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AN EVALUATION OF THE EFFECTIVENESS OF SYSTEMATIC
DESENSITIZATION FOR THE MODIFICATION OF
CIGARETTE SMOKING

By

David Paris

B.A., Antioch College, 1975

Presented in partial fulfillment of the requirements

for the degree of

Master of Arts

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1981

Approved by:


Chairman, Board of Examiners


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Paris, David, M.A., April 1981 Psychology

An Evaluation of the Effectiveness of Systematic Desensitization for the Modification of Cigarette Smoking

Director: Nabil Haddad, Ph.D. *NH*

Cigarette smoking is a national health problem of epidemic proportions, causing thousands of deaths and disabling illnesses each year. A truly effective smoking cessation treatment has not been found, however, despite a prodigious amount of research in this area in the last fifteen years. Most treatments aimed at modifying smoking have shown a typical short term reduction of smoking followed by relapse to near baseline rates of smoking after a few months of follow-up. The purpose of this study was to evaluate an innovative approach to smoking cessation treatment.

Based on evidence that nicotine alters the state of physiological arousal of the smoker, possibly acting differentially depending on the state of arousal the smoker is experiencing prior to the ingestion of nicotine, it was hypothesized that use of systematic desensitization to various arousal states as a smoking cessation treatment would be effective.

A group of adult smokers was recruited for participation in the study and randomly assigned to one of two groups. An effort control group was planned for but was not formed because of the limited number of available subjects. One group was treated using systematic desensitization to specific, individually generated high probability smoking situations. The other group was treated using systematic desensitization to high and low states of physiological arousal. Subjects self-monitored their smoking for six weeks during the study and for one week periods at one, two, and three month follow-ups.

A repeated measures analysis of variance was performed on the dependent measure, number of cigarettes smoked per week. The analysis showed that neither group was effective as a smoking cessation treatment and that neither group differed significantly in effectiveness from the other.

Various reasons for the treatment failure and for the unexpected finding that no significant difference existed between the Treatment groups are discussed from both methodological and theoretical vantage points. Implications for future smoking cessation research utilizing systematic desensitization are reviewed.

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Chapter I

INTRODUCTION

In the interval since the Surgeon General's report appeared in 1964, evidence has continued to accumulate that implicates cigarette smoking as a causal or facilitating factor in an array of major health disorders, including emphysema, lung cancer, coronary artery disease, chronic bronchitis, and bladder cancer (American Heart Association, 1970; United States Public Health Service, 1971, 1973, 1974). Despite awareness of the health risks incurred by smoking (Gallup, Note 1), it has been estimated that more than 60 million adults in the U.S. alone continue to smoke cigarettes (U.S. Department of Health, Education, and Welfare, 1969). Although a vast amount of research has been done in attempting to isolate the variables involved in the acquisition and maintenance of smoking behavior, as well as the variables necessary to design effective treatment, a truly effective treatment to help those wishing to stop smoking has not yet been found (Bernstein & McCalister, 1976; Lichtenstein & Danaher, 1976). Rather, numerous treatment approaches produce similar reductions in smoking rate (Hunt & Matarazzo, 1973; Epstein & McCoy, 1975). Such approaches as self-management (Ober, 1968); stimulus control (Levinson, Shapiro, Schwarz, & Tursky, 1971); contractual management (Eliot & Tighe, 1968); satiation (Marston & McFall, 1971); aversion (Franks, Freid, & Ashen, 1966); self monitoring (McFall & Hammen, 1971); and desensitization (Koenig & Masters, 1965), have

all shown a familiar pattern of short term reduction followed by relapse to baseline or near baseline rates of smoking (Bernstein & McCalister, 1976).

Methodological Issues in Smoking Abstinence Research

McFall (1978) discusses several methodological problems in smoking cessation research. First, he notes that despite continuing interest in the area, investigators have typically not shown much interest in the special methodological problems inherent in such research, or in strategies designed to overcome these limitations. One such problem concerns generalizability in relation to the subjects. The subjects in smoking cessation studies are almost always volunteers or recruits, whose relationship to the parent population of smokers or even to the subset of it encompassing those wishing to quit is obscure. This obviously limits the conclusions that can be drawn from individual smoking studies. It can even be argued that volunteers in smoking cessation programs are not typical of smokers in general. At a minimum, it is important to report in detail how subjects are recruited, and the essential characteristics (such as demographic and smoking history information) of the resulting sample. Although difficult, some attempt to assess and report the subjects' motivation for treatment should be reported as well.

Another problem that plagues smoking abstinence research--though by no means is exclusive to this area--is that of subject mortality. The higher the attrition rate, the more difficult

meaningful interpretation of the results becomes (Jeffrey, 1975). McFall and Hammen (1971) found that when they recomputed the results of several smoking studies and included dropouts the reported outcomes were considerably over-optimistic. McFall (1978) notes that there are simply no acceptable post hoc methods for correcting for subject mortality--therefore, the only attractive solution is to retain all original subjects.

Equally, if not more important, are issues relating to the reliability and validity of dependent measures. The most common measurement unit used in smoking studies is the self-report of number of cigarettes smoked per day (Lichtenstein & Danaher, 1976; McFall, 1978). There are, however, some problems with this unit of measurement. Those studies that have utilized some objective check on subjects' self-reported smoking have tended to find discrepancies between self-report and objective data (Brockway, Kleiman, Edleson, & Bruenwold, 1977). However, since self-report has been so widely used in treatment outcome studies in this area (Lichtenstein & Danaher, 1976), using self-reported data on number of daily cigarettes smoked as the dependent measure in evaluating a new treatment should pose no major difficulty as long as the results are interpreted with an appropriate degree of caution. Also, by using collaborator reports and an intervention that Bornstein, Hamilton, Miller, Quevillon, and Spitzform (1977) have shown to increase the accuracy of self-report, one could obtain the best possible measure within the limitations of self-reported smoking data.

McFall and Hammen (1971) noted that practically any smoking treatment imaginable seems capable of producing a significant, if temporary, reduction in cigarette consumption. Assessing changes in smoking behavior across the experimental periods should then lead to a statistically significant main effect for periods, but it will not be likely to yield any significant between treatment differences (McFall, 1978). Therefore, McFall goes on to note, only the discovery of significant treatment differences is of sufficient interest to warrant publication at this time.

Another problem that has been common in smoking studies is that they are often difficult to compare (Lichtenstein & Danaher, 1976; McFall, 1978). One suggestion is that the standard format for reporting results include as a minimum 1) changes in smoking frequency (across experimental periods) expressed as a percentage of baseline mean smoking, and 2) the percentage of subjects within groups achieving total cessation of smoking (McFall, 1978). It is especially important that these statistics take into account all subjects who entered treatment and not just those completing it. McFall concludes his review by noting that standards for design of worthwhile smoking research are essentially the same as in other areas of psychological research, although smoking research has chronically been beset with the problem of adequate measurement.

Models of Smoking

Treatment strategies for cigarette smoking should be

deriveable from conceptual models for why people smoke (Lichtenstein & Danaher, 1976; Best & Hakstian, 1978). Various models to explain the mechanisms whereby smoking is acquired and maintained have been proposed, involving psychological, physiological, and social determinants of the behavior (Tomkins, 1966; Bernstein, 1969; Dunn, 1973; Franks & Wilson, 1976, 1977; Epstein & Collins, 1977; Best & Hakstian, 1978). As Yates (1975, p.125) wryly observes: "When an empirical impasse is reached, theories, rightly or wrongly, proliferate."

Physiological theories of cigarette addiction emphasize the primary reinforcing effects of nicotine (Yates, 1975; Lichtenstein & Danaher, 1976; Stephens, 1977). Jarvik (1970) has reviewed the literature relating to the theory that smoking is motivated by the need to bring high concentrations of nicotine to the brain in the most effective manner. A study done by Luchesi, Schuster, and Emley (1967) provided evidence that injection of nicotine was experienced by pleasant by smokers and unpleasant by nonsmokers, as well as that high dosages of nicotine injections tends to suppress smoking frequency. A more general variant of the model proposed that nicotine, when inhaled, had an arousing effect which was reinforcing to the organism (Armitage, Hall, & Morrison, 1968). Fuller and Forest (1973) provided data that tended to support this theory--when a high level of arousal was experimentally caused in heavy smokers, this tended to suppress the smoking rate. Recent evidence (Furth, 1971) suggests that the effect of nicotine--arousing or relaxing--may be a dose dependent phenomenon, small amounts having an arousing effect but

larger amounts tending to promote relaxation. Ashton and Watson (1970) presented evidence that smokers will attempt to vary their nicotine intake in order to optimize their arousal level--producing either arousal or relaxation effects, depending on the requirements of the situation. Eysenck (1973) hypothesizes that nicotine effects will either be depressing or excitatory depending upon the ongoing level of cortical arousal; the need still exists for research designed to test this hypothesis (Stephens, 1977). Hutchinson and Emley (1973) demonstrated that nicotine acts to decrease the effect of stressful and unpleasant stimulation as well as enhancing the capacity of the organism to reduce or terminate aversive stimuli. Summing up the evidence in support of the reinforcing effects of nicotine, Russel (1974) has observed: "there is little doubt that if it were not for the nicotine in tobacco smoke, people would be little more inclined to smoke than they are to blow bubbles or light sparklers (p.793)". Stephens (1977) argues that it is important to identify those variables that contribute to the maintenance of cigarette smoking in order to develop effective treatment programs for this behavior, and notes that smoking is likely to be maintained by a combination of physiological and environmental events. He also argues that individual differences in reactivity to nicotine need to be considered. Some individuals may smoke primarily to experience physiological arousal, while social reinforcement may be a primary motivating factor for other smokers. Evidence exists suggesting the key contributory variables involved in smoking vary across subjects and also vary

within the smoking history of the individual (Berecz, 1972; Best, 1975; Epstein & McCoy, 1975).

Several investigators propose models that attempt to integrate both physiological and behavioral data into a model of smoking behavior. The models proposed by Dunn (1973) and Russel (1974) both describe the importance of psychosocial reinforcers in initially acquiring the behavior, with a learned dependence on nicotine later becoming important in maintaining the behavior. Psychosocial reinforcers then again become important in the elimination of cigarette smoking.

Although Russel's model in particular is comprehensive, drawing on material on the physiological effects of nicotine, learning mechanisms, and mechanisms of psychosocial reinforcement, it is still not sufficiently precise to permit the derivation of specific treatment techniques (Lichtenstein & Danaher, 1976), a criticism that has been made of most models of smoking behavior (Best & Hakstian, 1978). Tomkin's (1966) well known formulation relating smoking to what he terms "deprivation negative affect" concentrates on the reinforcing properties of using nicotine to alter internal feeling states, as well as differentiating among types of smokers. He proposes that a cigarette habit is acquired only under the conditions that it is consistently reinforced by an increase in positive affect or a reduction in negative affect. Both of these states have in common some amount of "deprivation negative affect", which means that the smoker experiences a state that he feels must be altered by some external agent. Ikard, Green, and Horn (1969) developed a widely used questionnaire

based on Tomkin's model to measure the various types of smoking. Factor analytic data have generally supported the typology of primarily negative affect or positive affect smokers (Lichtenstein & Danaher, 1976).

Best and Hakstian (1978) propose a situation specific model to account for smoking behavior. They argue strongly for the need to consider individual differences in smoking behavior, as do others (Mausner, 1971; Bernstein, 1974; Best, 1975). Shaping individual treatment strategies based on individual reasons for smoking requires both an appropriate conceptual model and valid clinical assessment procedures. Models variously involving such determinants of smoking as affective state, arousal level, addiction, social learning, and personality variables of the smoker have all been proposed and are still being considered (Tomkins, 1966; Bernstein, 1969; Yates, 1975; Epstein & Collins, 1977; Best & Hakstian, 1978). These models are not necessarily inconsistent; rather they differ in the amount of emphasis the various factors receive. A problem lies in the limitations that the models have in guiding behavioral application aimed at modification--most are couched in terms not readily applied to common treatment methods (Bernstein, 1976; Best & Hakstian, 1978). Existing models seem to owe more to theoretical than empirical considerations. The result has been that behavior modifiers have infrequently made use of models describing individual differences in smoking behavior, despite increasing recognition that to do so might result in the development of more effective treatments (Best, 1975).

Systematic Desensitization

Systematic desensitization, a therapeutic technique developed originally by Wolpe (1958), has been demonstrated to be highly effective for the reduction of fears and phobias (Goldfried, 1971). Wolpe originally theorized that the process of reciprocal inhibition explained the therapeutic effectiveness of the procedure. However, much doubt has been cast upon this explanation, and three other constructs have been proposed to account for systematic desensitization's effectiveness: counterconditioning, extinction, and habituation (Yates, 1975). One attempt to date to test these alternative theories is the work of Van Egeren (1970, 1971). Reciprocal inhibition refers to the temporary and reversible blocking of one nerve process by another, much as happens with antagonistic skeletal muscles. Habituation describes the temporary and reversible reduction of a response after repeated evocation by a stimulus. Extinction refers to the permanent diminution of a response through its repeatedly being elicited under conditions of non-reinforcement. Finally, counterconditioning refers to the replacement of a stimulus-response connection with a new response becoming attached to the stimulus, of a greater intensity than its predecessor. Van Egeren, Feather, and Hein (1971) did a study involving measurement of heart and respiration rate, digital pulse amplitude, and skin conductance in subjects who were anxious in public speaking situations. These measures were obtained under conditions of relaxation training versus no relaxation training and with

presentation of either threatening or neutral scenes. They found strong support for the hypothesis that threatening stimuli produce sympathetic nervous system activation. However, none of the other major hypothesis of the study, relating to the counterconditioning, extinction, and habituation models of systematic desensitization received any support. In another experiment, Van Egeren (1970) tested the habituation model proposed by Lader and Mathews (1968) and found no evidence to support it. Watts (1971), however, did find empirical support for the habituation model. According to this model, desensitization should proceed most rapidly when low anxiety stimuli are presented for short periods of time. Watts argued in addition that for both low and high anxiety stimuli, long presentation time should lead to increased reduction of anxiety between sessions, and these predictions were also supported by his study.

One of the most prominent theories of systematic desensitization is that it can successfully eliminate phobic anxiety by facilitating the client's prolonged exposure to the particular conditioned stimulus so that extinction of anxiety and avoidance behaviors can occur (Rosen, 1976). The suggestion is then made that relaxation training may increase the subject's ability to bear exposure to the conditioned stimulus (Mathews, 1971; Vodde & Gilner, 1971; Wilson & Davison, 1971). Rosen (1974) suggests that subject's initial expectancies may play a similar role in systematic desensitization (that of motivating prolonged exposure to the phobic stimulus when the expectations for treatment outcome are positive).

The role of cognitive factors in systematic desensitization has received considerable attention in recent years (Yates, 1975; Rosen, 1976). Attempts have been made to demonstrate that expectancy of outcome (the subject's therapy set) is a significant variable in the desensitization procedure. Borkovec (1973) concluded that of nineteen studies he reviewed, nine supported the importance of expectancy in relation to outcome while ten failed to support this hypothesis. Wilson and Thomas (1973) found that the expectancy hypothesis was supported when self-report measures were considered but not when behavioral approach measures were considered. Rosen (1976) points out that one difficulty in evaluating studies that examine a subject's initial therapeutic expectancies is that the actual effect that instructions have on these expectancies is not independently assessed. However, he disagrees with Yates (1975) conclusion that the picture with regard to expectancy is indeterminate, finding rather that experiments which manipulate subject's awareness of therapeutic goals tend to consistently reveal significant instructional effects on behavioral as well as self-report measures of fear change.

Another aspect of systematic desensitization that should be mentioned is the role that imagery plays in its effectiveness. Wilkins (1972) claimed that the only essential element in desensitization is the instructed imagination of fear producing scenes, and Singer (1974) also argues that the image itself is the key element in systematic desensitization. However, the evidence on this point is conflicting. Danaher and Thoreson (1972) demonstrated that self-report

and behavioral measures of imagery were discrepant; Davis, McLemore, and London (1970) presented findings that an imagery scale score did not correlate with change scores on a behavioral approach task following treatment. Hekmat (1972), employing a technique which he termed semantic desensitization, found that verbalization but not imagery was necessary for successful outcome of the desensitization procedure. Despite the controversy, imagery is an important part of systematic desensitization as it is almost always employed (Yates, 1975). In addition, the role of social reinforcement factors in the procedure should not be neglected.

It has been demonstrated that selective verbal reinforcement of approach behavior to a feared object tends to increase such behavior; it may even result in more approach behavior than the usual form of imaginal systematic desensitization (Barlow, Agras, Leitenberg, & Wincze, 1970; Vodde & Gilner, 1971). Negative results were obtained by Anthony and Duerfeldt (1970) in an experiment that used concrete rewards on approach behavior, as well as by Rimm and Mahoney (1969), who compared the effects of both contingent and non-contingent rewards on approach behavior. Thus, although reinforcement probably plays some role in systematic desensitization, it cannot account in full for its effectiveness (Yates, 1975).

Goldfried (1971), rather than conceptualizing systematic desensitization as a passive process, interprets the therapeutic procedure as offering the client a generalized skill which he or she can use to reduce anxiety in a wide variety of situations. Rather

than viewing relaxation as operating to inhibit anxiety reciprocally, a mediational conception of desensitization posits that an individual has learned to react to certain environmental events with an avoidance response. This overt response may be seen as the end product of a series of mediational responses. Within such a paradigm, systematic desensitization would involve not a passive conditioning process but the "active building in of the muscular relaxation response and cognitive relabeling into the r-s mediational sequence" (Goldfried, 1971, p.228). The client learns to attend to proprioceptive cues for tension, and to use these cues as the stimulus for the newly learned skill of deep muscle relaxation. Zemore (1974), in a study comparing Goldfried's method with a standard desensitization procedure, found support for the conception of this technique as a generalized anxiety reducing skill. In addition, several investigators, checking on the possibility of symptom substitution, have reported that in marked contrast to the possible emergence of new fears, subjects tend to report a general reduction in fearfulness (Lang & Lazovik, 1963; Paul, 1966; Paul & Shannon, 1966). These findings are consistent with the hypothesis that desensitization in effect teaches an anxiety reducing skill that the person can apply at times that he or she experiences tension and anxiety. It is also of interest to note that although the therapist may conceive of systematic desensitization as a counterconditioning process, the clients themselves often see the benefit of this treatment as involving the learning of a strategy for coping with stress in

general (Goldfried, 1971; Paul & Shannon, 1966).

Goldfried (1971) suggests several procedural modifications based upon his hypothesis. First, he suggests that the rationale given to the client include a description of the process of desensitization, including learned avoidance responses, the purpose of relaxation training, and hierarchy construction. In relaxation training, the emphasis is on teaching the subject to be aware of bodily sensations that accompany being tense, and to utilize these sensations as cues for the relaxation response. As far as the construction of the stimulus hierarchy is concerned, the specific environmental situation eliciting the anxiety response is seen as less important than the tension that it elicits (in clear distinction to a Wolpean conception of desensitization). This is important because it negates the need for thematic unity in a hierarchy, stressing only that it be composed of items eliciting increasing amounts of anxiety.

Another important procedural modification suggested is that rather than have the client discontinue imagining a scene in the presence of anxiety (as in traditional desensitization), the client should continue to imagine the anxiety-provoking situation, attempting to use the skill he has learned in responding to proprioceptive cues of tension with a relaxation response. This has the important advantage of more closely approximating realistic, stressful life situations.

Finally, it is emphasized that the client be instructed to

apply his newly learned skill of relaxation in vivo. This may involve the client in using this skill in situations that were not specifically dealt with during treatment (i.e., were not part of the hierarchy). It is important to warn the subject that at times he or she may not be completely successful in relaxing away tension, particularly when the anxiety is strong. Evidence for the effectiveness of this type of instruction as relaxation training was provided in a study by Goldfried and Trier (1974).

Systematic desensitization is a procedure of demonstrated clinical effectiveness with a myriad of fears, phobias and anxieties. It has been used to successfully treat phobias of all types (Rimm & Masters, 1974); speech disorders (Walton & Mather, 1963); sexual deviations (Bond & Huthcison, 1960; Madson & Ullman, 1967); insomnia (Geer & Katlin, 1966); and anger (Rimm, deGroot, Board, Heiman, & Dillow, 1971); to name but a partial sample. Yet its therapeutic effectiveness, while well documented empirically, is not well understood from a theoretical standpoint.

Recent reviews of the smoking literature show that the majority of reported studies use aversive conditioning procedures (Lichtenstein & Danaher, 1976; Bernstein & McCalister, 1976). Brockway, Kleiman, Edleson, and Gruenwold (1977) argue that, in light of the meagre results, the preference for aversive procedures as the primary intervention strategy in smoking cessation treatments is questionable. They contend that non-aversive procedures might profitably be utilized as intervention strategies. One such

non-aversive procedure is systematic desensitization.

Koenig and Masters (1965) utilized systematic desensitization to modify smoking, comparing it with aversion therapy and supportive counseling treatments. They had subjects construct individual hierarchies based on the difficulty of not smoking in various situations. Their method of desensitization was traditional in that subjects were required to imagine a scene without experiencing a desire to smoke for fifteen seconds before going on to another hierarchy item. No subject listed more than twenty items, and each subject was able to complete their hierarchy over the course of treatment. The results were familiar in that all three treatments produced reductions which had mainly disappeared at a six month follow-up. (An additional finding of the study was that, although no between-treatment effects was noted, a main effect for therapists was found). The results of this study do not support clearly the use of systematic desensitization, in the form in which it was employed in this study, as a superior method of treatment for smoking.

Pyke, Agnew, and Kopperud (1966) utilized systematic desensitization as a treatment for cigarette smoking. The argument had been made that under conditions of high arousal, the probability of the most practiced response occurring is increased (Farber & Spence, 1953; Hebb, 1955; Osgood, 1957). The authors therefore hypothesized that under conditions of high arousal or excitement (either in a positive context, such as at a party, or in a negative context, such as being late for school and rushing to catch a bus) the well-practiced

smoking response would have a high likelihood of occurrence. They therefore proposed that if a relaxation response can be conditioned to these stimuli this would act to reduce the strength of the smoking response and enhance the probability that alternative responses will occur. Therefore, desensitization was seen as having possible value for either elimination or modification of the smoking habit.

Hierarchy items for the desensitization procedure were constructed from smoking charts that each individual kept; care was taken to ensure that situations where smoking frequently occurred were represented as well as those circumstances where smoking did not occur as frequently. The number of items in each hierarchy varied from twenty-seven to nineteen. Measures of galvanic skin response (GSR) were obtained during all desensitization sessions.

The desensitization paradigm employed was traditional. That is to say, when evidence of tension was found, the presentation of items was discontinued. A problem arose in that only two (of twenty-two) subjects completed their hierarchies over the course of treatment.

The results of the study showed an initial decrease in smoking followed by a relapse to near baseline rates of smoking at a four month follow-up. The authors point out that the effectiveness of systematic desensitization remains in doubt because so few of the subjects completed their hierarchies. They recognize that their criterion of item presentation may have been too rigid, demanding too high a level of relaxation. The results of this study can be seen as neither supporting nor failing to support the use of systematic

desensitization as a smoking treatment; they were inconclusive.

Finally, a study by Gerson and Lanyon (1970) utilized a combined desensitization-covert sensitization procedure to treat smoking. The rationale that the experimenters used for the desensitization component of treatment was that since smoking is often described as relieving tension, a procedure for reducing anxiety such as systematic desensitization would be appropriate.

The hierarchy utilized was a standard twenty item discomfort hierarchy, consisting of situations in which smokers would be likely to smoke, ranked in order of strength of desire. The desensitization paradigm employed was again traditional in that if any individual signalled that they were anxious, uncomfortable, or had a desire to smoke, the entire group was instructed to dismiss the image. The desensitization-covert sensitization group was compared to a covert sensitization-discussion group. Both treatments produced a marked temporary reduction in smoking, and this reduction was still retained to a significant degree in the desensitization-covert sensitization group at thirteen week follow-up, although all groups showed evidence of a return towards a baseline rate of smoking. The results indicate that the desensitization component added to the effects of covert sensitization alone.

The Present Investigation

It is the thesis of this study that systematic desensitization, for a number of reasons, can reasonably be thought to have

potential application to the elimination and modification of smoking behavior. Although the literature does not seem to support clearly such a position, several points need to be made. First, none of the studies conducted thus far have utilized the self-control variant of systematic desensitization as suggested by Goldfried (1971). Research clearly indicates that it is superior in most cases to the standard, Wolpean variety, and with cigarette smoking, which differs from a well defined phobia in that it can occur under so many varied stimulus conditions, it would seem particularly appropriate. Second, the strategies employed for hierarchy construction vary widely and have not been well grounded in theory, particularly consideration of models of cigarette smoking involving physiological components. For example, the study by Pyke et al (1966) theorized that under conditions of high arousal smoking would be more likely. Yet Fuller and Forest (1973) showed that by experimentally inducing arousal, they could cause subjects to suppress their smoking rate. In addition, the evidence that smoking itself may often cause arousal (Fagerstrom & Goteslam, 1977; Myrsten, Elgerat, & Edgran, 1977; Jarvik, 1970; Armitage, Hall & Morrison, 1968) would seem to indicate that both high and low levels of physiological arousal are important discriminative stimuli for smoking. It may be that arousal serves as a cue for smoking intended to promote relaxation (Ashton & Watson, 1970), yet a large segment of the situations promoting smoking are ignored if smoking in response to low levels of arousal is not considered.

The purpose of the present investigation is to test the applicability of systematic desensitization in the modification of smoking behavior. The hypothesis of the study rests upon a basic assumption: Cigarette smoking is usually cued by a person's perception of their own physiological state of arousal. In the case of low states of physiological arousal, it is assumed that cigarettes are used by the smoker to change this state to a higher level of arousal. In the instance of a high state of physiological arousal, cigarettes are presumed to be used by the smoker to change this state to a more relaxed condition, that is, a lower level of physiological arousal. It is therefore hypothesized that desensitization to both high and low levels of arousal in the context of a smoking modification program should facilitate abstinence from cigarettes. Desensitization to the extreme levels of arousal should prove measurably more effective than desensitization to specific high probability smoking situations.

Chapter 2

METHOD

Subjects

Forty-five volunteer subjects responding to an advertisement placed in local newspapers (see appendix A) were to be selected for treatment. As a limited number of subjects responded, the design was modified to include only five subjects in two groups (a total of ten subjects), and the effort control group was not formed at all. All subjects selected for the study were administered a smoking history questionnaire (Hamilton, 1978, see appendix F). The criteria for selection were that subjects:

- 1) be at least eighteen years of age, and have smoked cigarettes for at least one year
- 2) were not currently being treated for any major health disorder
- 3) were willing to deposit a sum of twenty dollars (ten dollars was to be returned, irrespective of treatment outcome, if all treatment sessions were attended; the remaining ten dollars was to be refunded upon turning in follow-up data six months after completion of treatment)
- 4) sign an agreement to attend all treatment sessions, and to provide all requested follow-up data
- 5) sign an informed consent form (see appendix B). Assignment to treatment groups was made on a random basis.

Procedure

Therapist

The therapist was an advanced graduate student in Clinical Psychology, selected on the basis of having had training and experience with the treatment procedures to be utilized. All sessions were supervised by appropriate clinical faculty members.

Dependent Measures

The subjects' self-report of number of cigarettes smoked daily for a one week period (mean daily cigarette consumption) served as the dependent measure in this investigation. Initially, using a card provided for the purpose (see appendix E), a baseline period of two weeks before treatment was recorded by subjects. Subjects continued to record their smoking on a daily basis each week during treatment in order to provide an indication of changes that occurred during the active phase of intervention. After treatment was completed, subjects monitored their smoking for one week using the cards provided for the purpose. Follow-up data was collected at three one month intervals by sending the subjects a card accompanied by a letter (see appendix C) and asking them to monitor their cigarette usage for a week and then mail the card back to the therapist. The final letter also contained the remaining ten dollars of the treatment deposit. Half of the treatment deposit was returned immediately after treatment ended, contingent upon having attended all the sessions.

Using a reliability enhancement manipulation shown by Bornstein et al (1977) to increase the validity of self report, subjects

were instructed to record their cigarette consumption as accurately as they could. They were also told that individuals who were familiar with their daily lives (and whose names were supplied by the subjects on the smoking history questionnaire) would be called to verify the smoking information which they turned in. The subjects were told that this was not because their truthfulness was suspect, but rather because it has been found that such checking helps individuals to be careful in their self monitoring and increases the value of the information that they provide to the investigator. It was believed that such a rationale would minimize the negative connotations that telling subjects their data would be checked on might otherwise carry.

Treatments

After assignment to groups, each group met weekly for six weeks, with each session lasting ninety minutes. All treatment sessions took place in the same dimly illuminated room. Since recliners were not available, subjects brought blankets to the treatment sessions so they could lie on the floor during the relaxation training and systematic desensitization procedures.

Brief descriptions of each of the treatment conditions follow. More detailed information about the treatments can be found in the Treatment Manuals (see appendices D and E).

Group 1: Systematic Desensitization to Specific High Probability Smoking Situations

The first two sessions focused mainly on training in progressive muscle relaxation, preparatory to desensitization proper.

Utilizing a procedure adapted from Bernstein and Borkovec (1973), subjects were instructed to alternately tense and then relax various muscle groups, with particular attention to be given by the subjects to the contrast between the different feelings associated with the states of tension and relaxation. Subjects were given the information that deep muscle relaxation is a skill which would improve with practice; subjects were instructed to practice at least three times per week during the first three weeks of treatment.

Using a scale adapted from Lazarus (1968), the first two treatment sessions and an intervening homework assignment were also used to get subjects to individually construct a hierarchy of items on a scale termed the Subjective Units of Non-smoking Distress Scale (SUNDS). This is a hundred point scale (1-100) reflecting the degree of intensity of the desire for cigarettes subjectively experienced by an individual in a variety of situations. Subjects were told that there are two major kinds of high probability smoking situations--those that are pleasant and those that are unpleasant. They were instructed to generate hierarchy items for each type of situation at each 5 point interval of SUNDS. For example, at "SUNDS-10 unpleasant", a subject might imagine having to wait in line at the bank and feel impatient to get home. At "SUNDS-10 pleasant", a subject might imagine taking a break after some chore is completed. At "SUNDS-90 unpleasant", a subject might imagine having a very intense quarrel with his or her spouse and deciding to get a divorce. At "SUNDS-90 pleasant", a subject might imagine dining in an elegant restaurant to celebrate

an important promotion at work. Individuals in this treatment condition were required to generate two items each (one pleasant and one unpleasant) at each SUNDS interval of 5 (beginning at 5). This resulted in 40 items being constructed for each individual subject's hierarchy. The therapist was available to help each individual with constructing the hierarchy as needed (for instance, meeting for a few minutes after a session with a subject or subjects at their request). The subjects were told that they did not need to discuss their hierarchy items or problems they were having in constructing them unless they wished to do so. However, time was set aside during the sessions for each discussion, if anyone cared to use it. Generally, there was a lot of discussion about hierarchy items during this time. Subjects were told that the evening of the third session was "quit night" and they were to plan on giving up cigarettes completely by that time.

Starting with the third session, desensitization proper began. After a relaxation period of approximately fifteen minutes, scenes beginning with each individual's lowest two SUNDS scores and proceeding through their tenth pair of hierarchy items (SUNDS-50) was presented. Based on the guidelines offered by Aponte and Aponte (1971) for automated group desensitization, scenes were presented twice for five seconds, twice for ten seconds, and twice for twenty seconds. A relaxation period of twenty seconds separated each presentation.

Subjects were told that the goal was not mastery of these situations, in the sense of not experiencing any anxiety at all in

connection with them, but rather that they should feel more comfortable--that is, able to cope with the situation with greater ease. Additionally, they were told, this was a skill that would improve with practice. Subjects were further told that they might find that this new skill would become useful to them in situations that were never dealt with at all during treatment.

It was stressed to subjects to concentrate all their attention on the scene at hand during the presentation of a hierarchy item, experiencing it as vividly as they could. In addition, it was emphasized to subjects that they imagine themselves not smoking in the situation. Otherwise, they were to attend entirely to their imagined perceptions, to note feelings of anxiety or muscular tension as these occurred, and to use such perceptions as cues to begin relaxation. The session concluded with a brief unstructured discussion period and distribution of self-report data cards for the coming week.

The next (fourth) session again began with a period of relaxation of fifteen minutes followed by a re-presentation of the last hierarchy item presented during the previous session. Ten items were then covered, this time ranging from SUNDS scores of roughly fifty to one hundred. The session concluded, as did all remaining sessions, with a brief discussion period and passing out of the data cards for the coming week. Sessions five and six were conducted exactly as sessions three and four except that presentation of hierarchy items was essentially random.

The last session concluded with a discussion of the difficulties

that remain in maintaining presumed gains in abstinence from cigarettes. Subjects were offered support and encouragement in their self-controlled efforts to maintain the treatment gains they had made. At the conclusion of the final session, subjects were administered a Post Treatment Questionnaire (Hamilton, 1978, see appendix H) to assess their ratings of the usefulness of the components of treatment and of the therapist's qualities.

Group 2: Systematic Desensitization to High and Low Levels of Arousal

The first two sessions focused mainly on training in progressive muscle relaxation, preparatory to desensitization proper, exactly as they did in the first group. Using a scale adapted from Lazarus (1968), time was spent during these first two treatment sessions familiarizing subjects with the Subjective Units of Arousal Scale (SUAS). The SUAS runs from 1-100 at intervals of ten. It differs from the SUNDS in that it is constructed to reflect various arousal states rather than situations and is devoid of any situational referents.

Subjects were instructed that the third treatment session was being designated as "quit night" and that they were expected to abstain completely from cigarettes by that time. Beginning with the third session, desensitization proper began. After a relaxation period of approximately fifteen minutes, desensitization to the lowest SUAS level (10) was started. Subjects were told that they were feeling very calm and relaxed, as they might when just sitting quietly. After one minute,

a 40 second period of relaxation followed. Proceeding to the next SUAS level (20), subjects were first told that they were feeling calm and relaxed for 30 seconds (SUAS-10) and were then given suggestions of slightly heightened feelings of arousal (SUAS-20) for one minute, followed by 40 seconds of relaxation. Desensitization proceeded in this manner, each new level on the SUAS being reached by coming up through the proceeding levels for 30 seconds each. (One minute was always allowed for the last or highest level in any given presentation, with 30 seconds given for each preceding level. Each period of induced arousal was followed by forty seconds of relaxation.)

Subjects were desensitized to the first five SUAS levels in the third session. Session four consisted of subjects being desensitized through SUAS level eight, and session five consisted of subjects being desensitized to all levels. The sixth session repeated the fifth session in desensitizing subjects to the complete SUAS hierarchy.

Each session concluded with a brief period of unstructured discussion, followed by passing out of the self-report cards for the coming week. The therapist remained for a few minutes after each session at the subjects' request to answer questions. In addition, the sixth and final session concluded with a discussion of the difficulties that remained in maintaining gains in abstinence from cigarettes. Subjects were offered support and encouragement in their efforts to maintain the treatment gains they had made.

Chapter 3

RESULTS

As a consequence of having a much smaller subject pool than was initially planned for, the Effort Control group was not formed and the number of subjects in each of the Treatment groups was reduced from 15 to 5 per each group.

Main Analyses

The dependent measure in this study was the subjects' self-reported number of cigarettes smoked each day for a week. Assessment data was collected for two weeks of Baseline, three weeks of Treatment, and for one week each at one, two, and three month Follow-up periods. The data for Baseline (two weeks) and Treatment (three weeks) was averaged so that it could be statistically compared with the one week Follow-up periods.

Using the Ullrich-Pitz computer program for analysis of variance, a two (Groups) by five (Sessions) repeated measures analysis of variance on the main dependent measure (number of cigarettes smoked in one week) was performed. The results are listed in Table 1. There was no significant differences found between groups on the dependent measure. Additionally, neither group showed a significant reduction of smoking during treatment or during the three months of Follow-up. Although two subjects did appear to have quit smoking completely by the time of the final Follow-up at three months after treatment, it must be concluded from the analysis offered here that not only were the

treatments no significantly different from one another in efficacy, but that neither was effective as a smoking cessation treatment.

Means and standard deviations for the two groups by periods is listed in Table 1-A. The means for the two Treatment groups are represented graphically in Table 1-B. The Statistical Package for the Social Sciences (SPSS) computer program was utilized to compute means and standard deviations.

Ancillary analysis

A Smoking History Questionnaire (Hamilton, 1978) was administered during the first meeting to gather demographic information about the participants and also to assess their expectancies and motivation for treatment in addition to various facts about their smoking history. The results of this Questionnaire are reported in Table I.

An ancillary analysis was performed on the data gathered from the two Treatment groups' response to the Post-Treatment Questionnaire. Since both groups had the same therapist, it was considered important to assess the effect of the therapist and to investigate whether the subjects differed in their assessment of the utility of the components of their treatments. An analysis of variance was performed on the data from this questionnaire. The results are listed in Table II. The means and standard deviations of these responses by treatment groups and across treatment groups are reported in Table II-A.

In analyzing the responses to fifteen questions, the responses

between the groups was found to differ significantly on only three.

The first of these concerned subjects' assessment of the utility of relaxation training as a component of the treatment. Group 1 - Systematic Desensitization to Specific High Probability Smoking Situations - assessed relaxation training as being significantly less helpful than did Group 2 - Systematic Desensitization to High and Low Levels of Arousal ($p < .05$). Group 1 also assessed group support and encouragement as being significantly more helpful than did Group 2 ($p < .05$).

Group 2, however, valued therapist support and encouragement to an extent significantly greater than Group 1 ($p < .05$).

The two groups did not differ significantly in their appraisal of their own individual ability to abstain from smoking.

On the seven questions assessing subjects' perception of therapist qualities, and the summative measure of all seven questions, no significant difference between the groups was found to exist. In other words, no therapist effect was found. This is interpreted as meaning that the two groups did not differ significantly in their perception of the way that each group was treated by the therapist, including such qualities as warmth, ability to relate to participants, ability to create a feeling of cohesion in the group, and so on.

Chapter 4

DISCUSSION

The results of this study demonstrate that neither of the treatment groups was effective in aiding those individuals who participated in the study in quitting or even modifying their smoking significantly. In addition, neither group differed significantly from the other in effectiveness.

There are many possible reasons for this failure. First, attention will be given to methodological considerations, and second, to theoretical considerations.

The sample size (N) of the study was much smaller than anticipated, and it is possible that a larger N would have resulted in findings of significance on the differential effectiveness of the two groups. The smaller N was necessitated by lack of subject response to newspaper advertisements. This may reflect something about the characteristics of the group that responded. First, as large groups of smokers have enrolled in experimental and clinical smoking cessation programs in the recent past, the small number responding to this study suggest that perhaps the pool of local smokers wanting to quit has been mostly depleted, at least temporarily. (As this study was being run, an annual Western Montana Clinic program for smoking cessation was cancelled, the first time that this has occurred, because of an insufficient number of participants. This is especially significant in that this program had been heavily

advertised on radio and television and had been well attended in previous years.) This could mean that those smokers responding to this study had bypassed earlier opportunities to attempt quitting or had been unable to quit in other programs. In support of this idea, 20% of the individuals in the study reported having had prior unsuccessful treatment experiences with quitting smoking. Every member of the study save one reported previous attempts to quit on their own. In short, the population of subjects in this study may have been in some measure a more resistant group to stopping smoking than is ordinarily the case. Clearly, this idea is speculative in nature and in no way is this meant to explain the failure of treatment.

The fee (\$5) charged for the program can only be described as minimal. With commercial programs that charge much higher fees (for example, a typical program might charge \$300 for eight hours of treatment versus the \$5 for twelve hours of treatment in this instance) better results are often reported. Such reports are uncontrolled and do not constitute scientific evidence. Yet, the fee is often considered important in many types of therapeutic intervention because it can help motivate the person to use the opportunity to change constructively. The mechanism at work may be the need to reduce cognitive dissonance in such a situation: the individual will feel invested in the wisdom of the choice to pay so much for help and may not want to believe it was an error in judgment. An alternative explanation is that by charging a high fee subject selection is occurring and is introducing a systematic bias into the data. Only those

smokers both able and willing to pay a high fee for treatment would enroll in such a program and such a group would not constitute a representative sample of the population of smokers wishing to quit and willing to enroll in a treatment program. High rates of abstinence would have to be viewed in light of this fact and results from such a study would have limited generalizability to the parent population of smokers.

However, although the importance of a fee in enhancing subject motivation for change is a part of clinical lore, it is not supported clearly by the literature. A recent study (DeMuth & Kamis, 1980) found that fee, sociodemographic and provider characteristics contributed little unique variance in explaining the volume of services utilized in an outpatient setting. Though volume of services used can only be thought of as a very rough measure of motivation, this study casts some doubt on the idea that subjects must pay heavily in order to gain maximum benefit from treatment. Though it seems reasonable to assume that the small fee likely did not contribute much to the subjects' motivation, there is no clear reason to believe that the small fee had a detrimental effect on their expectancies of the value to be derived from treatment. The issue is in need of further empirical clarification, particularly in regard to smoking.

Another consideration is the time span utilized in treatment. The Treatment sessions for both groups were spread out over a period of six weeks, meeting once weekly for two hours, so that subjects would have an opportunity to practice the skills they were

being taught. It may be that a more intensive effort would be more efficacious, especially in the initial stages of quitting smoking, which are widely acknowledged as being very difficult times. The opportunity for increased group support and interaction with the therapist at the crucial stage of quitting completely might have enhanced the treatment effectiveness. It should be noted that subjects in a recent multicomponent smoking abstinence program (Hamilton, 1978) reported that they felt their treatment was too time intensive and did not allow them adequate opportunity to practice new skills. It seems that a balance between very intensive programs, such as Hamilton's, or less intensive programs, such as the present investigation, with respect to the scheduling of treatment meetings, could be better suited to subjects' needs.

It is worth noting that previous studies utilizing systematic desensitization to treat cigarette smoking have not shown it to be effective (Koenig & Masters, 1965; Pyke, Agnew, & Kpperud, 1966). In this respect, the present study can be thought of as having results consistent with those found in the literature. In the case of the study by Koenig and Masters, a treatment effect was found which had mainly disappeared at six month follow-up. In the study done by Pyke et al., a similar short term reduction in smoking was found which showed the same pattern of relapse to near baseline smoking rate at follow-up. Though both studies pointed to methodological difficulties as possible reasons for these results, and encouraged further smoking cessation research utilizing systematic desensitization, the fact

remains that the use of this procedure to decrease or eliminate smoking has not been productive.

Of major concern in this experiment was the testing of the hypothesis that a systematic desensitization procedure for low and high levels of physiological arousal would prove more effective as a smoking cessation treatment than a systematic desensitization procedure for specific, individually generated high probability smoking situations. In this respect, the results can be interpreted in one of two ways. It can be suggested that the failure to get significant results is evidence supporting the null hypothesis. That is, that desensitization to arousal level is not significantly different in effectiveness compared to desensitization to specific high probability smoking situations. Another interpretation, however, is that the findings are indeterminate or inconclusive because the methodology employed in this experiment was not adequate to test the hypothesis.

Since there was no check made to see whether arousal was actually induced by the procedures used, or even whether memories of such a state of arousal were evoked by the procedure designed for this purpose, it is impossible to specify to what extent arousal was actually induced. Essentially, the procedure, which was experimental, consisted of suggestion. The suggestion involved telling the individuals in the arousal group that they were feeling a certain level of arousal, depicted in terms of appropriate proprioceptive and somatic cues. This procedure was, in a sense, a weak link in the design of the study in that there was not adequate prior evidence to

suggest that arousal can be induced reliably merely by suggestion.

Some discussion of the findings of a few significant differences between the two Treatment groups that did appear in the ancilliary analyses is in order. These findings relate to items on the Post Treatment Questionnaire. The utility of relaxation training was assessed as being significantly more useful by the desensitization to situations group. A possible reason for this is that the mean age of this group was higher and more of the individuals were working as opposed to going to school. It should be stressed that the groups differed in the respects mentioned after random assignment was made, so any explanation offered is of necessity post hoc. It is felt that the tension relaxing properties of progressive muscle relaxation may have been more rewarding to this group because the members were more tense, or had less opportunity to relax than did the group which was made up of more college people.

The same group valued therapist support and encouragement more than did the first group. It may have been that this group, being less cohesive than the college dominated group, looked more to the therapist than to themselves for leadership and support.

Following this line of reasoning, it seems unsurprising that the group that valued therapist support and encouragement less valued group support and encouragement more. As peers, it is understandable that they would look to one another for encouragement.

Implications for Future Research

The attempt made in this study to determine whether the application of systematic desensitization to high and low levels of arousal would be effective in helping individuals to eliminate or modify their cigarette smoking was predicated on the assumption that individuals smoke to modulate their ongoing level of physiological arousal. Although there exists evidence that would tend to support such a hypothesis, as reviewed earlier (Furth, 1971; Ashton & Watson, 1970), the relationship between level of arousal and cigarette smoking needs explication. It is not known, for example, whether changes in level of arousal covary with urges to smoke, and speculation about a direct causal relationship between level of arousal and cigarette smoking is therefore premature. Nor is it known what the relationship is among frequency, intensity, and duration of urges to smoke and perceived and/or physical level of arousal (discrepancies sometimes appear between the two, e.g. Lang, 1979). Before suggesting ways in which the investigation of such relationships might begin experimentally, some current theory and research concerning arousal is relevant to review.

Psychological theorizing about motives and motivation is complicated by the existence of a number of concepts which are identically labelled and which may not mean the same thing in different contexts, or, alternately, by identical concepts which are labelled differently by various authors. Stagner (1977) proposes the use of the term motivation to describe differences in energy,

effort, or arousal. The term motive is reserved for a motivational state which has directional properties. To further clarify this, he suggests that the adjective motivated by used to describe behavior in which the energy level is high and which is persistent until some goal or state is achieved. A motive would refer to a specific organismic state, such as hunger, which when aroused sets off energetic behavior toward predictable goals--which behavior serves as a concrete example of the abstract concept "motivation."

Stagner further proposes that energy mobilization is predictably related to a class of events which have in common a discrepancy between the registered or expected value and the input value of a relevant variable. The argument is presented that "the biological concept of homeostasis provides a framework and a mechanism which can integrate such views of motivation as are associated with terms like dissonance, need achievement, competence and self-actualization into a biologically based theoretical structure, without redefining these concepts to the point of distortion" (1977, p.104).

Essentially what is postulated is that energy mobilization is a single process which varies in degrees, and which may be integrated into varied goal directed action patterns. It follows from this, however, that energy mobilization is a reliable phenomenon that will manifest internal consistency when measured with different instruments in the same situation. The data does not, however, converge unambiguously as would be expected from a straightforward prediction. For example, Anderson (1938), cited in Stagner (1977), used various plausible

measures of energy mobilization in response to hunger in experimental animals, and found correlations of intensity of operational indices of hunger drive (such as time spent digging to get food, or crossing an electrical grid to get food) to range from $-.17$ to $+.34$, which Stagner describes as "not an encouraging indication of a generalized level of arousal" (1977, p.107).

Rather than discarding the attempt to relate these phenomena through a theoretical concept, Stagner proposes that despite the phenotypical variations in motivated behavior, it is worthwhile to search for abstractions or genotypes which are characteristic of different events and to attempt to identify some of the environmental influences which operate on the "pure" phenomenon of motivation.

The general case is that the organism manifests an increase in energy level when a discrepancy is encountered between current input and the established or steady state with respect to that input. This increased energy level is reflected in an increased level of effort which tends to operate until the discrepancy has been removed. Further, the amount of increase in effort is proportional to the magnitude of the detected discrepancy.

Freud is quoted as asserting that the "nervous system is an apparatus which has the function of getting rid of the stimuli which reach it, or of reducing them to the lowest possible level" (1954, vol. 14, p.120, quoted in Stagner, 1977, p.107). The author essentially agrees with Freud's assertion but proposes utilizing the word discrepancies in lieu of stimuli. It should be noted that what individuals often

seek, however, is not a tensionless or static state of satiation but an optimal level of stimulation or arousal. For example, a glass of wine before dinner may be experienced as pleasurable even though it increases feelings of hunger. However, this can be handled by the theory in that what induces motivated behavior is not any deviation from a homeostatic state but rather discrepancy between the expected (one might add, preferred) state and current input.

The significance of this theory of arousal with respect to cigarette smoking is that it may explain, at least in a theoretical sense, why nicotine is so powerfully addictive, and why cigarette smoking has been so difficult to treat, even with smokers who report that they are highly motivated to quit (e.g. Hamilton, 1978).

Nicotine level in the blood supply of the brain may itself be properly thought of as a motive, in the same sense that blood glucose, pH, or osmotic pressure, controlled by homeostatic mechanisms in the hypothalamus, are motives (cf. Jarvik, 1970). Simply put, this means that an addictive smoker, deprived of nicotine for a certain length of time, will show motivated behavior to reduce the detected discrepancy (low level of nicotine in cerebral blood supply) by obtaining and then smoking a cigarette. Stagner's (1977) theory would predict that the level of effort is a function of the magnitude of the detected discrepancy. This can be seen reflected in the lengths to which a habitual smoker, having what is commonly termed a "nicotine fit", will go to obtain a cigarette, numerous instances of which can be provided by practically any heavy smoker.

To continue, since cigarette smoking is not natural in the sense of being necessary to protoplasmic survival in the same way that eating, or breathing, for example, are, simply to describe it as an addiction or a motive is to offer a phenomenal circularity without explanation. The question arises, why is cigarette smoking so reinforcing? What function does it serve? It may be possible that individuals could become addicted to a substance that "does" nothing other than cause addiction, but such a possibility does not negate the fact that most addictive substances are habit forming because they have some kind of pleasurable or reinforcing effect on the individual. In this context, the research by Hutchinson and Emley (1973) that nicotine acts to decrease the effect of stressful and unpleasant stimulation as well as enhances the capacity of the organism to reduce or terminate aversive stimuli assumes new importance. This, after all, is in the present discussion viewed as a primary function of the nervous system itself. If nicotine facilitates the basic mechanism of energy mobilization which is hypothesized to underlie all purposeful behavior, then it could conceivably become an extremely potent reinforcer through acting in association with any other conceivable motive.

Another aspect of the treatment utilized in the present investigation which bears discussion is the nature of the imagery instructions to create arousal. The hypothesis that specific patterns of efferent activity are associated with type and content of imagined activity has a long history in psychophysiological research (Lang, 1979). Shaw (1940) performed an experiment to test whether muscle

tension varied systematically with imagined performance of a perceptual task, and whether the relationship was closer when subjects reported more vivid imagery. In fact, subjects reporting more vivid images did manifest more arm muscle tension than those reporting only fair images. Also, a monotonic increase in electromyographic activity appeared with the imagination of weights of increasing heft. Lang (197) reviews the research and concludes that the evidence suggests that during imagined recall of a just completed perceptual task, sense organ changes and muscular adjustments mimic the patterns observed during the original perceptions. There is a positive within subject association between reports that an image is vivid and the degree of correspondence between actual observation and image efferents.

Lang (1979) goes on to propose a new theory of emotional imagery, drawing on three areas of research and scholarship—psychophysiology, the information processing approach to cognitive psychology, and behavior therapy. Psychophysiology provides evidence that imagined activities are accompanied by efferent outflow, and that specific patterns of somatotiform activity are associated with the kind of processing and the specific content of cognitive events. Work in information processing about the way visual images are stored in and retrieved from the brain suggest that the image is a finite, propositional structure (and not the analogue representation suggested by phenomenology). Lang proposes that the image structure includes a motor program and is a prototype of overt behavioral expression. He attempts to describe the conditions under which affective reactions are evoked by

symbolic stimuli, to show how differences in the structure of image networks and the subjects' capacity for image generation could be related to psychopathology, and to suggest how emotional imagery may be a vehicle for behavior change. Finally, behavior therapy provides methods through which imagery based treatments may be effectively used in a clinical setting.

A complete account of Lang's bio-informational theory of emotional imagery and the evidence on which it rests is beyond the scope of this discussion. The relevance to the present investigation is that there is clear evidence that perceptual response information is coded along with information about stimuli, both of which are "degraded" at recall, and that this response information can be accessed by instructions to imagine vividly a recent perceptual experience. Therefore, subjects should be instructed to remember actual experiences, and the more recent ones whenever possible. Perhaps during the baseline period subjects could be told to gather information about situations in which their desire for a cigarette was strong, as well as write down as much detail as possible to facilitate recall (and thereby arousal). In the present investigation, hierarchies were constructed by asking subjects to come up with general experiences and situations which were problematic in terms of strong desire for cigarettes. They were not instructed to recall specific instances in which they actually felt a strong desire to smoke. In a future investigation, this modification could make the manipulation significantly more effective.

Bauer and Craighead (1979) performed a study of instructional

set variables, arranged in a 2 x 2 factorial design. The variables were attentional focus (whether the subjects focused on the physical properties of the scenes themselves or on imagined bodily responses to the scene) and orientation set (whether subjects imagined themselves as observers or as actually being in the scene). The results were that greater increase in heart rate were found as a result of an attentional focus on bodily responses. Also, imagination of self-rated fearful scenes produced a greater increase in skin conductance and higher heart rate responses than did the imagination of similarly rated neutral scenes. (The orientation set was not significant.)

The implications for the present investigation are 1) that exactly what is said to subjects in getting them to use imagery is vital, and 2) that a focus on bodily responses produces greater physiological arousal than a focus on the scene. In this study, one group imagined scenes and the other bodily responses (devoid of situational content, by instruction). In light of this evidence, a combination of the two (subjects asked to imagine scenes and to focus on their bodily responses to those scenes) would seem to offer the greatest likelihood that arousal could be produced.

In sum, better results could be expected if subjects were instructed to recall actual experiences, with appropriate cues for vivification, and instructed to focus on their bodily responses as they attempt to replicate the scene through imagery.

As has been mentioned, efferent outflow consistent with perceptual experience is more likely to be observed in subjects who report

that they are able to create vivid images. "However, vivid imagery (whether defined by verbal report or physiological pattern) is not achieved by all subjects, and indeed the absence of this ability may represent a barrier to some forms of therapeutic intervention" (Lang, Kozak, Miller, Levin, & McClean, 1980, p.181). Lang reports an investigation which attempts to improve subjects' ability to form emotional imagery, and which met with some success. An important finding was that response oriented subjects (subjects were prompted to attend either to stimulus detail or active responding) showed greater physiological activity during imagery, and their efferent pattern generally followed the script content. Thus, in instructions to subjects, active responding could be emphasized, in addition to focus on bodily responses during recall of actual scenes.

Two issues remain to be discussed briefly. The first is the issue of subject selection. The second is the issue of assessing the effectiveness of imagery instructions in terms of arousal produced.

Given that subjects who report being able to imagine most vividly show greater physiological response to appropriate instructions, perhaps subject selection on that basis could improve treatment efficacy. Pre-treatment screening could accomplish such subject selection, with those subjects unable to imagine very well or who showed little physiological response being offered some alternative form of treatment.

Finally, the issue of measurement of arousal is important. Various indices of physiological arousal can be recorded using a polygraph, most typically galvanic skin response (GSR) and heart rate, with

respiration rate measured as an artifact control. Electromyographic measures are sometimes useful. (Lang, 1980; Bauer & Craighead, 1979; May & Johnson, 1973). However, polygraphs are not feasible to use in a group treatment situation. Their utility might be in a pre-treatment subject selection as an assessment device of arousability to specific imagery instructions.

Thayer (1978) presents a case for the effectiveness of controlled self-report as a measure of arousal level. Self-report may, under certain conditions, provide a better indication of physiological arousal than would any single psychophysiological measure. Using the Activation-Deactivation Adjective Checklist (AD-ACL), the reliability and construct validity of this form of self-report were studied in comparison with several physiological and behavioral indices of arousal. Thayer writes that although self-report is associated with numerous methodological problems, it usually represents a high level of organismic integration. In conjunction with ratings of the vividness of imagery, such a controlled self-report instrument as the AD-ACL could provide information about the effectiveness of arousal inducing instructions during a group format treatment.

In light of the theory surrounding arousal which was introduced in this section, perhaps the appropriateness of the basic paradigm of desensitization should be reexamined. It may not be appropriate to attempt to get subjects to feel more comfortable with high and low points of arousal, in the sense that the homeostatic tendency of the nervous system may oppose such comfort. Perhaps it would be more

fitting to teach subjects ways to homeostatically handle highs and lows using emotional imagery rather than nicotine.

Appendix A

Newspaper Advertisement

Would you like to quit smoking and start living? A group of University of Montana psychologists led by Dr. Phil Bornstein will be offering a free treatment program (a deposit of \$20 will be required, refundable, regardless of outcome, upon completing the program). For more information, call the Clinical Psychology Center at 243-4523.

Appendix B

Consent Form

Cigarette smoking is a life threatening habit, as you are undoubtedly aware. The treatment that you will receive is intended to help you modify that habit--in fact, to eliminate it entirely and permanently. Your willingness to participate fully in the treatment is essential to its success.

A treatment deposit of \$20 is being required for the treatment. Ten dollars will be returned to you when you have completed the treatment phase, which will involve six weekly meetings of one hour and a half each. It is sincerely hoped that you will attend each of these meetings, as they are all considered essential to the success of the treatment procedures. The ten dollars will be returned regardless of how well you are doing with your smoking, if you attend each meeting and provide the data requested on your smoking.

The second ten dollars will be returned upon turning in all requested follow-up information. This will consist of mailing in cards (which will be mailed to you) at intervals of one week, three months, six months, nine months, and one year after treatment.

Contact with other persons who know you or live with you will also be made periodically to check on the accuracy of the reports that you turn in. This is done to help us to get the most reliable information that we can about how well the treatment has been working.

Any money that is not refunded will be donated to the American

Cancer Society.

I understand the conditions listed above and I am willing to
comply with them.

Signature: _____ Date: _____

Signature of Therapist: _____

Appendix C

Three Month Follow-up Letter

Dear (subject's name),

It is now three months since you successfully completed the smoking treatment program. As was stressed at the close of our sessions together, quitting smoking is difficult but remaining a non-smoker is even tougher. It is my hope that you have been successful in maintaining those gains you made during treatment, and that you will continue to enjoy pollution-free air. It isn't easy, as you know, but the rewards are great and lasting.

Enclosed you will find a self-report of (non)smoking card. I would like you to monitor your (non)smoking daily for one week and then mail the card back to me (you can see that it is already addressed and stamped). This is very important! When I receive your card back, I'll be sending you the remaining ten dollars of the deposit that you made at the beginning of the sessions. Please be honest in reporting your (non)smoking.

I very much enjoyed working with you. If I may be of service now or in the future please feel free to call on me.

With best wishes,

David Paris
Psychologist-in-Training

P.S. I'll be sending you cards again at three month intervals for the next nine months (three more cards). It would be really appreciated if you would fill them out and send them back. Thanks, and Good Luck!

Appendix D

Treatment Manual

Group 1: Systematic Desensitization to Specific High Probability Smoking Situations

First Treatment Session

During the first treatment session, the therapist will make some effort to make subjects feel comfortable and that they are part of the group. To accomplish this, each participant will be asked his or her name, and to tell the group a little about themselves (such things as where they grew up, how many in their family, what they do for relaxation and for a living). After this is done, each member will be asked about their smoking history--when they started, how much they smoke, and why they would like to quit. The therapist will moderate this discussion, and try to draw out reticent group members if necessary. After these preliminaries, the treatment rationale will be presented.

Treatment Rationale

As smokers, perhaps you have noticed that even when you are just thinking about quitting smoking you get anxious. You may even have noticed that you are smoking more when you are thinking about not smoking, or planning to cut down. The treatment you are going to experience is intended to make not smoking feel more comfortable by making you more comfortable in those situations in which you probably do smoke. This is especially important at first; later you may find that not smoking itself is very rewarding. The treatment that we'll be using

here is called systematic desensitization.

There will be two major parts to this. First, you have to learn to relax deeply and completely, physically as well as mentally. We'll be spending a good deal of time during the first two treatment sessions mainly practicing this new skill. I will be asking you to practice this at home as well, at least three times during each week for the first three weeks. I think that you will find this enjoyable, and, as is true with any new skill, practice will really pay off. You will find yourself not only better able to relax but also much more aware of tension building up in your muscles when you are not relaxed. (At this point the handout on progressive relaxation is distributed.) The next half hour is spent in the initial training session in progressive muscle relaxation.

We will also be working, both in the sessions and through a homework assignment, in having each of you develop a hierarchy of situations in which you habitually smoke. Some researchers have felt for a long time that smoking treatment needs to be tailored to meet the requirements of the individual smoker. This treatment tries to incorporate this suggestion since each of you will be supplying those situations where you have the most difficulty in not smoking. Although we'll be working in a group, you won't be required to share the situations that you come up with with other participants unless you want to talk about one during a discussion period. I'll be available as necessary to answer questions that you might have to help you with your hierarchies.

We'll be coming up with hierarchies of situations on a scale called the Subjective Units of Non-smoking Distress Scale, or SUNDS for short. The SUNDS runs from 1-100 at intervals of five.

You may have realized that there are two major kinds of situations where you feel you need a cigarette. One type is pleasant, such as after a big and enjoyable meal. The other type is unpleasant, such as being stuck in a traffic jam and already being late for work.

Let's take a few minutes and write down as many different pleasant situations where having a cigarette is really enjoyable as we can. Just write down as many situations as you can think of--a process that's sometimes called brainstorming. Don't worry, you'll have plenty of time to refine your list before we actually use it in treatment. (At this point participants are allowed five minutes to generate items).

All right, fine. Now let's write down as many negative or unpleasant situations as we can in which smoking is pretty much of a habit. (Five more minutes are allowed for this exercise.)

What I would like you to do is to keep this list and add to it as much as possible over the next week. To help you, here is a sample of a completed SUNDS hierarchy. (The sample SUNDS hierarchy is handed out at this time.) It is important to stress that this is just to help you--it is important that you develop your own list of items that are relevant to you. Try to pick situations or events that happen relatively frequently. You'll notice that the hierarchy items are numbered. Don't worry about that right now, we'll be taking care of that during the next treatment session. For the next treatment session,

I am asking each of you to bring at least twenty 3 x 5 index cards to the session with you. (The session concludes with a brief discussion period in which any questions or matters of concern may be brought up. After indicating that he or she will be available for a few minutes after the session, the self-report cards for the coming week are passed out by the therapist.)

Second Treatment Session

The second treatment session will begin much as did the first, with some casual conversation designed to keep participants feeling at ease. Such things as asking people how their weeks went, have they noticed any changes in their smoking, did they bring their lists and their index cards, will occupy the first few minutes of the session (there will be index cards available for those participants that did not bring theirs). Thirty minutes of relaxation will then follow, using seven muscle groups instead of the original sixteen. The remainder of the session will be spent in helping subjects sequentially order the situations that they have on the SUNDS. If necessary, subjects may have to list new situations, particularly at the extreme ends of the scale. At the end of the session, each subject should have twenty positive and twenty negative situations. They will then be instructed to list each situation, along with its SUNDS number in the upper left corner, on the index cards. One side of the cards will be for the positive situations and the reverse side will be used to list the negative situations. Participants are to be reminded that next

treatment session is "quit night." After a brief discussion period during which questions may be raised, the session will conclude with instructions to practice the new seven muscle group relaxation, and with passing out of the self-report cards for the coming week.

Treatment Session Three

This session will begin with a brief (five or ten minute) unstructured group interaction similar to that beginning the last session. Next, a fifteen minute period of progressive relaxation utilizing four muscle groups will take place. At that point, desensitization is ready to begin. Subjects are to be instructed to imagine each scene as vividly as possible. It is to be emphasized to subjects that they concentrate on the situation itself and on the idea of not smoking in the situation. They are to attend entirely to their imaginal perceptions, to note feelings of anxiety or muscular tension as these arise, and when signalled to begin relaxation, to use these cues to begin a deep relaxation. Subjects will be cautioned that they may not be able to completely relax away all tension, particularly as the hierarchy is ascended, but that this should not be a cause for concern. Both items at each SUNDS level will be covered during this session up to SUNDS-50. Each item will be presented twice for five seconds, twice for ten seconds, and twice for twenty seconds, with a twenty second interval of relaxation separating each presentation. The session will conclude with participants being instructed to practice the new four muscle group relaxation at least three times during the coming week. After a brief

discussion period, self-report cards will be distributed.

Treatment Session Four

This session will begin in a manner identical to that of the other sessions, with a brief unstructured discussion. Then, after a fifteen minute period of relaxation using four muscle groups, desensitization will again begin. Beginning with SUNDS-50 (the last level covered in the previous session), and using the same model of each item twice for five seconds, twice for ten seconds, and twice for twenty seconds, with twenty second intervals of relaxation separating each presentation, the remaining SUNDS levels will be desensitized. The session will conclude with a brief unstructured discussion period and passing out of the self-report cards for the coming week.

Fifth Treatment Session

This session will follow the pattern exactly of the fourth treatment session, except that participants will be desensitized to SUNDS levels chosen at random for an equivalent time period.

Sixth Treatment Session

This session will follow the pattern exactly of the fifth treatment session. At the end, participants will be offered support and encouragement for maintaining the gains that they have made in treatment.

Group 1: Systematic Desensitization to Specific High
Probability Smoking Situations
Outline of Treatment Sessions

Session 1

Introduction and Group Orientation

Presentation of the Treatment Rationale

Progressive Relaxation Training (PRT) -16 muscle groups

a) handout and homework assignment

Introduction to the SUNDS

a) handout and homework assignment

Discussion

Session 2

Informal Discussion

PRT - 7 muscle groups

Completion of the SUNDS Hierarchies

Discussion

Session 3 ("Quit Night")

Informal Discussion

PRT - 4 muscle groups

Desensitization to SUNDS 5-50

Discussion

Session 4

Informal Discussion

PRT

Desensitization to SUNDS 50-100

Discussion

Session 5

Discussion

PRT

Desensitization to SUNDS (levels chosen at random)

Discussion

Session 6

Discussion

PRT

Desensitization to SUNDS (levels chosen at random)

PROGRESSIVE RELAXATION TRAINING
(PRT)

One method of exercising control over the urge to smoke is to employ "substitute behaviors" which serve to fulfill the same needs met by smoking. Since most smokers report that smoking is often relaxing, or produces a calming effect when they feel tension, a skill that involves generating a relaxed state makes a great deal of sense as a component of a smoking abstinence program. In addition, Progressive Relaxation Training (PRT) is an important part of the technique of Systematic Desensitization which you will be exposed to as an integral portion of treatment for smoking.

Basically, PRT consists of learning to sequentially tense and then relax various muscle groups of the body and to pay close attention to the feelings associated with the states of both tension and relaxation. It is likely that you will find learning to relax in this fashion to be a useful skill in its own right, one that you can apply with increasing ease whenever you feel the need to. Like any skill, however, practice is necessary to achieve a high degree of competence.

You will be learning initially to tense and then relax sixteen separate muscle groups in order to become familiar with all of the areas where bodily tension can reside. Some of them may surprise you at first. It is very important that you practice this at least three times between sessions.

Next, you will be learning a form of PRT that combines the previous sixteen muscle groups into seven groups. Again, it is very important that you practice this form of PRT at least three times between treatment sessions. Finally, you will be learning to relax by tensing and relaxing only four muscle groups. One more week of practice (again, at least three times) and you will have learned a valuable new skill which you can use for the rest of your life. Psychologists have found this to be useful in cutting down on self-reported anxiety, muscular tension, heart rate, skin conductance (GSR), and respiration rate.

In order to help you with your practice, the various muscle groups and instructions for how to tense them is included. There will also be an opportunity to learn this during the treatment sessions.

STAGE I

(Sixteen Muscle Groups)

<u>Muscle Group</u>	<u>Tensing Instructions</u>
1. Dominant hand and forearm	Make a tight fist
2. Dominant biceps	Push elbow down against chair
3. Nondominant hand and forearm	Make a tight fist
4. Nondominant biceps	Push elbow down against chair
5. Forehead	Lift eyebrows as high as possible
6. Upper cheeks and nose	Squint and wrinkle nose
7. Lower cheeks and jaws	Bite hard and pull back corners of mouth
8. Neck and Thorat	Pull chin toward chest and keep it from touching chest
9. Chest, shoulders, and upper back	Pull shoulder blades together, take a deep breath and hold it
10. Abdominal or stomach region	Make stomach hard
11. Dominant thigh	Counterpose top and bottom muscles
12. Dominant calf	Pull toes toward head
13. Dominant foot	Point and curl toes, turning foot inward
14. Nondominant thigh	Counterpose top and bottom muscles
15. Nondominant calf	Pull toes toward head
16. Nondominant foot	Point and curl toes, turning inward

STAGE II

(Seven Muscle Groups)

Muscle Group

1. Dominant hand and forearm
Dominant biceps
2. Nondominant hand and forearm
Nondominant biceps
3. Forehead
Upper cheeks and nose
Lower cheeks and jaws
4. Neck and throat
5. Chest, shoulders, and upper back
Abdominal or stomach region
6. Dominant thigh
Dominant calf
Dominant foot
7. Nondominant thigh
Nondominant calf
Nondominant foot

STAGE III

(Four Muscle Groups)

Muscle Group

1. Dominant hand and forearm
Dominant biceps
Nondominant hand and forearm
Nondominant biceps
2. Forehead
Upper cheeks and nose
Lower cheeks and jaws
Neck and throat
3. Chest, shoulders, and upper back
Abdominal or stomach region
4. Dominant thigh
Dominant calf
Dominant foot
Nondominant thigh
Nondominant calf
Nondominant foot

SUBJECTIVE UNITS OF NON-SMOKING DISTRESS SCALE (SUNDS)

Sample hierarchy of positive (pleasant) situations:

- 5 - after a class, or taking a work break
- 10 - driving, and a favorite song comes on the radio
- 15 - settling down with the new issue of your favorite magazine
- 20 - getting a letter from an old friend who is coming to visit
- 25 - after breakfast with a second cup of coffee
- 30 - by the fire during a snowstorm
- 35 - wearing new clothes and feeling good
- 40 - getting an "A" back on a difficult test
- 45 - making a date and really looking forward to it
- 50 - after a really nice meal out
- 55 - after a good workout, feeling pleasantly worn out
- 60 - drinking at a party, feeling good on Saturday night
- 65 - on vacation, feeling no worries
- 70 - after a good movie, having a nightcap
- 75 - getting an unexpected raise (or money in the mail)
- 80 - getting a promotion, or graduating
- 85 - apres skis, had a great day on the slopes
- 90 - a really nice compliment from someone you like and respect
- 95 - on your birthday, opening presents
- 100 - after sex

SUBJECTIVE UNITS OF NON-SMOKING DISTRESS SCALE (SUNDS)

Sample hierarchy of negative (unpleasant) situations:

- 5 - waking up, feeling tired
- 10 - rushing to work
- 15 - stuck in traffic, late to work for the second time that week
- 20 - somebody says something nasty about you
- 25 - having a headache
- 30 - getting a "C" back on an important test
- 35 - getting turned down for a loan that you need
- 40 - being really worried about money and hit with unexpected bills
- 45 - just feeling down, a grey, cold day, nothing to do
- 50 - coming out of the movies and finding the air let out of your tires
- 55 - some idiot burns a hole in your new suit at a party
- 60 - a quarrel with your spouse (or boyfriend or girlfriend)
- 65 - getting a traffic ticket (third one - there goes your insurance)
- 70 - a car accident that's your fault
- 75 - getting turned down for a really exciting job
- 80 - getting bit by a dog
- 85 - somebody breaks into your house and wrecks it
- 90 - breaking up with your spouse (or boyfriend or girlfriend)
- 95 - finding out that you have to go in the hospital for an operation
- 100 - someone you love is very sick

Appendix E

Treatment Manual

Group 2: Systematic Desensitization to High and Low Levels of Arousal

First Treatment Session

During the first treatment session, the therapist will make some effort to make subjects feel comfortable and that they are part of the group. To accomplish this, each participant will be asked his or her name, and to tell the group a little about themselves (such things as where they grew up, how many in their family, what they do for relaxation and for a living). After this is done, each member will be asked about their smoking history - when they started, how much they smoke, and why they would like to quit. The therapist will moderate this discussion, and try to draw out reticent group members if necessary. After these preliminaries, the treatment rationale will be presented.

Treatment Rationale

As smokers, perhaps you have noticed that you smoke cigarettes more when you feel really good or bad. The treatment that you will be receiving here is based on research that indicates that smokers use cigarettes to cut off and modify high and low points in arousal. The treatment is a form of systematic desensitization.

First, you will be learning to relax deeply--both physically and mentally. Using a form of deep muscle relaxation known as

Progressive Relaxation Training (PRT), you will spend the first two sessions mainly practicing this new skill. I'll also be asking you to practice at home a few times each week between sessions. I think you will find this an enjoyable experience. And, as is true with any skill, your practice will really pay off. (At this point, the PRT handout is distributed to the group.)

The major part of treatment will involve systematic desensitization to various states of arousal on a scale called the Subjective Units of Arousal Scale (SUAS), which runs from 1-100 at 10 point intervals.

At about SUAS-10 would be the way you feel when sitting quietly, calm and relaxed with your eyes closed. At SUAS-40 might be the way you feel when you are taking an exam. At SUAS-60 would be the way you feel when you're watching a really exciting movie. At SUAS-80 might be feeling the way you do when you are out dancing. At about SUAS-90 would be the kind of feeling you would have when you would be about to deliver an address to a large group of people or go on television for the first time. At SUAS-100 might be the feeling you would have when you narrowly miss being in a really bad traffic accident. Without actually changing what are essentially natural and healthy reactions, the treatment is designed to make you more comfortable with these bodily feelings so they no longer act as cues for cigarette smoking. This is intended to aid you in your efforts to quit.

Second Treatment Session

The second treatment session will begin with an informal discussion period designed to keep participants feeling at ease. Such topics as asking people how their weeks went and whether they have noticed any changes in their smoking will be discussed.

A thirty minute period of practice of PRT utilizing seven muscle groups instead of sixteen will follow. Then, in order to prepare subjects for the desensitization, a trial run through the various levels of the SUAS will be done. Utilizing a series of appropriate verbalizations (see therapist verbalizations for the SUAS below) all ten levels of arousal will be induced in subjects. They will be closely questioned as to their ability to actually feel the different levels, and difficulties will be dealt with as they occur. The session will conclude with a reminder to practice PRT at least three times during the coming week. Additionally, subjects are to be reminded that next session is "quit night" and that they are expected to abstain completely from cigarettes from that point on. After a brief discussion period, and passing out of the self-report cards for the coming week, the session will come to a close. The therapist will remain for a few minutes after the session to be available to answer questions or consult with subjects at their request. (All sessions will end with this brief discussion period and passing out of the self-report cards. Therefore, it will not be mentioned further.)

Third Treatment Session

Desensitization proper begins with the third session. Following the format of the previous sessions, first a brief discussion period is followed by fifteen minutes of PRT, this time using only four muscle groups. The desensitization procedure is accomplished by inducing SUAS levels in the subjects, beginning with the lowest, and following each period of induced arousal with a forty second period of relaxation. Beginning with SUAS -10, arousal at this level is induced for one minute followed by forty seconds of relaxation. Going on to the next level, SUAS -20, arousal is induced by coming up through the previous level for thirty seconds, followed by one minute at the target level, followed by forty seconds of relaxation. This is the model for the desensitization procedure. Each target level is reached by coming up at thirty second intervals through all previous levels. One minute is then spent at the target level, followed by forty seconds of relaxation before moving on to the next higher level. In all, SUAS levels 10-50 will be desensitized during this session. This session will end in the usual fashion.

Fourth Treatment Session

This session begins with an informal discussion, followed by fifteen minutes of relaxation. SUAS 10-80 are then desensitized. The session ends in the usual fashion.

Fifth Treatment Session

This session begins with an informal discussion, followed by fifteen minutes of relaxation. SUAS 10-100 (the entire hierarchy) is then desensitized. The session ends in the usual fashion.

Sixth Treatment Session

This session is a repetition of the sixth session. It ends with a discussion of maintenance issues and with the therapist offering the subjects support and encouragement in their efforts to maintain the gains they have (presumably) made in treatment.

Group 2: Systematic Desensitization in High and LowLevels of ArousalOutline of Treatment SessionsSession 1

Introduction and Group Orientation

Presentation of Treatment Rationale

Progressive Relaxation Training (PRT) - 16 muscle groups

a) handout and homework assignment

Discussion

Session 2

Discussion

PRT -7 muscle groups

a) homework assignment

Trial Run through: SUAS

Discussion

Session 3

Discussion

PRT -4 muscle groups

Desensitization to SUAS 10-50

Discussion

Session 4

Discussion

PRT

Desensitization to SUAS 1-80

Discussion

Session 5

Discussion

PRT

Desensitization to SUAS 10-100

Discussion

Session 6

Discussion

PRT

Desensitization to SUAS 10-100

Discussion of Maintenance Issues and Concluding
Remarks

Therapist Verbalizations to Induce Arousal

(all verbalizations are paraphrased as necessary to fill time)

SUAS-10 You're feeling very calm and relaxed, very peaceful. Your breathing is deep, slow, and steady. You feel very calm and relaxed.

SUAS-20 You're feeling calm, relaxed, and alert, perhaps as if you're waiting for something not very exciting to happen. Your mind is alert, you feel calm, relaxed, and ready. Your breathing is normal and regular.

SUAS-30 You're feeling alert and at ease. Your breathing is regular. You're ready to attend to what is going on around you. You feel alert and at ease.

SUAS-40 You're feeling awake and at ease. You feel as if you're walking somewhere, or driving perhaps. Just a regular feeling, paying attention to what's happening around you.

SUAS-50 Feeling like you usually do. You aren't aware of any bodily sensations. You just feel normal, everyday, and your breathing is easy and regular.

SUAS-60 You're feeling like you just had a cup of coffee— alert and kind of turned on. Your breathing is a little quicker than normal, and you feel a little bit restless. Feeling like you want to do something. Just feel a little restless staying in one place.

SUAS-70 You're feeling a bit wound up. Your breathing is getting a little bit quicker now, and you notice that you're swallowing a few more times than usual. Your palms are sweating ever so slightly, and you feel a little bit flushed. Your breathing is getting faster and shallower. You feel definitely restless now.

SUAS-80 You feel wide awake and your thoughts are racing. You are swallowing often and with a little bit of difficulty. Your palms are sweating. You are aware that your heart has speeded up and your breath is quickening. You feel ready to run.

SUAS-90 Your breathing is very fast and shallow, almost gasping. You feel flushed, and as you turn your attention inward, you can feel your heart thudding against your chest and you hear a pounding in your ears. You swallow with difficulty and notice that your mouth is dry. You break out in a sweat all over, and begin to feel shaky.

SUAS-100 You can feel the adrenalin pumping into your blood. You feel hot all over - a rushing feeling as if you were ready to explode. Your heart is racing very fast. It's very difficult to swallow, and you feel waves of heat all over. You really feel wired up. Your thoughts are racing, just racing. You feel your heart pounding in your ears.

PROGRESSIVE RELAXATION TRAINING
(PRT)

One method of exercising control over the urge to smoke is to employ "substitute behaviors" which serve to fulfill the same needs met by smoking. Since most smokers report that smoking is often relaxing, or produces a calming effect when they feel tension, a skill that involves generating a relaxed state makes a great deal of sense as a component of a smoking abstinence program. In addition, Progressive Relaxation Training (PRT) is an important part of the technique of Systematic Desensitization which you will be exposed to as an integral portion of treatment for smoking.

Basically, PRT consists of learning to sequentially tense and then relax various muscle groups of the body and to pay close attention to the feelings associated with the states of both tension and relaxation. It is likely that you will find learning to relax in this fashion to be a useful skill in its own right, one that you can apply with increasing ease whenever you feel the need to. Like any skill, however, practice is necessary to achieve a high degree of competence.

You will be learning initially to tense and then relax sixteen separate muscle groups in order to become familiar with all of the areas where bodily tension can reside. Some of them may surprise you at first. It is very important that you practice this at least three times between sessions.

Next, you will be learning a form of PRT that combines the previous sixteen muscle groups into seven groups. Again, it is very important that you practice this form of PRT at least three times between treatment sessions. Finally, you will be learning to relax by tensing and relaxing only four muscle groups. One more week of practice (again, at least three times) and you will have learned a valuable new skill which you can use for the rest of your life. Psychologists have found this to be useful in cutting down on self-reported anxiety, muscular tension, heart rate, skin conductance (GSR), and respiration rate.

In order to help you with your practice, the various muscle groups and instructions for how to tense them is included. There will also be an opportunity to learn this during the treatment sessions.

STAGE I

(Sixteen Muscle Groups)

<u>Muscle Group</u>	<u>Tensing Instructions</u>
1. Dominant hand and forearm	Make a tight fist
2. Dominant biceps	Push elbow down against chair
3. Nondominant hand and forearm	Make a tight fist
4. Nondominant biceps	Push elbow down against chair
5. Forehead	Lift eyebrows as high as possible
6. Upper cheeks and nose	Squint and wrinkle nose
7. Lower cheeks and jaws	Bite hard and pull back corners of mouth
8. Neck and Throat	Pull chin toward chest and keep it from touching chest
9. Chest, shoulders, and upper back	Pull shoulder blades together, take a deep breath and hold it
10. Abdominal or stomach region	Make stomach hard
11. Dominant thigh	Counterpose top and bottom muscles
12. Dominant calf	Pull toes toward head
13. Dominant foot	Point and curl toes, turning foot inward
14. Dominant foot	Counterpose top and bottom muscles
15. Nondominant calf	Pull toes toward head
16. Nondominant foot	Point and curl toes, turning inward

STAGE II
(Seven Muscle Groups)

Muscle Group

1. Dominant hand and forearm
Dominant biceps
2. Nondominant hand and forearm
Nondominant biceps
3. Forehead
Upper cheeks and nose
Lower cheeks and jaws
4. Neck and throat
5. Chest, shoulders, and upper back
Abdominal or stomach region
6. Dominant thigh
Dominant calf
Dominant foot
7. Nondominant thigh
Nondominant calf
Nondominant foot

STAGE III

(Four Muscle Groups)

Muscle Group

1. Dominant hand and forearm
Dominant biceps
Nondominant hand and forearm
Nondominant biceps
2. Forehad
Upper cheeks and nose
Lower cheeks and jaws
Neck and throat
3. Chest, shoulders, and upper back
Abdominal or stomach region
4. Dominant thigh
Dominant calf
Dominant foot
Nondominant thigh
Nondominant calf
Nondominant foot

Appendix F

Smoking History Questionnaire

Instructions: Please answer the following questions as accurately and honestly as possible. Print clearly and remember that all information will be kept strictly confidential.

1. a. Name _____
 b. Address _____
 c. Phone (home) _____
 Phone (business, if applicable) _____
2. a. Age _____ b. Weight _____ c. Height _____
3. Sex: M _____ F _____
4. a. Marital status: Single _____ Married _____
 Divorced _____ Widowed _____
 b. Number of children _____
5. Average number of cigarettes smoked per day _____
6. Kind of cigarettes usually smoked:
 - a. Brand _____
 - b. Filter _____ non-filter _____ (check one)
 - c. Length: Regular _____ King _____ 100 mm _____
7. Do you sometimes smoke a pipe? Yes _____ No _____
 If yes, how many pipefuls daily? _____
8. Do you sometimes smoke cigars? Yes _____ No _____
 If yes, how many daily? _____
9. How many years have you been smoking? _____ years.

Smoking Questionnaire

10. a. How many times have you previously attempted to quit smoking?

b. If you have previously attempted to quit, what was the longest period of time that you were able to go without smoking?

c. If you have previously attempted to quit, why do you think you were unsuccessful? _____

d. State the nature of the difficulties you encountered while attempting to quit smoking (five mental and physical symptoms, if any). _____

11. Which of the following physical symptoms do you now have that you associate with smoking?

Wheezing _____ Morning cough _____ Shortness of breath _____

Lack of energy _____ Nervousness _____ Excessive sputum _____

Stained teeth _____ Stained fingers _____ Frequent colds _____

Frequent cough _____ Coated tongue _____ Bad breath _____

Loss of taste _____ Loss of smell _____ Other _____

_____ (specify).

12. Why do you wish to quit smoking at the present time. _____

Smoking Questionnaire

13. Have you been subjected to any pressure from doctors, family, friends, etc. to cut down on your smoking? Please explain:
- _____
- _____
- _____
14. Have you ever previously participated in a special program or formal treatment designed to help you quit smoking? Yes _____ No _____
- If yes, please describe the program, telling where, when, and whether it was effective in helping you quit smoking, and for how long you remained abstinent. _____
- _____
- _____
15. How important do you feel it is for you to quit smoking at the present time? (Check one of the following and BE HONEST). Urgency will not determine your selection for this program.
- a. Matter of life and death - great urgency. _____
- b. Very important but not vitally urgent. _____
- c. Important but not very important. _____
- d. Not important but preferable. _____
- e. Would just as soon continue smoking. _____
16. How much do you believe this treatment program will be effective in helping you quit smoking? (Check one of the five categories below. Again, BE HONEST: your answer will have no effect on your selection).
- a. Strongly believe _____

Smoking Questionnaire

b. Moderately believe _____

c. Am not sure _____

d. Doubt it will help _____

e. Strongly disbelieve _____

17. How much trouble do you expect to have in quitting?(check one)

Extreme _____ Moderate _____ Slight _____

18. List the people with whom you are now living. If they smoke, put a star (*) after their "relation." (Do not give names, give relation e.g., "wife", "son", etc.)

	<u>Relation</u>	<u>What do they smoke?</u>	<u>How much?</u>	<u>Do they want to stop?</u>
a.	_____	_____	_____	_____
b.	_____	_____	_____	_____
c.	_____	_____	_____	_____
d.	_____	_____	_____	_____
e.	_____	_____	_____	_____
f.	_____	_____	_____	_____

19. List five situations in which you smoke most consistently and rate the percentage of time you smoke in each situation.

i.e., during coffe break at work - 80% of the time

after dinner at home - 96% of the time

a.	_____	-	_____
b.	_____	-	_____
c.	_____	-	_____

Smoking Questionnaire

d. _____ - _____

e. _____ - _____

Medical Information

Instructions: The following information is needed for screening purposes and will be held in the strictest of professional confidence.

Your answers will be useful in evaluating the smoking treatment. Please be as accurate and complete as possible (use other side of page if necessary).

1. Have you suffered from any respiratory disorder, heart disorder, or any other chronic illness? If yes, give details: _____

2. Are you currently taking medications (pills, injections, etc.)? If yes, give details: _____

3. Have you had a recent physical examination and/or chest x-ray? If yes, by whom and for what reasons? _____

4. Have you been hospitalized during the past five (5) years? If yes, where, when, and why? _____

Smoking Questionnaire

5. Do you experience chest pain associated with mild or heavy physical exertion or during periods of emotional stress? If yes, give details:

6. Do you currently have (or have you ever had) any of the following medical problems? (Check those which are applicable).

- a. Cardiovascular disease _____
b. High blood pressure _____
c. Diabetes _____
d. Emphysema _____
e. Chronic bronchitis _____
f. Bronchial Asthma _____

7. Women only: Are you currently pregnant or actively attempting to become pregnant? If yes, please indicate: _____

Date: _____ Signature: _____

Smoking Questionnaire

MISCELLANEOUS INFORMATION

1. List the names, addresses, and telephone numbers of four individuals who are familiar with your smoking habits and your rate of consumption. Please include individuals with whom you associate both in and outside of the home (e.g., spouse, business associate, friend, relative, etc.)

	NAME*	ADDRESS	PHONE NO.
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

*These individuals will aid us in evaluating the Smoking Abstinence Program by providing independent checks on your rate of smoking, following the completion of the treatment program.

2. As far as you know right now, do you plan to be living in the Missoula area for at least one more year? (check one)

YES _____ NO _____ NOT SURE _____

Appendix G

Self-Report of Smoking Card

		() NO. CIG'S	TOTAL	
DATES: _____			<input type="checkbox"/>	M
			<input type="checkbox"/>	T
			<input type="checkbox"/>	W
			<input type="checkbox"/>	T
			<input type="checkbox"/>	F
			<input type="checkbox"/>	S
			<input type="checkbox"/>	S

Appendix H

POST TREATMENT QUESTIONNAIRE

Name: _____

Directions: Rate the following treatment components in terms of their value in helping you to abstain from smoking: (select a number from the scale below which best approximates your answer and place it in the blank to the left of each item).

Not at all Slightly helpful Moderately helpful Very helpful Extremely helpful

1 2 3 4 5

___(A) being in a group with others trying to quit

___(B) self-monitoring (keeping track of my smoking)

___(C) relaxation training (PRT)

___(D) systematic desensitization

___(E) therapist support and encouragement

___(F) group support and encouragement

___(G) other (specify): _____

___(H) other (specify): _____

How optimistic are you about your ability to abstain from cigarettes?

(1 = not at all, 2 = somewhat, 3 = some change, 4 = moderately confident, 5 = completely certain)

II. Directions: Rate the ability of your group leader in performing the following treatment functions. Select a number from the scale below which best approximates your answer and place it in the blank to the left of each item.

Poor Unsatisfactory Average Good Excellent

1 2 3 4 5

- ___(a) Ability to generate positive treatment expectations, optimism, and enthusiasm for success.
- ___(b) Ability to relate to individual participants in a warm, friendly, and personal manner.
- ___(c) Ability to create cohesiveness, solidarity, and unity among group members.
- ___(d) Ability to present information in a clear, concise, and direct manner.
- ___(e) Ability to demonstrate concern and caring for each individual's difficulties in quitting and for each participant's ultimate success in the program.
- ___(f) Ability to promote active participation from every group member.
- ___(g) Overall ability as a group leader.
- ___(h) General comments regarding the abilities of your group leader:

TABLE 1
Analysis of Variance
Summary Table

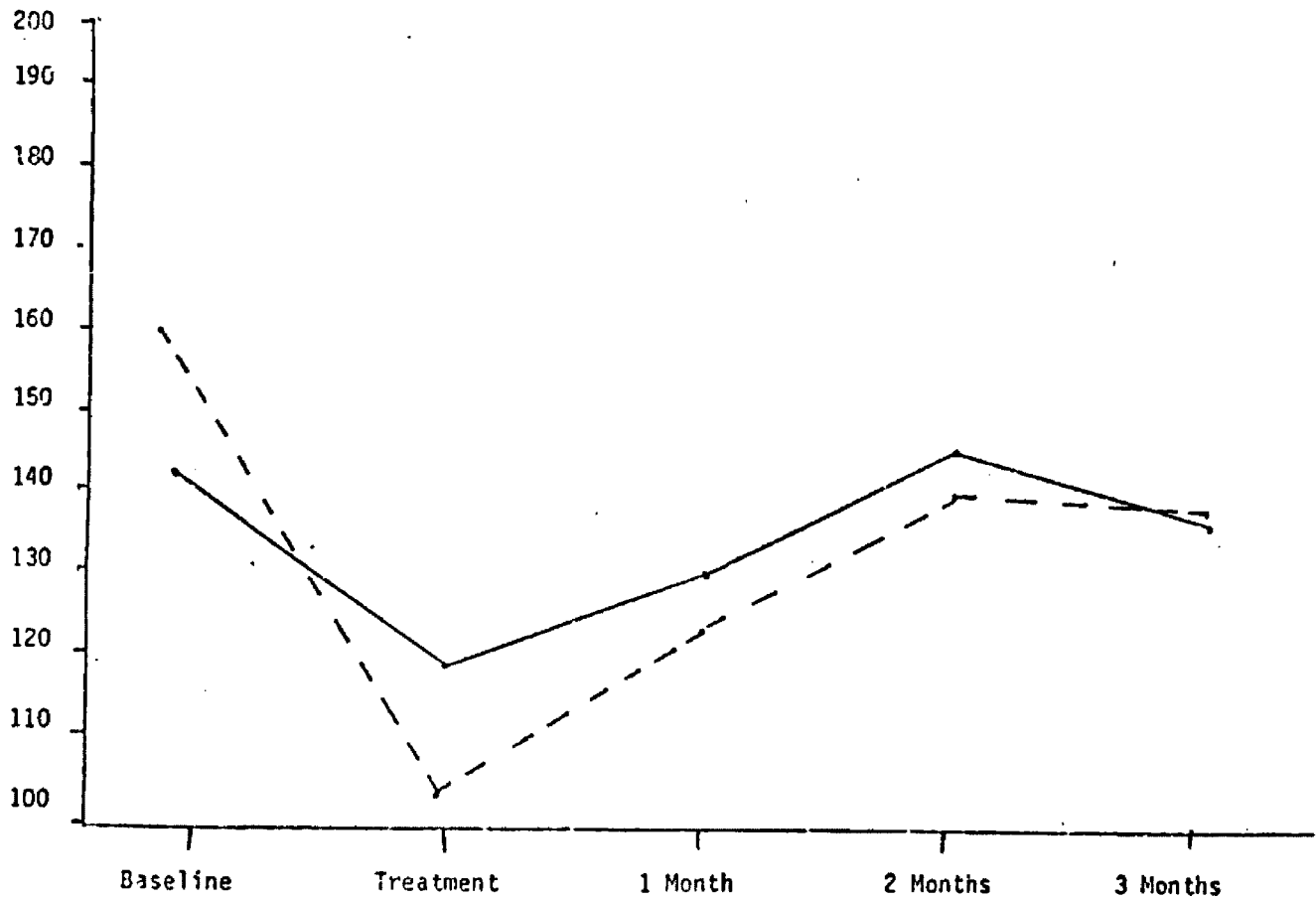
Sources of Variance	MS	df	F-Ratio
A (Treatment Groups)	292.82	1	< 1
B (Assessment Periods)	3043.33	4	1.83
AJ (Treatment Groups by Assessment Periods)	494.37	4	< 1

TABLE 1-A
Means and Standard Deviations
of Number of Cigarettes Smoked on
One Week

	Group	Mean	Standard Deviation
Baseline	I	143.80	109.02
	II	160.00	44.79
Treatment	I	118.00	98.49
	II	104.40	76.59
1 Month Follow-up	I	132.80	109.78
	II	124.60	76.78
2 Month Follow-up	I	161.20	85.71
	II	141.40	53.05
3 Month Follow-up	I	144.00	147.59
	II	145.20	59.49

Number of Cigarettes Smoked Per
One Week Period

No. of Cigarettes
Smoked Per One
Week Period



— Group I - Systematic Desensitization to Smoking Situations
 - - - Group II - Systematic Desensitization to Arousal

TABLE 1-C
Subject Characteristics (Across Groups)

<u>Characteristic</u>	<u>M</u>	<u>SD</u>	<u>Range</u>
Age	29	12.02	20 - 55
Percent Female	80	-----	-----
Percent Married	40	-----	-----
Cigarettes Smoked / Day	27.6	10.41	15 - 40
Years Smoking	9.9	9.80	1 - 30
Prior Attempts to Quit	3.3	3.47	0 - 12
Longest Period of Abstinence/Weeks	7.32	16.12	0 - 52
Percent Participating Prior Treatment Programs	20	-----	-----
Motivation for Treatment ^a	3.5	.97	2 - 5
Expectation of Success ^b	3.9	.99	3 - 5
Difficulty in Quitting ^c	2.6	.52	2 - 3

a
based on a Likert type scale, 1 = just as soon still smoke,
5 = matter of life and death

b
based on a Likert type scale, 1 - strongly disbelieve, 5 = strongly
believe

c
based on a Likert type scale, 1 = slight, 2 = moderate, 3 = extreme

TABLE II
Post Treatment Questionnaire
(Between Groups)

Analysis of Variance
Summary Table

Sources of Variance	MS	df	F-Ratio
1-A (being in a group with others trying to quit)	.40	1	1
1-B (self-monitoring)	.10	1	1
1-C (relaxation training)	3.6	1	7.20*
1-D (systematic desensitization)	.4	1	1
1-E (therapist support and encouragement)	3.6	1	7.20*
1-F (group support and encouragement)	4.9	1	12.25*
II (optimism about ability to abstain from smoking)	1.0	1	1
III-A (therapist ability to generate positive expectations)	.00	1	1
III-D (therapist ability to present information)	.40	1	1
III-E (therapist caring for individual success)	.90	1	1.38
III-F (therapist ability to promote participation)	.00	1	1
III-G (overall ability as group leader)	4.9	1	1
Summary of III A-G (therapist qualities)	.00	1	1

* $p < .05$

TABLE II-A

Means and Standard Deviations of Responses
to the Post Treatment Questionnaire

Item	Group A		Group B		Combined	
	M	SD	M	SD	M	SD
1-A	3.8	.84	4.2	.84	4.0	.82
1-B	3.6	1.14	3.4	1.52	3.5	1.27
1-C	1.6	.55	2.8	.84	2.2	.92
1-D	2.2	1.30	2.6	1.52	2.4	1.35
1-E	2.6	.55	3.8	.84	3.2	.92
1-F	3.0	.71	4.4	.55	3.7	.95
II	3.6	.55	3.4	.55	3.5	.53
III-A	4.0	.71	4.0	.71	4.0	.67
III-B	4.0	.71	4.6	.89	4.3	.82
III-C	3.6	.55	3.4	.89	3.5	.71
III-D	3.6	.89	4.0	.71	3.8	.71
III-E	4.0	.71	4.6	.89	4.3	.82
III-F	4.2	.84	4.2	1.79	4.2	1.32
III-G	4.0	.71	4.2	.84	4.1	.74
III A-G	27.4	2.97	29.0	6.34	28.2	4.73

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