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VISUAL DEPRIVATION AS A THERAPEUTIC TOOL IN THE TREATMENT OF SMOKING BEHAVIOR

by

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Acknowledgements

There are probably a number of good arguments both for and against the inclusion of an acknowledgements section in a formal thesis. By the time a student reaches that stage in writing when he can weigh them, however, he has been pretty well impressed by the fact that no one gets very far alone, and that either accidentally or purposefully, others have involved themselves in his progress. With this realization, further debate really becomes academic.

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Abstract

Visual Deprivation as a Therapeutic Tool in the Treatment of Smoking Behavior

The purpose of this thesis was to determine the effect of a 24 hour period of visual deprivation upon the subsequent smoking patterns of subjects. Previous studies (Suedfeld, Landon, Pargament, and Epstein, 1972; Suedfeld, 1973; Suedfeld, 1974) have shown that a similar period of full sensory deprivation or sensory deprivation together with taped anti-smoking messages significantly reduced subjects' later smoking rates. Visual deprivation, a more easily induced and controlled condition, is known to produce many of the same sensory and cognitive effects as its full sensory counterpart (Zubek, 1969). A demonstrated extension of its effectiveness would have both theoretical and practical importance.

Accordingly, 48 male smokers who had averaged 20 cigarettes a day for at least one year and who had expressed a desire to quit were randomly assigned to one of four experimental conditions: (1) a 24 hour period of visual deprivation with no smoking permitted, (2) a like period of visual deprivation with smoking permitted, (3) no deprivation (confinement) with no smoking permitted, and (4) no deprivation (confinement) with smoking permitted. Subjects monitored their smoking rates for a five day period immediately prior to the experimental session. A second five day monitor period was carried out one month after treatment. Statistical analyses of the pre-post measures showed a significant reduction in smoking rates across all conditions, but no significant differences among groups for visual deprivation, smoking deprivation, self-monitoring, or their interactions.

Qualitative data from post treatment questionnaires supported the latter findings.

Results were discussed within the context of the relationship of visual to sensory deprivation and in terms of design differences between this study and previous investigations of the smoking-deterrent effectiveness of deprivation states. A tentative explanation of the overall significant decrease in smoking levels was presented. Its implications for the present experiment and Suedfeld's past research were delineated. Avenues for future research were suggested.

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CHAPTER I

INTRODUCTION

The persisting habitual consumption of cigarettes by large segments of the population has been of phenomenon of interest and concern to medical and behavioral scientists for nearly 40 years. Though the foci of research interest varied during that period, recent investigative efforts have centered upon the evolution and refinement of techniques effective in the reduction or elimination of smoking behavior. This latter problem has been approached from various conceptual viewpoints -- pharmacological, psychotherapeutic, learning theory, and cognitive theory -- and with an often bewildering variety of procedures or combinations of procedures. The present study represented an evaluation of one promising stream of research in this area, the use of full or partial sensory deprivation as a tool in the treatment of smoking habituation.

Early in the last decade, the major medical society of Great Britain and the national health agencies of the United States and Canada published reports concerning the effects of smoking, particularly cigarette smoking, upon the health of habitual users of tobacco (Smoking and Health: Summary and Report of the Royal College of Physicians of London on Smoking in Relation to Cancer of the Lung and Other Diseases, 1962; Smoking and Health; Report of the Advisory Committee to the Surgeon General of the Public Health Service, 1964; A Canadian Study of Smoking and Health, 1966). All three studies presented evidence in support of the conclusions of the Surgeon General's report that cigarette smoking is causally related to lung cancer, and that strong associations exist between cigarette consumption and cancer of other respiratory and body sites, cardiovascular diseases, chronic bronchitis and pulmonary emphysema. Moreover, the more comprehensive

British and American summaries were in agreement in referring to smoking as a habituation rather than an addiction, attributing the compulsion or drive to smoke primarily to psychological or social sources.

The importance of the conclusions regarding the effects and motivational sources of smoking obtain perspective against the statistical context provided by the British and American studies. The report of the Royal College of Physicians states that three-quarters of the adult male population and one-half of the adult female population of Britain could be regarded as smokers (1961 statistics). Without differentiating between sexes, the Surgeon General's study placed the number of American smokers at 70 million (1962 statistics). No similar data were included in the more restricted Canadian report. It was apparent that significant numbers of individuals in the two countries -- and, presumably, in the third -- had become habituated to a drug whose long term effects were grossly detrimental to their health. The primary motivations for adopting and continuing its usage were, seemingly, social and psychological.

The publication and subsequent attention given to the reports' findings generated a somewhat ambiguous behavior pattern. Data from biannual surveys commissioned by the United States Clearinghouse for Smoking and Health indicated a substantial decline in the number of adult smokers over the six year period from 1964 to 1970. Approximately 24 million individuals were estimated to have given up cigarettes during that time. Yet the surveys noted that 48.8 million Americans still used cigarettes regularly; the percentage of smokers within the adult male populations (43.2) exceeding that within the female (30.9). Moreover, cigarette production in the United States and Canada has remained at

comparable or higher levels than those attained during the period of the reports' immediate appearance. Generally, then, the impressiveness of the spontaneous cessation effect appeared to have been lessened by the number of those who had retained the habit, the influx of a new generation of smokers, and the return of some whose abstinence from cigarettes was temporary only. Smoking behavior seemed to be a deeply ingrained habit, resistant to change even when those habituated were confronted with factual certainties regarding its effects.

The evidence presented in the three reports and the impressive tolerance for dissonance manifested by the majority of cigarette users stimulated a renewal of interest among researchers concerned with the phenomenon. Though investigative studies of cigarette smoking predated report dissemination, their major area of concentration had been upon the personality and motivational patterns involved in the maintenance of smoking. Concomitant with report publications, however, there began to appear a growing number of exploratory studies whose emphasis was upon the development of potentially useful techniques for the elimination of smoking behavior (Keutzer, Lichtenstein, and Mees, 1968; Bernstein, 1969; Schwartz, 1969; Johnston and Donoghue, 1971; Lichtenstein and Keutzer, 1971; Kroll, 1974). A seemingly disparate, hectic quality characterized this evolving field. The procedures employed were derived from several different models or approaches: pharmacological, educative, suggestability, psychotherapeutic, and learning theory. Factors selected as criteria for success/failure differed from study to study. Design and control measures were often inadequate.

Despite divergencies, the research does permit discernment of a

progressive and, thereby, unifying trend. Investigators initially concerned with the problem of smoking reduction came predominantly from a medical background. Techniques, outcome criteria, and design incompleteness reflected both that orientation and, often, the applied settings of the experimenters. With the increasing interest of behavioral scientists in the area, there occurred gradual changes in treatment models or approaches and in the refinement of design and outcome evaluation procedures. The progression was from medical to psychological influence. Its effects became evident in the successive theoretical frameworks from which the problem was broached and in a growing attention to difficulties of control and assessment.

A review of the pertinent literature employing this developmental course furnishes some baseline for evaluation of comparative effectiveness and allows for the emergence of a promising direction for experimentation. To provide further order, studies have been grouped under the following headings: pharmacological model, smoking clinics (educative approach), hypnotic techniques, psychotherapeutic model, behavior modification procedures, and cognitive-attitude change approach. Organization of presentation within each section includes (1) a review of representative studies, (2) summary of the rationale for each approach, (3) critique and comment upon approach effectiveness and methodological difficulties.

Review of the Literature

Pharmacological Model

Experimentation with smoking deterrent drugs long preceded report publication. Dorsey (1936) was the first to describe the use of lobeline sulphate, a nicotine mimetic, in the treatment of chronic smokers. Clinical

observation led him to conclude that the drug was effective in reducing the desire to smoke among patients motivated to quit. Using a somewhat more controlled approach, Wright and Littauer (1937) compared the effect of lobeline sulphate and an inert substance, magnesium oxide. Though the lobeline group noted a decreased craving for cigarettes, they also reported a number of gastrointestinal side-effects. The severity of these effects was of such a magnitude that the authors advised against the broad use of the drug as a 'cure' for smoking habituation.

Later pharmacological advances provided the means for a clearer evaluation of lobeline's action upon cigarette consumption. Rapp and Olen (1955) employed a reduced dosage of the drug buffered with fast and slow acting antacids (Bantron) together with a starch placebo in a treatment-reversal study with 200 subjects. Results seemed to provide impressive evidence for the new compounds efficacy. Over 80% of the participants were abstinent at the end of the Bantron treatment period. A second control study, however, brought the initially promising into question. Participants given the reduced dosage of lobeline alone and the antacids alone again within a counterbalanced paradigm showed no appreciable decrease in smoking at the end of either period.

Wary of the possible influence of extraneous variables, Bartlett and Whitehead (1957) attempted to structure their design in such a way as to control for differential subjective motivation and experimental placebo effect. Investigators instructed subjects to respond normally to their desire for a cigarette and to make no conscious effort to reduce their consumption. Participants were then administered Bantron, the tranquilizing agent Meprobamate (Miltown), and a sugar placebo across

four counterbalanced orders. End of treatment data revealed no noticeable decrement in consumption attributable to any of the three substances.

Additional partial support for the usefulness of the smoking deterrent drug was offered once again by Rapp (Rapp, Dusza, and Blanchet, 1959). 28 volunteers expressing a desire to quit and 25 who stated no such intention were treated first with Bantron and then with a starch placebo. Two outcome measures were employed: number of cigarettes consumed during treatment and mean amount (weight) of each cigarette smoked. End of experiment results showed a steady, impressive decline in the frequency of smoking for the motivated group during Bantron administration. No decrease at all was evident among non-motivated participants. Both groups displayed intriguing 'compensation' patterns on the second evaluative measure. Non-motivated subjects reduced sharply the amount of each cigarette they consumed under Bantron. Those who declared an intention to quit, however, greatly increased the amount of each cigarette smoked in proportion to the declining number consumed.

Rapp's findings, while consistently reported as favorable to buffered lobeline, were by no means free of challenge. Scott, Cox, Maclean, Price, and Southwell (1962) replicated the second part of his original study (Rapp and Olen), comparing a lobeline-antacid compound, Lobidan, with an antacid placebo. A double-blind treatment-reversal paradigm was employed with 55 motivated and non-motivated subjects. Only 29 volunteers completed the six week project, 23 of whom had a stated desire to discontinue smoking. Of the term subjects, 19 were uneffected by either Lobidan or antacids, 4 showed a decrease in consumption during the Lobidan regimen, and 6 reported a similar decrease while under antacid

placebo administration.

Merry and Preston (1963) strengthened the case against the effectiveness of lobeline and provided support for the extraneous variable hypothesis of Bartlett and Whitehead. The study required 90 motivated volunteers to spend an initial two week period in an attempt to stop smoking on their own resources. Those subjects still smoking were then divided into two groups, one of which was treated with Lobidan, the other with an antacid placebo. All were told the medication would be helpful. 13 of the original participants quit smoking on their own initiative. 14 dropped out of the project either at this phase or later. Of the remaining 63, 70% reduced their consumption by half or more, regardless of treatment condition. 30% stopped smoking completely. The authors concluded that there was no difference in performance under Lobidan or placebo. The results suggested the importance of instructional set, and subject motivation and expectation.

Physicians involved in a Smoking Deterrent Study conducted by the British Tuberculosis Association (British Tuberculosis Association, 1963) matched inert placebo tablets in taste and appearance with Lobidan capsules. 80 subjects, a mixed pool of healthy individuals and those afflicted with various respiratory ailments, were randomly assigned to two groups. Each received either Lobidan exclusively or the facsimile exclusively for six weeks. At the end of that period, 45 participants reported no change in smoking frequency, 27 showed a decrease of 50% or more, and nine had quit. There was no difference between groups on either reduction or elimination criterion. Additionally a six week follow-up revealed no difference in recidivism rates between Lobidan and placebo recipients.

The results of the studies reviewed here are generally non-supportive of the efficacy of lobeline variations in combatting cigarette habituation. There is some indication (Rapp and Olen; Rapp, Dusza, and Blanchett) that the nicotine mimetic can play a minimal, ancillary role in the discontinuation of smoking for subjects with some degree of motivation to stop. But the exact nature of the role is clouded by the presence of extraneous variables (instructional set, expectation). The majority of the findings would seem to support the conclusion of the Surgeon General's report that "There is no acceptable evidence that this goal (quitting smoking) can be achieved solely by modifying sensory drives or using tobacco substitutes" (Smoking and Health; Report of the Advisory Committee to the Surgeon General of the Public Health Service, 1964, page 354).

Pharmacological research concerned with the effectiveness of medication to alleviate the possible after-effects of smoking withdrawal (hunger, nervousness, irritability) has been equally discouraging. Studies employing benzedrine sulphate (Miller, 1941), Miltown (Bartlett and Whitehead, 1957) hydroxyzine hydrochloride (Turle, 1958), and Ritalin and Valium (Whitehead and Davies, 1964) have all reported negative results.

The pharmacological approach to smoking behavior presupposed the dominant factors maintaining the activity were physiological. Accordingly its treatment rationale centered upon the amelioration of physical dependence by direct substitution (lobeline sulphate) or by supplementary medication. This theoretical framework and the medical background of researchers espousing it dictated that design structure center upon the 'cure', the immediate cessation of smoking, as the criterion of success. Only one of the studies included here (British Tuberculosis Association) made use of a

follow-up survey to monitor the stability of treatment effects.

All of the studies reviewed suffered from methodological flaws and imprecisions. Subject populations and subject relevant variables were not clearly specified or standardized across investigations. Potential placebo effects of the experimental situation were often ignored or poorly controlled for. The general omission of a post treatment assessment has been alluded to above.

Educative or Clinic Model

As with pharmacological research efforts, impetus for the development of various short-term programs to eliminate smoking came from medical investigators. Ejrup (1960, 1967) designed a ten day smoking deterrent format that combined an introductory lecture on smoking and health, provision of literature on the problems and treatment of smoking behavior, and administration of a battery of pharmacological agents. Participants visited clinic facilities daily to receive an injection of lobeline hydrochloride, and supplies of meprobamate and an amphetamine. They also reported on treatment progress at this time. Data collected from over 1,000 volunteers at the conclusion of their treatment seemed highly significant. 76% of those reporting had stopped smoking and 22% had reduced their consumption to one quarter or less of their pre-treatment average. However, results of a six month follow-up (as cited in Keutzer, Lichtenstein, and Mees, 1968) disclosed that 56% of those who had quit smoking relapsed. Interpretation of treatment value is rendered more difficult by the fact that over 96% of those who participated suffered from serious physical ailments attributable at least in part to their smoking habit.

Plakun, Ambrus, Bross, Graham, Levin, and Ross (1966) carried out a

series of eight two-week programs with a format similar to Ejrup's. Volunteers heard an initial lecture on the health hazards of smoking and a discussion of the medical regimen they were to follow. Approximately half the subjects were then given a week's supply of lobeline sulphate in tablet and lozenge form. Amphetamine capsules were also provided to counteract increased feelings of hunger. Remaining subjects received placebo tablets and capsules as a control. Both subgroups met together the next week to discuss their experiences, progress, and problems and to offer and obtain support. Reports presented by participants at the end of their programs revealed a difference that was statistically significant, but of little real importance. 66% of the 'pure' treatment subjects discontinued smoking. 50% of the treatment-placebo group in like manner stopped. An attempted post treatment assessment was a partial failure. 122 of 313 subjects returned the follow-up questionnaire. Omitting group specification, the authors reported that only 42% of initially successful participants were still abstinent.

Plakun et al viewed these first eight clinics as pilot investigations and subsequently completed an additional 19 programs with modified formats (1966, 1967). Program length was extended from two to four weeks and greater emphasis was given to the other components of the clinic model, its educational and group supportive aspects. Various medications were also provided. Average end of treatment cessation rate for the new programs was 34%. Six month follow-ups showed a decline in this figure to 16%.

The trend toward heavier reliance upon educative and peer supportive functions of short-term clinics was given further prominence through the work of MacFarland (1965). In an attempt to create a totally involving

situation for participants, this investigator developed a Five Day Plan that included daily group meetings composed of lectures, demonstrations, practical suggestions for avoiding smoking, and group discussion. Each group member was assigned a 'buddy' upon whom he could rely for support outside the meetings. In addition those in attendance were presented with a physical fitness regimen that had the actual effect of restructuring the subjects' daily habits and of providing a number of discrete substitute behaviors that could be invoked when the urge to smoke was felt. End of clinic data for over 2,000 participants placed the success or cessation of smoking rate between 70% and 80%. Once again, however, follow-up surveys were discouraging. Only 34% of those who stopped smoking were abstinent after three months and only 15% to 20% were not smoking after a year.

Thompson and Wilson (1966) conducted a similar five day clinic with one past treatment modification. Follow-up assessment was carried out for all participants (298) ten weeks after program conclusion. Additionally a matched subgroup of 50 subjects was monitored weekly for supportive and informational purposes. 73% of all volunteers reported they had ceased smoking by the last day of the clinic. At ten weeks this figure had dropped to 29% for the main body and 33% for the monitored subgroup. A second survey of successful subjects from both groups was made after a ten month interval. There was no difference between groups. 16% of all volunteers contacted were not smoking.

Taking note of the hope to despair pattern that characterized the outcome and follow-up data of previous clinics, Frederickson (1967) devised a triphasic program format that was all but open-ended. Volunteers heard a lecture that stressed the advantages of non-smoking and outlined the

positive, supportive aspects of the clinic format. Those who chose to participate were then instructed to spend a week in intense observation of their own smoking patterns, noting frequency, time, place, activity, and feelings associated with the behavior. Subjects were also asked to compile a list of subjectively important reasons for breaking their cigarette habits.

The second phase of the program began at the week's end. Participants were randomly assigned to small groups of 10 to 15, each group moderated by two ex-smoking volunteers. Groups were scheduled to meet for a period of two months. The structure of each meeting was standardized. Members reported on their progress and problem areas, receiving consultation and advice from their peers. Subjects then formed four-person teams to decide on individual goals and procedures for the next week. Finally the members reconvened for presentation and discussion of the separate strategies.

At the end of eight weeks, individuals were transferred to new groups which served as supportive milieus for the consolidation and maintenance of gains. These last met for periods of from five to six months with the intervals between gatherings gradually lengthening. Smoking rate data collected at the conclusion of phase two showed this stage of treatment successful. 53% of the participants reported they discontinued smoking, 23% reduced consumption by three quarters, and 15% cut their smoking rates by half. Results from the consolidation phase were also indicative of success. At the end of that stage, 65% of those attending were not smoking, 15% were maintaining consumption at one quarter of baseline, and 5% were smoking only half of their original average. No follow-up assessment was reported. Subject attrition rate for the active three phases of the program

was approximately 33%. About one-half of those present at the introductory lecture chose not to participate.

Rationale of the educative or clinic approach to smoking modification was broader than that of its pharmacological counterpart. Like the latter, it focused upon immediate cessation as its area of treatment. It acknowledged, too, that the immediate process of withdrawal was physiologically and psychologically difficult. But it also posited that decision-making and motivational factors operative in the situation were of equal importance. Though one factor was often stressed over the others, each of the programs reviewed sought to design treatment components that would be effective with the three: physical and psychological reactions to discontinuance, rational decision to quit, and motivation to adhere to decision.

The most obvious criticism of studies employing a clinic paradigm derives from the applied orientation of their investigators. Almost all the efforts lack the controls necessary for an accurate evaluation of treatment procedures. Assessment is further complicated by the use of different criteria for success (complete termination, percentage reduction, consideration of oneself as a smoker/non-smoker plus abstinence for a stated period). The use of chronically ill and, presumably, highly motivated patients as subjects (Ejrup) clouds any interpretation of treatment effectiveness. Though precise evaluation is not possible, it does seem that short-term intensive clinics can aid with the initial process of giving up smoking. With the exception of Frederickson, however, their long range effect appears negligible.

Hypnotic Techniques

Hypnosis has been used in the treatment of smoking habituation almost as long as has lobeline sulphate (Johnston and Donoghue, 1971). Yet the literature concerning its effectiveness is sparse, and what there is is often anecdotal, lacking in controlled design and systematic investigation, Studies reported here have been limited to those containing some form of outcome data.

Von Dedenroth (1964a, 1964b, 1968) developed a program of graduated smoking reduction in which the goals and procedures of each step were discussed prior to the induction of trance, then repeated and reinforced under hypnosis. Subjects were seen for five sessions over a 21 day period, the final session scheduled for 'Q' or 'Quitting Day'. The incremental design of the program was intended to minimize the difficulties of withdrawal and enhance self-confidence through a process of cumulative success. Without specifying the nature of his data, the author claimed a success rate of 94 % with 1,000 patients.

In a somewhat more precisely conducted and reported investigation, Moses (1964) employed hypnotic suggestion to reinforce patients' decision to quit smoking. A single interview was structured to explore the subject's feelings about his smoking habit, to explain to him the social and psychological pressures that originally caused him to smoke, and to detail the harmful physiological effects of continuous cigarette usage. A brief discussion of affective factors maintaining the behavior followed, with stress placed upon the importance of the individual's own decision to stop. When the subject had affirmed this decision, a hypnotic trance was induced and the suggestion made that the individual would lose all desire,

need, and taste for cigarettes. The suggestion was supported by repetition of both the person's and the investigator's reasons for discontinuance. Follow-up data obtained from 50 of 75 subjects showed 18% abstinent, 56% relapsed after various lengths of time, and 26% with no change in smoking pattern.

Two studies cited by Johnston and Donoghue attempted to evaluate hypnotic techniques within controlled treatment-comparison designs. Edwards (1964) used two types of post-hypnotic suggestion; the first stressing the greater pleasure and sense of accomplishment in terminating smoking, the second recommending the reversal of meaning for specific stimulus cues formerly associated with smoking. A group of subjects given lobeline sulphate served as comparison. Both groups participated in four treatment sessions. End of treatment results showed no difference between the two conditions. 30% of all participants discontinued smoking, 40% reduced consumption to some degree, and 30% displayed no change in smoking levels. A high attrition rate precluded follow-up. The author suggested that the effect of either treatment was no greater than that which could be obtained under a placebo setting. Graff, Hammett, Bash, Fackler, Yanovsky, and Goldman (1966) compared a post-hypnotic suggestion procedure, a group therapy condition, and two drug regimens, lobeline sulphate and chlordizepoxide. Of 135 initial participants, only 24 were available for a three-month post treatment assessment. Hypnosis subjects showed the greatest improvement. 88% of their number were abstinent compared with 44% for those in therapy, and 22% for those administered chlordizepoxide. All lobeline subjects contacted were smoking. Obviously the overwhelming attrition rate complicated interpretation of these results.

It is difficult to draw definite conclusions from a review as brief as the one presented here. Nevertheless some statements can be made concerning the presuppositions underlying the use of hypnosis in the treatment of smoking habituation and the effectiveness of the attempt. There appears to be no one model or rationale that stands as a theoretical framework for research efforts in this area. Rather, investigators developed combinations of treatment procedures, relying upon analysis of smoking behavior (Von Dedenroth), social and psychological theories (Moses), or some amalgam of the two. Within these highly individualized paradigms, hypnosis was assigned the role of a treatment technique. Experimenters made use of the phenomenon of suggestion in support of other procedures and of the individual's own commitment to quit.

The presence of such a trend in the research makes evaluation especially difficult. Treatment methodologies were so identified with individual experimenters that there was no attempt to replicate or systematically investigate initially promising findings. Design of individual efforts themselves lacked sufficient control conditions, leaving unanswered the question of possible confounding of the effect of suggestability with that of other procedures and with the motivational level of subjects. This last is of particular importance for some studies (principally Von Dedenroth) whose subject populations contained a large proportion of individuals suffering from respiratory and cardiovascular ailments. Though there is some support for the effectiveness of hypnosis in all but one of the studies reviewed (Edwards excepted), lack of specification in reporting, omission of follow-up data, and the flaws outlined above render any such evidence tentative and inconclusive.

Psychotherapeutic Model

Studies which designate some form of therapy or counselling as a single or main treatment procedure constitute still another approach to the problem of smoking. Though depth and orientation of therapeutic treatment vary across investigations, their general purpose is a common one: supportive exploration of the psychological factors involved in smoking and possible withdrawal.

Lawton (1962) used a problem-centered non-directive therapeutic paradigm with a group of 19 confirmed smokers. Participants were required to meet for nine sessions over a six week period. Data obtained at the final session showed that 71% of those completing treatment were no longer smoking (two members dropped out of therapy earlier). Follow-up surveys were carried out at three months and again at 18 months. 47% of the group participants were still not smoking at the early follow-up. This figure declined to 18% at the time of the second assessment. The lack of control groups is partially explained by the difficulty the author experienced in obtaining subjects. Despite a fairly extensive publicity campaign, it took several months for Lawton to gather a sufficient number of volunteers for the lone group.

Mausner (1966) employed a more probing, person-centered therapeutic approach with two small groups of female college students (total N=17). Seven meetings were scheduled over a four week period. Additionally a third group of volunteers who were unable to attend sessions served as controls. A within treatment attrition rate of 75% forced merger of the two experimental groups. End of treatment data revealed a slight reduction in smoking frequency for group members, regardless of drop-out status.

A ten week follow-up, however, indicated no difference between treatment and control subjects.

In a test of treatment effectiveness, Lawton (1967) contrasted an educational group format (lecture followed by question and answer period), a group therapy approach identical to his original one (1962), a combination of the above two, and an intensive 'massed trials' therapy approach that required group meetings on consecutive days. A serial order of conducting the groups allowed two to function in control capacities prior to beginning active treatment. Members of the first were told they were on a waiting list. Participants in the second were told the same, but were urged to quit smoking on their own resources. Though all groups did significantly better than controls in reducing their smoking frequency, results disclosed no significant differences among treatment conditions themselves. 26% of experimental subjects were abstinent one week after treatment, this figure deteriorating to 17% after seven months. A high in-treatment attrition rate was again noted. The use of the same subjects in control and treatment conditions raises some question regarding the validity of the results.

As a part of a series of studies concerned with smoking patterns, Schwartz and Dubitzky (1967) compared individual and group counselling formats with a drug condition (tranquilizer) and with controls. 252 subjects were randomly assigned to one of seven conditions: tranquilizer regimen, placebo treatment, individual counselling and tranquilizer, individual counselling and placebo, group counselling and tranquilizer, group counselling and placebo, control groups, Treatment period for all experimental subjects was of eight weeks duration. Counselling conditions

met weekly. Data collected five days after the conclusion of the treatment phase disclosed that 33% of participants across all experimental conditions had stopped smoking. Counselling conditions, whether individual or group, had the largest percentage of non-smokers (50%). Individual and group counselling also had the highest reduction rates, 86% and 78% respectively. Placebo subjects in either group performed better than those receiving tranquilizers. Post treatment assessment conducted after a 12 month interval revealed the familiar pattern of recidivism. 20% of all subjects still refrained from smoking; 50% maintained some level of reduction. Counselling conditions were again superior to drug treatment.

Other investigations employing therapy or counselling either alone (Graff et al; Koenig & Masters, 1965; Ober, 1969) or in combination with different treatment procedures (Bachman, 1964) reported a pattern of results similar to those recorded here: moderately successful end of treatment cessation and reduction rates, and a gradual erosion of gains over time. In general, studies which adopt a psychotherapeutic approach to the problem of smoking assume that the behavior is maintained by psychological factors or needs important to the person and that the possibility of withdrawal creates a conflict for the individual. The goal of treatment is the exploration of these underlying factors and the nature of the conflict in order to clarify the context of the smoker's decision to stop or continue. The supportive milieu provided by the individual therapist or group is intended to compliment and reinforce the subject's own desire to stop smoking.

With the possible exception of Schwartz and Dubitzky, the studies reviewed here show the same pattern of poor control manifested in the

research of other approaches. In contrast to the other investigations, however, the major cause of this lack does not appear to lie with design or experimenter inadequacy. Rather the treatment procedure itself seems at fault. The commitment in time and effort required by such a lengthy treatment format appears to be too great for many smokers. All of the studies except Schwartz and Dubitzky noted high pre-treatment reluctance and within treatment attrition, both of which forced investigators to drop controls or manipulate their designs. The difficulties attendant to the psychotherapeutic form of treatment have so far rendered both its accurate evaluation and implementation impractical.

Behavior Modification Procedures

Reports concerning behavior modification techniques make up the largest single segment of the anti-smoking literature. The variety of procedures that have been developed is impressive, a testimony both to the resistance of the behavior studied and to the innovative abilities of concerned experimentalists. For purposes of classification, studies have been grouped under three headings: (A) aversive techniques, (B) de-conditioning or counterconditioning procedures, and (C) contractual management programs.

A. Aversive techniques. Electric shock (McGuire and Vallance, 1964; Powell and Azrin, 1968; Carlin and Armstrong, 1968; Steffy, Meichenbaum, and Best, 1970), a forced stream of concentrated cigarette smoke (Franks, Fried, and Ashem, 1966; Schmahl, Lichtenstein, and Harris, 1972; Lichtenstein, Harris, Birchler, Wahl, and Schmahl, 1973) smoking to satiation (Resnick, 1968; Claiborn, Lewis, and Humble, 1972; Lando, 1975), and covert sensitization (Wagner and Bragg, 1970) have been paired

with either the act of smoking or the desire to smoke in classical conditioning paradigms. Initial tests of the forced stream procedure and satiation technique were encouraging. The original results, however, have not been consistently replicated by subsequent experimenters. Overall outcome pattern for the remaining studies is a depressingly familiar one. Generally reports describe a high end of treatment cessation or reduction rate for those completing programs and a gradual return to pre-treatment levels over time.

B. Deconditioning and Counterconditioning. Deconditioning and counterconditioning procedures have also been used to alter the stimulus-response bonds of smoking behavior. Guttman and Marston (1967) and Sachs, Bean, and Morrow (1970) asked subjects to rank everyday smoking situations according to the intensity of the need to smoke during them. A program of graduated reduction was imposed, requiring subjects to abstain from smoking in successively more difficult or needy situations. In like manner, coverant control techniques (Keutzer, 1968, Lichtenstein & Keutzer, 1969, Lawson and May, 1970) and systematic desensitization programs (Koenig and Masters, 1965; Pyke, Mc K Agnew, and Kopperud, 1966; Wagner and Bragg, 1970) have been employed to provide subjects with either opposing or alternate responses to stimuli which previously served as smoking cues. An assessment of the effectiveness of these methods shows that present counterconditioning techniques are of minimal lasting value when applied in smoking reduction contexts.

C. Contractual management. Manipulation of stimuli within the individual's social environment constitutes a third behavior modification approach to the problem of smoking. Studies using this strategy ignore

the discrete stimulus-response bonds that maintain smoking behavior. Instead they treat the process of smoking as a behavior unit that will be abandoned in preference for a more valued reinforcement made contingent upon its sacrifice. Elliot and Tighe (1967) made use of personal invonvenience in establishing smoking termination contracts with subjects. Default in abstention meant the loss of all or a portion of a fifty dollar deposit. As a part of an anti-smoking program for a married couple in treatment, Tooley and Pratt (1967) encouraged a reciprocal contract in with social approval and rewarding behaviors were contingent upon cigarette abstinence. Nehemkis (as cited in Lichtenstein and Keutzer, 1971) employed a similar contractual agreement with eight married couples. Though subject response during treatment was encouraging for all procedures, long term effects paralleled the discouraging results of other modification techniques reviewed.

The behavior modification paradigms reviewed here place cigarette habituation within the context of learning theory. Smoking is defined as a conditioned response maintained by specific stimuli, external and internal. Accordingly treatment techniques derived from these orientations approach cigarette smoking as a discrete behavioral process to be interrupted either by immediate or remote substitution of other responses. The success of the majority of procedures attempted to date has been limited and unconvincing.

In general studies employing behavior modification techniques appear better designed and controlled than those of other models. To some extent, this is true. However, behavioral investigators often seem unaware of the confounding effects of instructional set, experimenter-

subject interaction, subject expectation, and similar unspecified variables. Often, too, designs are confounded by the inclusion of auxillary techniques intended to supplement main procedures. Most of the studies reviewed here are marred by one or more of these flaws.

A review of the major treatment approaches to the problem of smoking shows them to be largely ineffective and inconclusive. Regardless of orientation, the majority of the studies discussed share a similar participant response pattern: (1) a within program subject attrition rate correlated with length and aversiveness of treatment; (2) an initial decrease in smoking frequency as an immediate outcome; and (3) a gradual return to baseline consumption following treatment. Additionally, investigations share a number of design and control imprecisions.

Cognitive-Attitude Change Approach

Recently Dr. Peter Suedfeld of the University of British Columbia employed a sensory deprivation condition in conjunction with taped messages to develop a promising attitude change approach to the problem of chronic smoking (Suedfeld, Landon, Pargament, and Epstein, 1972; Suedfeld and Ikard, 1973; Suedfeld, 1973; Suedfeld and Ikard, 1974). Sensory deprivation has long been known to effect sensory and cognitive changes in individuals undergoing the experience (Zubek, 1969). The current attitude change technique is based upon the original impetus for research in the deprivation area, the heightening effects of sensory deprivation upon suggestibility (Scott, Bexton, Heron, and Doane, 1959; Zubek, 1969). Suedfeld has conducted two full investigations of the effects upon smoking of attitude manipulation in a restricted environment.

In the first experiment (Suedfeld et al, 1972) forty male under-

graduate smokers were randomly assigned to one of four conditions: a 24 hour period of sensory deprivation with message; a day long period of sensory deprivation alone; a non-confined message condition; and a non-confined, no-message situation. A pre-treatment questionnaire included a request for an estimate of the number of cigarettes consumed on the day prior to experimental treatment. A similar request during a follow-up interview furnished data for comparison. Subjects were not aware of the smoking reduction purpose of the experiment. None participated with the intention of quitting.

After 23½ hours of the experiment, message conditions heard a three minute tape referring to the physical hazards of cigarette smoking. All groups were released shortly after this for questionnaire evaluation of possible opinion change.

Results of a three-month follow-up disclosed a significant main effect for sensory deprivation conditions in comparison to the two non-confined groups. Both message and no-message deprivation groups estimated a decrease in smoking consumption of 38%. The message only group decreased by 25%. The no-message, non-confined group minimally increased smoking frequency by 2.4%. The authors attributed the study's results to the disruptive effect of the sensory deprivation upon complex cognitive behavior, with subsequent occurrence of belief instability and heightened susceptibility toward alternate beliefs or attitudes.

In a second experiment (Suedfeld and Ikard, 1974) 80 male and female subjects were selected as a representative cross-section of the community. A similar 2 x 2 design was used, with subjects randomly assigned to one of four conditions: a sensory deprivation message

condition of 24 hours duration; a like period of sensory deprivation alone; a partially-confined message condition, with subjects asked to spend a day at home near a phone; a no confinement, no message group informed that treatment facilities were not currently available and encouraged to try other techniques. In contrast to the previous investigation, subjects were aware of the general purpose of the study and their participation was indicative of some degree of motivation to stop smoking.

Both message content and frequency of presentation were altered in an attempt to increase effectiveness. Approximately ten messages were pre-taped. The content and format of three of these were based upon a desensitization paradigm, the subject being asked to imagine himself in an emotional situation that led him to crave a cigarette and then encouraged to substitute a relaxation exercise for the imagined act of smoking. Anger, anxiety, and joy were the emotional tones of the three situations described. Five additional short messages were designed as reinforcements, congratulating the subjects for stated elapsed time without smoking (6, 10, 15, 20, and 23 hours). Administration schedule allowed for approximately one and a half half hours between message presentations.

Participant's smoking rates were tracked at monthly intervals for one year. At the end of twelve months, both deprivation conditions had significantly decreased their smoking rates: the deprivation and message group by 45%, the deprivation alone group by 52%. The two control groups did not differ significantly. The message alone group reduced daily consumption by 17%, the no treatment group by 15%. Results of the study were attributed both to the cognitive disorganizing capacities of the deprivation condition and to the possible pheonomenon of 'painless'

withdrawal occasioned by the deprivation-abstention period.

Results cited in these two studies were comparable to those obtained by the most successful reports reviewed. Moreover, their post treatment stability was impressive. One intriguing factor emerged from these investigations. In both studies, the sensory deprivation alone condition matched or exceeded the deprivation with message condition in effectiveness. Though initial interpretations of the results attended to the apparent efficacy of the deprivation attitude-change combination, deprivation itself seemed to be the variable of dominant effect. Additional research appeared necessary to determine both the deprivation factors responsible for the change and the manner in which they operate.

Further, achievement of a full sensory deprivation condition requires extensive facilities and equipment. Should the deprivation procedure continue to prove its effectiveness, its implementation in an applied setting would be extremely difficult. Visual deprivation, a more easily induced and controlled condition, has been shown to produce many of the same sensory and cognitive alterations found with full sensory restriction (Doane, Mahatoo, Heron, and Scott, 1959; Zubek, 1969). It appeared to be of both theoretical and practical importance to investigate the possible effectiveness of this unimodal deprivation state within an experimental paradigm similar to Suedfeld's. Accordingly, an experiment was proposed to study the effects of a 24 hour period of visual deprivation upon the subsequent smoking behavior of subjects.

Several modifications to Suedfeld's original design matrix were incorporated into the present study. By definition sensory deprivation situations included cigarette deprivation as a co-variable. Subsequent

experimental results were not clear of a possible confounding or interaction of effects for the two variables. To control for this possibility, cigarette deprivation was manipulated as a second independent variable in the present experiment. Secondly, control subjects of the initial investigations were exposed to only partial confinement or to no confinement at all. To equate all groups of the proposed study across the variables of simple environmental restriction and degree of participation, a confinement component was included in both control conditions. The third modification concerned the method of measurement for the dependent variable, subject's smoking rates. Suedfeld et al employed participant estimation of pre-post daily consumption to evaluate treatment effectiveness. It was felt that more reliable and valid data could be obtained through the process of self-monitoring. As a result, five-day pre and post-treatment periods of self-monitoring were used to measure possible alterations in the dependent variable. The finalized design matrix of the study was a 2 x 2 x 5 for visual deprivation, cigarette deprivation, and self-monitor trials. An outline of the matrix is shown in Figure 1.

Figure 1
Design Matrix

	Visual Deprivation				No Visual Deprivation			
	No Smoking Permitted		Smoking Permitted		No Smoking Permitted		Smoking Permitted	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Days of measurement 1								
2								
3								
4								
5								

The results obtained by Suedfeld and the demonstrated similarity between visual and full sensory deprivation on other measures led the experimenter to hypothesize that a combined visual and smoking deprivation condition would significantly alter participants' later smoking behavior. The same rationale suggested a second hypothesis. It was expected that a visual deprivation, smoking permitted condition would also exert a significant influence upon post treatment smoking. Though the two control conditions, no visual deprivation (confinement) with no smoking permitted and no visual deprivation (confinement) with smoking permitted, share some of the components of a sensory deprivation state (social isolation, reduced stimulus input), their potential for impact was considered negligible and neither condition was expected to have a significant effect upon subsequent smoking levels.

CHAPTER II

EXPERIMENTAL METHOD

Subjects

48 male volunteers were recruited through newspaper advertisements and through announcements posted on the campus of the University of Manitoba (see Appendices 1 and 2). Public notices specified a subject age range of 18-26. However, no individual who exceeded the upper limit was rejected for the experiment. Thus actual participant age range was from 18 to 39, with a mean age of 25.8 years. All volunteers had smoked at least 20 cigarettes a day for over one year (mean number of years smoking, 10.1, range 1.5-25 years) and all had expressed a desire to quit. Each subject received an honorarium of fifteen dollars for his participation.

Experimental Setting

Participants were randomly assigned to one of four conditions: visual deprivation with smoking deprivation; visual deprivation with smoking permitted; no visual deprivation (confinement) and smoking deprivation; no visual deprivation with smoking permitted.

All participants were required to spend a 24 hour period in a spacious (14x12), windowless room, comfortably equipped with a desk, chair, radio, and bed. Simple meals and snacks were provided at regular intervals. Subjects were free to move about in the room, but were permitted to leave it only for brief trips to nearby toilet facilities. Individuals in all conditions were monitored hourly by an experimenter located in an adjoining room.

Subjects assigned to visual deprivation conditions wore a black,

opaque mask that covered the facial area from forehead to below the nose. Checks to insure against light leakage were made at monitor points and prior to toilet visits. In addition the room was maintained in a state of darkness. Subjects in both smoking permitted situations had matches for their cigarettes supplied by an experimenter on request. This last procedure was intended to serve as a safety precaution in the visual deprivation condition. Its extension to the no deprivation group controlled for any possible reluctance to smoke induced by the immediate absence of matches.

Procedure

Volunteers responding to the advertisements contacted the experimenters by phone to schedule a brief pre-treatment interview. The purpose of the meeting was to obtain relevant biographical data (see Appendix 3 for biographical questionnaire) and to acquaint potential subjects with the general conditions of the experiment. They were also informed of the constant presence of an experimenter and of their right to terminate the experimental period at any time. Presentation of information was standardized for each interview. During this and subsequent instructional phases of the investigation, experimenters were careful to stress the empirical nature of the study and to maintain a friendly but neutral attitude toward subjects. Text of the preliminary instructions is shown below.

Preliminary Interview Instructions

> The purpose of this interview is to give you some further information about the investigation and to let us find out something about you. Later in the interview I will ask you to fill out a short questionnaire concerned simply with broad

biographical information.

As the advertisement states, we are interested in studying the effects of a person's environment upon his smoking behavior. Smokers often feel a stronger desire to smoke in some situations rather than in others. These situations can be social, physical, or task-structured. What we are attempting to look at is the affect of a 24-hour period in a regulated environment upon an individual's later smoking pattern. If you decide to participate in this investigation, you will spend a day in a quiet room, furnished with a bed, chair, and radio. Meals will be provided at regular hours. An 8-hour period has been set aside for sleep. Though you will be alone in the room, you will be able to communicate either with myself or the other experimenter. Some types of environmental stimuli will be regulated by us. Upon completion of the 24-hour period, we will ask you to fill out a second questionnaire relating to your experience. You will receive the $15.00 remuneration at that time. Is all of this clear so far?

(Biographical Data Sheet Administered Here)

I will now give you a booklet with the first five pages numbered. Starting with your first cigarette tomorrow morning and throughout the next five days, each time you smoke a cigarette I want you to record it with a check on the page appropriate to the day. Please make a check <u>each time you smoke</u>. When you return here for the 24-hour session, it is <u>important</u> that you

bring this booklet with you.

(Experimental session was then scheduled six days from the interview date. A reminder card with date, time and room number was given to the subject.)

Finally, to help us in insuring that all participants in this investigation receive exactly the same information regarding it, we would ask you not to speak to any one of your friends or acquaintances about either the contents of this interview or your experiences in the experimental situation. O.K.

Individuals agreeing to participate in the study[1] were asked to self-monitor their cigarette consumption daily for five consecutive days prior to the experimental session. Pocket-size data booklets were provided to facilitate recording.

On the morning of the experiment, subjects presented themselves at the door of the investigator's control room. Participants were shown both the control room and the room in which they would spend the day. A second

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[1] An implicit process of selection was operative during these early stages of the experiment. Successively, individuals interested in breaking their smoking habits were required to (1) phone to schedule an appointment, (2) meet with the experimenter at the University for the preliminary interview, (3) perform the mildly annoying task of recording their smoking frequency daily over a week and (4) interrupt their lives and normal routines for one full day. Successful completion of each step can be taken as an indication of individual motivation to quit.

During this preliminary screening process approximately 120 individuals phoned for information and appointments, 78 presented themselves for interviews, and 52 agreed to participate. 4 subjects terminated the experimental session prematurely, 2 from visual deprivation conditions and 2 from control situations.

set of instructions was then read repeating the general research conditions and including specification of assigned experimental groups. With the exception of the phrase or phrases denoting the specific form of treatment, instructional wording was uniform. Text of the standardized format was as follows. (For complete instructions, see Appendices 4-7)

> As you know this experiment is concerned with the role of environmental variables in smoking behavior. One thing we wish to determine is if .....(specification of experimental condition) .... will help you reduce your subsequent smoking. We wish to see if we can give you a 'head start' on quitting by ...(repetition of condition).... . During this period we wish to make you as comfortable as possible. We have provided a radio for your use. Apart from meal or bed time, you may structure your time as you wish. Someone will always be available if you require anything. Any questions?

Participants were also asked to read and sign a Subject Participation Agreement (see Appendices 8-9) stating the terms of the study and the rights of subjects. Following this, the actual experimental session was begun. To control for the effects of any possible interaction, experimenters alternated their monitor role every 12 hours.

At the conclusion of the 24 hour period, subjects were administered a questionnaire concerned with their experience of the experimental session (see Appendix 10). At this time, too, data booklets were returned and an

appointment made for a one-month follow-up interview. Participant honorariums were presented at this time.

Seven days before their next scheduled interviews, subjects were contacted by phone and asked to monitor their cigarette consumption for a second five-day period. 45 of the 48 subjects were reached. Two participants had moved, and a third was suffering from a severe cold that drastically depressed his smoking level.

Experimental Analyses

Daily smoking totals of the pre-treatment monitor period and of the one month post treatment follow-up served as data for evaluative analyses. An analysis of variance for repeated measures was planned for the pre-treatment scores to determine the presence of a possible initial bias among the four groups. As suggested by Huck and MacLean (1975), an analysis of covariance for repeated measures was proposed as the main statistical tool for evaluation of pre-post differences. Finally, in order to compare the results of the present study with those obtained by Suedfeld, a percentage gain-score analysis of variance was proposed.

CHAPTER III

RESULTS

The analysis of variance performed on pre-treatment measures of the dependent variable revealed a significant difference in initial smoking levels among the four groups ($F=4.11$, $df= 1/41$, $p < .05$). Subjects assigned to both smoking permitted conditions averaged significantly fewer cigarettes during the first monitor period than did their counterparts in cigarette deprivation situations. A summary of the results for the preliminary analysis is presented in Table I. Cell means for pre-treatment measures are shown in Table II.

Pre-post data was then submitted to an analysis of covariance. A test of the homogeneity of regression assumption proved it tenable ($F=1.27$, $df= 3/37$, $p > .25$). Results of the analysis indicated no significant differences among groups for either visual deprivation ($F=1.27$, $df= 1/40$, $p < .27$) or cigarette deprivation ($F=.331$, $df= 1/40$, $p < .57$). The interaction of the two independent variables was also non-significant ($F=.481$, $df = 1/40$, $p < .49$). Additionally, results disclosed no significant effect for self-monitoring ($F=.238$, $df= 4/164$, $p < .92$), the interaction of monitoring with visual deprivation ($F=.621$, $df= 4/164$, $p < .65$), with cigarette deprivation ($F=.287$, $df= 4/164$, $p < .89$) or of monitoring with visual deprivation and cigarette deprivation ($F=1.128$, $df= 4/164$, $p < .35$). A summary of the results is contained in Table III. Cell means adjusted for initial differences in smoking levels are presented in Table IV.

As previously proposed, a percentage gain-score analysis of variance was performed for purposes of comparison with Suedfeld. Once again, no

significant differences were noted for visual deprivation ($F=1.44$, $df= 1/41$, $p < .24$), cigarette deprivation ($F=1.27$, $df= 1/41$, $p < .27$), or self-monitoring ($F=.301$, $df= 4/164$, $p < .88$). Interactions of visual and smoking deprivations ($F=.390$, $df= 1/41$, $p < .54$), self-monitoring and visual deprivation ($F= .547$, $df= 4/164$, $p < .70$), monitoring with cigarette deprivation ($F=.449$, $df= 4/164$, $p < .77$) and of self-monitoring with both visual deprivation and cigarette deprivation ($F=.820$, $df= 4/164$, $p < .51$) were, in like manner, non-significant. However, the analysis revealed a significant decrease (25%) in post treatment smoking levels for all subjects, regardless of condition ($F=25.67$, $df= 1/41$, $p < .01$). Table V contains the results of the gain-score analysis. Percentage gain cell means are shown in Table VI.

Qualitative data was obtained from the post treatment questionnaire (Appendix 10). This last was composed of questions pertaining to participants' subjective experience of the experimental session (i.e., physical discomfort, psychological comfort-discomfort, cognitive or sensory effects, need to smoke during the period, and prediction of effect of treatment). The majority of participants in three of the conditions (visual deprivation with no smoking permitted, visual deprivation with smoking permitted, and no visual deprivation - confinement - with no smoking permitted) described the experience as either tension-free or relaxing. Thirty-three individuals across all conditions reported a lessened general desire to smoke during the day. The same number predicted that the experimental period would have a beneficial affect upon their smoking habit. One group, no treatment confinement, recorded a high incidence of feelings of boredom, tension, and anxiety.

As could be expected from previous studies (Zubek, 1969), approximately

half of the subjects in visual deprivation conditions reported cognitive or sensory distrubances ranging from hypnagogic imagery to mild hallucinations. Control subjects recorded no similar hallucinatory activity. Six suffered a degree of mental dullness or inability to concentrate. Two of these recalled experiencing hypnagogic imagery.

Table 1

Summary Table for Preliminary Analysis of Variance

Source	Sum of Squares	df	Mean Square	F	Prob. F Exceeded
Mean	127,085.187	1	127,085.187	627.042	0.0
Deprivation	113.340	1	113.340	0.559	0.459
Smoking	833.547	1	833.547	4.112	0.049
Interaction	39.078	1	39.078	0.193	0.663
Error	8,309.625	41	202.674		
Self-Monitoring	64.281	4	16.070	0.385	0.819
Monitor x Deprivation	99.641	4	24.910	0.597	0.666
Monitor x Smoking	55.949	4	13.987	0.335	0.854
Monitor x Deprivation x Smoking	260.559	4	65.140	1.560	0.187
Error	6,847.543	164	41.753		

Table 2

Cell Means for Preliminary Analysis of Variance

	Visual Deprivation-Smoking Deprivation	Visual Deprivation-Smoking Permitted	No Visual Deprivation-Smoking Deprivation	No Visual Deprivation-Smoking Permitted	Marginal
Day 1	25.454	20.636	24.909	22.250	23.289
Day 2	24.000	19.545	26.636	24.083	23.578
Day 3	25.091	21.455	25.091	22.917	23.622
Day 4	23.545	23.818	29.455	22.500	24.778
Day 5	24.818	22.364	28.091	19.000	23.467
Marginal	24.581	21.563	26.836	22.149	23.746

Table 3

Summary Table for Analysis of Covariance

Source	Sum of Squares	df	Mean Square	F	Prob. F Exceeded
Mean	384.176	1	384.176	1.085	0.304
Deprivation	448.796	1	448.796	1.267	0.267
Smoking	117.070	1	117.070	0.331	0.567
Interaction	170.070	1	170.465	0.481	0.492
1 - ST Covariate	7980.105	1	7980.105	22.535	0.000
Error	14164.824	40	354.121		
Self-Monitoring	23.883	4	5.971	0.238	0.917
Monitor x Deprivation	62.430	4	15.607	0.621	0.648
Monitor x Smoking	28.797	4	7.199	0.287	0.886
Monitor x Deprivation x Smoking	113.290	4	28.322	1.128	0.345
Error	4119.394	164	25.118		

Table 4

Adjusted Cell Means for Analysis of Covariance

	Visual Deprivation-Smoking Deprivation	Visual Deprivation-Smoking Permitted	No Visual Deprivation-Smoking Deprivation	No Visual Deprivation-Smoking Permitted
Day 1	18.454	16.139	20.426	17.981
Day 2	18.817	13.957	17.608	20.398
Day 3	17.362	14.321	18.608	20.064
Day 4	17.090	14.321	21.244	19.231
Day 5	19.272	15.957	18.608	19.981

Table 5

Summary Table for Percentage-Gain Analysis of Variance

Source	Sum of Squares	Degrees of Freedom	Mean Square	F	Prob. F Exceeded
Mean	14.767	1	14.767	25.674	0.000
Deprivation	0.826	1	0.826	1.435	0.238
Smoking	0.731	1	0.731	1.271	0.266
Interaction	0.224	1	0.224	0.390	0.536
Error	23.582	41	0.575		
Self-Monitoring	0.063	4	0.016	0.301	0.877
Monitor x Deprivation	0.114	4	0.029	0.547	0.701
Monitor x Smoking	0.094	4	0.023	0.449	0.773
Monitor x Deprivation x Smoking	0.171	4	0.043	0.820	0.514
Error	8.567	164	0.052		

Table 6

Cell Means for Percentage Gain Analysis of Variance

	Visual Deprivation-Cigarette Deprivation	Visual Deprivation-Smoking Permitted	No Visual Deprivation-Smoking Deprivation	No Visual Deprivation-Smoking Permitted	Marginal
Day 1	-.2049	-.3631	-.1161	-.2980	-.2467
Day 2	-.2092	-.4575	-.2210	-.1992	-.2701
Day 3	-.2694	-.4372	-.2058	-.1877	-.2731
Day 4	-.2723	-.4303	-.0984	-.2369	-.2590
Day 5	-.1859	-.3401	-.2102	-.1843	-.2291
Marginal	-.2283	-.4056	-.1703	-.2212	-.2556

CHAPTER IV

DISCUSSION

The purpose of the present study was to determine the effect of a 24 hour period of visual deprivation upon subjects' smoking behavior. Three control groups were employed to gauge the effects of visual deprivation with smoking permitted, cigarette deprivation, and confinement (participation) with no treatment. It was hypothesized that the combined visual deprivation and cigarette deprivation condition would significantly alter participants' later smoking levels. In like manner, it was postulated that the visual deprivation with smoking permitted condition would have a significant effect upon subsequent cigarette consumption. Two control conditions were expected to have little influence upon subjects' ongoing smoking patterns.

The results of statistical analyses showed no significant effect attributable to any of the variables studied, either visual deprivation, cigarette deprivation, or their interaction. The analyses also failed to reveal any significant alterations in smoking rates due to self-monitoring or its interactions with visual or cigarette deprivation.

Qualitative data obtained from the post treatment questionnaire supported the statistical findings. Regardless of experimental condition, the majority of subjects recalled the experimental experience as relaxing or tension-free, and reported both a decreased general need to smoke and an expectation that the session would aid in reducing their future smoking rates. Two exceptions to this overall similarity of response were noted. Nine of twelve subjects in the no visual deprivation, smoking permitted condition described the 24 hour session as boring and tension-inducing.

Such a reaction can be attributed to their actual experimental situation, spending a day in a room with little to do and a package of cigarettes in plain sight. Of greater importance was the fact that over half of the participants in visual deprivation conditions experienced sensory or cognitive distortions. Only six control subjects reported any similar occurrences. These latter were minor, consisting of either 'feelings of dullness' or diminished capacity to concentrate. Despite the apparent effectiveness of the visual deprivation state manifested in this qualitative variation, there were no differences among the reports of the majority of subjects concerning the overall mood evoked by the experience (relaxation), the felt need to smoke, and the expectation or prediction of ultimate usefulness.

The results of the study disconfirmed the two major hypotheses. Visual deprivation, with or without cigarette deprivation, does not appear to be an effective therapeutic tool in the treatment of smoking behavior. Though this condition has been shown to mimic the effects of full sensory deprivation on a variety of perceptual and cognitive dimensions (Zubek, 1969), visual deprivation apparently differs from a full sensory state in its lack of effect upon smoking habituation. It may be that the attenuating effect on smoking found by Suedfeld is either exclusive to a complete sensory isolation state, or is only minimally shared by partial forms of deprivation. The possibility of differential effectiveness for various forms of deprivation on this behavioral dimension constitutes an area of future research.

An alternate more extensive and more tentative interpretation of the results rests upon the assumption that the demonstrated continuity of

effect between visual deprivation and full sensory deprivation was maintained in the former's application to the area of smoking behavior. The current study incorporated several design modifications (closer alignment of control and experimental situations, uniform instructional set, a more reliable measure of smoking rates, self-monitoring) intended to provide improved control of experimental conditions. It is possible that the negative results of the present investigation reflected more accurately the effectiveness of deprivation states upon smoking behavior than did the findings of Suedfeld's previous studies that employed both control situations less closely matched to main treatment conditions, and a less dependable measure of smoking levels, subject estimate. Again this avenue of explanation offers opportunities for further research.

The appearance of a general significant reduction in post-treatment smoking rates was both puzzling and difficult to explain. Its occurrence was not accounted for by any of the variables manipulated in the study. Reference to a recent investigation in the area of smoking modification provided a possible context for interpretation, however. McFall and Hammon (1971) analyzed end-of-treatment and follow-up data for a number of different smoking modification programs. The almost identical outcome pattern found for all studies led the authors to hypothesize that the results obtained were not a function of the specified modification procedures employed, but rather of the non-specific factors common to each investigation. Subject motivation, structure, and self-monitoring were factors designated as present in all experiments. In a subsequent investigation, the experimenters designed a no treatment "clinic program" with attendant motivation questionnaires and self-monitoring procedures. The end of treatment and

follow-up data obtained were highly similar to those of the studies initially analyzed.

The McFall and Hammen hypothesis of non-specific variables appears applicable to the general outcome of the present study. Motivation to quit, active participation in a structured experimental situation, and pre-post periods of self-monitoring were common to all conditions. It is possible that all three factors combined to create either a heightened awareness of smoking behavior or an expectation of treatment effectiveness. Either or both of these present across all groups could account for the general statistically significant but actually slight 25% reduction in smoking rates. The current investigation's lack of control groups designed to measure the influence of these factors renders the explanation tentative.

It would appear from the present study that visual deprivation is ineffective as a method of treatment for smoking habituation. Further, it would seem that the general significant outcome of the experiment was attributable to the activity of non-specific variables. These results, together with the close similarity in experimental setting and instructional set for all conditions of the current investigation strengthen the possibility, raised earlier, of an inaccurate assignment of efficacy to sensory deprivation in the studies of Suedfeld et al. Non-specific variables were present in both sensory deprivation experiments, but due to the lack of equation of control to treatment conditions, their presence was a differential one. Control subjects were exposed to partial confinement or no confinement at all and to different instructional sets. They differed widely from treatment subjects in experience of structure and required degree of participation. Though sensory deprivation may be the variable of main effect, additional

research is required to clarify its role and the possible influences of non-specific variables poorly controlled for in previous studies.

The implications of the present study regarding the importance of non-specific variables and their potential, confounding effects extend to all research efforts in the area of smoking modification. By the very nature of most studies, their inclusion is inevitable. Increased sensitivity to their presence and attention to design aspects that will facilitate identification of their effects are necessary to avoid undue complication in the search for a solution to what already is a difficult problem.

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APPENDIX 1

NEWSPAPER ADVERTISEMENT

Newspaper Advertisement

Approximately 48 male smokers who have averaged a pack a day or more for at least one year and who wish to quit are required for an investigation of the possible smoking-reducing effects of a 24 hour period in a regulated environment. Participants will spend the day in a quiet room, furnished with a radio, desk, chair, and bed. Meals will be provided. Volunteers will receive $15.00 as remuneration for thier time - in addition to possible help in quitting smoking. For further information or to schedule an appointment, contact Tim Hennessy or Dan Harper at 269-1036.

APPENDIX 2

CAMPUS ANNOUNCEMENT

Cigarette Smokers

Volunteers Wanted

Approximately 48 male smokers who have averaged a pack a day or more for at least one year and who wish to quit are required for an investigation of the possible smoking-reducing effects of a 24 hour period in a regulated environment.

Environmental cues such as where you are, what you are doing, and who you are with often influence smoking behavior. We wish to see if we can help smokers quit by removing them from their normal 'smoking setting' for a 24 hour 'time-out' period. Meals, a bed, desk, chair, and radio will be available.

Volunteers will receive $15.00 as remuneration for their time - in addition to possible help in quitting smoking.

Contact: Tim Hennessy
Dan Harper

At: 269-1036

APPENDIX 3

BIOGRAPHICAL DATA QUESTIONNAIRE

BIOGRAPHICAL DATA

Date _____

Name _____
First Name Initial

Address: _____
Street City Postal Zone

Permanent Address: _____
Street City Postal Zone

Local Phone _____ Student No. _____

Age _____ Marital Status _____

Social Insurance No. _____

Have you ever participated in an experiment like this before?

Yes _____ No _____

General Health Status (good, fair, etc.) _____

Do you have any medical problems? _____

_____

How long have you been smoking? _____

How many cigarettes per day do you now smoke? _____

How long have you smoked that number or approximately that number?

_____

Have you ever quit smoking?_____

How many times? _____

For how long during your most successful attempt? _____

What brand of cigarettes do you currently smoke? _____

How long have you smoked this brand? _____

APPENDIX 4

PRE TREATMENT INSTRUCTIONS

VISUAL DEPRIVATION WITH CIGARETTE DEPRIVATION

PRE TREATMENT INSTRUCTIONS

VISUAL DEPRIVATION WITH CIGARETTE DEPRIVATION

As you know this experiment is concerned with the role of environmental variables in smoking behavior. One thing we wish to determine is if 24 hours of a restricted environment (darkness) together with not smoking for that same period of time will help you reduce your subsequent smoking behavior. We wish to see if we can give you a "head start" on quitting by a 24 hour "time-out" from smoking in this restricted environment.

During this period we wish to make you as comfortable as possible. We have provided a radio for your use. Apart from meal or bed time, you may structure your time as you wish. Someone will always be available if you require anything.

Any questions?

RECORD QUESTIONS:

APPENDIX 5

PRE TREATMENT INSTRUCTIONS

VISUAL DEPRIVATION WITH SMOKING PERMITTED

PRE TREATMENT INSTRUCTIONS

VISUAL DEPRIVATION WITH SMOKING PERMITTED

As you know this experiment is concerned with the role of environmental variables in smoking. One thing which we wish to determine is if 24 hours of a restrictive environment (darkness) will help you to reduce your subsequent use of cigarettes. Smoking in the absence of visual cues we usually associate with it may not be as rewarding as when done in their presence. We wish to see if we can give you a "head start" on quitting by removing the visual cues for a 24 hour period.

During this period we wish you to be as comfortable as possible. You may smoke at will. We have provided a radio for your use. Apart from meal and bed times, you may structure your time as you wish. Someone will always be available to help you light your cigarettes and with anything else you may require.

Any questions?

RECORD QUESTIONS:

APPENDIX 6

PRE TREATMENT INSTRUCTIONS

NO VISUAL DEPRIVATION, SMOKING DEPRIVATION

PRE TREATMENT INSTRUCTIONS

NO VISUAL DEPRIVATION, SMOKING DEPRIVATION

As you know this experiment is concerned with the role of environmental variables in smoking behavior. One thing we wish to determine is if your removal from the social and physical situations in which you usually smoke, together with not smoking for a 24 hour period will help you reduce your subsequent smoking behavior. We wish to see if we can give you a "head start" on quitting by a 24 hour "time out" from smoking in this restricted environment.

Durind this period we wish you to be as comfortable as possible. We have provided a radio for your use. Apart from meal and bed times, you may structure your time as you wish. Someone will always be available if you require anything.

Any questions:

RECORD QUESTIONS:

APPENDIX 7

PRE TREATMENT INSTRUCTIONS

NO VISUAL DEPRIVATION, SMOKING PERMITTED

PRE TREATMENT INSTRUCTIONS

NO VISUAL DEPRIVATION, SMOKING PERMITTED

As you know this experiment is concerned with the role of environmental variables in smoking behavior. One thing which we wish to determine is if 24 hours of removal from the social and physical situations in which you usually smoke will help you to reduce your subsequent smoking. Smoking usually follows a pattern closely tied to immediate social and situational variables. We wish to see if we can give you a "head start" on quitting by removing you from your normal "smoking" environment for these next 24 hours.

During this period we wish to make you as comfortable as possible. You may smoke at will. We have provided a radio for your use. Apart from meal and bed times you may structure your time as you wish. Someone will always be available if your require anything.

Any questions?

RECORD QUESTIONS:

APPENDIX 8

SUBJECT PARTICIPATION AGREEMENT

VISUAL DEPRIVATION

SUBJECT PARTICIPATION AGREEMENT

VISUAL DEPRIVATION

I, the undersigned, hereby agree to participate in 24 hours of visual deprivation and to abide by all the conditions of the experiment. Furthermore, I promise not to remove, under any circumstances, the experimental mask, to confine my movements to the prescribed laboratory area, and to follow all instructions pertaining to the experiments given to me by the investigators. I understand that a violation of any of the above conditions, even on one occasion, provides grounds for dismissal from the experiment. I understand, too, that if for any reason, including the above, I have to leave the experimental situation before 24 hours have elapsed, I may do so with partial remuneration.

Signature _____

Date _____

APPENDIX 9

SUBJECT PARTICIPATION AGREEMENT

NO VISUAL DEPRIVATION

SUBJECT PARTICIPATION AGREEMENT

NO VISUAL DEPRIVATION

I, the undersigned, hereby agree to participate in 24 hours of environmental restriction and to abide by all the conditions of the experiment. Furthermore, I promise to confine my movements to the prescribed laboratory area and to follow all instructions pertaining to the experiment given to me by the investigators. I understand that a violation of any of the above conditions, even on one occasion, provides grounds for dismissal from the experiment. I understand, too, that if for any reason, including the above, I have to leave the experimental situation before 24 hours have elapsed, I may do so with partial remuneration.

Signature _____

Date _____

APPENDIX 10

POST TREATMENT QUESTIONNAIRE

POST TREATMENT QUESTIONNAIRE

Instructions:

Below are a number of questions concerning your experience and feelings about the experiment you have participated in. Please answer all the items. If a particular item is not applicable to you, place N/A after it.

1. Were you bothere by boredom? Yes _____ No _____

   If so, please describe: _____

   _____

   _____

2. Did you consider the living conditions to be a stressful one?

   Yes_____ No _____ Describe your answer more fully _____

   _____

   _____

3. Did you find the food provided satisfactory? Yes _____ No _____

4. Would you recommend the experience to a friend? Yes ____ No ____

   Why? _____

   _____

5. Would you be willing to participate in the same experiment again sometime in the future? Yes _____ No _____

6. Were you able to sleep reasonably well? Yes _____ No _____

   Please describe more fully _____

   _____

   _____

7. Did you experience any signs of claustrophobia (any anxiety or tension related to the confined condition)? Yes _____ No _____
Please describe more fully _____

_____

_____

8. Did you have any strange experiences or feelings during the day spent in the room? Yes _____ No _____
If yes, please describe more fully _____

_____

_____

9. Did your desire to smoke appear the same, more noticeable, or less noticeable during the past 24 hours? _____

10. Were there times when you particularly wanted a cigarette? Yes ____ No _____ If so, please describe these in terms of what they were like, when they occurred (early in the session, the middle, towards the close) and what feelings went along with them._____

_____

_____

11. How do you think your experience in this study will affect your smoking habit in the future (increase it, decrease it, have no effect upon it)?

_____

_____

12. Are there any particular complaints or suggestions you would like to make about this study and the treatment you received in it? _____

_____