td>n15</td>
<td>78.61</td>
<td>55.55</td>
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<td>82.22</td>
<td>52.22</td>
</tr>
<tr>
<td><strong>TT3</strong></td>
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</tr>
<tr>
<td>n12</td>
<td>74.09%</td>
<td>50.0%</td>
</tr>
<tr>
<td>n4</td>
<td>83.33</td>
<td>50.0</td>
</tr>
<tr>
<td>n2</td>
<td>77.14</td>
<td>40.0</td>
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<td>n14</td>
<td>78.46</td>
<td>45.15</td>
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<tr>
<td><strong>TT4</strong></td>
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<tr>
<td>n6</td>
<td>93.33%</td>
<td>82.66%</td>
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<td>n16</td>
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<td>n11</td>
<td>90.75</td>
<td>85.0</td>
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eight weeks of follow-up, four Ss were maintaining the percent of baseline reported at the end of the treatment weeks and eight Ss had actually improved. At the same time, only four Ss were smoking more than they had been consuming when treatment had stopped and only one of these Ss was smoking more than twice what he had at the beginning of the follow-up.

Grand means were computed combining the data of the four Ss in each of the four groups and converted into percentages of operant baseline. These percentages for each of the treatments over four weeks and over eight post treatment weeks of follow-up were plotted in Figure 1.

The empirical hypothesis was that a rank order of treatment effectiveness would be as follows: 1. a combination of covert sensitization and systematic desensitization, 2. contractual management, 3. CO₂ inhalation, and 4. counting interaction combined with supportive counseling. It can be noted in Figure 1 that the hypothesis was not wholly supported, since the most effective treatment technique by the end of the four weeks of treatment was contractual management (3.81% of operant level), and the second most effective was the combination of covert sensitization and systematic desensitization (6.67% of operant level). The CO₂
FIGURE 1

Cigarette consumption as percentage of operant level for four groupings of subjects obtaining treatment over four weeks and for eight weeks of follow-up without treatment.
**CO\(_2\)** Inhalation

○ Covert Sensitization—Systematic Desensitization

▲ Contractual Management

▲ Counting Interaction and Supportive Counseling

Mean Cigarettes smoked as percentage of Operant Level

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Treatment</th>
<th>Follow-Up (No Clinical Treatment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
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<td>60</td>
<td>30</td>
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<tr>
<td>4</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>60</td>
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<tr>
<td>10</td>
<td>10</td>
<td>70</td>
</tr>
<tr>
<td>12</td>
<td>10</td>
<td>80</td>
</tr>
</tbody>
</table>
inhalation technique was at 8% of operant level and the counting interaction combined with supportive counseling technique was at 54.29% of baseline. These data show that the percentage of operant level for the contractual management technique was 175% less than the combination of covert sensitization and systematic desensitization technique and 210% less than the CO₂ inhalation method during clinical treatment.

However, by the end of two weeks following the treatment period, the technique combining covert sensitization and systematic desensitization was obtaining the most effective results and maintained its effectiveness throughout the eight week follow-up. Percentages of operant baseline at the end of the follow-up period were: covert sensitization and systematic desensitization = .83%; contractual management = 7.94%; CO₂ inhalation = 10%; and a combination of counting interaction and supportive counseling = 53.78%.

These data show that the imagery techniques continued to increase in effectiveness (from 3.81% to .83% of operant level) throughout the follow-up period. The other two most effective techniques also maintained effectiveness with only a 2% increase in cigarette consumption over the eight weeks. By the end of the 12 weeks of the experiment the Ss who had been treated by
the covert sensitization and systematic desensitization techniques were at a percentage of operant level which was 970% less than were the Ss employing contractual management and 1200% less than the Ss treated by CO₂ inhalation.

The random block factorial design of the study made possible a measure of treatment effects, effects over four weeks, and the interaction effects of treatment x weeks. Using a balanced analysis of variance, there was evidence that treatment effects were statistically significant beyond the .01 level ($F_3, 48 = 6.41$). A summary of the anova is contained in Table 4. It is also apparent that there were weekly cumulative treatment effects well beyond the .01 level of statistical significance ($F_3, 48 = 21.07$). Interaction between treatment groups and weeks of treatment did not approach significance. The lack of interaction effects suggests there were no variations in means of the four treatment groups which cannot be accounted for by an observation of the main effects of treatments and weeks. Thus, there is evidence that each treatment was effective in eliminating or decelerating cigarette addiction. Treatment effectiveness increased significantly over four weeks.

The self-reports of each of the 16 Ss during an eight week follow-up after clinical treatment had been
### TABLE 4

**Analysis of Variance of Weekly Cigarette Consumption During a Four Week Treatment Period as Compared to Operant Level**

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Treatment Groups</td>
<td>978.63</td>
<td>3</td>
<td>326.21</td>
<td>6.41*</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>B = Treatment Weeks</td>
<td>3215.69</td>
<td>3</td>
<td>1071.90</td>
<td>21.07*</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>A x B</td>
<td>273.67</td>
<td>9</td>
<td>30.41</td>
<td>0.60</td>
<td>P&gt;.05</td>
</tr>
<tr>
<td>Error</td>
<td>2441.64</td>
<td>48</td>
<td>50.87</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*F-ratio significant beyond the .01 level*
terminated was computed into daily means of cigarettes consumed. The follow-up data were used to compute an analysis of variance. The summary of these results is included in Table 5. The carry-over effects of treatment in the four group categories were apparent (F\(_3, 48 = 37.31\)) beyond the level of significance (alpha = .01). Although Figure 1 shows a slight increase in post treatment smoking for each treatment except the covert sensitization-systematic desensitization technique, the anova summarized in Table 5 did not reflect any statistical significance as a result of weeks of follow-up. There were no main effects as a result of eight weeks of follow-up after clinical treatment had stopped, and there were no interaction effects (Groups x Weeks). These data support the conclusion that the success of the treatment techniques was maintained even after clinical treatment was terminated for Ss who desired to eliminate the tobacco habit.
### TABLE 5

Analysis of Variance of Weekly Cigarette Consumption During An Eight Week Post Treatment Follow-Up as Compared to Operant Level

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = Groups</td>
<td>2430.42</td>
<td>3</td>
<td>810.14</td>
<td>37.31*</td>
<td>P&lt;.01</td>
</tr>
<tr>
<td>B = Weeks</td>
<td>18.92</td>
<td>3</td>
<td>6.31</td>
<td>0.29</td>
<td>P&gt;.05</td>
</tr>
<tr>
<td>A x B</td>
<td>7.27</td>
<td>9</td>
<td>0.81</td>
<td>0.04</td>
<td>P&gt;.05</td>
</tr>
<tr>
<td>Error</td>
<td>1042.25</td>
<td>48</td>
<td>21.71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*F-ratio significant at the .01 level
DISCUSSION

The Ss in the present therapeutic experiment were highly motivated, since only those who actually expressed a sincere desire to stop smoking were permitted to enroll. Lawson & May (1970) also emphasized the value of this type of motivation. Another measure of motivation was the $25.00 deposit which each S had to pay to enroll for therapy. It was explained that the deposit would be returned if the Ss attended all therapeutic sessions and kept accurate records of daily cigarette consumption. Berecz (1972) and Gerson & Lanyon (1972) also discovered that a refundable deposit variable was effective as a means of reinforcing S attendance at the treatment sessions.

Each S was given the responsibility of reporting the daily frequency of cigarette consumption throughout the clinical sessions and follow-up period. It has been observed that this involvement would assist Ss in self-control (Goldiamond, 1965). The reliability of self-reports has been shown by others (Agnew, 1964; Berecz, 1972; Pelletier, 1971; and Pinneau, 1958). One study noted a +.94 correlation with reliability checks made by independent observers (Ober, 1966). The present study used reliability checks made by significant others, e.g.,
husband, wife, or parent of the Ss, and found a similar correlation.

It is noteworthy, as seen in Table 2, that all Ss in this study were of varying ages. Extent of addiction and years of addiction also varied a great deal. It is of note that all who enrolled for the clinical sessions were actually seeking a way to give up smoking. Most of the other studies dealing with cigarette addiction as reported in the literature have used college students in a college laboratory setting to experiment with techniques (Berecz, 1972; Gerson & Lanyon, 1972; Lawson & May, 1970).

While there was some difference in the effectiveness of the treatment technique used, it is apparent from the curves noted on Figure 1 that the degree of effectiveness was basically similar for the three experimental groups. The treatment technique employing aversive imagery had the greatest effects over the 12 week period of the study, a finding which supports Berecz's (1972) report that punishing imagined smoking was as effective as punishing actual smoking.

The argument raised by Cahoon (1971) that CO₂ inhaled in tobacco smoke could be one of the variables which need to be controlled in eliminating cigarette addiction found support in the results obtained in the
present study.

It is noted that during the actual clinical treatment period, contractual management was the most effective. It may be hypothesized that the reasons for this are that when a person actually endorses a contract with another person, and is reinforced for contractual agreement, that he will be more apt to keep his word because he has affixed his signature to an agreement. The present experiment did not test this hypothesis, which is left to other studies.

The fact that treatment employing imagery and relaxation techniques had the greatest maintenance and follow-up effects could be the result of the Ss continuing to do their home work with these techniques even after clinical treatment and instruction had stopped. Gerson & Lanyon (1972) reported similar follow-up results. The use of visual fantasy and relaxation is a good technique for hypnotic induction (Erickson, 1967). The reported success resulting from the use of imagery techniques in the present study may be an indication of the degree of subject hypnotizability. The use of the Barber Suggestibility Scale (1969) in pre- and post-treatment tests in subsequent studies could test this possibility. One of the effects resulting from the sensitization-desensitization techniques may, in part, be the result
of producing a change in S behavior by changing the
cognition of the S. The effects of other techniques
were not as well maintained perhaps because Ss had lost
some motivation when clinical reinforcement was with­
drawn. While clinical reinforcement was also withdrawn
from the Ss using imagery techniques, they, nonetheless,
had built-in reinforcers ascribable to the conditioning
such techniques provide.

The three experimental techniques resulted in over­
whelmingly greater results than did the simple counting
interaction-supportive counseling control group, a
finding which concurs with other studies (Koenig &
Masters, 1965; Lawson & May, 1970). The control group,
however, was brought to only 54.29% of baseline level
by the end of the four clinical weeks, and was maintained
(53.78% of baseline) to the end of the eight weeks of
follow-up. This may suggest that any treatment method,
even that which simply offers the therapist's support,
is more effective than no treatment at all.

The primary concern of the E was a desire to dis­
cover techniques which could be applied to treating the
present problem as well as supporting hypotheses in
treating other maladaptive behaviors. In addition, a
hypothesis was generated and statistically examined
from obtained data. The concern to explore varied treat­
ment techniques has proven valuable. There remains a need to systematically study the effects of employing the same techniques in treating other maladaptive behaviors, such as alcoholism and drug addiction. Studies using the techniques of the present experiment in treating groups of Ss could provide valuable data to compare with the data herein obtained in treating individual Ss.

The effects of long term follow-up of the present study await additional data collection. The maintenance of the treatments employed even after clinical treatment is terminated underscores again the validity of Berecz's (1972) observation, "In an era when the shortage of trained clinicians is becoming more acute, it is difficult to overstate the importance of a treatment technique which is, to a great extent, self-operative [p. 249]."
REFERENCES


Bernstein, D. A. The modification of smoking behavior. (Doctoral dissertation, Northwestern University) Ann Arbor, Mich.: University Microfilms, 1969, No. 69-6811. (b)


McGuire, R. J., & Vallance, M. Aversion therapy by electric shock, a simple technique. *British Medical Journal*, 1964, 1, 151-152.


APPENDIX A

Saints to Open Smoking Clinic

Human Development Ministries (HDM), a branch organization of the Grand Rapids District of the Reorganized Church of Jesus Christ of Latter Day Saints, will add anti-smoking clinics to its services soon.

A spokesman for HDM said the clinic typically would run for five weeks with meetings about twice a week. He said scheduling would be flexible, but that at least four persons must be in each group.

The fee is $25, but part of the money will be refunded if the person kicks the tobacco habit. The HDM offices are at 1915 Nelson Ave. SE, and for additional information, call 243-3445 or 243-1326.

HDM opened this spring and also offers individual behavioral counseling, marriage and family counseling, provisions for the poor, self-motivation classes, financial counseling, vocational and employment guidance, and rehabilitative ministries in the field of drug and alcohol abuse.

Grand Rapids Press, July 22, 1972, p. 10-A.
APPENDIX B

KICK THE HABIT

C'mon now. You can do it and we will help you. Several tested and proven techniques will help you kick the habit. HDM's Director is skilled in at least eight different treatment techniques in this area and is offering therapy to assist you in kicking the habit. We work in groups of three to five. It's still not too late to get into a group if you want to be healthier, feel better, stop coughing, breathe better and stop smoking.

Give us a jingle at 243-3445 today. There is a slight fee for equipment and materials but it is far less expensive than continuing to smoke. The sooner you stop smoking after therapy starts, the less it will cost. Sign up today. You will have fun doing it and you will be a new person in just a short while. Tell your friends and get them to sign up before all sessions are full.

Rapport, 1972, 2 (8), 66.
Kick the Habit

C'mon now you can do it. We'll help you. There are several tested and proven techniques to help you kick the habit. HDM's Director is skilled in teaching you at least eight different treatment techniques in this area. HDM is presently extending into an additional service; it will offer therapy to help you kick the habit. We will work in groups of three to five and are ready to start as soon as we hear from the first three who want to be healthier, feel better, stop coughing, breathe better and stop smoking. Give us a jingle today at 243-3445. There is a slight fee for equipment and materials, but it is far less expensive than continuing your smoking habit. The sooner you stop smoking after therapy starts, the less it will cost. Sign up today. You will have fun doing it and you will be a new person in just a short while. Tell your friends and get them to sign up before our sessions are full.

Register: ANYTIME
APPENDIX D

Name ___________________  Beginning Date __________ 

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of Cigarettes Smoked Per Day</th>
<th>Comments</th>
</tr>
</thead>
</table>


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APPENDIX E

PRESCRIPTION FOR SMOKERS

EACH DAY:

1. Keep an accurate record of number of cigarettes (or other tobacco) you desire to smoke.
2. Compute daily costs of the tobacco habit.
3. Drink at least nine glasses of water:
   a. Two the first thing in the morning;
   b. Two between each meal;
   c. One with each meal (noon and evening);
   d. One between evening meal and bedtime.
4. Drink lots of fluids to flush out the nicotine.
   (Avoid alcohol.)
5. Eat lots of fruit.
6. Get enough rest.
9. Upon getting up in the morning, and after each meal, and every time you want to smoke,
   Repeat,
   "I choose not to smoke."
   "I choose not to smoke."
   "I choose not to smoke."
   (Keep repeating it.)
10. Don't smoke for one whole day.
11. At night, repeat,
    "I made it through the whole day without a smoke."
    Thank God and ask for more Divine help just for tomorrow.