Covert sensitization as a function of punishment and reinforcement

Signe Harold Weedman

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COVERT SENSITIZATION AS A FUNCTION
OF PUNISHMENT AND REINFORCEMENT

By

Signe H. Weedman
B.A., Seattle Pacific College, 1969

Presented in partial fulfillment of the requirements for the degree of
Master of Arts
UNIVERSITY OF MONTANA
1971

Approved by:

[Signatures]

Chairman, Board of Examiners

Dean, Graduate School

Date

Mar. 12, 1971
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I wish to express my sincere appreciation to my thesis director, Dr. J. Atthowe, for his guidance. The comments and help from the members of my thesis committee: Drs. R. Zimmerman, P. Hemmingway, and Dr. Evans were also appreciated. I would also like to thank the volunteers who participated in this project. Special thanks is due to my typist, Kathy Anders.
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Chapter I
INTRODUCTION

Maladaptive behavior can be placed into two categories: maladaptive avoidance responses and maladaptive approach responses.

Maladaptive avoidance responses, such as fear of failure, fear of criticism, and phobias have been effectively treated by systematic desensitization procedures developed by Joseph Wolpe (1958). More recently, covert reinforcement (Cautela, 1970) and other self control techniques have been shown to be effective in the elimination of this type of behavior (Ferster, Nurnberger and Levitt, 1962; Goldiamond, 1965; Homme, 1965).

The treatment of maladaptive approach responses such as obsessions, compulsions, homosexuality, drinking, stealing and smoking has typically involved the use of aversive stimuli in the reduction of such behavior. Usually, an undesirable behavior pattern is associated with unpleasant stimuli or the unpleasant stimulus is made a consequence of the undesirable behavior. By repeated pairings a connection between the undesirable behavior and the aversive stimulus develops, and the behavior is eliminated through an attempt by the organism to avoid the unpleasant stimulation (Rachman and Teasdale, 1969). The unpleasant stimulus traditionally employed has been either a chemical or shock. Aversion therapy has been used with numerous maladaptive behaviors including alcoholism (Maguire and Vallence, 1964), obesity (Meyer and Crisp, 1964), drug addiction (Raymond, 1964), smoking (Azrin and Powell, 1968), and homosexuality (Thorpe, Schmidt, and Castell, 1964).
There are, however, a number of disadvantages in the use of aversion therapy. The primary disadvantage in the use of aversive techniques is that treatment is usually very unpleasant or painful. For this reason patients often avoid therapeutic sessions. In addition, with alcoholics the use of chemically induced conditioning may be contraindicated because of gastro-intestinal, hepatic, cardiac or muscular disorders which often plague this type of individual. It has also been found that nausea-producing drugs have a depressant action which tends to inhibit conditioning. Moreover, the nausea is built up slowly, and animal studies have demonstrated that the gradual onset of the unconditioned stimulus is the least effective means of establishing a conditioned response (Abrams, 1964).

Because of the arduous, unpleasant and complicated nature of aversion therapy, particularly chemical aversion, it is impractical to provide frequent pairing of the conditioned and the unconditioned stimulus. Likewise, the treatment is unpleasant for the therapist and nursing staff as well as the patient. In addition, there is some clinical evidence to suggest that chemical and shock treatment brings about increased aggressiveness and hostility on the part of the patient (Rachman and Teasdale, 196).

In the use of electrical techniques, Cautela (1966) suggests that the apparatus must be adjusted so it can be both aversive and yet not harmful. Furthermore, treatment has to be carried out in an office or clinic.

An alternative to overt aversion therapy, is a technique primarily developed by Cautela, called "covert sensitization." This procedure is a type of aversion therapy but one which is probably less unpleasant. Like aversion therapy it is a conditioning procedure involving the association of a noxious stimulus with an undesirable behavior, except this is
accomplished through the use of imagery. Cautela (1966, 1967, 1969, 1970) has been the primary developer of the procedure, however, Gold and Neufeld (1965) preceded Cautela in initially developing the use of aversive imagery. They successfully treated a sixteen-year-old boy who had been convicted for soliciting men in the toilets of a railway station. The patient was relaxed and then asked to imagine a rather unpleasant image (i.e. to visualize himself in a toilet alongside a most obnoxious old man). Further images were then given and were slowly changed to a more attractive form but at the same time they were surrounded by prohibitions such as the image of a policeman standing nearby. Later the patient was presented with imaginary alternatives in the form of an attractive woman. The image of the woman was associated with pleasant suggestions, and the image of the man was associated with unpleasant imaginal stimulation. After ten treatment sessions the patient reported feeling considerably improved and said that he had been able to avoid homosexual contacts. After another seven interviews, carried out over a period of twelve months, the patient retained his therapeutic improvement, and successfully formed a relationship with a girl involving petting but not intercourse.

Cautela (1966) coined the term "covert sensitization." The word covert is used because neither the undesirable behavior nor the aversive stimulus is physically presented. They are both presented in imagination. The word sensitization is used because the purpose of the procedure is to build up an avoidance response to the undesirable stimulus. Various other terms have been applied to essentially the same technique including, "verbal aversion" (Anant, 1968), "symbolic aversion" (Bandura,
In the usual procedure, as reported by Cautela (1967), the client is initially instructed to relax as completely as possible. He is then told that the way to eliminate the undesirable behavior is to associate it with an unpleasant stimulus. The client is then asked to visualize very clearly the pleasurable object (i.e., food, alcohol, cigarettes). He is further instructed to visualize the sequences of events involved in enjoying the pleasurable object, and with each event he is to imagine becoming increasingly nauseous until the object touches his lips, at which point he imagines himself vomiting. Another type of scene, alternatin'g with the aversive scene, is imagined in which a feeling of relief is generated by refusing the pleasurable object.

There is agreement among some investigators that imagery behavior is subject to the same principles as overt behavior and that the manipulation of imagery can affect overt behavior (Bandura, 1969; Weiner, 1965). In covert sensitization procedures, both the pleasurable behavior and the undesirable stimulus, presented in imagination, are made as similar as possible to the external response and stimulus. It is assumed that on the basis of stimulus-response generalization there will be a transfer of conditioning from imagination to overt behavior (Cautela, 1970). That the imagery must be as similar as possible to real life is questionable. Kraft (1970) reports successful treatment of a "wedding-phobia" in a female patient in whom all imagery was on an emotional plane; the patient was unable to produce any visual or auditory images. Concerning aversive imagery Weiner
(1965) found that imagining aversive consequences reduced response rate more than a condition involving no consequences. The self-controlling scene involves the use of self-reinforcement which has also been found to increase response probability (Kanfer and Marston, 1963).

According to Cautela (1967, 1970), covert sensitization offers some advantages over conventional aversion therapy:

1. No special apparatus is required.
2. Patients are taught to apply the procedure to themselves outside of the office.
3. There are more conditioning trials and thus more reinforcement. As a result, there should be a more rapid elimination of the undesirable behavior, thereby conserving time, money, and the therapist's services.
4. If anxiety is the response to be eliminated, its rapid elimination can prevent further stimuli from becoming attached to it, thereby making the formation of new faulty habits less likely.
5. According to some patients, just knowing that they have a procedure that they can use themselves reduces the overall anxiety level. This is called self-confidence in non-learning terms.
6. The procedure is under the patient's control, so outside of therapy, extinction need not occur.
7. The procedure can be taught to large numbers of individuals to prevent the occurrence of faulty behavior on a large scale.
8. New behavior is more apt to be maintained when the individual perceives that he is responsible for the behavior change.

The use of covert sensitization or very similar procedures has been shown to be effective in the treatment of alcoholism (Cautela,
6


Because smoking is to be the variable manipulated in this study, two experimental studies and one case study related to smoking will be elaborated upon.

Mullen (1967), employed a control group, a group-treated covert sensitization group, and a group in which Ss were treated individually with covert sensitization. At the end of six sessions (½ hour for each session), the control group went from 16.3 cigarettes a day to 15.4 a day. The two covert sensitization groups went from a mean of 15.3 cigarettes a day to 3.6 cigarettes a day. The group-treatment of covert sensitization had a mean of 5 a day, and the individually treated covert sensitization Ss had a mean of 0.5 cigarettes a day. A six month follow-up showed that the control group had a mean of 17.1 cigarettes a day and the experimental groups had a mean of 10.1 a day. No member of the control group gave up smoking, but two members of experimental groups stopped smoking completely. Mullen reports that as early as the second session the majority of the experimental Ss commented that they no longer enjoyed the cigarettes they smoked.

Viernstein (1968) compared covert sensitization with an educational-supportive group and a control group in the modification of smoking behavior. Seven sessions were held and two therapists alternated weekly administration of the procedures. Ss subjected to covert sensitization
smoked significantly \((p < .05)\) fewer cigarettes at post-treatment and at a five-week follow-up. Viernstein also reports that when they did smoke, they did not enjoy the cigarettes.

Tooly and Pratt (1967) combined covert sensitization contract management and contingency management in the treatment of a husband and wife. Prior to treatment the husband was smoking 50 cigarettes per day and the wife, 30 cigarettes per day. Treatment began with covert sensitization. By the end of the third session the consumption rates of both Ss was reduced to 10 cigarettes per day. Contingency management was then initiated. Each S constructed an inventory of low probability coverants composed of such thoughts as: smoking leaves a bad taste in the mouth, and smoking is a bad influence. A highly probable behavior was then selected to serve as the reinforcing event; for the husband, drinking coffee, and for the wife, drinking water. Five days using Premack's Principle and one additional sensitization session reduced the husband's rate to five cigarettes a day, and the wife's rate down to a single cigarette. Contractual management was then begun; both Ss agreeing to give up the first cigarette of the day and never to smoke in the presence of the other. This brought the wife's cigarette consumption down to zero, and the husband's rate down to two. Further contractual agreements were made by the husband and his rate was also reduced to zero. Tooly and Pratt report that the zero consumption rate was still being maintained after three years.

As stated earlier sensitization refers to the creation of an avoidance response to the undesirable stimulus. However, as also stated earlier, a self-reinforcement scene is typically included in
the procedure. Therefore, the term "covert sensitization" as a descriptive word for the procedure may be a little misleading. At any rate, in reviewing the literature on covert sensitization little was found pertaining to the role that the reinforcement scenes play in the effectiveness of the procedure. The present study was designed to investigate the extent to which the results can be attributed to the aversive (punishment) imagery and to what extent they can be attributed to the self-controlling (reinforcement) imagery. Furthermore, this study will offer additional evidence regarding the effectiveness of the procedure.

Modification of smoking behavior was chosen as the dependent variable. This variable was chosen because it is easy to quantify, and because interest in the modification of smoking behavior is quite prevalent as evidenced by the many diverse techniques of modification that are being suggested (Bernstein, 1969).

Specifically the following hypotheses will be investigated:

I Hypothesis - There is no significant difference in the reduction of smoking as a function of covert sensitization as measured by the number of cigarettes smoked per day post-treatment as compared to pre-treatment.

II Hypothesis - There is no significant difference in the effectiveness of covert sensitization as a function of punishment or reinforcement or both as measured by the number of cigarettes smoked per day post-treatment as compared to pre-treatment.
Chapter II

METHOD

Subjects

Forty Ss were chosen on a volunteer basis from the Introductory Psychology class enrolled spring quarter of 1970 at the University of Montana. There were 28 male and 12 female participants.

Experimental Design

This study utilized a 2x2 factorial design. Table 1 illustrates the design.

Ss were assigned to treatment conditions in the following manner. A base rate of the mean number of cigarettes smoked per day for each S was obtained prior to the beginning of the treatment. This base rate was obtained from a self report record kept by each S for a period of one week before treatment sessions began. The Ss were ranked according to obtained base rates. Then beginning with the highest rate, Ss were taken four at a time and assigned to the four treatment conditions.

Procedure

Prior to the experiment a short questionnaire was circulated, via teaching assistants, to all Psychology 110 students. The questionnaire asked if the individual smoked and if so would he be interested in quitting or reducing. An announcement was then given in the Introductory Psychology class asking if those who reported the desire to quit or reduce smoking would gather at the front of the auditorium after class. At this time it was explained that a study was going to be conducted
**TABLE I**

General Experimental Design

<table>
<thead>
<tr>
<th>Reinforcement</th>
<th>Punishment</th>
<th>No Punishment</th>
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<tbody>
<tr>
<td>Group I</td>
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<td></td>
</tr>
<tr>
<td>Group III</td>
<td>Group IV</td>
<td></td>
</tr>
<tr>
<td>No Reinforcement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
regarding methods of smoking reduction. The students were told that participation would require six hours but that experimental credit would be given. The possibility of obtaining experimental credit was withheld until this time because I felt that this would help eliminate those Ss interested in credit only and not necessarily in reduction of smoking.

The Ss were then instructed to keep a daily record of cigarettes smoked. Each cigarette smoked was to be recorded immediately. The Ss were asked to meet the same time the following week and in the same place.

At the following meeting the records were collected from each S, and they were asked to meet again the following day. At this time the Ss were told that for effective treatment it would be necessary to divide up into four smaller groups. They were then instructed as to which group they had been assigned, and the meeting time of that group. Treatment began the following week. All groups met in the evening. The treatment period lasted four weeks with groups meeting for ½ hour sessions approximately every four days.

At the first scheduled meeting of the control group the Ss were told that for the first five weeks their only responsibility was to report their smoking rate, after the first, third and fifth week. They were further instructed that at the end of the fifth week treatment would be initiated for them. It was explained that the reason for delay in treatment was to determine whether initiation of treatment was better after five weeks of record keeping than after one week of recording. At each scheduled meeting with the control group
the records were collected, any problems related to record keeping were discussed, and some general indications were given on how the study was progressing, (e.g. "method seems to be working quite well").

The experimental treatment sessions were held in a classroom of the psychology building. At the beginning of the first session all groups were told that they would be asked to report their smoking rates at the end of one week, three weeks, and five weeks. Ss were told that a treatment was going to be used which had been found effective in other studies. A brief description of the procedure was given and a meeting schedule for the next four weeks was worked out.

Ss were then told that smoking could be decreased or eliminated if they were willing to associate something unpleasant with smoking. At the beginning of each session all groups were instructed to sit back in their chairs, close their eyes and try to completely relax.

All three groups were initially given the following instructions at each session:

"I am going to ask you to imagine a scene as vividly as you can. I don't want you to imagine that you are seeing yourself in these situations. I want you to imagine that you're actually in the situations. Try not only to visualize the scenes but also try to feel, for example, a cigarette in your hand. Try to use all your senses as though you are actually there. The scene that I pick will be concerned with a situation in which you are about to smoke. It is very important that you visualize the scenes as clearly as possible and try to actually feel what I describe to you."

The treatment group receiving only punishment was then further instructed as follows:

"You are about to smoke a cigarette. As you start reaching for the package, you get a nauseous feeling. You begin to feel sick to your stomach, like you are about to vomit. As you touch the package, bitter spit comes into your mouth. When you take a cigarette out of the pack,
some pieces of food come into your throat. Now you feel sick and have stomach cramps. As you are about to put the cigarette in your mouth, you puke all over the cigarette, all over your hand and all over the package of cigarettes. The cigarette in your hand is very soggy and full of yellow and green vomit. Snots are coming out of your nose, and your hands feel all soggy and full of vomit. Your clothes are all full of puke. You try to stop but you keep vomiting. There is no more food coming up, but you keep heaving anyway, and some blood comes out."

The Ss in this group were then asked to wipe the scene completely out of their minds and then the process was repeated. This group received ten trials per session. At various times during the session Ss were asked to repeat the scene by themselves without the E's assistance. The reinforcement group, after having been given the initial instructions about concentrated imagination was given the following instructions:

"You are about to smoke a cigarette and as soon as you decide to smoke a cigarette you get a discomforting feeling. You feel very disappointed and disgusted with yourself that you are about to smoke again. You say to yourself "Why should I smoke; I really don't need to." Then you say to yourself, 'The heck with it; I'm not going to smoke.' As soon as you decide not to smoke you feel really good and proud that you had enough self-control to resist smoking. You take a deep breath and feel clean and satisfied, and there is no bad taste in your mouth. You feel really great and free."

As with the punishment group the Ss in this group received ten trials and were asked to repeat the scene by themselves several times during the session.

The group receiving both punishment and reinforcement imagery was given both sets of instructions in an alternating sequence after the initial instructions had been given. In this group the two scenes were given five times per session. As with the other two groups the
Ss in this group were asked to imagine the scenes by themselves at various times during the session.

All three experimental groups were instructed at each session to rehearse the scenes by themselves ten times a day between sessions. They were further instructed to say "stop" whenever they reached for a cigarette, and to rehearse the appropriate imagery depending on the group to which they belonged.

Due to the possibility of satiation, various punishment and reinforcing scenes were randomly used. They may be found in the appendix.

At the termination of the fifth week all final records were received. The analysis was computed on these post-treatment smoking rates.
Chapter III

RESULTS

Pre-treatment smoking rates of the four groups were shown by a one way analysis of variance to not significantly differ from one another ($F < 1.0$).

Post-treatment smoking rates were analyzed in terms of a factorial analysis of variance and individual comparisons. Homogeneity of variance was established prior to analysis. A summary of the analysis is contained in Table 2. Variable A, punishment, with an obtained $F$ of 3.28 was significant at the .1 level. Variable B, reinforcement, with an obtained $F$ of 4.85 was also significant at the .1 level. AB, interaction, however, with an obtained $F$ of 2.5 was not significant. These results seem to show a statistically reliable difference between treatment and control groups and indicate that the treatment of covert sensitization was effective in the reduction of smoking. The lack of significance with regard to AB in light of the statistical significance of both A and B indicates that both variables A and B are effective alone and that the effects of both are additive. Individual comparisons (see Appendix B) of treatment means showed significant differences between control and treatment groups, but not between treatment groups.

<table>
<thead>
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<th>df</th>
<th>MS</th>
<th>F</th>
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</thead>
<tbody>
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<td>289.99</td>
<td>1</td>
<td>289.99</td>
<td>3.28*</td>
</tr>
<tr>
<td>B</td>
<td>428.38</td>
<td>1</td>
<td>428.38</td>
<td>4.85*</td>
</tr>
<tr>
<td>AB</td>
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<tr>
<td>Error</td>
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<td>Total</td>
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*F .90(1.36) = 2.86

Table 2. Summary of Analysis of Variance
Figures 1, 2, 3 and 4 show the mean number of cigarettes smoked per day for each group prior to the treatment sessions, the first and the third week during treatment, and one week following the termination of treatment. Figure 5 shows the mean post-treatment smoking rate for each group.

Figure 1. Mean number of cigarettes smoked per day for control group from pre to post-treatment. (Group IV)

Figure 2. Mean number of cigarettes smoked per day for reinforcement group from pre to post-treatment. (Group II)
Figure 3. Mean number of cigarettes smoked per day for punishment group from pre to post-treatment. (Group III)

Figure 4. Mean number of cigarettes smoked per day for punishment and reinforcement group from pre to post-treatment. (Group I)
Figure 5. Mean post-treatment smoking rates for each group.

Group I = reinforcement and punishment
Group II = reinforcement
Group III = punishment
Group IV = control
Chapter IV
DISCUSSION

The results indicate that covert sensitization as it is generally practiced is effective as a treatment for the reduction of smoking behavior. However, because of the non-inclusion of a placebo-control group, the variables contributing to the reduction cannot be clearly delineated. Theoretically, it is assumed that the effectiveness of the procedure is due to an attempt by the organism to avoid the unpleasant stimulation that has been conditioned to the undesirable behavior; or that the organism avoids the undesirable behavior because of the reinforcement that has been associated with the avoidance response (Rachman and Teasdale, 1969). Because of the lack of a placebo-control group, the apparent effectiveness of covert sensitization in this and other studies could be the result of demand characteristics inherent in the procedure. The demand characteristics would include: meeting weekly for "treatment", attention received in each session, and expectation that the "treatment" would result in smoking reduction.

The results also seem to indicate that aversive imagery and reinforcement imagery are both effective when used alone as a treatment for the reduction of smoking; in addition, there appears to be no significant increase in effectiveness when reinforcement and punishment scenes are combined, although the effects of punishment and reinforcement do appear to be additive.

Although some members of the control group did reduce slightly, other members of the group increased. As a result the reductions were balanced and no reduction for the group was indicated. All members of
the treatment groups decreased their smoking rates. Post-treatment rates for these groups ranged from 9.23 to 6.81 as compared to a post-treatment rate of 18.7 for the control group. Five members of the treatment groups stopped smoking completely.

The use of individual treatment groups and/or progressive relaxation would probably have enhanced these results. Mullen (1967) found the use of individual treatment more effective than group procedures. The relaxation variable is presently being investigated by Fuhrer (1971), and preliminary results indicate that the treatment group including progressive relaxation showed slightly better results than the treatment group without relaxation.

Several Ss reported that after the first session they began enjoying the cigarettes they smoked less. This is in agreement with data reported by Mullen (1967). One woman who was smoking approximately 54 cigarettes per day, and had been smoking for 16 years, reduced to 20 cigarettes at the end of the six treatment sessions. She reported that this was the first method that she had found to be effective in helping her reduce.

For various reasons some Ss reported that the vomiting imagery had little effect on them as compared to the scenes having to do with lying in a cancer ward. Apparently different types of imagery are more effective for different people. The procedure might be made more effective by first determining for each S the type of imagery which is most aversive to that S. Ferster, et al., (1962) refers to this as the "ultimate aversive consequence" (UAC).

Prior to the initiation of treatment, E anticipated that the aversive scenes would play a much larger role in the effectiveness
of the procedure than would the reinforcement scenes. The indication, however, that the reinforcement imagery is just as effective as the aversive imagery is in agreement with recent work done by Cautela (1970) with "covert reinforcement." The work being done by Cautela in this area was not brought to the attention of the E until the study under consideration had been completed. The procedure as described by Cautela is very similar to the method used in this study in producing reinforcement.

The primary weakness of this study was the lack of a placebo-control group. Another uncontrolled variable in this study is the apparent inclusion of mild aversion followed by reinforcement in the reinforcement scenes. There is some indication that mild aversion followed by reinforcement would enhance the reinforcement effects (Molineux, Atthowe, 1971). In future studies it would be well to eliminate the mild aversion from the reinforcement scenes.

Although these results suggest that there exists no significant difference in applying aversive or reinforcement imagery, there is the possibility that these two processes may have differential effects on different personality types. This may be a possible avenue for further research.
SUMMARY

Forty Introductory Psychology students served as Ss in a study to determine the extent to which the effects of covert sensitization can be attributed to the aversive (punishment) imagery and to what extent they can be attributed to the self-controlling (reinforcement) imagery. Aversive imagery and reinforcement imagery were found to be equally effective and a combination of the two did not seem to improve the effectiveness of treatment. As in other studies covert sensitization was shown to be an effective treatment for the reduction of smoking behavior.
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Homme, L.E. Perspectives in Psychology: XXIV. Control of coverants, the operants of the mind. *Psychological Record*, 1965, 15, 501-511.


Molineux and Atthowe, (Personal Communication) 1971.


## Appendix A

### Summary of Analysis

#### AB Summary Table

<table>
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<th>b2</th>
<th>Totals</th>
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<td>a1</td>
<td>68.1</td>
<td>92.3</td>
<td>160.4</td>
</tr>
<tr>
<td>a2</td>
<td>80.7</td>
<td>187.4</td>
<td>268.1</td>
</tr>
</tbody>
</table>

|   | 148.8 | 279.7 | 428.5 |

1. \( G^2/npq \) = 4,590.3
2. \( x^2 \) = 8,668.8
3. \( (A^2)/nq \) = 4,880.29
4. \( (B^2)/np \) = 5,018.68
5. \( ((AB)^2)/n \) = 5,490.07

### Calculations

- \( SS_A \) = 3-1 = 289.99
- \( SS_b \) = 4-1 = 428.38
- \( SS_{AB} \) = 5-3-4+1 = 181.4
- \( SS_{W-cell} \) = 2-5 = 3,178.73
- \( SS_{total} \) = 2-1 = 4,078.5
Appendix B

Individual Comparisons

\[ F = \frac{(AB_{ij} - AB_{km})^2}{2_n MS w. cell} \]

1. Reinforcement compared to Punishment = .09
2. Punishment compared to Reinforcement+Punishment = .33
3. Punishment compared to Reinforcement = .08
4. Control compared to Reinforcement+Punishment = 8.06*
5. Control compared to Reinforcement = 6.45*
6. Control compared to Punishment = 5.12*

\[ F_{.95}(1,36) = 4.12 \]
Appendix C

Summary of Cigarettes for Each Group

Punishment and Reinforcement

<table>
<thead>
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<th>Subjects</th>
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Totals 178.4 120.5 124.1 68.12
Mean 17.84 12.05 12.41 6.82

Reinforcement

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Totals 230 166.7 104.7 80.7
Mean 23.0 16.67 10.47 8.07
### Punishment

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**Totals**: 238.0, 134.9, 125.7, 92.3  
**Mean**: 23.8, 13.49, 12.57, 9.23

### Control

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**Totals**: 186.1, 177.1, 184.9, 186.9  
**Mean**: 18.61, 17.71, 18.49, 18.69
Appendix D

Imagery Scenes

Punishment #1:

You are about to smoke a cigarette. As you start reaching for the package, you get a nauseaus feeling. You begin to feel sick to your stomach, like you are about to vomit. As you touch the package, bitter spit comes into your mouth. When you take a cigarette out of the pack, some pieces of food come into your throat. Now you feel sick and have stomach cramps. As you are about to put the cigarette in your mouth, you puke all over the cigarette, all over your hand, and all over the package of cigarettes. The cigarette in your hand is very soggy and full of yellow and green vomit. There is a terrible stink coming from the vomit. Snots are coming out of your nose, and your hands feel all slimy and full of vomit. Your clothes are all full of puke. You try to stop but you keep vomiting. There is no more food coming up, but you keep heaving anyway, and some blood comes out.

Punishment #2:

You are about to smoke a cigarette. As you reach for the package you get a ticklish feeling in your throat. As you touch the cigarette you cough a little to relieve the tickle. As you take the cigarette out of the pack you start coughing harder. When the cigarette touches your mouth you start coughing extremely hard. Your chest is beginning to hurt because of the coughing. You try to stop coughing because your throat and chest are hurting so much, but you are unable to stop. Now something else is caught in your throat, and it is gagging you. You try to cough it up, and eventually it comes out and lands on the floor in front of you. You look down to see what it is and it is a piece of your lung. It is dripping with blood and it really scares you.

Punishment #3:

You are lying in a bed looking at the ceiling. It is pure white. You decide that you would like to have a cigarette. You take it out of the pack and start to light it. As you do you look to your left and see another person lying in a bed with tubes running out of his body. You look to your right and there is a fellow lying in bed smoking a cigarette through a tube inserted into his lung through his chest, because he no longer has a throat. It was removed because of cancer. You are in a cancer ward with many other people. You feel terrible, just awful. It was the cigarettes that put you there and now you are lighting another. You lay there thinking how bad you feel, thinking about what the doctors are going to cut out of you.
Reinforcement #1:

You are about to smoke a cigarette and as soon as you decide to smoke a cigarette you get a discomforting feeling. You feel very disappointed and disgusted with yourself that you are about to smoke again. You say to yourself 'Why should I smoke; I really don't need to.' Then you say to yourself, 'The heck with it; I'm not going to smoke.' As soon as you decide not to smoke you feel really good and proud that you had enough self-control to resist smoking. You take a deep breath and feel clean and satisfied, and there is no bad taste in your mouth. You feel really great and free!

Reinforcement #2:

You are about to smoke a cigarette. As you reach for the package you get a tickle in your throat. As you touch the package you cough a little and the possibility of cancer comes into your head. You put the cigarette back and the coughing ceases. You think to yourself it's really not that hard to put that package back. You just stand there feeling good. There is no burning in your chest or throat, your mouth feels clean. You feel like you are on top of the world in complete control because you said no to that awful habit. And you think if I would always refuse that urge I could feel like this more often. You just feel great.

Reinforcement #3:

You are lying in a bed looking at the ceiling. It is pure white. You decide that you would like to have a cigarette. You begin reaching for the package but then you change your mind, and say to yourself 'Why can't I lick this habit?' You pull your hand away from the package. Now immediately as you pull your hand away you feel yourself lying on a hillside. There is green grass all around you. The sun is shining down on you out of a pure blue sky. You feel so good. You feel so clean. No smell or taste of cigarettes. Just pure air. You feel in complete control and free!