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Visual Imagery to Increase Overt Behavior, Discern Interpersonal Reinforcers, and Identify Interpersonal Difficulties

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VISUAL IMAGERY TO INCREASE OVERT BEHAVIOR, DISCERN INTERPERSONAL REINFORCERS, AND IDENTIFY INTERPERSONAL DIFFICULTIES

by

John Edward Landino

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

Western Michigan University
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December, 1972
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John Edward Landino
Masters Thesis

Landino, John Edward

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To Andy
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td></td>
</tr>
<tr>
<td>Methodological Difficulties in Studying Visual Imagery</td>
<td>6</td>
</tr>
<tr>
<td>The Present Study</td>
<td>11</td>
</tr>
<tr>
<td>II</td>
<td>12</td>
</tr>
<tr>
<td>EXPERIMENT I</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>12</td>
</tr>
<tr>
<td>Results</td>
<td>17</td>
</tr>
<tr>
<td>Discussion</td>
<td>20</td>
</tr>
<tr>
<td>III</td>
<td>21</td>
</tr>
<tr>
<td>EXPERIMENT II</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td>21</td>
</tr>
<tr>
<td>Results</td>
<td>27</td>
</tr>
<tr>
<td>IV</td>
<td>33</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td></td>
</tr>
</tbody>
</table>

## APPENDIXES

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Block Designs for Scale of Image Difficulty</td>
</tr>
<tr>
<td>B</td>
<td>Rating Form, Scale of Image Difficulty</td>
</tr>
<tr>
<td>C</td>
<td>Questionnaire, Forms A and B</td>
</tr>
</tbody>
</table>

REFERENCES | 50 |
INTRODUCTION

Private events, for the most part, have been ignored by behaviorists. "The layman calls them mental and knows they are important, but behaviorists are of very little help in elucidating them" (Homme, 1965, p. 501). Skinner's statement (1953, p. 237) that, "We need not suppose that events which take place within an organism's skin have special properties for that reason," is typical of the attitude.

A review of the literature indicates few studies of experimental rigor. Most traditional studies have tended to be loose narratives often describing the beneficial results to clients by the nonsystematic application of visual imagery. For example, Shapiro's (1970) review of schools of thought on imagery in psychoanalysis is rampant with vague, inferential statements, such as "the unconscious impulses latch onto the screen provided by the image" (p. 209). Phenomenologists, though more exact in their procedures, can be just as foggy in their terms. Gendlin and Olsen (1970, p. 222) believe that: "images were characteristically powerful in the formation of a specific feeling, but alone cannot give an experiential shift."

Among behaviorists the experiments also seem to have major methodological flaws, which are discussed below. Basically these studies fall into two categories: either the
modification of maladaptive approach responses or the modification of avoidance responses. Most typical of the approach behaviors studied have been compulsions such as smoking, overeating, and alcoholism. Various culturally sanctioned sexual behaviors have also been dealt with. A typical approach is to have the person imagine acting out the behavior to be decreased and then to administer contiguously an unpleasant shock. With this technique Berecz (1971) did a well controlled study in the use of imagery to reduce cigarette smoking. He found that with very heavy smoking males, to imagine oneself smoking while self-administering shocks, was more effective in reducing future cigarette consumption then to self-administer shocks while actually smoking. Another technique frequently used is "covert sensitization" (Cautela, 1967). This treatment involves first teaching a subject to relax in order to heighten the production of imagery. Next, the person is asked to imagine the maladaptive behavior, such as drinking alcohol, and then immediately shift to an aversive image, such as vomiting. Complex behaviors, such as drinking alcohol, are broken into small segments, each of which is punished. For instance, a person might be asked to visualize the following sequence: as he thinks about taking a drink, he begins to feel a bit queasy; as he begins to reach for the drink, he can taste the puke in his mouth; and so forth until he is
about to take a sip, and then he retches over everything. Relief sequences are also provided, where the individual can escape the consequences of feeling nauseous by not giving in to the temptation to drink. Covert sensitization then combines the punishment and negative reinforcement paradigms. This design has been used to modify alcoholic abuse and car stealing (Cautela, 1966, 1967). It has also been employed in the treatment of sexual deviations such as homosexuality, exhibitionism, fetishism, pedophilia, masochism, sadism, rape, and sadistic fantasies (Davison, 1968; Cautela and Wisocki, 1971). Success is also reported in decreasing overeating (Cautela, 1966, 1967; Stuart, 1967). However, Tyler and Straughan (1970) in a rigorous test did not find covert sensitization useful in treating obesity.

To summarize, the two techniques utilizing imagery that are relied on by behaviorists to modify maladaptive approach responses have several common features; (1) they both involve the temporal association of two stimuli; (2) they both presumably involve cognitive changes in the person; (3) they both involve the arousal of unpleasant reactions in the person; (4) they both presume to produce a learned connection between the real or symbolic deviant stimulus and autonomic reactions; (5) they both have the person imagine that he is about to commit the behavior to be decreased. The major difference is in the use of real vs. symbolic unpleasant consequences.
Phobias and other maladaptive avoidance responses have been modified through the use of imagery. Most famous of the methods is Wolpe's systematic desensitization. This technique has been successful in the treatment of many types of fears. Basically, it involves having the person imagine the least feared situation and pairing it with an incompatible response, such as relaxation. After the image no longer produces "anxiety," he proceeds to the next most feared scene. Eventually he reaches the most anxiety producing image and is desensitized to it (Brown, 1970). Imagery has also been used to remove a fear through extinction. The client is encouraged to imagine himself experiencing sequences of images involving his fears. The imagery sequences end only when he imagines the feared experience terminating (Frankel, 1970). This latter paradigm could perhaps best be described as negative reinforcement.

"Covert negative reinforcement" is designed to increase the probability of a response by instructing a subject to imagine an aversive event, and to terminate it by imagining the response to be increased (Cautela, 1970). He has applied this approach successfully in the modification of a school phobia, the case of a girl who feared sexual molestation, a man who became anxious in sexual relations with his wife, and a woman that became anxious when talking to men at parties.
Covert reinforcement has also been used by Cautela. In this procedure the person is asked to imagine a target behavior to be increased and then is asked to shift to a pleasant or reinforcing visual image. In maladaptive avoidance antagonistic approach responses are reinforced. For example, he cites a case where a person was to imagine himself studying and then to shift immediately to visualizing himself skiing down a mountain (Cautela, 1970). He has also used it with maladaptive approach behavior. For instance, a homosexual was taught to imagine approaching a female and then to shift to a reinforcing image (Cautela, 1970).

Visual imagery has been used by behaviorists in the modification of maladaptive avoidance responses in the following ways: (1) by systematically pairing imagined and progressively more fear evoking scenes with an incompatible overt response such as relaxation (systematic desensitization); (2) by having a subject repetitively and for a considerable duration imagine a feared situation without negative consequences (extinction); (3) by having a person imagine an unpleasant situation continuously and making termination of this unpleasant image contingent on imagining the desired approach behavior (covert negative reinforcement); (4) by having a person imagine the antagonistic approach response and then shifting quickly to a pleasant visual image (covert reinforcement).
Methodological Difficulties In Studying Visual Imagery

The problem of defining visual imagery

The problem of defining visual imagery both theoretically and operationally is one that has made many experimentalists shy away (Mahoney, 1970; Philips, 1971). It seems that there is a fear that it will lead to a semantic trap—a circularity of logic such as has been encountered in hypothetical constructs such as Penis Envy, Oedipus Complex, or Ego. The inference of visual imagery is different from these other abstractions in at least three ways. First, it has "response status." This can be seen more clearly by contrasting visual imagery with some static internal state such as blood sugar level. Though the latter can change, and therefore could be construed as a response, its tendency is toward homeostasis. Second, "It is observable by at least a public of one" (Philips, 1971, p. 113). Can a person observe his Ego or an Oedipal Complex inside himself? Or cognitive dissonance? Furthermore, a recent study by Marks et al. (1971) indicates that the physiological effects of visual imagery are observable through instrumentation. Third, "It is inferentially proximal and direct" (Philips, 1971, p. 114). In other words, semantically it is a first order fact or observation. A person either observes it as a private event, or infers it
through its physiological effects on instrumentation. It is not an inference which is built on several other inferences. These characteristics then make the definition of visual imagery not as insurmountable as it might seem at first. There need not be any vagueness or circularity of logic.

The problem of antecedent variables

It appears that visual imagery is often preceded by certain stimuli. To say that visual imagery is a product of antecedent stimuli is too strong for the evidence at hand. However, it seems that visual imagery is facilitated by antecedent stimuli. "The physical conditions conducive to the heightened awareness of ongoing imagery have been summarized by Richardson (1969). They generally involve reduction of novel sensory input, as in the use of relaxing on a couch, looking at the bare ceiling, shutting one's eyes, or allowing one's gaze to focus on infinity (Greenberg, 1970). These techniques added to systematic relaxation with its monotony and reduction of the general activation level are employed in almost all of the psychotherapeutic imagery methods" (Singer, 1971, p. 38). Furthermore, not only may there need to be a reduction in variety of stimuli, but also one of the individual sense modalities, such as hearing, may need to be activated (Bartley, 1958).
"More complicated than establishing the proper physical environment or relaxation is the question of the personality or cognitive style which the person brings to a therapeutic situation. There is considerable support for the notion that individuals have markedly differing styles of self awareness, imagery availability, interest in or capacity to report fantasy, freedom from dependence on the stimulation of the environment in order to look 'inward' and fear and suspicion of internally generated material" (Singer, 1971, p. 39). It is clear then that a rigorous test of imagery must somehow reliably measure an individual's present ability to produce imagery before execution of the experimental manipulation.

The problem of control

Visual imagery is unique as an independent variable. The reason for this uniqueness is that the absolute control of this independent variable lies not with the experimenter but with the subject (Mahoney, 1970). With the present stage of knowledge the experimenter can only instruct the subject and hope that the latter will follow the instructions faithfully. This poses a serious methodological flaw for all current studies on imagery. It poses an especially serious question for those studies which require the person to imagine unpleasant visual imagery (Cautela, 1967, 1970). It is somewhat analogous...
to a rat being asked by the experimenter to shock itself. Though humans will shock themselves upon an experimenter's request, it is questionable as to how many would if they knew they could avoid the shocks; and the experimenter would never be the wiser. Optimistically, if visual imagery is a totally learned behavior, then perhaps environmental conditions could be arranged to produce it reliably in an individual.

The problem of measurement

Perhaps most frustrating in studying visual imagery is how to measure it. A reliable measure should accurately record not only the frequency and duration, but also the topography of the behavior (Mahoney, 1970). The latter refers to the intensity and quality of the visual imagery. At present there is no direct way for an experimenter to monitor the frequency of visual imagery or manipulate its effects. However, there appears to be two indirect means. "The first of these is the overt report (which may be verbal or nonverbal)" (Mahoney, 1970, p. 515). Through the use of an event recorder, the subject can record accurately not only the frequency, but also the exact onset and termination of the imagery, and thereby its duration. A second means is to record the physiological accompaniments of imagery. Two recent research findings make this even more promising.
Jacobsen (1967), as reported in Philips (1971, p. 112), stated that he has never encountered a verbal report of a mental state without a concomitant and characteristic efferent pattern, e.g. neuromuscular activity recorded electromyographically. More exciting is a study just published by Marks, et al. (1971). Using a polygraph with 16 phobic patients, he found that physiological assessment of heart rate, skin conductance, and subjective anxiety differed significantly between neutral and phobic imagery. Furthermore, it was evident that increases in autonomic activity were relative to the intensity and hierarchy of the phobic image.

The topography of visual imagery is less well understood. However, measurement of both the intensity and quality of a visual image could be improved. Through the use of standardized tasks on visual imagery and norms of performance, more rigorous subjective reports can be obtained. For the present, though, many useful studies on imagery can be carried out without measures of the quality or intensity of the image (Mahoney, 1970). Certainly, through the manipulation of frequency and duration, much valuable knowledge can be gained.
The Present Study

Theoretically, visual imagery can be defined as the experience of a pictorial representation of some set of points in space, either by way of memory or by way of association with some modality that is being activated through its own sense organs (Bartley, 1958). Forming an adequate operational definition is a much more difficult task, and a flaw in most studies. In this study a person is said to be experiencing visual imagery (V.I.) when the person is pressing a button on an event recorder with the prearranged understanding that to do so is to indicate that he is experiencing V.I.

The purpose of the present study is fourfold. First, it is to develop a technique to determine whether visual imagery might be successfully used with a particular person to increase appropriate overt behaviors. Second, it is to develop a technique to determine which interpersonal situations are reinforcing to someone. Third and fourth, it is a technique to determine the focus of interpersonal difficulty, as well as a way of aiding a person in disclosing the source of his discomfort.
EXPERIMENT I

Method

To investigate visual imagery as a reinforcer for overt behaviors, one must first be able to rule out other plausible explanations for an increase in the frequency of the particular behavior. For example, if the behavior is to be the number of times a person replays a tape, one must rule out other possible reasons for the increase in tape replays before assuming that visual imagery is reinforcing this behavior. One likely explanation would be that a person replays a tape more often if it is more difficult, i.e., if it is a tape which has been missed to a significant degree by others.

Subjects

Group I consisted of 15 subjects chosen at random from a list of 30 who had volunteered for the project. None of the subjects had received psychiatric services. There were ten females and five males. Their chronological ages ranged from 24 to 57 years with a median age of 25 years. Educationally, they ranged from 12 years of school to 6 years of college with a median of 4 years of college.
Apparatus

The apparatus consisted of a Wollensach Model 200 cartridge tape recorder, a set of Wechsler Bellvue Form II blocks, and a stop watch. The response measures were the number of times a subject replayed a given tape, the amount of time to the nearest second that it took the person to build the design once he asked for the blocks, and whether he built the structure correctly.

Procedure

Subjects were asked to take a Scale of Image Difficulty (S.I.D.). (See Appendix A) The S.I.D. consists of a set of taped messages describing various cube arrangements. There are ten, and they were subjectively structured to become progressively more difficult. If a subject could visualize the image and retain it, then he could make the arrangement with real cubes. A subject proceeded through the scale completely regardless of failures. The taped instructions to the subject were as follows:

The following is a way to create a scale for yourself of how difficult it is for you to visualize various objects or situations. You will be asked to imagine an object or situation in minute detail. To order and reorder these details.

There are ten problems. Each gives you specific directions as to how to build various arrangements of blocks. In order to do this you must visualize
each cube, arrange it in its proper position within the visual image, and then retain the image of the finished structure which then can be built from real blocks. You may listen to the message as many times as you wish before you ask for the real cubes. Once you ask for the blocks, you must build the structure within 3 minutes or it is scored as a failure.

Remember you must imagine or visualize various cube arrangements. You may listen to the tape as many times as you wish before you ask for the blocks to build the structure. Once you ask for the blocks the tape cannot be replayed, and you must build the correct structure within 3 minutes.

Image I
You have two cubes. You take one cube and place it on the other so that all faces are parallel. Construct the image.

Image II
You have three cubes. You take two of them and place them about a half a cube apart. The third block is placed on top of these two. It is parallel to the bottom two. Construct the image.

Image III
You have three cubes. You take two of the cubes and place them so that one edge of each cube touch. You take a third cube and place it so that one of its edges touches one of the other two's edges. All three cubes form a straight line. Construct the image.

Image IV
You have four cubes. You take three of the cubes and arrange them in an L shape. All three are touching the surface of the table. You take the fourth cube and place it upon the corner cube. Construct the image.

Image V
You have five cubes. You take 3 cubes and place their edges together such that in the center is formed a triangular opening. The sides of this triangle are all of equal length. Above this opening, and resting on the other blocks is placed a fourth, and upon that a fifth. Construct the image.
Image VI
You have 5 cubes. You take 3 of the cubes and make a T figure. You take a fourth block and place it partly on the stalk of the T and on one of the blocks forming the top of the T. You take the fifth block and do the same, only on the opposite side. Construct the image.

Image VII
You have 5 cubes. You take 2 of the cubes and place them so that one edge of each cube touch. The faces of the two cubes should be at right angles. You take a third cube and place it upon the two cubes such that the edge of this third cube splits the right angle formed by the two faces of the bottom cubes. You now take a fourth cube and place it upon the third. Finally you take a fifth cube and place it upon the fourth. Construct the image.

Image VIII
You have 5 cubes. You take 3 of them and make a T-shaped figure. You take a fourth block and place its edge against one of the exposed edges of the block forming the stalk of the T. You take a fifth block and place it equally upon the crack in the top of the T. Construct the image.

Image IX
You have 7 blocks in a row. You take 3 of the blocks and make an L-shaped figure. All 3 blocks are touching the surface of the table. You take another 3 blocks and make another L-shaped figure. This time only 2 of the blocks are touching the surface of the table. The L with only 2 touching the surface of the table is placed on top of the other L, such that the corners of each L coincide. The remaining block is placed on top of the lowest exposed block. Construct the image.

Image X
You have 4 blocks. You take 3 cubes and make an L-shaped figure, such that the bottom of the L is facing you. You place the fourth cube on top of the corner block. Construct the mirror image of this figure.
"Pick out the image that was most difficult for you. The one that you were unable to visualize and construct correctly. Assign that a value of 100. Now pick out the one that was least difficult for you to visualize and construct. Assign that a value of 0. Now pick out the one that most nearly was halfway between these two in degree of difficulty. Assign that a value of 50. Now rank the remaining images from 0 to 100 according to their degree of difficulty. You may rank more than one image at the same value."

(See Appendix B)

The purpose of Experiment I was to determine: (1) the order of difficulty of the tapes on the S.I.D.; (2) if there was a significant relationship between the number of times a tape is replayed and its degree of difficulty; (3) if it was feasible to reduce the number of tapes in the S.I.D. from 10 to a smaller, less time-consuming number.
Results

Analysis of variance for a repeated measure design was carried out on three comparisons rather than on all possible comparisons, since by visual inspection of the data only three showed large differences. The behavioral measure used was the number of times a tape was missed. Table 1 shows the comparison, the F value obtained and the significance level.

Table 1

F Values for Tape Comparisons for Group I+

<table>
<thead>
<tr>
<th>Tape Number</th>
<th>I</th>
<th>VI</th>
<th>X</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>*F=11.99</td>
<td>*F=15.66</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\alpha=.005$</td>
<td>$\alpha=.005$</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td></td>
<td>F=0.19</td>
</tr>
<tr>
<td>X</td>
<td>+ N=15</td>
<td></td>
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</tr>
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* indicates significant values

Since the assumptions of homogeneity of variance and equal correlations were violated, the maximum reduction in degrees of freedom was used (Geisser and Greenhouse, 1958). In all cases 1 and 14 degree of freedom were employed.
The results indicate that Tape I was missed significantly less often than Tapes VI or X at the $\alpha = .005$ level. Tapes VI and X do not differ significantly from each other as to how often people err on them.

Correlations were obtained for all ten tapes between the number of times a tape is played and how often a tape is missed. The correlations are presented in Table 2.

The mean correlation between the number of times a tape is played and how often it is missed is $-0.327$. This value is not significant at $\alpha = .10$. The two significant correlations were on Tapes V and VII. However, these tapes were not found to be significantly more difficult than Tape I. This latter statement is based on the observation that Tapes V and VII, when compared with Tape I, were not missed significantly more often.
<table>
<thead>
<tr>
<th>Tape Number</th>
<th>Correlation</th>
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<tr>
<td>I</td>
<td>0.000</td>
</tr>
<tr>
<td>II</td>
<td>-0.429</td>
</tr>
<tr>
<td>III</td>
<td>-0.345</td>
</tr>
<tr>
<td>IV</td>
<td>0.000</td>
</tr>
<tr>
<td>V</td>
<td>-0.575*</td>
</tr>
<tr>
<td>VI</td>
<td>-0.258</td>
</tr>
<tr>
<td>VII</td>
<td>-0.812*</td>
</tr>
<tr>
<td>VIII</td>
<td>-0.082</td>
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<tr>
<td>IX</td>
<td>-0.434</td>
</tr>
<tr>
<td>X</td>
<td>-0.327</td>
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<tr>
<td>Mean Correlation</td>
<td>-0.327</td>
</tr>
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</table>

*N=15

* Significant at the *\(\alpha=.05\) level
Discussion

Three conclusions seem warranted from Experiment I. The first is that Tape I is missed significantly less often than Tapes VI and X. Second, there is only a slight correlation between the number of times a tape is played and how often it is missed. Certainly one could not conclude that a person will listen to a tape more often if it is more difficult to visualize. Last, and in further support of the just mentioned conclusion, though Tape I was missed significantly less often than Tape X, the correlation between number of times played and number of times missed for the latter is only 0.327, which finding again indicates that a tape is not necessarily played more often if it is more difficult.
EXPERIMENT II

Method

As previously mentioned, this experiment had four purposes. Quantitatively, it was concerned with answering two questions. Can the interpersonal situations a person finds most pleasant or reinforcing be discerned in a relatively short observation time? If they cannot in this experimental situation, then the frequency with which Tapes A, B, and C are played should not differ significantly. Second, and perhaps more importantly, can visual imagery act as a reinforcer for overt behavior without that person's knowledge? If it does not in this experiment, then there should be no difference between treatment subjects and control subjects in the number of times they replay a tape. However, if it does, then the treatment group should experience a significantly greater number of replays as a result of the visual imagery acting as a reinforcer.

Qualitatively, it is also concerned with answering the following two questions. Can this technique be used to determine the focus of an interpersonal difficulty, and second, can it be used to aid a client in disclosing the source of his discomfort? Evaluation of both of these
questions depends heavily upon the subjects responses to the questionnaires, as well as observation by the experimenter.

**Subjects**

Group II consisted of 24 subjects who were receiving psychiatric services. Due to policies at the clinic, it was not possible to group the subjects into formal diagnostic categories. However, people who reported hallucinating in the past or present were excluded. There were 18 females and 6 males. Their chronological age ranged from 18 years to 58 years with a median of 24 years. Educationally, they ranged from 8 years of school to 6 years of college with a median of 12 years of school.

**Apparatus**

The apparatus used was identical to that used in Experiment I with the following additions: a model 292-4 Rustrak Event Recorder and a set of Claricon Stereo Headphones, model 85-285A. Response measures for the S.I.D. were identical with those previously described. The other response measured for Experiment II was the number of times Tapes A, B, and C were replayed.
Procedure

Group II subjects were randomly assigned to a treatment condition, IIA, and a no-treatment condition, IIB, each containing twelve subjects. Before any treatment or control session began, all instrumentation was checked to make certain it was operating correctly. All sessions began with recording identifying data and a statement of confidentiality. The operation of the tape recorder and event recorder were explained to the subject. After this, stereo headphones were placed on the subject and adjusted. Each person in both the treatment and control groups was administered Tapes I, VI, and X of the S.I.O. The person could listen to the tapes message only once. Whether the subjects built the structure correctly and how long he took were recorded. The purpose of this was to give the subjects a "warm up," and also to allow the subjects to rank the tapes from 1 to 100. This created a subjective scale or framework on which the later Tapes A, B, and C could be ranked for degree of difficulty. (See Appendix B) At this point, depending on which group a person had been randomly assigned to, he was read either the treatment or control instructions.

Instructions for Treatment Group IIA

"You will be asked to listen to three taped messages...Each of them focuses on a pleasant interpersonal situation...as you listen to the
message...you are to visualize the scene depicted...Try to visualize the scene in every detail...As you visualize the image or an image related to the tape...you are to press the button before you...(if subject seems confused, point out button to him)...when you stop visualizing the image...stop pressing the button....Remember, you are to try to visualize the scenes described...when you have visual imagery...be sure to press the button and continue to hold down the button until you stop visualizing the image....You may replay a tape as many times as you wish, and after each tape you will be asked to fill out a questionnaire....If there are any questions please ask them now....Now settle back and relax...take a deep breath...and let it out slowly...become aware of your breathing and the relaxation that comes with it...hear yourself breathe...feel the tension go away with each breath."

Instructions for Control Group IIB

"You will be asked to listen to three taped messages....Each of them focuses on a pleasant interpersonal situation....As you listen to the message...you are to be sure not to visualize the scene depicted....You may concentrate on visualizing an object not described...or...just not think of anything in particular...or another way is to listen to the dialogue without any scenes depicted....If at any time you do have imagery related to the tape...then push the button before you...continue holding down the button until the imagery stops...(if subject seems confused, point out the button to him)....Remember, you are to listen to the taped messages, but not to visualize the scenes depicted....If you should have imagery related to the tape, be sure to press the button...when the imagery stops...stop pressing the button....You may replay a tape as many times as you wish...and after each tape you will be asked to fill out a questionnaire....If there are any questions, please ask them now.......Now settle back and relax...take a deep breath...and let it out slowly...become aware of your breathing and the relaxation that comes with it...hear yourself breathe...feel the tension go away with each breath."
It is important to note that the order of Tapes A, B, and C was also randomized. There were six ordered permutations. With 12 subjects in both the treatment and control groups, this meant that each ordered permutation had an equal number of two subjects randomly assigned to it.

Subjects in the treatment group, IIA, were asked in their instructions to listen to three taped messages focusing on Love and Intimacy (A), Friendship (B), and Occupational Success (C). During each of the taped messages (A, B, C), they were asked to visualize the scenes depicted. The text of the messages follows:

**Loving - Intimacy A**

"You're sitting on a soft couch....The warmth and touch of your loved one near....A fire crackles brightly on the hearth....wafting a faint odor of smoke throughout....You think how wonderful it is to have someone you love and care for...and who loves and cares for you....A spark of warmth...a sense of well being begins to glow inside...until it becomes an unbearable ache....Quickly you turn to that special person...your eyes meet...and in a soft, crushing embrace you burst forth....I love you....Let's go to bed, darling."

**Friendship B**

"You are at a wonderful party of close friends....The food and drink are excellent...and the music soothing....It's a surprise party for one of your closest friends....As you stand there, sipping a drink, your friend comes across the room to greet you....Smiling...and touching your arm...his face beams with the joy you have helped to bring him...Looking into your eyes, he says...'I'm so glad you could be here....This party has made me very happy....Thank you.'"
Occupational Success C

"You are at work....You have just completed a difficult task--successfully....As you sit there... savoring the moment and noticing the dazzling sunlight outside... your superior comes by....he stops in and smilingly states that he 'is pleased with your work'....In fact,...he says, 'You are going to be promoted very shortly.'

Furthermore, when they had an image relating to the scene depicted, they were instructed to depress a button which deflected a pen on the Rustrak Event Recorder. In this way a continuous record of a subject's visual imagery was kept. All subjects were allowed to play the tape as many times as they wished. They were then asked to rank the degree of difficulty they had in visualizing the image on the S.I.D. scale. This provided an estimate of the quality of their visual image. A questionnaire was also filled out after each tape. (See Appendix C) The number of times a subject replayed any particular tape was recorded.

Subjects in IIB, the control group, received the same treatment except they were asked to listen to the dialogue but not visualize the scenes depicted. They were asked to concentrate on visualizing an object not described on the tapes, or think of nothing in particular, or listen to the dialogue without visualizing the scenes depicted. They were also asked to use the event recorder any time they had imagery related to the taped messages. However, they were not asked to rank the tapes on the S.I.D.
Results

Quantitative

The independent variable then is visual imagery (V.I.), and the dependent variable is the number of times a subject replays Tapes A, B, and C. It was extremely important, therefore, that subjects in the treatment group report or record a significantly greater amount of time spent in visual imagery as opposed to the control. A two way analysis of variance was carried out. For 5 and 66 degree of freedom an F value of 29.07 was calculated. This value was significant at the $\alpha=.005$ level. Therefore, the treatment group definitely reported experiencing significantly greater amounts of V.I.

What effect did this V.I. have on the treatment group as opposed to the control group in terms of the number of times a tape was replayed? Table 3 gives the mean number of replays and standard deviation for each Tape (A, B, C) for both the treatment and control groups. A two way analysis of variance was carried out for 5 and 66 degrees of freedom. The F value (4.92) obtained was significant at the $\alpha=.005$ level. No significant difference was found for the effects of the Tapes (A, B, C) irrespective of the V.I. (F=.97), or for the interaction of V.I. with a
particular tape \((F=.73)\). From these results we can conclude that the treatment group replayed the taped messages a significantly greater amount. Also this replaying was not the result of some intrinsic quality of the tapes per se, or due to some interaction between a peculiarity of the tapes and V.I. Rather the data reject the null hypothesis that V.I. has no effect on the number of times subjects will replay Tapes A, B, and C.

Table 3

Mean Number of Replays and Standard Deviation for Treatment Group (IIA) and Control Group (IIB)

<table>
<thead>
<tr>
<th>Tape</th>
<th>Mean Number of Replays</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TREAT</td>
<td>A</td>
<td>1.17</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>1.42</td>
</tr>
<tr>
<td>CONTROL</td>
<td>A</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>1.17</td>
</tr>
</tbody>
</table>

+ \(N=24\)
If then V.I. can act as a reinforcer, is there a differential effect? In other words, is one interpersonal situation depicted more reinforcing than another; or stated otherwise, is the visual imagery derived from one particular tape more reinforcing than another? From Table 3 we can see that the greatest difference in means for the treatment group is between Tapes A and B. For these two tapes in the treatment group an analysis of variance for a repeated measures design (Edwards, 1972) was carried out. For 1 and 11 degrees of freedom an F value of 3.055 was determined. This value is not significant. Therefore, since the largest difference existed between these two tapes, one can conclude that no significant differential effect of the tapes was found.

Correlations were carried out for the number of times a subject played a tape in the treatment group and how he responded to various items on Questionnaire Form A. Specifically, the following variables were correlated with each other: (1) the total number of words the subject wrote in response to question 1 for Tapes A, B, and C; (2) the total number of replays for Tapes A, B, and C; (3) whether the subject answered question 2 affirmatively, i.e., whether he said he experienced feelings while visualizing the image (Note: If the subject stated that he did, it was scored as 1, otherwise as 0); (4) how the subject responded to
question 3, i.e., if he localized the feelings, it was scored 1, otherwise 0; (5) how they responded to question 4 (The following code was used: 1, if they marked pleasant; -1, if they marked painful, and 0 if neither.). Table 4 shows the correlations between the variables.

Table 4
Correlations***

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.37</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.35</td>
<td>0.23</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-0.13</td>
<td>-0.10</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.32</td>
<td>0.37</td>
<td>0.23</td>
<td>-0.10</td>
<td>1.00</td>
</tr>
</tbody>
</table>

+ N = 24

** Each variable correlated with every other variable.

Variable 1: The total number of words the S wrote in response to question 1 for Tapes A, B, C.
Variable 2: The total number of replays for Tapes A, B, C.
Variable 3: A yes on question 2 of the questionnaire.
Variable 4: Localization of feelings on question 3.
Variable 5: Response to question 4 (i.e., whether they marked if the feelings were pleasant, painful, or neither).
From the results depicted in Table 4, it can be concluded that no relationship was shown between any five of the variables, such that from a subject's response on one variable, his response on another could be predicted.

Qualitative

Qualitatively, the interest in this technique is whether it can be used clinically to determine the focus of an interpersonal difficulty, and also whether it can be used to help a client express his source of concern. Analysis of the questionnaire previously mentioned indicates three conclusions. First, both the treatment and control questionnaire contained discussion of areas of interpersonal difficulty. However, it is unclear whether this was a result of the tapes or the expectations of someone visiting an outpatient clinic. Second, the treatment questionnaire reported more often, and of a greater intensity, pleasant, warm feelings. In fact, eight of the twelve people in the treatment group reported that the experience was very pleasant, and several described the procedure as a relaxation exercise. Typical of the responses was, "I felt good all over." Lastly, the treatment questionnaire reported more positive memories in the past and near past. Evidence indicates then that a positive visual image tended to bring out positive verbalizations about a person's life, past and present. Nothing
conclusive can be drawn from this, except that with further investigation this may be a useful clinical tool in the areas of assessment and behavior change.
DISCUSSION

The study supports the hypothesis that visual imagery can act as a reinforcer. An alternative explanation might be that a person plays a tape more times because it is more difficult to visualize. However, the results of Experiment I indicated that a person did not play a tape more often if it was more difficult. Another alternative explanation could be that visual imagery was not acting as a reinforcer, but rather to concentrate on not visualizing was a type of punisher for the control group. This explanation seems doubtful, since analysis of the questionnaires indicated many reports of pleasant feelings from the treatment group, and no reports of unpleasant feelings from the control group.

More important, however, than the quantitative support for visual imagery acting as a reinforcer, is that the study strengthens the hypothesis that visual imagery can act as a reinforcer of overt behavior without a person's knowledge. This result has far reaching implications. For example, if an individual inadvertently reinforced a maladaptive behavior with visual imagery, the probability of that behavior occurring in the future would be increased. The more often the behavior would happen, the more likely it would be to be again reinforced by the visual imagery. Thus a vicious circle would be created. The more frequently the behavior occurred,
the more often it would be reinforced with visual imagery, which in turn would increase the probability of the mal-
adaptive behavior appearing more often in the future.

Homme (1965) conceptualized visual imagery as a "coverant," that is as obeying the principles of any operant behavior. Though this study lends support to this viewpoint, it is difficult to explain certain aspects of visual imagery solely from an operant theoretical framework. For example, it is difficult to conceive how visual imagery could be shaped initially. What is the first approximation to a visual image? Second, why do certain antecedent variables or stimuli facilitate imagery? For a considerable period in the literature, there has been evidence that a reduction in types of sensory input results in imagery, and that severe reduction can cause hallucinations (Fiske, 1961). Could visual imagery be the unconditioned response to decreases in types of sensory stimulation? Certainly this presents a logical explanation for the deprivation studies, the heightened imagery just before falling asleep, or even dreaming. The intensity of the V.I. in each of these situations would support Fiske's (1961) finding that "the most marked effects are to be found in conditions with the greatest reduction in temporally varying stimulation" (p. 143).
Nevertheless, most of us can produce visual imagery upon request or desire. We do not seem to need a major decrease in sensory input. Studies have indicated though that many minute behaviors occur just prior to V.I. For example, we might close our eyes, focus them at infinity, or relax our muscles. The topography of many of these behaviors is such that they cannot be observed without instrumentation (Jacobsen, 1967; Greenberg, 1970). Could these behaviors which precede the V.I. be conditioned stimuli? Certainly behaviors such as closing one's eyes or relaxing musculature would invariably be contiguously paired many times with decreases in sensory input. For instance, the following would be a typical example of the classical conditioning paradigm in operation in this case:

U.S. → U.R.  
| decrease in types of sensory input | visual imagery |

C.S. → U.S. → U.R. 
| 1. eye closing, or decrease in visual |
| 2. focusing eyes at infinity, or types of sensory imagery |
| 3. muscle relaxation input |

C.S. → C.R.  
| behaviors 1, 2, or 3 visual imagery |

Though the above provides a convenient explanation of how visual imagery arises and is therefore present to become an
operant, it skirts the issue of how man happens to have this response in his repertoire in the first place. One can only speculate on this, but if the problem is viewed from an evolutionary standpoint, some answers seem forthcoming. Visual imagery would appear to have survival advantages for an organism for three distinct reasons: (1) If the brain is stimulated, it increases its capacity. V.I. is a way of providing self-stimulation at times when sensory stimulation is deprived. (2) The organism which can create stimulation for itself would be likely to maintain a higher performance level over a longer period and be more alert to its environment. Therefore, it would be more likely to obtain food and less likely to be preyed upon. (3) And perhaps most important, it would greatly aid an organism in problem solving ability. It would increase the probability of an organism obtaining food, mates, and territory. It would give the organism a chance to solve enumerable unanticipated problems which might arise by allowing him to store valuable survival information without the aid of a complex verbal system. In this way the organism could anticipate problems which might arise. Natural selection then would clearly favor an organism which possessed this ability.

How is it then that visual imagery can come to act as an operant? It seems that there are three ways. First, it
could act as a reinforcer or possible punisher by contiguous pairing. For example, if V.I. is paired many times with relaxation, then it comes to take on the reinforcing properties of this relaxing behavior. Second, through stimulus generalization if an organism is conditioned to respond to a tone, $S_1$, the organism will respond to a second, slightly different tone, $S_2$. The magnitude of the response is a direct function of the similarity between $S_1$ and $S_2$. Similarly, visual images can be very proximal in structure to real life situations which are pleasant. Therefore, they are a type of $S_2$, which approximate closely the real life situation $S_1$, and thereby gains the same effect. This also explains how visual images could possibly act as punishers or negative reinforcers. Last, by Premack's Principle any behavior, such as V.I., which is more frequent, can be used to reinforce a behavior which is less frequent (Premack, 1965). Theoretically then it seems advantageous to conceptualize V.I. as an unconditioned response to a decrease in sensory stimulation. By classical conditioning it becomes a C.R. to many behavioral C.S.'s. Through contiguous pairing, stimulus generalization, and Premack's Principle, it can act as an operant.

Though methodologically this experiment is not without flaw, its format is an improvement upon most of the previous studies involving V.I. It is hoped that future studies will
not only include this basic experimental structure, but will improve upon it. This experiment is more rigorous in design than most previous studies involving V.I. in several ways. First, it has a clear theoretical and operational definition. Second, it incorporates a control group. Third, it is free of subject expectations of what should happen. Fourth, there is clear specification of the antecedent stimuli. Fifth, there is systematic manipulation of the V.I. as an independent variable. Sixth, an attempt was made to measure indirectly not only the occurrence of V.I., but also its exact onset, termination, and duration. Also, the quality of the V.I. was subjectively scaled. Last, the relationship between the V.I. and the overt behavior to be increased was temporally proximal, such that one could observe directly, and therefore immediately count the increase in response. Often, previous studies have not systematically observed the change in behavior. Reported behavior changes were often outside the experimental session and even weeks later. Many intervening variables then may have caused the change in behavior and not the manipulation of V.I.

Future studies might improve upon this design in the following ways: (1) Provide a more direct measure of V.I., or at least have another indirect measure, such as physiological correlates through instrumentation. Some accurate measure of
the quality and intensity of a V.I. also needs to be found. (2) Allow the experimenter to manipulate independently the V.I., or at least to know beyond question that the subject is following the instructions.

As a result of the experimental design, there are also some limitations on the generalizability of the findings. For example, though it was shown to act as a reinforcer for playing back a tape recorder, would it reinforce much more complex behaviors which require a greater expenditure of energy? Furthermore, little is known about the intensity of the image required. One can only guess as to whether the artificial conditions created in the experimental session are necessary to produce visual imagery capable of acting as a reinforcer.

Future research directions need to investigate the possibility of V.I. being classically conditioned to a tone, its role as an operant, how it can be measured more accurately, and whether one can improve his ability in V.I. The antecedent variables which facilitate V.I. also need to be clearly delineated. As a clinical tool, its role in the formation and modification of maladaptive behaviors needs to be systematically investigated. If man is to survive, he must be very much aware of events within and without, that control his behavior.

To summarize, the study investigated the possibility that
visual imagery can act as a reinforcer for overt behavior. Subjects in a treatment and control group were compared on an overt response measure with visual imagery being the independent variable. Subjects in the treatment group emitted the response a significantly greater number of times ($\alpha = .005$). The data support the idea that V.I. can act as an operant to increase the frequency of a behavior, even without the person's awareness that it is doing so.
Appendix A

Block Designs for Scale of Image Difficulty

FIGURE 1

FIGURE 2

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Appendix A, Continued

FIGURE 6

FIGURE 7
Appendix B

Rating Form - Scale of Image Difficulty (S.I.D.)

<table>
<thead>
<tr>
<th>100</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td></td>
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<td>60</td>
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</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Appendix C

Questionnaire, Form A

Please fill out this questionnaire

1) Describe the image you visualized. Be as detailed as possible.
2) Did you have any feelings while visualizing the image? If so, describe.

3) Did the feelings appear to be in any particular part of the body? If so, describe.

4) Were the feelings you paid attention to mostly pleasant or mostly painful?
   Pleasant ____  Painful ____  Neither ____

5) Did you have difficulty visualizing the image? If so, describe some possible reasons why.

6) How does this image touch upon your life? (If this image does not touch upon your life please go to Question 7)

7) If the image does not touch upon your life, please write one that does.
Appendix C

Questionnaire, Form B

Please fill out this questionnaire

1) Describe the taped message. Be as specific as possible.

2) Did you have any feelings while listening to the taped message? Please describe.

3) Did the feelings appear to be in any particular part of the body? Please describe.

4) Were the feelings you paid attention to mostly pleasant or mostly painful?
   Pleasant ____  Painful ____  Neither ____

5) Did you have difficulty not visualizing the image? If so, describe some possible reasons why.
6) How does this tape touch upon your life? (If this tape does not touch upon your life, please go to Question 7.)

7) If the tape does not touch upon your life, please write one that does.
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