

SYSTEMATIC DESENSITIZATION AND IMAGINATION:  
A TEST OF LONDON'S COGNITIVE INTEGRATION  
OF BEHAVIOR THERAPIES

Thesis for the Degree of Ph. D.

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DONALD B. BEERE

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## ABSTRACT

### SYSTEMATIC DESENSITIZATION AND IMAGINATION: A TEST OF LONDON'S COGNITIVE INTEGRATION OF BEHAVIOR THERAPIES

By

Donald B. Beere

#### Statement of the Problem

London (1964) hypothesizes that the crucial variable in both systematic desensitization and implosive therapy is the elicitation of vivid imagery. This research was designed to test London's hypothesis: namely, *the elicitation of vivid imagery is as effective as systematic desensitization therapy in reducing phobic behaviors.*

Consequently the measurement of phobic behavior--the dependent variable--was one aspect of the experimental design and method. The two independent variables were: (1) the ability of the subject to image vividly, and (2) the conditions of imaging a phobic object (desensitization) or a non-phobic object (imagination).

Given the hypothesis and the relevant variables, four specific hypotheses were tested.

Hypothesis one: The desensitization and imagination conditions will be equally effective in reducing fear of the phobic object.

Hypothesis two: Subjects possessing a high ability to image vividly will demonstrate a significantly greater decrease in fear of the phobic object than the subjects possessing a low ability to image vividly.

Hypothesis three: There will be no interaction between the experimental conditions and ability to image vividly.

Hypothesis four: Subjects who report more vivid imagery during the experimental procedures will demonstrate a larger decrement of fear than those subjects who report less vivid imagery.

### Procedure

The short form of the Betts' Questionnaire upon Mental Imagery (Betts' QMI) was chosen as the measure of the ability to image vividly. Some supplementary measures of imagination were also used: the Gordon Test of Visual Imagery Control (Gordon Test); the ability to alter the rate of reversal of the Necker Cube (Necker Cube), a perceptual measure of the ability to control visual imagery; and selected items from the Juhasz Test of the Ability to Imagine (JAI), a behavioral measure of the ability to image.

Three variables had to be considered in testing the hypothesis: (1) subjects had to be identified who are high on the ability to image vividly, and subjects had to be identified who are low on the ability to image vividly; (2) two experimental conditions--imagination and systematic desensitization--had to be established; and (3) pre- and post test measures of fear of the phobic object had to be obtained.

The research procedures can be conceptually divided into four stages: subject selection, pretest, experimental procedure and post test. The purpose of the "subject selection" stage of this study was to obtain volunteers who possessed two characteristics: a usable phobia and extremely high or extremely low vividness of imagery. The Betts' QMI and a fear survey were administered to an initial sample of 520 undergraduate students at Michigan State University. From the results, fear



of snakes was chosen as the phobia for this research; and extremely high and extremely low vividness of imagery were empirically defined. The Betts' QMI and the fear survey were then administered to a second sample of 405 undergraduate students at Michigan State University. From the 925 students tested, 39 volunteers participated in the complete study.

The purpose of the "pretest" stage of this research was to measure the extent of the phobia and to obtain additional imagery measures. Each subject was individually administered (1) a behavioral measure of fear, (2) a self-report measure of fear, (3) the Necker Cube, and (4) selected items from the JAI. The Gordon Test had been administered earlier.

The purpose of the "experimental procedure" stage of this research was to implement the experimental conditions of desensitization--imaging the phobic object--and imagination--imaging a non-phobic object. The procedure consisted of six, 45-minute group sessions, which met once a week for six weeks. The first of the six sessions was standardized, administered via tape recording, and consisted of two parts: (1) an explanation of the experimental procedure and (2) the teaching of progressive relaxation. The subjects then completed five sessions in one of two conditions: (1) desensitization--a tape-recorded, standardized group desensitization procedure--or (2) imagination--a tape-recorded, standardized procedure identical to the desensitization procedure except that a non-phobic imaginal object was substituted for the phobic imaginal object. Four times during each session the subjects were asked to report the vividness of their imagery.

The purpose of the "post test" stage of this research was to assess the reduction in fear of the phobic object. Consequently, the behavioral measure of fear and the self-report measure of fear administered during the pretest were re-administered to obtain a post test measure of fear.

## Results

*A significant decrease in fear was obtained for the imagination and desensitization treatments on both measures of fear. With reference to the four specific hypotheses, hypotheses one and three were supported and hypotheses two and four were not supported. In other words, the imagination treatment was as effective as the desensitization treatment in reducing fear of snakes. Although support for hypothesis one, that merely imaging is as effective as desensitization in reducing phobias, is consistent with London's theory, lack of support for hypotheses two and four, that the experimental procedures were equally effective for vivid and poor imagers, causes one to question London's theory. However, a cautionary note should be added. The absence of positive results for vividness of imagery might have been the result of unreliability or invalidity in the vividness' measure. With this caution in mind, the following can be stated: The results of this research do not support but do not disprove London's theory that the elicitation of vivid imagery is as effective as systematic desensitization therapy in reducing phobic behaviors.*

Supplementary analyses were performed to ascertain the relationships between the ability to control visual imagery, a behavioral measure of the ability to image, and the effectiveness of the imagination and desensitization treatment procedures. No relationship between the Gordon Test and the effectiveness of either treatment procedure was found. Of the various Necker Cube measures, only the "fast minus normal" rate of reversal had any significant relationship with treatment effectiveness. It might be fruitful to pursue the inter-relationships between (1) various measures of the ability to control visual imagery and (2) the

effectiveness of the treatment procedures. Although the JAI demonstrated no relationship to treatment effectiveness, Tiles ABC, one of the JAI subscales, did display a significant relationship with treatment effectiveness. It was hypothesized that the skills necessary to be successful at Tiles ABC were the same skills described in an interpretation of London's theoretical rationale: namely, that imagery of the body-boundary moving in relationship to the external world was one component of London's theoretical rationale.

In summary, *an imagination treatment procedure, equated to a systematic desensitization treatment procedure in every respect except for the imaging of phobic items, was just as effective as desensitization in reducing fear of harmless snakes.* Vividness of imagery, as hypothesized by London (1964), might account for these results. However, three alternative speculations were developed to account for the results: two pertaining to the acquisition of internal controls and one pertaining to the differentiation of the self from the physical world. Regardless of the explanation, the results are exciting and demand explanation and further research.

#### REFERENCE

London, P. The modes and morals of psychotherapy. New York: Holt, Rinehart and Winston, 1964.

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dedicated to Carole

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## CHAPTER I

### STATEMENT OF THE PROBLEM

London (1964) provides a theoretical cognitive integration of the therapeutic techniques of Wolpe (1958) and Stampfl (Stampfl & Levis, 1967). He hypothesizes that the crucial variable in both systematic desensitization and implosive therapy is the elicitation of vivid imagery. This research is designed to test London's hypothesis.

### Theory

The following passage details the rationale behind London's hypothesis.

Wolpe and Stampfl . . . both propose true learning theories of psychoneurosis and psychotherapy, and both claim very great effectiveness for their practical applications of them. The singular difference in their presentation is that Wolpe says he is "desensitizing" people to anxiety by a technique that avoids anxiety insofar as possible, while Stampfl says that he is producing "extinction of anxiety responses" by eliciting it as much as possible. Even more remarkable is the great similarity in what they both describe as their essential therapeutic procedure: *They create as vivid a mental image as they possibly can of all the different things that arouse anxiety in their patients.* Wolpe says that the preliminary procedure of relaxation produces a response state which is incompatible with anxiety, so that patients unlearn anxiety responses, in effect by counterconditioning. Stampfl claims that he reproduces anxiety without reinforcing it, and it therefore reduces by simple extinction.

Neither considers, however, that a third possibility may exist, in which both counterconditioning and extinction responses are facilitated: *The repeated elicitation of vivid imagery produces a discrimination set such that the patient increasingly learns to distinguish between the imaginative, cognitive, affective aspects of experience, and the sensory and overt muscular aspects.* [Italics added.] The very process of repeatedly inspiring imagination, in other words, may dispose the patient to discriminate between imaginary and "real"--between mental and physical experiences--more readily than any other means. Anxiety is reduced as he develops increasing ability to tolerate the imagery, which both Wolpe and Stampfl agree is necessary, and the ability to tolerate the imagery is progressively increased in turn as the patient makes an ever-finer discrimination between the impulsive, motivational, cognitive aspects of experience, and the sensory muscular ones. The closer the imagery comes to representing "real" experience of the most complete sort without being followed by the actual experience it stimulates, the more the patient's expectation of disastrous action, with its disastrous consequences, is reduced. By this means, he learns increasingly that the most intense thoughts, feelings, and motives do not impel him helplessly to perform those concrete acts whose punishment would realistically produce intense pain. Thus the patient learns control, so to speak; the differentiation process, as it becomes more efficient with repetition, creates a new response alternative to anxiety in the face of provoking stimulation; it might be labeled mediation. By this process, it becomes increasingly possible to think over the stimulus instead of automatically trying to escape it. Since by definition the threatening stimulus really is harmless, its discrimination becomes increasingly easy and unimportant at the same time, so that its stimulus value gradually decreases beneath the threshold of observation.

The principle of discrimination is hardly new to students of learning, and it is also thoroughly applicable to cats and rats. In this sense, its use does little violence to either Stampfl or Wolpe. But the variant I have termed cognitive discrimination has two functions in this paradigm that limit it more specifically to people:

1. It explains why speech on the therapist's part can be sufficient to arouse imagery that has no innate connection with the purely auditory aspects of the stimulus.

2. It suggests that *the only critical issue in the stimulus input is its capacity to elicit imagery, not its success at either producing or avoiding anxiety.* [Italics added.] In that event, neither Wolpe's verbal brinkmanship nor Stampfl's verbal brutality count as much towards success as the skill they both have in vivid description, and perhaps the luck they have in patients whose imaginations can be so aroused [London, 1964, pp. 130-131].

### General Hypothesis

As indicated in the above passage, London hypothesizes that the effectiveness of systematic desensitization and implosive therapy is influenced by several variables: (1) the capacity of the therapist's verbal description to elicit vivid imagery; (2) the ability of the subject to have his imagination aroused; and (3) the ability of the subject to image vividly. Furthermore, and perhaps most startlingly, the theoretical rationale asserts that imaging the fear provoking object is irrelevant to the effectiveness of these therapeutic techniques.

A careful reading of the above passage provides additional clarification of the rationale underlying London's assertion that imaging the fear provoking object is irrelevant to the effectiveness of systematic desensitization and implosive therapy. The essence of these therapeutic procedures does not lie, according to London, merely in imaging vividly. Rather, the essence derives from the discrimination between the imaginary and the real, between the mental and the physical, or more explicitly, between the imaginative, cognitive, affective and the sensory-muscular. The more consistently vivid, and thus more realistic, the image becomes, the more likely the person is to discriminate between his imaginal product and reality. When the almost real image is not accompanied by what would realistically follow, the subject

learns that internal states do not necessarily lead to real events. Consequently, he learns to discriminate between his own internal states and real events; and his expectation that something disastrous will happen as a result of certain impulses diminishes.

To summarize, the phobic has confused his impulses and fantasies with reality. If he can vividly experience impulse and fantasy without real consequences, he is less likely to confuse impulse and fantasy with external reality. When he learns to discriminate between the "inside" and the "outside," the phobia will disappear.

This explication suggests that the crux of what London has hypothesized is not only having the subject vividly image but having him vividly image the interaction between his body and physical objects. The sense of self and of physical separateness develops from such interactions with the physical world (Piaget & Inhelder, 1969). Consequently, if the subject vividly images sensory-muscular events in conjunction with their possible real outcomes, he would learn to differentiate between the "inside" and the "outside," the imaginary and the real, and the impulse and the action.

As a result of the above considerations, this research is designed to test the following hypothesis: *the elicitation of vivid imagery will be as effective as systematic desensitization therapy in reducing phobic behaviors.*

The hypothesis focuses on systematic desensitization therapy rather than implosive therapy for two--quite practical--reasons. First, there has been more systematic experimentation on the former; thus, parameters which might affect the outcome can be elucidated from the published literature. Second, systematic desensitization therapy can be used with groups of subjects. In other words, a group of ten to fifteen subjects

can be desensitized in about half the time required to do implosive therapy with the same number of subjects. Thus, for the purposes of this research, systematic desensitization therapy seems the most appropriate therapeutic procedure.

## CHAPTER II

### RELATED LITERATURE

#### Imagination

##### Scientific Acceptance of Imagination

Even though "imagery" and other central or mediational processes seem unavoidably real, they have not been acceptable research topics in psychology for about 50 years. Re-acceptance of their existence and revival of research interest in them has been scientifically acceptable only since the early 1960s. In his article, "The return of the ostracized," Holt (1964) describes a series of events which he feels allowed "imagery" once again to become a scientifically acceptable topic.

In the late 1800s, the crux of the Structuralists' and Functionalists' theoretical positions involved the contents and laws of the "mind." Consequently, the use of introspection and reports of imagery tended to dominate psychology. Two events altered this emphasis on the "mind." First, Kulpe's students at Wurzburg discovered that certain mental events--such as imageless thought--could not be captured with introspection. This discovery implied that scientific methods

other than introspection were necessary. Second, the rise of Behaviorism tended to exclude introspection and introspective reports from psychological research.

After Behaviorism had run its course, however, some novel discoveries tended to revive scientific interest in internal processes such as imagery. These discoveries, according to Holt (1964), were made in diverse psychological fields: for example, highway hypnosis in truck drivers, hallucinatory phenomena in prisoners of war, perceptual artifacts during sensory deprivation, mediational processes deriving from neurophysiology and brain research, and the revival of the "black box" in cognitive psychology. As a result, interest in imagery was revived and it became an acceptable topic for psychological research.

#### Definitions of Imagination

In order to provide the reader with an understanding of the concept of "imagination," four definitions will be presented.

English and English (1958) offer the traditional and popular meaning of "image": "a likeness or. . .a mental copy of something not present to the senses. . . . A copy or image of a not-present but objective reality [p. 251]." A "memory image" is a

more or less complete representation of the attributes of an object or event once experienced but not now present to the senses, together with recognition of its "pastness"; a revival that resembles but need not exactly copy a past experience [English & English, 1958, p. 252].

They add, furthermore, that "despite the fact that we cannot well say what an image is, we have many terms by which we distinguish different



kinds [p. 252]." Finally, English & English define "imagination" as a "recombination into a new pattern of mental images from past experiences [p. 252]."

The definitions offered by English and English include the traditional notion or theory that an image is an objective "copy" of a sensory experience. The experience, in turn, objectively mirrors reality. However, there are psychological theories (referred to by Richardson, 1969; and Sheehan, 1966b) which are at variance with these notions; these psychological theories assert that the individual who images vividly tends to confabulate his images.

In his book, Mental Imagery, Richardson (1969) defines imagery:

Mental imagery refers to (1) all those quasi-sensory or quasi-perceptual experiences of which (2) we are self-consciously aware, and which (3) exist for us in the absence of those stimulus conditions that are known to produce their genuine sensory or perceptual counterparts, and which (4) may be expected to have different consequences from their sensory or perceptual counterparts. By "quasi-sensory" or "quasi-perceptual" experiences is meant any concrete re-presentation of sensory, perceptual, affective or other experiential states [pp. 2-3].

This definition includes after-images, eidetic images, memory images and imagination images.

Richardson's (1969) definition focuses on the characteristics necessary to classify an experience as mental imagery; that is, his definition is descriptive rather than theoretical. Richardson stipulates two subjective and two objective characteristics of mental imagery. The subjective characteristics explain that: (1) an image is a re-experience of some prior experiential state; and (2) in order to label the re-experience an image, the individual must be aware of the re-experience.

The objective characteristics explain that: (1) an image is experienced without having been the result of direct distal stimulation; and (2) the experience of an image is not likely to be followed by the sequence of realistic events generally associated with the real stimulus.

Neisser (1967), writing from a cognitive psychology orientation, provides a definition which appears to be similar to Richardson's.

"Visual image" is a partly undefined term for something seen somewhat in the way real objects are seen, when little or nothing in the immediate or very recent sensory input appears to justify it [p. 146].

Neisser goes on to hypothesize that imagination and perception are related processes. Visual imagery, like cognition and visual perception, is an active and constructive process, not a mere reflection or copying of past perceptual experiences.

Finally, Piaget and Inhelder (1969) define "imagery" in terms of their theoretical framework. They conceptualize the image as one aspect of the semiotic or symbolic function.

Certain behavior patterns appear which imply the representative evocation of an object or event not present and which consequently presuppose the formation or use of differentiated signifiers, since they must be able to refer to elements not perceptible at the time as well as to those which are present [p. 53].

As the child grows, the semiotic function develops and includes increasingly more complex behavior patterns. It begins with deferred imitation, and proceeds through symbolic play, drawing, and mental imagery to verbal evocation. The fundamental characteristic of all these symbolic behavior patterns, including mental imagery, is imitation.

## Measures of Imagination

There is a great diversity of approaches to measuring imagination. The measurement techniques can be conceptually classified into three categories: physiological measures, self-report measures, and behavioral measures.

### Physiological Measures of Imagination

Numerous research reports (Jacobson, 1932; Max, 1935, 1937; Shaw, 1940) assert that physiological measures validly assess imaginal events. In general, the muscle group that the subject might have used during the actual performance of his imaged activity produced small but measurable muscle action potentials (Max, 1937; Shaw, 1940). As Max (1937) reports, however, there is no assurance that the muscle group monitored is the one actually being used in imagination. For example, Max found that when subjects were asked to "imagine holding a live snake behind the neck [p. 309]," action potentials could almost always be recorded from one of their arms. One subject, who produced no such recordings in response to the item, reported that he saw himself holding the snake. Thus, an electromyographic record from the eye muscles of this subject would probably have yielded muscle action potentials.

Shaw (1940) investigated the relationship between the amount of neural activity and self-report of vividness. He demonstrated, not only "that minimal muscular activity occurs during. . .imaginal lifting [p. 47]" of a weight, but that the amount of muscular activity increased linearly with the size of the imaged weight. Shaw concluded that "the greater the reported vividness of the imaginal lifting, the greater the amount

of muscular activity [p. 47]." Neither Shaw nor any other author correlated their physiological measures with any measure of the general ability to image.

Despite the objectivity deriving from the use of physiological measures, there are numerous disadvantages to using them. First, as mentioned earlier, there is no assurance that while imaging, the muscle group being monitored is the one utilized. In addition, with complex and ambiguous situations to be imaged, it is difficult to specify which muscle group should be monitored. Finally, when using large sample sizes, physiological recordings are extremely time consuming and expensive.

#### Self-report Measures of Imagination

Two self-report measures of imagination seem particularly valid and reliable. They are: (1) the short form of the Betts' QMI vividness of imagery scale, and (2) the Gordon test of visual imagery control.

##### Short Form of Betts' QMI Vividness of Imagery Scale

The Betts' QMI is a 35 item questionnaire designed to measure the vividness of an individual's imagery. The subject is asked to image each item and to rate the vividness of each of his images. The subject is provided with a seven point scale for rating the vividness of his imagery. (See Appendix A for a copy of the Betts' QMI.)

Development of the short form of the Betts' QMI. Historically, the first form of the Betts' Questionnaire upon Mental Imagery (Betts' QMI) was developed by Galton (1880, 1883). In 1909, Betts expanded and altered it to produce a 150 item questionnaire covering the seven major

sensory modalities. Sheehan (1966a, 1966b, 1967a, 1967b, 1967c, 1967d) factor analyzed, shortened, and validated the Betts' questionnaire

*Galton.* As part of his inquiry into the human faculty, Galton (1880, 1883) examined differences in the ability to form visual images. He began by questioning his acquaintances, most of whom were scientists, about their mental images. He was surprised to discover that the more abstract thinkers--scientists and philosophers--reported less imagery than more mundane and poetic thinkers. As a result, he decided to make a more extensive survey. He developed a questionnaire which he mailed to people in a variety of professions. His questionnaire began as follows:

Think of some definite object--suppose it is your breakfast-table as you sat down to it this morning--and consider carefully the picture that rises before your mind's eye. 1. Illumination. -- Is the image dim or fairly clear? Is its brightness comparable to that of the actual scene? 2. Definition. -- Are all the objects pretty well defined at the same time, or is the place of sharpest definition at any one moment more contracted than it is in a real scene? 3. Colouring. -- Are the colours of the china, of the toast, breadcrust, mustard, meat, parsley, or whatever may have been on the table, quite distinct and natural [Galton, 1880, pp. 301-302]?

Galton continued by questioning his respondents about: (1) their command over visual images, (2) the quality of their visual images, and (3) the characteristics of their images in other sensory modalities.

Galton sampled several groups of people and eventually obtained approximately 300 respondents to his questionnaire. Using one sample of 100 individuals, he rank ordered their responses along three continua--illumination (vividness), definition, and coloring. He implicitly developed scoring categories for his continua by specifying individual responses which occurred at certain percentiles. The following illustrates Galton's scaling of the responses for the vividness continuum.

Highest. -- Brilliant, distinct, never blotchy.

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First Suboctile. -- The image once seen is perfectly clear and bright.

First Octile. -- I can see my breakfast-table or any equally familiar thing with my mind's eye quite as well in all particulars as I can do if the reality is before me.

First Quartile. -- Fairly clear; illumination of actual scene is fairly represented. Well defined. Parts do not obtrude themselves, but attention has to be directed to different points in succession to call up the whole.

Middlemost. -- Fairly clear. Brightness probably at least from one-half to two-thirds of the original. Definition varies very much, one or two objects being much more distinct than the others, but the latter come out clearly if attention be paid to them.

Last Quartile. -- Dim, certainly not comparable to the actual scene. I have to think separately of the several things on the table to bring them clearly before the mind's eye, and when I think of some things the others fade away in confusion.

Last Octile. -- Dim and not comparable in brightness to the real scene. Badly defined, with blotches of light; very incomplete; very little of one object is seen at one time.

Last Suboctile. -- I am very rarely able to recall any object whatever with any sort of distinctness. Very occasionally an object image will recall itself, but even then it is more like a generalized image than an individual one. I seem to be almost destitute of visualizing powers under control.

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Lowest. -- My powers are zero. To my consciousness there is almost no association of memory with objective visual impressions. I recollect the table, but do not see it [Galton, 1883, pp. 64-65].

Bain (1880) criticized the validity of Galton's questionnaire. It is impossible, he wrote, to discover if two people are having the same experience of a specific perceptual object, let alone to establish a

similarity between their mental images of that object. In other words, Bain claimed that descriptions of images provided by different people cannot be validly compared.

Bain also criticized Galton's survey for a lack of experimental control. He asserted that: (1) there was no control for the amount of experience each respondent had with the objects he was asked to image; (2) there was no control for the number and diversity of items each respondent might image on any given question; and (3) some respondents might have used verbal mediators to recall objects and obtained no images at all.

*Betts.* Betts (1909) was interested in studying "the distribution and functions of mental imagery." Among other interests, he was examining a theory, dominant in the early 1900s, that people possessed imagery-types. The theory hypothesized that there were individual differences in style of imaging, one modality being dominant over the others. According to the theory, different imagery-types possessed different personality characteristics.

In order to pursue his interest, Betts developed the Questionnaire Upon Mental Imagery utilizing questions and basic concepts from Galton's (1880) questionnaire. However, Betts changed Galton's questionnaire in two significant ways: (1) Betts greatly increased the number of items and made them more specific; and (2) Betts provided his subjects with a rating scale for indicating the vividness of their imagery. Each of these two major changes will be elaborated upon separately.

In the original (long) Betts' QMI, the subject is asked to obtain an image of each of 150 items. The items cover seven sensory modalities. The visual modality (40 items) is weighted most heavily due to its apparent diversity; the organic modality (10 items) is given the least

weight. The auditory, gustatory, olfactory, kinesthetic, and cutaneous modalities are weighted equally (20 items each).

Whereas Galton asked his respondents to describe their imagery, Betts provided a rating scale on which his subjects could rate the vividness of their images. The Betts' rating scale provides "seven alternatives for discriminating the degrees of clearness and vividness of the images [Betts, 1909, p. 20]." The clearest and most vivid image is rated "1"; the least clear and vivid is rated "7." When using the Betts' rating scale, the subject rates the vividness of each image by writing the number of the alternative which most closely describes the clearness and vividness of his image. The subject is instructed to refer to the following key when answering the items:

With respect to the mental picture suggested in each of the questions of the test, is the image which comes before your mind,

1. Perfectly clear and as vivid as the actual experience, or
2. Very clear and comparable in vividness to the actual experience, or
3. Moderately clear and vivid, or
4. Not clear or vivid but recognizable, or
5. Vague and dim, or
6. So vague and dim as to be hardly discernible, or
7. No image present at all, you only knowing that you are thinking of the object [Betts, 1909, pp. 20-21]?

*Sheehan.* As one aspect of research on hypnotic susceptibility, Sheehan worked to develop a shortened form of the Betts' QMI. In order to do this, Sheehan (1967a) administered the 150 items of the original Betts' QMI to 140 female and 140 male Australian college students. Although women consistently rated their imagery more vivid than men, the differences between them were not significant. In general, the differences between different modalities were greater than the differences between males and females within a given modality. Fourteen



separate factor analyses were computed. The data were separated by sex, and then, separate factor analyses were done for each of the seven modalities (2 sexes x 7 modalities = 14 factor analyses). The results indicated that a single factor accounted for most of the variance of the scores within each modality.

Given the above results, Sheehan constructed the short form by selecting from the original Betts' QMI, a sub-set of five items for each of the seven modalities. There were three criteria for selecting an item: (1) a high loading on the main factor for that modality; (2) similar means and standard deviations for the five items; and (3) correlations between the item and the total score similar for both sexes. The 35 selected items comprise the short form of the Betts' QMI.

In order to cross-validate the short form, Sheehan (1967a) administered the original (150 items) Betts' QMI to 32 female and 28 male Australian college students. A correlation of .92 was obtained between the total scores on the original and short forms. This finding was replicated ( $r=.98$ ) on a second sample. Sheehan (1967a) admitted that these correlations are spuriously high since the same 35 items overlapped on both tests. Regardless, these results suggest that a score on one form of the test reliably predicts a similar score on the other form.

Properties of the Betts' QMI. After Sheehan developed the short form of the Betts' QMI, various research was conducted to establish (1) its test-retest reliability and (2) its construct validity. Reliability and validity will each be discussed below.

*Reliability.* Sheehan (1967b) was interested in establishing the test-retest reliability of the Betts' QMI<sup>\*</sup>, as well as determining the test's applicability to American subjects. On two occasions, separated by seven months, Sheehan administered the Betts' QMI to a sample of 62 male, American, college students. The test-retest reliability obtained was .78. Excluding the organic modality, the average vividness ratings for each modality and for each item did not differ significantly from those of Australian men. However, for the organic modality, American men reported significantly more vivid imagery than Australian men.

*Validity.* A factor analytic study conducted by Sheehan (1967a) provides evidence of construct validity. Using the data obtained from the cross-validation sample (described on p. 16), 43 variables were extracted: 35 item ratings, total score for each of the seven modalities, and total test score. The 43 variables were factor analyzed, and a single major factor was obtained. Six minor factors seemed to be specific to modalities. The results indicate that the Betts' QMI measures a relatively pure and "general ability to image in a variety of sensory modalities [Sheehan, 1967a, p. 388]." Furthermore, it was found that a single underlying factor, vividness of imagery, accounts for most of the variance.

An independent replication of this factor analysis was conducted by Richardson (1969). The Betts' QMI and six other cognitive tests were administered to 162 Australian college students. The data were separated by sex. A factor analysis was done using the vividness score for each modality, the total vividness of imagery score, and the six cognitive tests. The factor analysis yielded nine factors with the seven sub-tests

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<sup>\*</sup>For the remainder of this dissertation, the term "Betts' QMI" actually refers to the short form (35 items) developed by Sheehan.

of the Betts' QMI all loading on the first factor. The visual modality yielded the highest factor loading (.951), and the organic yielded the lowest factor loading (.718). The total vividness of imagery score showed a factor loading of .990 on the first factor. This replication provides additional evidence to support the factorial purity and construct validity of the Betts' QMI.

Additionally, Sheehan conducted a series of experiments (Sheehan, 1966b, 1967c; Sheehan & Neisser, 1969; Sutcliff, Perry & Sheehan, 1970) from which construct validity of the Betts' QMI can be inferred. In this series of experiments, Sheehan used the Betts' QMI to classify his subjects into two groups: good imagers and poor imagers. The two groups--good imagers and poor imagers--were given the same experimental task to perform: subjects were first asked to reproduce their perceptions of two-dimensional stimuli composed of geometrical designs; subjects were then asked to reproduce their images of the stimuli. The stimuli varied in complexity; that is, they varied in color, shape, and number of design components. Sheehan found that there were consistent differences between those classified as good imagers on the Betts' QMI and those classified as poor imagers. For example, good imagers, when compared with poor imagers, consistently produced more accurate reproductions of the stimuli. Poor imagers, on the other hand, were inconsistent in their ability to accurately reproduce the stimuli.

*Properties of the rating scale.* As mentioned above (pages 14-15), the Betts' rating scale is an instrument on which respondents can rate the vividness of their images. The scale provides seven alternative ratings, ranging from 1, "perfectly clear and as vivid as the actual experience," to 7, "no image present at all, you only knowing that you are thinking of the object."

Since the rating scale alone provides the basis for a respondent communicating the vividness of his imagery, it seems that an awareness of some of its characteristics would be of interest to the reader. The possible mean score and skewness of the distribution of responses using the Betts' rating scale can be inferred by comparing the work of Betts and Galton. A comparison between Galton's rank ordering of the responses to his questionnaire and the rating scale alternatives listed by Betts seems to place the "middlemost" (or median) response in Galton's data at about 3 on the Betts' rating scale. This comparison suggests that the median vividness score on the Betts' rating scale should approximate "3." This inference is supported by Sheehan's (1967b) report that mean scores on the Betts' QMI for Australian and American college students are 2.99 and 2.85, respectively. Thus, one can expect the mean or median vividness of an image rated on the Betts' scale to approximate "3," "moderately clear and vivid."

One might also expect the distribution of scores to be positively skewed; that is, for most of the scores to fall toward the lower end of the scale where more vivid imagery is reported. This conclusion derives from the observation that the median falls at approximately "3." Consequently, half of the distribution lies between 1 and 3, and the other half between 3 and 7.

Summary of the short form of the Betts' QMI. Early work towards developing the Betts' QMI was done by Galton (1880, 1883). Betts (1909) expanded upon Galton's work and developed a 150 item questionnaire covering seven sensory modalities. Sheehan (1966a, 1966b, 1967a, 1967b, 1967c, 1967d) factor analyzed, shortened, and validated the Betts' QMI.

The Betts' QMI now includes 35 items, five in each of seven sensory modalities. The subject is asked to image each of the 35

items. A seven point rating scale is provided for the subject to rate the vividness of each image. (See Appendix A for a copy of the Betts' QMI.)

Two factor analytic studies have verified the construct validity of the Betts' QMI. Furthermore, they have demonstrated that the Betts' QMI measures a single, unitary factor--vividness of imagery.

The Betts' QMI was shown to be a reliable and valid instrument for measuring an individual's ability to image vividly. Individuals classified into good and poor imagers on the basis of the Betts' QMI have consistently demonstrated differences in their ability to evoke images in experimental settings.

#### The Gordon Test of Visual Imagery Control

The Gordon Test is a 12 item questionnaire designed to measure the control an individual has over his visual imagery. The first question asks the subject to obtain a visual image of a car, and in the succeeding eleven questions, the subject is directed to change or manipulate the image in some way. For each question, the subject reports whether he can or cannot obtain the new image. (See Appendix B, Part 1, for a copy of the Gordon Test.)

Development of the Gordon Test. The Gordon Test of visual imagery control was originally developed as part of some research into the formation of stereotyped images (Gordon, 1949). Gordon hypothesized that individuals with controlled imagery and individuals with uncontrolled imagery would differ in the flexibility of their stereotypes. Specifically, Gordon hypothesized that individuals with controlled imagery would form flexible stereotypes of different nationalities, and individuals with uncontrolled imagery would form rigid stereotypes of different

nationalities. In order to test this hypothesis, Gordon drafted her 12 item questionnaire to classify subjects as having controlled or uncontrolled imagery. Initially, there was no experimental research nor empirical evidence to support her choice of items.

As a result of his research, Costello (1957) enlarged upon the Gordon Test. In studying the ability of hysterics, dysthymics, neurotics, and normals to control their imagery, he found that subjects who had uncontrolled imagery could be categorized into two groups based on the type of difficulty they had in controlling their visual imagery. From questioning his subjects, Costello learned that a low score on the Gordon Test--that is, difficulty in controlling imagery--could result from one of two conditions: vivid-autonomous imagery and weak-unstable imagery. Vivid-autonomous imagery was vivid, and tended to change contrary to the volition of the subject; this interfered with the subject's manipulation of his imagery. Weak-unstable imagery was weak, and was not easily retained in visualization. Thus, a subject could not easily form images.

Properties of the Gordon Test. Although it would be informative to have evidence of the reliability of the Gordon Test, a search of the relevant literature failed to disclose any indication of its reliability. Likewise, there has been no research conducted for the purpose of validating the Gordon Test. However, construct validity can be inferred from three research studies.

As mentioned above, Gordon (1949) was interested in studying the relationship between imagery control and rigidity of stereotypes. She hypothesized that stereotyped or change-resistant images of national types would be related to uncontrollable or unchangeable visual imagery.

In order to test this hypothesis, Gordon obtained measures of imagery control and national stereotypes.

One hundred and sixteen subjects completed the Gordon Test. When a subject answered "Yes" to all the questions, he was classified "controlled" imagery type; when he answered "No" to one or more questions, he was classified "autonomous" (uncontrolled) imagery type. Gordon identified 74 controlled and 40 autonomous subjects. (Two subjects were eliminated due to incorrectly completed questionnaires.)

Images of given nationalities were obtained in the following way. In individual sessions, the subjects were asked to report the images arising in response to certain national stimulus-words, such as Englishman, Chinese, German or Jew. The subjects were then asked to explore the experiential determinants of these images; for example, by recalling the source of the image, the first experience they had had with a given nationality, current experiences with any nationalities, and any emotions experienced along with the image. The subjects' reported images were classified in terms of their rigidity or flexibility.

Gordon confirmed her hypothesis that stereotyped images of national types would be associated with autonomous imagery, and that flexible or less stereotyped images would be associated with controlled imagery. The autonomous imagery subjects relied on experiences occurring early in their life for these stereotypes, while controlled imagery subjects utilized more complex, less personalized and more "adult" information for their conceptions of national types. The confirmation of Gordon's initial hypothesis can be presumed to provide evidence of construct validity for the Gordon Test.

Later, Gordon (1950) conducted some further research in which she:

. . . attempted to find some more objective  
criteria which might corroborate the differentiation

of imagery processes and serve perhaps. . .as an additional method for the assessment of controlled and autonomous image types [Gordon, 1950, p. 63].

She hypothesized that perceptual and imaginal processes were conceptually intertwined and empirically related. She considered that reversal of perspective provides a perceptual analogue to the manipulation of imagery; that is, in both cases, the objective stimulus remains the same, and the change in perspective must result from some internal, psychological process. Consequently, Gordon examined the relationship between the ability to change the rate of reversal of the Necker cube and the ability to control visual imagery. She specifically hypothesized that controlled imagery types would be able to influence the rate of reversal more than the autonomous imagery types.

After testing 42 male, neurotic patients, she identified 20 autonomous and 22 controlled imagery subjects. All subjects were asked to report each reversal of the Necker cube by tapping a pencil. The subjects observed the cube for one minute in each of three conditions: normal (no instructions given), fast (instructions directed subjects to "increase the number of reversals as much as possible") and slow (instructions directed subjects to "decrease the number of reversals as much as possible").

The results indicated that the absolute rates of reversal for the three conditions did not differ significantly for the autonomous and controlled groups. A significant difference, however, was obtained in their ability to vary or change the rate of reversal: the controlled subjects could increase and decrease the rate of reversal significantly more than the autonomous subjects ( $p < .05$  in both cases).



Gordon concluded that her experiment tentatively supports the hypothesis that stereotopy--the tendency to resist change--is a characteristic attribute of a person's mental traits, such as imagery and perception. Individuals can be differentiated into two groups by a reversal of perspective test, and this differentiation closely parallels that of autonomous and controlled imagery types derived from the Gordon Test. Since Gordon initially hypothesized these findings, the research results can be interpreted as providing further evidence of construct validity of the Gordon Test.

In examining the effects of prefrontal leucotomy on complex operations, Costello (1956) further researched the relationship between the control of visual imagery and reversal rates of the Necker cube. Fifteen normal subjects completed the Gordon Test. Based on their responses, nine subjects were classified into the controlled imagery category and six into the autonomous imagery category. Subjects in the latter group typically reported more difficulty obtaining visual images while completing the Gordon Test. Furthermore, members of the autonomous group reported frequent, vivid dreams, while members of the controlled group rarely remembered their dreams.

The two groups produced significantly different changes in the rates of reversals for the Necker cube. (Costello reported no absolute rates of reversal for the different conditions.)

Costello also administered two additional tests of the ability to manipulate imagery: the Moray House Space Test Adv. 1 and the Group Test 80A of the National Institute of Industrial Psychology (N.I.I.P.). The controlled imagery group obtained higher scores on both tests, but a significantly greater score only for the N.I.I.P. There was no

significant difference between the two groups on two measures of intelligence, obtained with the Raven's Progressive Matrices and the Mill Hill Vocabulary Scale.

Thus, Costello's research provides further evidence of construct validity since he found that results on the Gordon Test were related to (1) ability to vary the rate of reversal of the Necker cube, and (2) results on the N.I.I.P., a measure of ability to manipulate imagery. Additionally, evidence of construct validity is obtained from the fact that results on the Gordon Test do not correspond to results on intelligence tests.

Summary of the Gordon Test. The Gordon Test is a 12 item questionnaire used to identify individuals with controlled and individuals with uncontrolled imagery. In each item, the subject is directed to manipulate a visual image of a car. The subject reports his success or failure for each item. (See Appendix B, Part I, for a copy of the Gordon Test.) Using the responses from the Gordon Test, subjects can be classified as controlled or uncontrolled imagers. If additional information is obtained, uncontrolled imagers can be further classified as vivid-autonomous imagers and weak-unstable imagers.

No data are available regarding the reliability of the Gordon Test. Construct validity can be inferred from three research studies (Gordon, 1949, 1950; Costello, 1956). These studies confirmed hypothesized relationships between results on the Gordon Test and (1) an individual's rigidity or flexibility of stereotopy, and (2) an individual's ability to change his reversal rate on the Necker cube.

### Behavioral Measures of Imagination

The only measure included in this section is the Juhasz Test of the Ability to Imagine (JAI).

#### Juhasz Test of the Ability to Imagine

The JAI includes exclusively behavioral measures of imagination. As such, it is unique among tests of imagination which typically rely upon self-report or problem solving.

The JAI is composed of 14 different behavioral measures of imagination. Each measure requires the subject "to act as if." In other words, Juhasz directs the subject to re-capture or re-experience some sensory experience and to manipulate it in the same sensory modality or translate it to a different modality.

Development of the Juhasz Test of the Ability to Imagine. The JAI was derived from a novel theory of imagination developed by Sarbin and Juhasz (1970). Their etymological analysis of the word "imagination" provides the basis for their theory.

Sarbin and Juhasz assert that originally "imaging" was used as a metaphor to describe the process of creating "graven images" or likenesses: thus the etymological relationship of "imagining" to the Latin word "imitari" (to imitate). "Imaging meant copying through the construction of an object that resembled the model [Sarbin & Juhasz, 1970, p. 56]." Sarbin and Juhasz suggest that "imaging" was originally used to describe this active process; and, the external active imitation became transformed to a passive, mechanical mirroring of two-dimensional pictures in the mind. "Imaging," a metaphor, became a mythical entity, "the imagination." Confusion concerning "imagination" derives from the confusion between

the original description of an active process and assigning it the status of an entity.

A contemporary conception of man, according to Sarbin and Juhasz (1970) conceives of him as an actor.

Man the Actor can, to some degree, control his experience. . .because he possesses intricate systems for acquiring and handling knowledge and, most pertinently, an ability to operate at various levels of hypotheticalness. . . . Man has hierarchical "as if" or hypothetical abilities which free him from domination by the immediate environment and allow for stimulation at a distance, not only in space but also in time [p. 61].

They define imagination as "hypothetical instantiation"--that is, the individual converts inputs into an instance or occurrence which is hypothetical. In simpler terms, he acts "as if."

As part of their theory, Sarbin and Juhasz proposed a developmental sequence for the development of imagination. A child acquires knowledge in a variety of ways, one of which is imitation. In the first stage, the child copies the behavior of another with the model present. This is "imitation." In the second stage, the child imitates an absent model. This is "role-taking"; and is more complex than imitation. In the third stage, the child mutes his role-taking. This is "imagination." Sarbin and Juhasz (1970) suggest that as the child learns to mute his speech, he also attenuates his actions and engages in silent role-taking.

Based on this conception of imagination, Juhasz (1970a) hypothesized a relationship between (1) the ability to image and (2) imitation and role-taking behavior. Specifically, the better the individual's ability to image, the better his ability to imitate and to take roles. Verbal ability would not predict imaging ability; but the ability to choose the better of two poetic images would be a good predictor.

Self-report of vividness of images or of readiness to image would be unrelated to the ability to image as conceptualized by Sarbin and Juhasz (1970).

In order to test their theory, Juhasz (1969, 1970a, 1970b) developed the JAI. In developing his instrument, Juhasz took account of some earlier work done by Piaget. According to Juhasz (1970a), Piaget was the first to develop a viable experimental method for the study of imagination. Basically, the method requires the subject to perform a task which necessitates imaging. The experimenter observes the subject's behaviors and draws inferences about the intervening imaginal processes. Juhasz was critical of Piaget's method because: (1) Piaget used exclusively cognitive tasks; (2) Piaget tested primarily the visual modality; and (3) Piaget used his method only with children. Therefore, Juhasz expanded Piaget's method to include additional tasks involving additional sensory modalities.

The original JAI includes thirteen items. For each item, the subject is directed to imaginally manipulate some sensory experience. In seven items, the subject is sequentially exposed to two stimuli. Afterwards, he must choose from a series of five comparison stimuli that stimulus which would be the one-to-one combination of the first two. In order to perform this task, the subject must manipulate the two stimuli in his "imagination," that is, "to act as if," the two were combined.

For example, in one item, the subject is to taste one solution and then to taste a second solution. The subject is then given a set of five solutions. He is directed to taste each one and identify which solution would result from mixing equal quantities of the original two

solutions. Juhasz emphasizes that these tasks do not lend themselves to verbal mediation; that is, there is no agreed upon label (e.g., sour or sweet) for the solutions.

Another example, Yellow, uses the same paradigm but crosses modalities. A blindfolded subject is given one shape to feel and then is given a second shape to feel. The two shapes each have only one straight edge so that placed next to each other, they form a large abstract shape. These two shapes are removed; the subject is given a set of five large abstract shapes; and the subject's blindfold is removed. The subject is then directed to view--not touch--the five alternative shapes and select the one which would result from placing the two original shapes next to each other. The other five items of this type involve (1) smells, (2) tastes and smells, (3) tactile perceptions of distances, (4) simple tones, and (5) musical selections.

Another task is similar to the seven above, but involves a more complex paradigm. The subject is requested to taste two aromatic solutions. The subject is then given five solutions and directed to identify, relying on taste and smell, the one solution which, when added to the first, would yield the second. Thus, whereas the seven tasks described above can be conceptualized as requiring addition of stimuli, this task can be conceptualized as requiring subtraction of stimuli.

One item in the JAI uses two sets of five abstractly shaped tiles. From one set, the subject is directed to choose, by sight alone, the tile he has just felt while blindfolded. From the other set, the subject is directed to choose, by touch alone--i.e., while blindfolded--the tile he has just seen. Although this item includes two distinct tasks, it is scored as a single item.

The following two items are the most explicitly Piagetian tasks in the JAI. The items involve having the subject watch a videotape of a model train traveling around an oval track. Half of the train's travel takes place inside of a tunnel. While the train is in the tunnel, "something" is done to the train. For example, while the train is in the tunnel, it may speed up, or the sound may "speed up" and the video slow down. The subject's task is to report what happened to the train in the tunnel. For one of the two items, the subject is exposed to only the video portion of the tape; for the other item, the subject is exposed to both the audio and video portions of the tape.

The JAI also includes two classical visualization problems. In one, the subjects are asked to solve the following problem:

A 3 inch cube, painted red, is sawed into one-inch cubes. (a) How many of the little cubes have paint on 3 faces? (b) How many have paint on just 2 faces? (c) How many have paint on just 1 face? (d) How many have no paint [Juhasz, 1970a, p. 13]?

The second visualization problem poses the following problem:

Think of a square. From the middle of the top line draw a line to the center of the square. From the middle of the right hand side draw a line to the center of the square. What do you have? . . . Now divide all of the large square not included in the smaller square into five triangles. What lines do you draw to do this? . . . Now divide the same area into four right triangles. What lines do you draw? . . . Now divide the same area into 10 right triangles. What lines do you draw [Juhasz, 1970a, p. 20]?

The thirteen items described above constitute the original JAI. However, as a result of his own research, Juhasz added a fourteenth item. The new item, ABC, requires the subject, while blindfolded, to feel an abstractly shaped tile. After removing the blindfold, the subject is to draw a tile with exactly the same shape and size. The subject repeats this task for three tiles.

In scoring the JAI, each of the original 13 items is assigned a score ranging from zero to four. Thus, the score for the 13 items can range from zero to 52. The fourteenth item, ABC, consists of three separate parts, each scored from zero to five. Thus, the total score for the fourteenth item can range from zero to 15.

Properties of the Juhasz Test of the Ability to Imagine. Juhasz has conducted some research to provide information regarding the reliability and validity of the JAI.

*Reliability.* Juhasz (1970b) has recently investigated the test-retest reliability of the JAI. On two occasions, separated by two months, he administered the JAI to 20 subjects. The test-retest reliability of an eight item "short form" was found to be .52 ( $p < .05$ ); the test-retest reliability of a 12 item version was found to be .57 ( $p < .01$ ).

*Validity.* Two research studies implemented by Juhasz provide evidence of the construct validity of the JAI. In his initial study, Juhasz administered the JAI to 100 undergraduate students. For each subject, Juhasz additionally collected two types of measures which he predicted would correlate with the subject's score on the JAI. One type of measure involved assessing the subject's role-taking and imitative ability. This was accomplished by having trained judges rate a video tape recording of the subject demonstrating his ability by performing specific imitative and role-taking tasks. (Several different measures were acquired from the judges' ratings.) For the second type of measure, Juhasz asked each subject to complete an additional measure of imagination. This additional measure, Poems 1A1B, required the subject to select the "better" of two poetic images for portions of each of two poems. (See Appendix C for a copy of Poems 1A1B.) Additionally,



for these subjects, Juhasz collected some "control" measures which one would expect to be uncorrelated with the subject's score on the JAI. These "control" measures included college major, verbal-visual dominance in problem solving, College Vocabulary Test (a test of verbal ability), an imagery self-report questionnaire (similar to the Betts' QMI), class, age, sex, and grade point average.

The first part of Juhasz' analysis involved predicting the imagination score from the imitation and role-taking measures and the Poems 1A1B measure. A step-wise multiple regression equation was computed. As hypothesized by Juhasz, the JAI score was predictable from the other variables.

Five variables: ratings of accurate visual and auditory imitation of a model's actions, intellectual understanding shown of various roles, ability at operational roles, ability to find the "better" of two alternative figures of speech for a poem, and three judges guess of imagining on the basis of observing role-taking and imitating tasks, have a multiple R of .5274 with the sum score of 14 behavioral measures of imagining--a value with a probability of .00027. Twenty-seven out of 100,000 chances are not generally included under the fortuitous accident category [Juhasz, 1970a, p. 46].

Also, as was predicted, Juhasz found no relationship between the results on the JAI and the "control" measures. Furthermore, Juhasz found that the self-report measures of imagination were completely unrelated to the behavioral measures of imagination obtained with the JAI. This, too, was consistent with Juhasz' a priori predictions.

The fact that Juhasz was able to successfully predict which variables would and would not correlate with scores obtained on the JAI provides evidence of the construct validity of the JAI.

Juhasz (1970b) has further researched his test of imagination by administering the JAI to 25 students at the San Francisco Art Institute

(SFAI). He predicted that creativity and imagination are interrelated. His prediction was supported by the finding that the art students scored significantly higher ( $p < .00001$ ) on the JAI than did the strictly academic students tested in his earlier research.

Juhasz also examined the question "Do those students who scored high on the JAI tend to be viewed as more creative than those students who scored low?" He verified that students who scored high were, in fact, viewed as more creative ( $p < .05$ ). He found no relationship between score on the JAI and academic performance. (This might be attributable to the fact that Juhasz was studying a college population which is relatively homogeneous with respect to I.Q.)

Juhasz also administered 160 additional variables to the SFAI students: these included the Strong Vocational Interest Blank, the California Psychological Inventory, and the Perceptual Acuity Test.

Juhasz summarized his findings as follows:

In general the picture of the person who does well on the performance measures of imagining is that of a well functioning, creative person. Particularly significant, in my opinion, is the negative correlation with academic courses and the high positive correlations with studio courses during the first semester at SFAI. The data certainly present evidence for the validity of the test. Of a total of 160 variables (many of which can be expected not to be significantly related to the test), two are significant at .001, 12 at .01, and 35 at .05--altogether 49 at better than .05 [Juhasz, 1970b, p. 14].

Summary of the Juhasz Test of the Ability to Imagine. The JAI is a behavioral measure of imagination. It includes 14 items, each of which requires the subject to imaginably manipulate a sensory experience. The JAI was developed from a novel theory of imagination which conceives of imagination as hypothetical instantiation, "to act as if." A 12 item

version of the test has been shown to have a test-retest reliability of .57. Construct validity of the JAI can be inferred from two research studies conducted by Juhasz.

### Systematic Desensitization Therapy

The primary objective of the search into the literature on systematic desensitization therapy (desensitization) was to discover variables which should be considered in the design of this research. The primary sources for this literature search were two recent, comprehensive surveys of behavior therapy: Bandura's 1969 book titled, Principles of Behavior Modification, and Franks' 1969 book titled, Behavior Therapy: Appraisal and Status.

### The Systematic Desensitization Package

Gordon Paul (1969b) has characterized systematic desensitization as consisting of a three-part package: (1) training in deep muscular relaxation, (2) construction of anxiety hierarchies, and (3) systematic desensitization itself.

Typically the relaxation procedure is a shortened version of Jacobson's (1938) progressive relaxation training. The procedure involves teaching the subject (1) how muscular tensing feels, (2) how to control the tensing, and (3) how to stop tensing. As a result, the individual learns to control his musculature and to reduce muscular tension.

An anxiety hierarchy is a list of graded stimulus situations which create progressively more anxiety or fear for the individual. Generally,

the anxiety or fear varies along several dimensions (e.g., distance from or size of an object), and the amount of anxiety can be varied by varying the imaged stimulus along these dimensions.

The desensitization procedure itself entails pairing imaged situations from the anxiety hierarchy with deep muscular relaxation. In its clinical application, the client images the least anxiety provoking item and proceeds through the hierarchy to the most anxiety arousing item. A client does not proceed from a lower to a higher item until he has imaged the first scene several times without anxiety. In other words, the client does not proceed to a higher item in the hierarchy until the anxiety associated with the lower item is extinguished.

#### Brief Historical Sketch

The first desensitization-like procedure was reported by Mary Cover Jones in 1924 (Jones, 1962). Peter, a two year old boy, displayed an intense fear of white rats and other fur-like animals or objects. Jones was able to extinguish the fear by slowly bringing a live rat and other furry animals and objects progressively closer to Peter while he was responding to pleasant stimuli such as playmates or food.

Almost no publications regarding desensitization appeared between 1924 and 1949. In 1949, Salter published Conditioned Reflex Therapy, the first published description of behavior therapy and desensitization-like techniques. Joseph Wolpe (1969), who had already begun experimenting with desensitization procedures, was influenced by Salter's book and optimism to extend the application of this technique.

In the late 1940s, Wolpe (1958, 1969) had been able to successfully create and extinguish neurotic fear responses in laboratory

animals. The animals were first traumatized in a given cage or setting. Wolpe then brought them gradually closer to the fearful situation while maintaining benign or pleasant stimulation. The benign stimuli, according to Wolpe, created a state antagonistic to fear. The repeated association of the benign and the fear evoking stimuli extinguished the fear response.

Wolpe extended his technique to help some of his human patients eliminate their phobias. First, he was interested in identifying specific internal states which in human beings would be antagonistic to anxiety and fear. It was necessary for Wolpe to identify controllable internal states, so that they could be experienced continguously with the fear evoking situations. He discovered three human responses-- sexual responses, assertive responses, and deep muscular relaxation-- which result in or reflect internal states antagonistic to anxiety and fear.

In working with his human patients, Wolpe tried to use a modification of the procedure he had used with laboratory animals. He instructed his patients to move closer and closer to the fear inducing stimulus while maintaining deep muscular relaxation. These in vivo procedures often proved ineffective because the fear inducing stimulus could not be controlled. Consequently, the patient would experience such intense anxiety that it would not be counteracted by the deep muscular relaxation. Thus, the patient would experience anxiety, and the extinction procedure--that is, the pairing of the fear inducing stimulus with deep muscular relaxation--would fail.

Since his in vivo procedures were often ineffective, Wolpe experimented with having his patients image the fear inducing stimulus in

lieu of having them actually confront the stimulus. He discovered that the use of imaginal events was, in fact, effective in reducing phobias.

During the 1950s, there was little research on and use of behavioral therapy techniques--especially systematic desensitization therapy (Paul, 1969a). However, throughout the 1960s, interest in desensitization increased greatly. In fact, at the present time, "in terms of sheer output of research, the desensitization branch of behavior therapy ranks just behind that of positive reinforcement [Krasner, 1971, p. 300]."

### Theory of Systematic Desensitization Therapy

There is controversy concerning the psychological and psychophysiological mechanisms operating in systematic desensitization. Wolpe (1958) espouses a Hull-Spence theory of learning and hypothesizes that "reciprocal inhibition" is the crucial process in systematic desensitization therapy.

If a response antagonistic to anxiety can be made to occur in the presence of anxiety-evoking stimuli so that it is accompanied by a complete or partial suppression of the anxiety responses, the bond between these stimuli and the anxiety responses will be weakened [Wolpe, 1958, p. 71].

Wolpe theorizes that a parasympathetic response--such as, sexual response, assertion, or deep relaxation--reciprocally inhibits sympathetic responses--such as, anxiety or fear. Wolpe suggests that it is conditioned inhibition which extinguishes the original anxiety response. Once the inhibitory process has been conditioned to the original anxiety evoking stimuli, the anxiety response will have been extinguished, and the individual will no longer need to perform the anxiety inhibiting behavior. Bandura (1969) and Lang (1969) doubt the validity of Wolpe's speculations.

Bandura asserts that Wolpe has hypothesized "a drive-reduction theory of learning and a fatigue theory of extinction [Bandura, 1969, p. 431]," while the experimental evidence supports a contiguity theory of learning and a response substitution theory of extinction. Bandura provides a thorough review of experimental and theoretical issues related to systematic desensitization, and describes the systematic desensitization therapy process differently from Wolpe.

Bandura defines phobic anxiety and fear as a conditioned emotional response leading to avoidance behavior. The process of systematic desensitization or "counter-conditioning" allows a new response--namely, relaxation--to be associated with the previously threatening stimuli. Bandura also disagrees with Wolpe's neurophysiological speculations, and asserts that mutually inhibitory mechanisms are more likely to operate sub-cortically than in the autonomic nervous system.

Lang (1969) expresses more extensive criticisms of Wolpe's hypothesized neurophysiological mechanisms. He agrees with Bandura that extinction is a response substitution process based on a contiguity theory of learning. He criticizes the simplified, unitary theory or systematic desensitization espoused by Wolpe; specifically, he criticizes Wolpe's idea that there are two mutually inhibiting autonomic states--arousal and quiescence. Neurophysiological evidence, according to Lang, demonstrates that the autonomic nervous system responds with great diversity and individual variability, not in a unitary fashion. Consequently, Lang contends that Wolpe's theory that there is a single, autonomic anxiety or fear response greatly oversimplifies the situation.

According to Lange, there are some fundamental questions concerning the role of the autonomic nervous system which need answering. Do

certain autonomic responses attenuate other autonomic responses? If they do, can they be learned? And, more specifically, does muscular relaxation lead to a direct effect upon the autonomic nervous system?

In addition to these issues, the process of systematic desensitization engenders a further question: what is the relationship between the behavioral, the verbal and the autonomic responses of fear or anxiety? Lang suggests that the evidence points to processes other than the relearning of autonomic responses.

It is also possible that the shaping of verbal behavior is the important part of desensitization, that cognitive set is the controlling element, and that the physiological concomitants are a simple peripheral constituent [Lang, 1969, p. 184].

Lang, Melamed, and Hart (1970) have conducted some research designed to obtain answers to these questions. "Overall, the results support the view that desensitization modifies autonomic, as well as gross motor and verbal responses, through learning [Lang, Melamed & Hart, 1970, p. 200]." As one part of their study, they monitored psychophysiological measures (heart rate, galvanic skin response, and respiration rate) during an automated desensitization procedure. They discovered that a subject's signal of fear on a given item, in fact, corresponded with an increase in autonomic arousal. Repeated presentation of this item led to a reduction in autonomic activity. Greatest reduction of fear after desensitization was associated with (1) higher heart rates during sessions in which fear was reported and (2) greater reduction in heart rate upon re-presentation of a fear evoking item. Least reduction of fear was associated with (1) lower heart rates across sessions and (2) little change in autonomic activity when a fear evoking item was signaled.

In effect, [subjects] who change tend to be more responsive autonomically and their autonomic



responses are synchronous with verbal report. The low change [subjects] tend to show dissociation between the verbal report and autonomic responsiveness [Lang, Melamed, & Hart, 1970, p. 229].

#### Evaluation of Systematic Desensitization Therapy

Systematic desensitization therapy has consistently been shown to be effective in reducing avoidance behaviors. Paul (1969a, b, c) has thoroughly reviewed and evaluated all reported research on systematic desensitization through 1968. Paul summarizes his review as follows:

A total of 75 papers were reviewed in detail. . . . These reports covered the application of systematic desensitization therapy to nearly 1,000 different clients in the hands of over 90 different therapists. While 55 of these papers were uncontrolled case reports or group studies without sufficient methodological controls to establish independent cause-effect relationships, 20 of the reports were controlled experiments, and 10 of the controlled experiments included designs which could potentially rule out intra-class confounding of therapist characteristics and treatment techniques. The findings were overwhelmingly positive, and for the first time in the history of psychological treatments, a specific therapeutic package reliably produced measurable benefits for clients across a broad range of distressing problems in which anxiety was of fundamental importance. "Relapse" and "symptom substitution" were notably lacking, although the majority of authors were attuned to these problems. Investigations of equal quality and scope have not been carried out with other treatment techniques deemed appropriate for similar problems, and cross-study comparisons where control is absent have little meaning [Paul, 1969c, pp. 158-159].

Marks and Gelder (Krasner, 1971) reviewed approximately 35 studies on systematic desensitization therapy and arrived at a conclusion similar to Paul's. They state that:

Nearly all investigations showed desensitization to produce more change in the treated fear than did the corresponding control treatments, which included relaxation, graduated exposure, flooding,

visualizing non-phobic scenes, suggestion and hypnosis, insight psychotherapy, drug, placebo, and no treatment or a period on a waiting list. Only live modeling with guided exposure has produced superior results [Marks & Gelder, 1968, p. 79; cited in Krasner, 1971].

#### Variables Affecting Systematic Desensitization Therapy

Fairly extensive research has been conducted on desensitization. Following is a brief overview of some definitive summaries of this research; some of the major variables mentioned as affecting desensitization will be enumerated.

Lang (1969) has researched the mechanisms of systematic desensitization.

We know that there is something about the desensitization process itself, the bald mechanics of the procedure, which instigates change. However, consistent positive results are obtained despite wide variations in procedural details. Thus, desensitization may be successfully applied by therapists of varying experiences and theoretical persuasion--even by an anonymous machine. Hypnotic induction procedures are not vital and have been dispensed with by most researchers and many practitioners. While the use of relaxation training and instructions have increased the frequency or persistence of fear reduction, it is not clear that such training is necessary. Most laboratory workers have employed anxiety hierarchies in treatment analogs of desensitization, and the data suggest that visualized scenes tend to evoke both the verbal and autonomic components of fear. However, some researchers have observed positive effects, even when intense fear stimuli are presented without preamble [Lang, 1969, p. 189].

Bandura (1969) has reviewed the controlling variables in systematic desensitization therapy. He cites research which suggests that social influence and expectancy effects are not crucial to effective fear reduction, but that they might facilitate the process. He further asserts that relaxation is not necessary but facilitative. In addition,

visualizing a graded series of stimulus scenes from the least to the most anxiety evoking is not critical for desensitization to be effective.

Paul (1969a, b, c) in his exhaustive review of the literature on desensitization evaluated its effectiveness. Generally, desensitization was most effective when more than 75 percent of the anxiety hierarchy had been completed. "A high positive relationship between items completed and all measures of fear change has been a consistent finding [Lang, 1969, p. 177]." The greater an individual's fear and the more extensive his anxieties, the less effective is desensitization. The use of actual or imaged scenes seemed to be equally effective.

Paul (1969c) also reviewed eleven controlled studies in which desensitization was used with groups of subjects. All eleven studies obtained positive results, although the change was not as great as that obtained with individualized treatment.

#### Visualization (Imaging) and Systematic Desensitization Therapy

Visualization is another variable which might affect systematic desensitization therapy. However, the role of visualization in desensitization was merely mentioned by Bandura (1969) and Paul (1969).

Individuals who are unable, for one reason or another, to visualize threatening stimuli vividly, or for whom imagined scenes fail to evoke emotional reactions, will most likely derive little benefit from. . .[systematic desensitization therapy] [Bandura, 1969, p. 473].

A small number of failures are reported due to difficulty in imagery, in which avoidant thinking patterns precluded responses to visualization [Paul, 1969c, p. 147].

Only Davis, McLemore and London (1970) have directly examined the relationship between visual imagery and systematic desensitization therapy. Thirty-three subjects completed an imagery scale after they had undergone a systematic desensitization procedure. A significant correlation ( $r = +.40$ ,  $p < .05$ ) was obtained between the imagery score and pre-therapy measures of fear. When this correlation was partialled out, the correlation between visual imagery and improvement as a result of systematic desensitization therapy was non-significant. These results suggest that good visual imagers (as measured by their scale) tend to approach the feared object closer than poor visual imagers. The authors theorize that the phobia of the good imagers is based primarily upon imagination, and thus, they are not as frightened when confronted by the objective stimulus. The phobia of the poor imagers, on the other hand, is maintained by sensory experience and not their imagination. Their fear is not exacerbated by their imagination, but by external sensory input. As a result, the poor imagers remain further away from the feared object when confronted with it in actuality. The authors predict that, in the systematic desensitization procedure, using objective stimuli would be more effective with poor imagers while using imaged stimuli would be more effective with good imagers.

Their imagery scale might have had some effect on their results.

They describe the scale as follows:

Subjects were asked to imagine each of 40 objects, and to rank the dominant sensory modalities elicited by each of them. The modalities were: visual, auditory, taste-smell, touch and motion. . . . One measure from the imagery scale was used, the visual modality score, which was the sum of the ranks for this modality among all 40 stimulus items. Since all Ss were presented the same stimuli, the score for this modality was taken as a measure of visual imagery ability [Davis, McLemore & London, 1970, p. 12].

From this description, their measure of visual imagery ability appears to be the extent to which visual imagery is dominant over imagery in the other modalities. In an earlier section of this literature review, it was reported that there are high intercorrelations between the vividness of imagery in all modalities. As a result, it is questionable as to whether the Davis et al. imagery scale measures visual imagery ability. It would appear to measure the dominance of visual imagery over imagery occurring in other modalities. Consequently, their results suggest that individuals whose visual imagery dominates over imagery from the other modalities approach fearsome objects more closely than those for whom it is less dominant. The authors' prediction can be restated as follows: individuals for whom the visual modality is most dominant in their imagery will profit from imaginal stimuli in systematic desensitization therapy, while individuals for whom the visual modality is not dominant will profit from the use of real stimuli in systematic desensitization therapy.

Rimm and Bottrell (1969) conducted some research in which they related imagery ability to desensitization. Using 55 subjects, they examined the intercorrelations between four measures: (1) a Betts-like self-report measure of the ability to image (Self-Report); (2) improvement in paired associate learning after being instructed to use imagery as an aid (Recall Improvement); (3) changes in respiration while imaging fearful scenes; and (4) the ability to remember the location of objects in a picture that was seen for 20 seconds (Picture Memory). The results are displayed in Table 1.

The authors conclude that Self-Report and Picture Memory might be useful prognostic devices for selecting subjects for systematic

TABLE 1

Intercorrelations Between Four  
Measures of the Ability to Image

	Recall Improvement	Picture Memory	Change in Respiration	
			Fearful Scene	Neutral Scene
Self-Report	-0.05	0.16	0.30 <sup>*</sup>	0.10
Recall Improvement		0.31 <sup>+</sup>	0.06	0.09
Picture Memory			0.33 <sup>+</sup>	-0.11

\*  $p < .05$     +  $p < .02$

Note: Data taken from Rimm & Bottrell, 1969, p. 62.

desensitization therapy. They also cite a 1967 study by Grossberg and Wilson in which self-report of clarity of fearful scenes was positively related to change in heart rate during imagination. Rimm and Bottrell conclude, somewhat erroneously in the present author's opinion, "that Picture Memory may prove to be the superior of the two [measures] [Rimm & Bottrell, 1970, p. 63]."

As shown in Table 1, both Self-Report and Picture Memory correlate significantly with the emotional response to the imaged fearful scene. But, it is naive to suppose that because Picture Memory correlated more significantly with one measure of emotional response to an imaged scene that it will be superior. Of interest to the present author is that Self-Report and Picture Memory are ostensibly independent measures ( $r = +.16$ ), and yet both correlate significantly with the change in respiration while imaging the fearful scene. Of even greater interest is that Recall Improvement correlates significantly with Picture Memory

( $r = +.31$ ), but does not correlate with change in respiration ( $r = +.06$ ). These observations suggest--somewhat speculatively--that Self-Report, Recall Improvement, and Picture Memory are different facets of the ability to image, and in contradistinction to Rimm and Bottrell's conclusion, Picture Memory and Self-Report would be the most appropriate measures to use as "prognostic devices" for systematic desensitization therapy.

Lang (1969) and Lang, Melamed and Hart (1970) have done the most extensive research on the relationship between visualization and items of the anxiety hierarchy. The theory of desensitization postulates that an imaged scene will arouse fear and anxiety as would an in vivo exposure. Lang (1969) describes some research in which he examined this postulate. In his research, he found that concurrent with subject's verbally reporting anxiety in response to a particular item, there was an increase in their heart rate and GSR. In other words, both verbal reports of anxiety and physiological indicators of anxiety occurred in response to visualized fear inducing scenes.

Lang (1969) also examined physiological measures and verbal reports of anxiety in relation to reported vividness of visualization for items at different levels of the anxiety hierarchy. Consistent with the theory, items visualized from the more anxiety arousing end of the hierarchy were correlated with higher ratings of anxiety and more rapid heart rate. For four spider phobic subjects, an increasing monotonic function was obtained between hierarchy level and physiological and self-report measures of anxiety. There was no significant difference between the ratings of the vividness of the visualization of the items at the different levels of the hierarchy.

This monotonic relationship between hierarchy level and physiological and self-report measures of anxiety was not obtained for four public speaking phobic subjects. There was no significant difference between anxiety measures for items from either end of the hierarchy. These inconsistent results might be attributable to differences in the vividness of imagery, since the public speaking phobic subjects reported significantly less vivid imagery than the spider phobic subjects. "It is not yet clear whether this difference is intrinsic to these specific items used, or a function of this particular subject sample [Lang, 1969, p. 177]."

In a subsequent study, Lang, Melamed and Hart (1970) further examined the relationship between GSR, heart rate, respiration rate, verbal report of anxiety, vividness of imagery and level on the anxiety hierarchy. Their subjects included ten spider phobic and ten public speaking phobic subjects. Their results were consistent with Lang's earlier finding that heart rate and verbal report of anxiety increase with increasing hierarchy level. Again, GSR and respiration rate increased in a significant, monotonic function only for the spider phobics but not for the public speaking phobic subjects.

Lang, Melamed, and Hart also replicated Lang's previous finding that, for both phobic groups, there was no reported difference between the vividness of images at the different hierarchy levels. However, they did find that, for both groups, neutral items were significantly more vivid than hierarchy items. Moreover, the public speaking phobic group, as compared to the spider phobic group, reported significantly less vivid imagery for both the neutral and hierarchy items. The correlative relationships between vividness and verbal report and



physiological responses to the hierarchy items is displayed in Table 2. GSR is not included since it was not significantly related to any other

TABLE 2

Correlations For Two Phobic Groups  
Between Vividness, Verbal Report and  
Physiological Measures of Anxiety in  
Response to Anxiety Hierarchy Items

	Vividness of Imagery		
	Spider	Public Speaking	Total
Respiration Rate	.79*	-.24	.14
Heart Rate	.17	.60	.52*
Verbal Report of Anxiety	.30	.88**	.69**

\* $p < .05$     \*\* $p < .01$

Note: Data taken from Lang, Melamed & Hart, 1970, p. 232.

measure. As can be seen from the bottom row of Table 2, the more vividly imaged items were also reported to be more anxiety evoking. Vividness of visualization and heart rate becomes significant only when the two groups are combined; and the relationships between vividness of visualization and respiration rate is significant only for the spider phobic subjects.

Once again differences between the spider phobic and public speaking phobic subjects are obtained. The authors suggest that "group differences in personality or actual capacity to visualize are involved [Lang, Melamed & Hart, 1970, p. 233]." The possibility that the items for the public speaking group involved more complex scenes than the spider phobic items was not explored. If the items were more complex,

then, as reported in the review of the imagination literature, they would be more difficult to image and probably less vivid. The authors, however, cite other evidence concerning differences between individuals with small animal phobias and social phobias. Individuals with social phobias are less responsive to desensitization than those with more focused phobias: a result, theoretically, of higher activation levels in the social phobics. Furthermore, social phobics do not seem to display habituation of GSR response over hierarchy items and display more variability of GSR during rest. The authors conclude that:

One is prompted to speculate that the ability to visualize stimuli facilitates habituation. It may reflect an assimilation of the stimulus. . . . In any event, it seems reasonable to identify both visualization and habituation as important interacting variables in the desensitization process [Lang, Melamed & Hart, 1970, p. 233].

### Summary

Systematic desensitization therapy is a therapeutic technique devised by Joseph Wolpe to help individuals eliminate specific fears and anxieties. Desensitization consists of a three-part package: (1) training in deep muscular relaxation; (2) construction of anxiety hierarchies; and (3) systematic desensitization itself. In the desensitization procedure, a subject, while deeply relaxed, images a graded series of stimulus situations. The series of stimulus situations create progressively more fear and anxiety; and the subject proceeds from the least to the most anxiety provoking situations.

Although there is some controversy about the psychological and physiological processes operating in systematic desensitization therapy,

researchers consistently report that it is a highly effective technique to help individuals eliminate circumscribed fears and anxieties. Fairly extensive research has been conducted on desensitization; and some of the major variables influencing its effectiveness have been elucidated.

## CHAPTER III

### METHOD

This chapter will begin with a discussion of the relevant variables and specific hypotheses, continue with a brief overview of the procedure, and conclude with a detailed description of each of the four stages involved in this research.

#### Relevant Variables

As mentioned in the first chapter, this research is designed to test London's (1964) hypothesis that the elicitation of vivid imagery will be as effective as systematic desensitization in reducing phobic behaviors. In order to test this hypothesis, what are the relevant dependent and independent variables?

#### Dependent Variable

It is clear from the above hypothesis that the dependent variable is "reduction of phobic behavior." As a result, the measurement of phobic behavior will be one aspect of the experimental design and method.

### Independent Variables

The potentially relevant independent variables alluded to in London's theoretical rationale (See Chapter I.) are as follows: (1) the capacity of the therapist's verbal description to elicit vivid imagery; (2) the ability of the subject to have his imagination aroused; (3) the ability of the subject to image vividly; and (4) the two different conditions of imaging a phobic or a non-phobic object. Which of these variables are relevant to an adequate test of the hypothesis?

The first variable, "the capacity of the therapist's verbal description to elicit vivid imagery," is essentially irrelevant to a test of the hypothesis. This variable pertains to the effectiveness certain verbalizations might have in eliciting imagery. It is not pertinent to the hypothesis, however, since it does not deal directly with reducing phobic behaviors. Consequently, the first variable will be held constant in the design of this experiment.

There is a subtle distinction between the second and third variables. The second variable, "the ability of the subject to have his imagination aroused," refers to a passive responsiveness on the part of the subject; that is, the second variable is concerned merely with the subject's ability to respond to suggestions of images offered by the therapist. On the other hand, the third variable, "the ability of the subject to image vividly," refers to the active ability to image vividly. It is apparent that the third variable should definitely be included in the experimental design.

Whether the second variable is related to a test of the hypothesis is less obvious. The variable pertains to the subject's predisposition--

for example, his suggestibility--to image in response to certain external conditions; it is not directly concerned with the vividness of his imagery. Since the hypothesis for this research is stated in terms of vividness of imagery and not in terms of suggestibility, the second variable will be ignored in this study.

The fourth variable, "imaging a phobic or a non-phobic object," is one of the major components of the hypothesis. The inclusion of this variable in the design will provide a test of London's proposition that the extinction of anxiety is not the process underlying systematic desensitization therapy.

To summarize, it seems that the third and fourth variables are necessary and sufficient to adequately test the hypothesis. Therefore, the two major independent variables to be included in this research are: (1) the ability of the subject to image vividly, and (2) the conditions of imaging a phobic object (desensitization) or a non-phobic object (imagination). Figure 1 graphically depicts the experimental design.

### Specific Hypotheses

Given the general hypothesis and the relevant variables discussed above, four specific hypotheses were tested.

Hypothesis one: The desensitization and imagination conditions will be equally effective in reducing fear of the phobic object.

Hypothesis two: Subjects possessing a high ability to image vividly will demonstrate a significantly greater decrease in fear of the phobic object than the subjects possessing a low ability to image vividly.

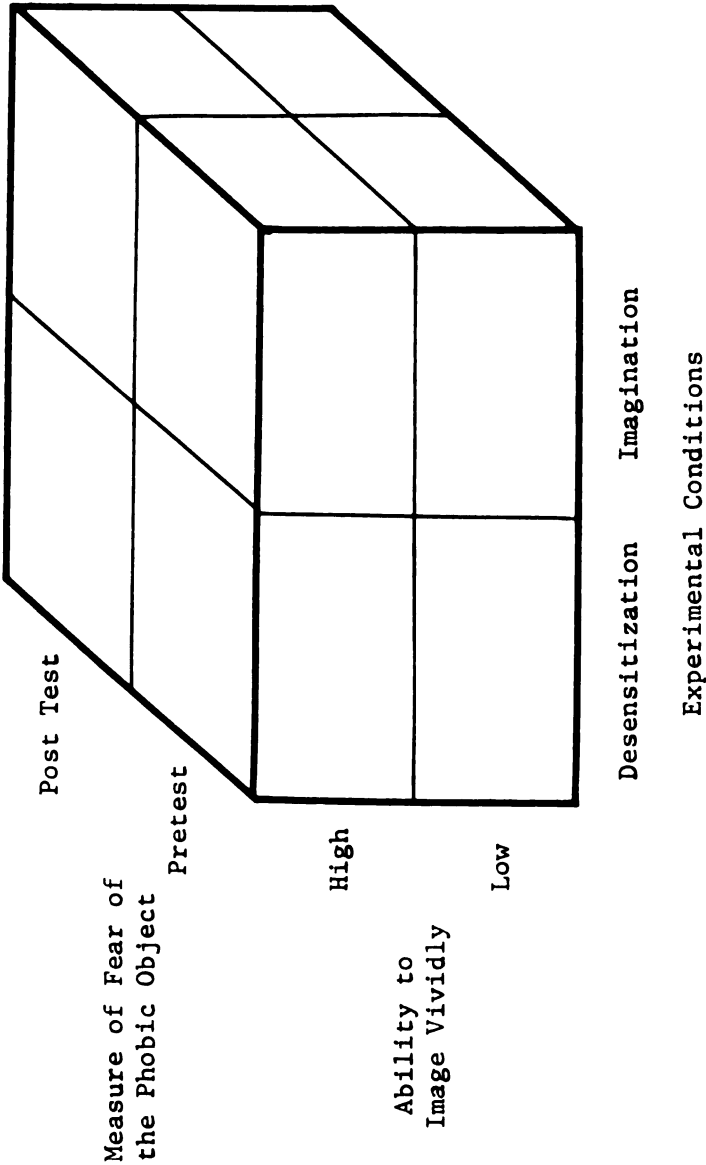


FIGURE 1

Experimental Design

Hypothesis three: There will be no interaction between the experimental conditions and ability to image vividly.

Hypothesis four: Subjects who report more vivid imagery during the experimental procedures will demonstrate a larger decrement of fear than those subjects who report less vivid imagery.

### Overview of the Procedure

The above discussion details three variables--two independent and one dependent--which must be considered in testing the hypothesis: (1) subjects must be identified who are high on the ability to image vividly, and subjects must be identified who are low on the ability to image vividly; (2) two experimental conditions--imagination and systematic desensitization--must be established; and (3) pre- and post test measures of fear of the phobic object must be obtained.

Thus, the research procedures can be conceptually divided into four stages: subject selection, pretest, experimental procedure and post test. Following is a discussion of each stage, and a description of the methodological details involved. Figure 2 summarizes the method to be used in this study.

### Subject Selection

The purpose of the "subject selection" stage of this study was to obtain volunteers who possessed two characteristics: a usable phobia and extremely high or extremely low vividness of imagery. In order to ascertain who possessed these two characteristics, a population of potential volunteers completed two instruments: the Betts' QMI and a



	Subject Selection	Pretest	Experimental Procedure		Post Test
			Desensitization	Imagination	
Purpose	To obtain <u>S</u> pool; To obtain <u>Ss</u> with 1) hi/low ability to image vividly, & 2) usable phobias	1. To obtain additional & behavioral measures of imagination; 2. To obtain behavioral & self-report measures of fear before treatment	To test the hypotheses		To obtain behavioral & self-report measures of fear after treatment
Procedure	Administration of self-report instruments to regular classrooms	Individual administration of instruments to volunteers	Group Desensitization	Group Imagination	Individual administration of instruments to <u>Ss</u>
Initial N	925	52	23	24	39
Measures Obtained	Imagination: Betts' QMI Gordon Test Fear: Fear Survey	Imagination: JAI Necker Cube Fear: Behavioral Self-report	Imagination: Self-report measure of vividness of imagery during the procedure		Fear: Behavioral Self-report
Time	30-35 minutes	30 minutes	Six 45-minute sessions		15 minutes

FIGURE 2

Graphic Illustration of the Method

fear survey. Because these instruments are so crucial to the subject selection procedures, they will be discussed first.

### Instrumentation

#### The Betts' QMI

Although numerous reports assert that physiological measures validly assess imaginal events (See Chapter II, pp. 10-11.), their numerous disadvantages precluded their use in this research. Therefore, it was necessary to select alternative procedures for measuring ability to image vividly.

The short form of the Betts' QMI Vividness of Imagery Questionnaire was chosen, for two reasons, as the measure of the ability to image. First, both the general hypothesis and London's theoretical rationale emphasize vividness of imagery. No other measure of imagery found in this author's review of the literature specifically measures vividness. Consequently, the Betts' QMI was the only appropriate measure for this research. Second, as discussed in Chapter II, the Betts' QMI seems valid and reliable, especially in relation to objective criteria.

The Betts' QMI consists of 35 items, five in each of seven sensory modalities. (See Appendix A for a copy of the Betts' QMI.) The subject is asked to obtain an image of each item and then to rate the vividness of his image. A seven point scale is provided on which the subject is to record the vividness of each image. A low rating means more vivid imagery; a high rating means less vivid imagery. Total scores on the Betts' QMI can range from 35 to 245.

The Betts' QMI used in this research is essentially the same as Sheehan's version (See Chapter II, pp. 15-16.); however, two minor

changes have been made. First, the instructions for the test were altered slightly to read more easily and clearly. Second, the format of the Betts' rating scale was altered. In the original version, the subject wrote the number of the appropriate rating next to the item which he had imaged. In the revised version, a four inch line was provided as a rating scale, and the specific response alternatives were indicated by the numbers one to seven placed at equal intervals along the four inch line. The subject was directed to record his response by making a slash across the scale at any appropriate point; unlike the original version, he was not restricted to the seven integers. The anchor points on the rating scale were identical to the response alternatives originally provided by Betts in his rating scale key. The revised rating scale provided greater discrimination and flexibility for the subject to rate the vividness of his image. Since he was not limited to only seven integers, he essentially had an infinite number of response possibilities.

Results obtained with the modified version of the Betts' QMI and results obtained with the original version used by Sheehan (1967a) are compared in Table 3. It is evident that the results obtained using the modified version are consistently lower--that is, more vivid--than those obtained by Sheehan. A two-tailed t-test comparing the two means is significant at the .0001 level. This result is probably attributable to the modified scale which allows the respondent to use fractional responses instead of exclusively integers. In other words, if an individual's "true" score lies between 2.5 and 3.0, Sheehan's version of the rating scale forces the individual to respond with 3.0, whereas the modified version allows the respondent to record his "true" score. Thus, assuming that the "true" mean is between 2.5 and 3.0, one would expect to

TABLE 3

Means and Standard Deviations for  
Betts' QMI Item Scores for Men  
and Women Based on this Research  
and Sheehan's (1967a) Research

		Men	Women	Men and Women
"Subject Selection" Population	N	201	217	480
	Mean	2.67	2.54	2.60
	S.D.	.80	.70	.75
Sheehan (1967a)*	N	140	140	280
	Mean	2.98	2.92	2.95
	S.D.	1.46	1.50	1.48

\* Sheehan, 1967a, p. 387.

obtain a lower mean using the modified version. Furthermore, research reported in Chapter II (p. 19) suggests that the mean score on the Betts' QMI does, in fact, lie between 2.5 and 3.0.

### A Fear Survey

The fear survey used in this research consists of a list of 51 potentially fear evoking objects or situations. For each item, the subject is asked to indicate the amount of fear he feels by circling one of seven response choices--none, very little, a little, some, much, very much, and terror. (See Appendix D for a copy of the fear survey.)

## Identifying the Subject Pool

### Testing for "Usable" Subjects

Nine hundred twenty-five students at Michigan State University were administered the Betts' QMI and the fear survey. The testing was conducted at two different times. First, during the fall, 1970, tests were administered to 520 students in four classes: child psychology, social psychology, introductory psychology, and introductory sociology. The purpose of this testing was three-fold: (1) to obtain a distribution of scores on the Betts' QMI from which "high" and "low" vividness of imagery could be empirically defined; (2) to select the phobia for this research; and (3) to identify a pool of usable subjects--that is, subjects with the usable phobia who had either extremely low or extremely high vividness of imagery.

Since the first testing did not yield a sufficiently large pool of usable subjects, it was necessary to conduct additional testing. During the winter, 1971, 405 students in an introductory psychology class completed the Betts' QMI and the fear survey.

### Specifying Characteristics of Usable Subjects

The characteristics of the usable subjects were defined by a two-step process using the data from the first group of students (N = 520). After incorrectly completed instruments had been deleted, a total of 480 instruments remained. First, using the results from these 480 instruments, extremely high and extremely low vividness of imagery were empirically specified. This was accomplished by selecting the students scoring in the upper quartile (low vividness) and lower quartile (high vividness) of the distribution of vividness of imagery scores. The lower

quartile includes scores equal to or less than 73.99; the upper quartile includes scores equal to or greater than 105.00. This information is displayed in Table 4.

TABLE 4

Ranges for Classifying Potential  
Subjects as High and Low Imagers  
According to the Betts' QMI

Quartile	Vividness	N	Range of Total Scores	Range of Average Rating per Item
Lower	High	120	35.00 - 73.99	1.00 - 2.10
Middle(2)	Average	240	74.00 - 104.99	2.11 - 2.99
Upper	Low	120	105.00 - 245.00	3.00 - 7.00

After the definitions of high and low vividness of imagery were established, the second step in indentifying usable subjects could be undertaken. It was necessary to select the phobia for this research. Of the 51 situations and/or objects in the fear survey, 17 of the referents are amenable to behavioral measurement in a laboratory setting. For each of these seventeen items, a frequency count was made of the number of times that the high and low vividness students responded to the item with "very much" or "terror." As can be seen from Table 5, the four most frequently endorsed items were: failing a test, heights, spiders, and snakes. The decision was made to choose one phobia from among the four: "fear of failing a test" was eliminated because of the difficulty involved in measuring fear in this context; fear of "spiders" was eliminated because assignment of subjects to treatment groups would have yielded grossly unequal cell sizes; fear of "heights" was eliminated because initial attempts to construct a behavioral measure failed.

TABLE 5

Fear Survey Items Amenable to Behavioral  
Measurement: Frequency of Endorsement  
by High and Low Vividness Subjects

	High	Low
5. Failing a test	17	15
23. Heights	13	18
39. Snakes	15	14
35. Spiders	18	10
41. Speaking before a group	13	12
12. Hypodermic needles	11	12
10. Rats and mice	10	11
48. Stinging insects	9	8
1. Sharp objects	5	7
44. Dark places	4	5
33. Closed places	2	7
16. Being alone	4	4
22. Blood	2	4
8. Worms	2	2
2. Being a passenger in a car	2	0
14. Meeting someone for the first time	0	0
31. Meeting authority	0	0

Therefore, by process of elimination, fear of "snakes" remained and was chosen as the phobia for this research.

Thus, the usable subjects for this study included those students who scored extremely high--lowest quartile--or extremely low--highest quartile--on the vividness of imagery measure and who responded with "very much" or "terror" to the phobic object--snakes--selected for the study.

#### Obtaining the Sample

Eighty-seven of the 970 students scored extremely high or extremely low on the Betts' QMI and had indicated an extreme fear of snakes. The researcher was successfully able to contact 82 of these students. Five students could not be contacted because their names were incomplete or their telephone numbers were untraceable. When each student was contacted, he was first reminded that the researcher had visited his class and administered some tests; he was then told that some research was being conducted to help people eliminate their fear of snakes. After a brief description of the procedure was given, the student was invited to participate in the research. As an inducement to participate, the student was informed that he would be paid five dollars. If the student agreed to participate, a time for the pretest was arranged.

Of the 82 students contacted, 28 indicated that they did not wish to participate. Pretests were arranged with the remaining 54 students, but two of these students failed to report for the pretest. This information is summarized in Table 6.



TABLE 6  
Number of Potential Volunteers  
According to Participation  
in Pre-Test

Total number of students with high or low vividness = 87 of imagery and fear of snakes	No contact = 5		
	Refusals = 28		
	Volunteers = 54 (pre-test arranged)	No show = 2	
		Pre-tested = 52	Deleted = 5
			Usable = 47

#### Pretest

The subjects who had agreed to participate in the research were individually pretested in order to: (1) measure the extent of their phobia; and (2) obtain additional imagery measures. To achieve these objectives each subject was individually pretested. During a thirty minute period, four tests were administered: (1) a behavioral measure of fear, (2) a self-report measure of fear, (3) the Necker Cube, a perceptual measure of the ability to control imagery, and (4) the Juhasz Test of the Ability to Imagine. The Gordon Test of Visual Imagery Control was actually administered during the "subject selection" phase of the research. However, its function in this study conceptually places it with the pretest measures. Each of the five pretest measures is described below.

## Instrumentation

### A Behavioral Measure of Fear

The purpose of the behavioral measure was to provide an objective measure of the subject's fear of snakes. The measure was defined as the extent to which the subject would approach a live garter snake.

In order to implement the behavioral measure of fear, the subject was escorted by the researcher to a long hallway; the researcher directed each subject to wait at the same specific location, approximately 15 yards from where a live garter snake would be placed. The researcher then said to the subject:

There is a snake down there at the other end of the hall. It's a harmless garter snake. I'd like you to wait here while I go down to bring it out into the hall. It will be in a large glass bowl covered by a screen. Once I get it out, I'd like you to walk slowly down to the bowl, take off the screen, reach in, touch it, and pick it up.

The subject often asked, "Do I have to pick it up?" and the experimenter would respond, "Do as much as you can."

The experimenter then left the subject and walked down to a room containing the snake. In order to eliminate the effects which modeling might have, the subject never saw the experimenter handle the snake. The experimenter returned to the hallway with the snake in a large glass bowl covered with a weighted screen and placed the bowl on a high stool, approximately three feet off the floor. The experimenter looked down the hall to the subject and said, "O.K.!" The subject was then free to approach the snake. After the subject first stopped, the experimenter urged him slightly by asking, "Is that as far as you'll

go?" When the subject indicated that he would not proceed closer to the snake, the experimenter said, "Fine."

During the subject's approach, the experimenter recorded the distance the subject stopped from the snake. To aid in this measurement, numbers had been unobtrusively placed at yard intervals along the baseboard of the hallway. The experimenter also recorded the subject's actions and verbalizations during his approach. For example, for each subject who walked the 15 yards to the bowl, the experimenter recorded what the subject did at the bowl. Did he remove the screen? Did he reach into the bowl? Did he pick up the snake?

The records made by the experimenter during the subject's approach provided the basis for scoring the behavioral measure of fear. Table 7 lists the relevant behaviors exhibited by the subject and, for each behavior, indicates the corresponding numerical score. During the behavioral measure of fear, 5 of the 52 subjects picked up the snake. Since they reached the ceiling on this measure, it would be impossible for these subjects to show measurable improvement as a result of either treatment. Thus, they were eliminated from the research.

#### Self-Report Measure of Fear

The purpose of the self-report measure of fear was to provide a subjective measure of the subject's fear of snakes. The measure was defined as the extent to which the subject reported experiencing fear in response to a specific "imaged" situation.

This measure followed directly after the behavioral measure of fear. At the point at which the subject refused to move closer to the snake, the subject was asked to provide a self-report measure of fear. Without removing the snake from the hallway, the experimenter gave the subject a

TABLE 7  
Scoring Criteria for the  
Behavioral Fear Test

Criterion	Score
Picks up snake with hand and holds for the count of three--completely out of the bowl.	10
Picks up snake with one hand or fingertips and/or drops it immediately. Does not remove snake from the bowl.	9
Touches snake.	8
Puts hand into bowl.	7
With the screen removed, hand approaches the mouth of the bowl.	6
Removes the screen from the bowl.	5
With the screen still in place, looks directly into the bowl, face within twelve inches of the side, and/or begins to but does not remove the screen.	4
Walks to within three feet of the bowl.	3
Walks to within six feet of the bowl.	2
Walks to within ten yards of the bowl.	1
Does not move.	0

piece of paper displaying a 5 3/8 inch vertical rating scale with five equally spaced anchor points: none, little, some, much, and terror. (See Appendix E for a copy of the rating scale.) The subject was asked to use the rating scale to indicate the amount of fear he would feel if he now had the snake in hand.

In order to score the self-report measure of fear, a plastic overlay was used to divide the vertical scale into 16 equal segments, such that the score "16" was assigned to "terror" and the score "0" was assigned to "none." On this measure, each subject was assigned an integer score ranging between 0 and 16 depending on where he placed his rating.

#### The Gordon Test of Visual Imagery Control

The Gordon Test measures an individual's ability to control his visual imagery. Thus, since the hypothesis being tested in this study pertains to the elicitation of vivid imagery and the effectiveness of systematic desensitization therapy, the Gordon Test has no direct relationship to the hypothesis. However, independent of the hypothesis, the ability to control visual imagery might pertain to the effectiveness of systematic desensitization therapy. In other words, is the ability to start, stop, and manipulate imagery related to the effectiveness of the systematic desensitization? Since results on the Gordon Test might indicate an important relationship between this aspect of imagination and systematic desensitization therapy, it was included in this research.

The instrument used here remained essentially unchanged from Gordon's original version (Richardson, 1969). However, one minor change was made in the instructions. A passage assuring the subject that it was quite "normal" for him to have difficulty controlling

his imagery was deleted, because of its implicit suggestion that there might be something "abnormal" in such an inability.

The Gordon Test consists of twelve items which describe situations the subject is asked to image. The first item asks the subject to obtain a visual image of a car. In the succeeding eleven items, he is asked to manipulate or change the car image. A subject can make one of three responses to each item: "Yes" means that the subject could successfully obtain the visual image; "No" means that the subject could not successfully obtain the image; and "Unsure" means the subject was uncertain as to whether he had successfully obtained the image. (See Appendix B, Part 1, for a copy of the Gordon Test.)

The score on the Gordon Test equals the number of items to which the subject answered "Yes." Thus, a subject's total score could range from 0 to 12.

Based on the research by Costello (See Chapter II, pp. 20-25.), the present author added a section to the Gordon Test. The new section was designed to classify "uncontrolled" respondents into "vivid-autonomous" or "weak-unstable" groups. The new section asked each subject to return to those items to which he answered "No" or "Unsure," and to specify the reason he could not obtain the image. (See Appendix B, Part 2, for the section added to the Gordon Test.) He was provided three response choices:

- V-A: Vivid-autonomous imagery is sufficiently vivid to be visualized but changes contrary to the voluntary, conscious efforts of the subject.
- W-U: Weak-unstable imagery is sufficiently vague and dim that visualization cannot be maintained despite the conscious, voluntary efforts of the subject.
- O: "Other" also refers to imagery which cannot be manipulated or controlled. Its characteristics, however, are different from the vivid-autonomous and weak-unstable imagery described above.

### The Necker Cube

The ability to increase and decrease the rate of reversal of the Necker cube has been related to reports of vivid-autonomous, controlled, and weak-unstable imagery (Gordon, 1950; Costello, 1956; and Costello, 1957). Therefore, the Necker cube was included as an objective pretest measure of the ability to control visual images.

The procedure was as follows: each subject looked at a Necker cube, two inches on a side, drawn on an 8 1/2 x 11 inch piece of white cardboard. He was asked to look at the cube for a minute and to tap his pencil each time the cube reversed perspective. Next, he was asked to increase the rate of reversal as much as possible, tapping his pencil each time the cube reversed. Finally, he was asked to slow the rate of reversal as much as possible, still tapping his pencil each time the cube reversed. The experimenter recorded the number of reversals for each condition.

### The Juhasz Test of the Ability to Imagine (JAI)

Despite the demonstrated validity and reliability of the Betts' QMI, it is, nonetheless, a self-report instrument. The JAI, on the other hand, is a strictly behavioral measure of the ability to imagine. Thus, it was included in this study to provide an objective measure. However, since the JAI measures the ability to imagine and not the vividness of imagery, it is not directly germane to the hypothesis being tested. Furthermore, Juhasz (1969) has reported that there is essentially a zero correlation between the JAI and a Betts-like measure of the ability to imagine. Consequently, the JAI was expected to provide a measure of the ability to imagine which was statistically unrelated to the Betts' QMI.

The administration of all 14 items of the JAI would have been excessively time consuming and involved complex preparations and materials. Consequently, the decision was made to limit the number of items.

Using the results of some research reported by Juhasz (1970a), three items from the JAI were selected for inclusion in this study. Juhasz reported that two orthogonal clusters of items account for much of the variance of the JAI. The three items were selected because they correlate highly with these two orthogonal clusters. The three items which were selected were: Yellow, ABC, and Poems 1A1B. Yellow and ABC were the two items which correlated most highly with one cluster--imaging in the visual-auditory-tactile modalities--and are considered by Juhasz (1970a) to be two defining items for this factor of the ability to image; Poems 1A1B correlated most highly with another cluster--imaging in the gustatory-olfactory modalities--and is the defining item for this factor of the ability to image.

#### Yellow

The shape of the stimulus materials used for Yellow are displayed in Figure 3. The tiles were made of 3/8 inch wood and painted yellow. The five comparison tiles were glued approximately an inch apart to a 9 x 33 inch board which had been painted black. The tiles themselves are approximately 5 1/2 inches high and 5 inches wide. The numbers 1 to 5 were placed at the edge of the board beneath the tiles so that the tiles could be easily identified. The subject's task is described below.

First, the experimenter placed a blindfold on the desk top in front of the subject. The stimulus materials for Yellow were hidden from the subject's view while the following directions were read:



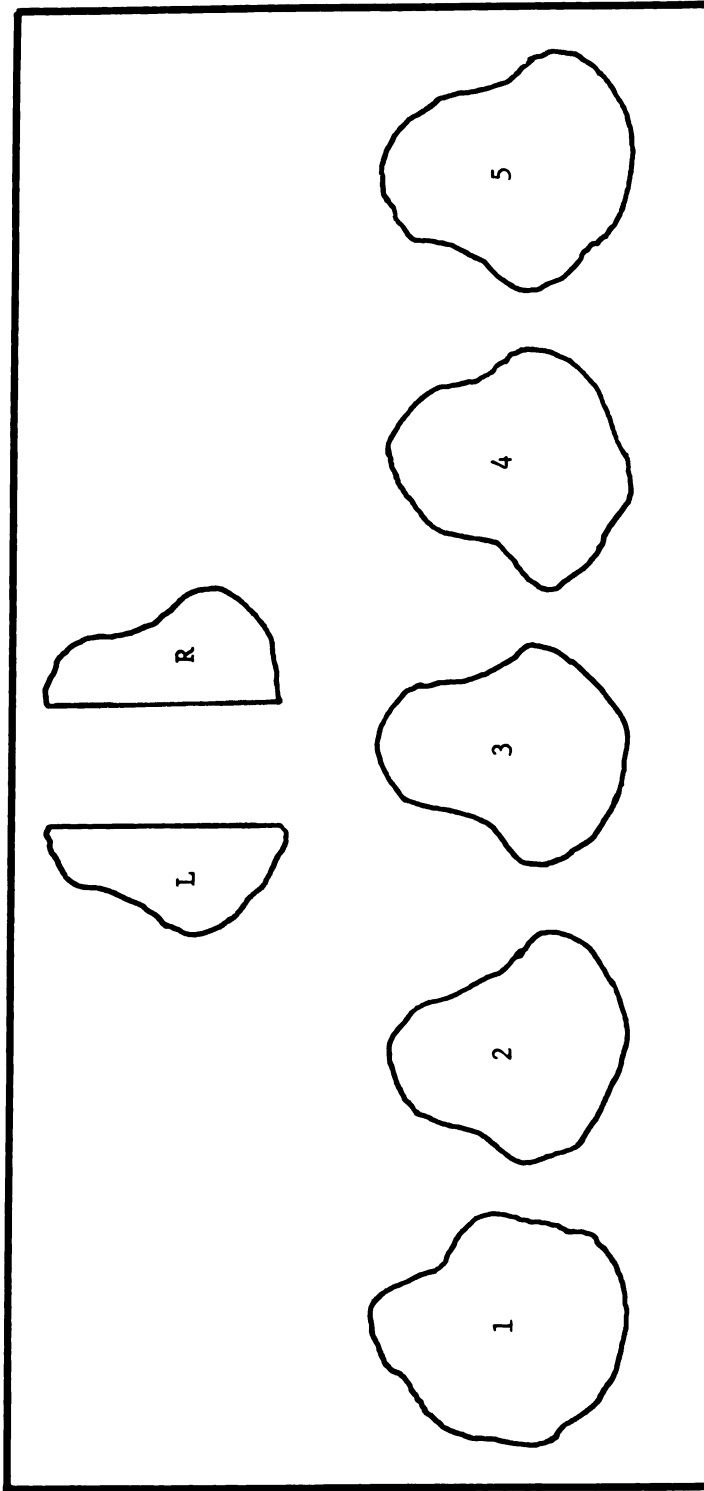


FIGURE 3

The Stimulus Materials Used for Yellow  
(Letters and numbers used for identification only in this Figure. Normally, of course, there were no identifying marks on the tiles. Tiles were approximately five inches on a side.)

This is a "feel" and "look" item. You will first feel two shapes while blindfolded; then, after you have taken off the blindfold, by looking alone you will have to tell which of five alternative shapes would look like the first two glued together on their respective straight edges. Each of the two figures you will feel has only one straight edge; a result of sawing in half a twin brother of one of the alternative comparison shapes. You will first feel the left half of the shape, and then the right half of the shape. So, if you will blindfold yourself I will give you the left half. Feel the top and sides only.

The experimenter handed the subject the left half and allowed the subject to feel it for 30 seconds; the experimenter then handed the subject the right half for 30 seconds. When both halves were removed from view, the subject was allowed to remove his blindfold and view the five response choices glued to the blackboard. The subject was asked to "Please tell me what number tile is the result of gluing together the original shapes on their straight edges." When the subject had made his choice, the experimenter recorded the tile number in the appropriate place on the data sheet. The stimulus materials for Yellow were then removed from the table, and the next item of the JAI, ABC, was administered.

When scoring Yellow, a choice of tile 1 yielded a score of 1 point; tile 2 was scored 2 points; tile 3 was scored 3 points; tile 4 was scored zero points; and tile 5 was scored 4 points.

#### Tiles ABC

The shapes of the stimulus materials used for Tiles ABC are displayed in Figure 4. The tiles were made of 3/4 inch plywood, sanded very smooth and painted yellow. The task for the subject is described below.

While seated at a table, the subject was read the following directions:

The object of this item is to see how good you are at tracing the outline of an object which you felt but could not see. There will be three objects used.

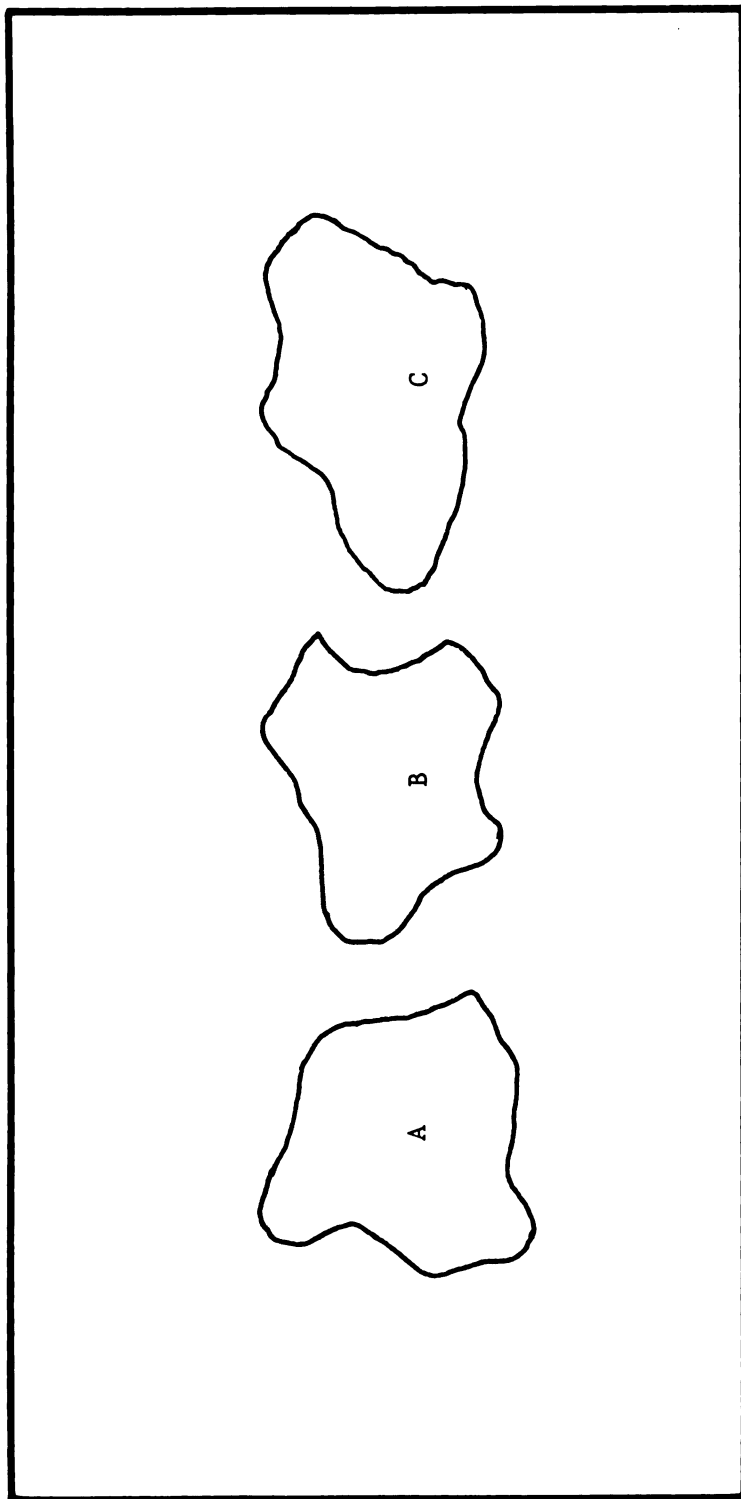


FIGURE 4

The Stimulus Materials Used for ABC  
(Letters used for identification only in this Figure. Normally, of course, there were no identifying marks on the tiles. Tiles were approximately five inches on a side.)

While blindfolded, you will feel each one for 45 seconds, and then you will be able to take off the blindfold, and I will then ask you to trace the figure that you have just felt, exactly to scale, that is to say with the same size and outline as the object that you felt.

After the instructions were read, the subject blindfolded himself and felt tile A for 30 seconds. Tile A was then hidden, and the subject removed the blindfold and "traced" the "image" of the tile on an 8 1/2 x 11 inch piece of white paper. The same procedure was repeated for tiles B and C.

The scoring for the item was based on three dimensions: size, major points, and shape. The correct size--within a tolerance of one inch--was scored 1 point. If the figure was too large or too small, there were no points given on this dimension. If the major points of the tile were all represented, the subject scored 2 points; if some major points were represented, 1 point was given; if no major points were represented, the subject scored 0 points. If the shape of the figure was "good," the subject scored 2 points; if the shape was "fair," the subject earned 1 point; if the shape was "bad," 0 points were given. Thus, on each sub-problem of this item, the subject could score up to 5 points. The range for the entire item is 0 to 15.

#### Poems 1A1B

This item consisted of two poems: Stephen Spender's poem "The Express" (Poem 1A), and William Butler Yates' poem, "Byzantium" (Poem 1B). At certain points in the poems, the subject had to choose the better of two alternative metaphors. The two response alternatives were chosen from the initial and final drafts of the poem--the better metaphor being defined as the author's final version. (A copy of the

instructions, the poems, and the correct responses can be found in Appendix C.)

Poem 1A included nine "items" for which the subject had to select the better of two metaphors. Each correct choice was scored 1 point. Poem 1B included fourteen "items" for which the subject had to select the better of two metaphors. Again, a correct choice earned the subject 1 point. Thus, a score on this item could range from 0 to 23.

#### JAI Score

The scores obtained on each of these three items of the JAI were added together to obtain a single measure of the ability to imagine as measured by the JAI. This score could range from 0 to 42.

### Experimental Procedure

The purpose of the experimental procedure was to implement experimental conditions necessary to test the research hypothesis: namely, that the elicitation of vivid imagery is as effective as systematic desensitization therapy in reducing phobic behaviors.

For each treatment group, the experimental procedure consisted of six, 45 minute group sessions, which met once a week for six weeks. The first of the six sessions had two parts: (1) an explanation of the experimental procedure, providing a rationale for what would be experienced; and (2) the teaching of progressive relaxation. Following this introductory session, the subjects participated in five sessions of either desensitization or imagination. One condition, desensitization, was a group desensitization procedure. The second condition, imagination, was identical to the first in every respect except that a non-phobic imaginal object was substituted for the phobic imaginal object.

## Composition of the Treatment Groups

After five subjects had been eliminated as a result of reaching the ceiling on the behavioral measure of fear, 47 subjects remained for inclusion in the experimental procedure. The 22 high vividness subjects were randomly assigned to the two treatment procedures (imagination and desensitization); then, the 25 low vividness subjects were randomly assigned to the two treatment procedures (imagination and desensitization). Thus, four groups of approximately 12 subjects were obtained. Table 8 displays the original number of high and low vividness subjects assigned to each of the treatment procedures. Table 8 also displays the number of subjects who completed all experimental sessions.

TABLE 8

Initial and Final Sample Sizes,  
by Vividness of Imagery and  
Treatment Procedures

		Vividness of Imagery		Total
		High	Low	
Treatment Procedure	Imagination	11* 7 <sup>+</sup>	13 12	24 19
	Desensitization	11 11	12 9	23 20
	Total	22 18	25 21	47 39

\*Initial number of subjects who began the treatment procedure.

<sup>+</sup>Number of subjects who finished the treatment procedure.

As can be seen, eight subjects dropped from the research after they had participated in at least the first session. The final sample consisted of 39 subjects--38 women and one man.

The researcher felt that a treatment group including 23 or 24 subjects would be unmanageable. Furthermore, it would be difficult to identify a meeting time which would be convenient for all subjects. For these reasons, the researcher decided to schedule two different weekly meeting times for each treatment condition. Thus, the 23 desensitization subjects were divided into two sections, each of which met at a specific time; and the 24 imagination subjects were also divided into two sections, each of which met at a specific time. Assignment to sections could not be random since the subject's free time and the time of the section meeting had to coincide.

Thus, there were four treatment sections: two desensitization and two imagination sections. High and low vividness subjects were distributed throughout these four sections. The treatment procedures were administered via audio tape. Thus, most potential differences between the treatments administered to the two sections of a treatment condition were precluded.

#### Desensitization

The desensitization procedure will be discussed in two sections: session one--the introduction and relaxation training; and sessions two through six--the desensitization procedure itself. Table 9 provides an overview of the desensitization procedure.

TABLE 9

**Example of the Sequence of Events  
for the Experimental Procedure**

Session	Time	Events in the desensitization condition only	Events in both conditions	Events in the imagination condition only
1	2 min.		Introduction	
	1 min.	Explanation of the procedure		Explanation of the procedure
	40 min.		Training in progressive relaxation	
2-6	3 min.		Introduction	
	60 sec.	Theoretical Explanation		Theoretical Explanation
	5 min.		Progressive Relaxation	
	10 sec.		1N1 *	
	20 sec.		Relaxation	
	10 sec.	1P1 *		1I1 *
	20 sec.		Relaxation	
	10 sec.		2N1	
	20 sec.		Relaxation	
	10 sec.	1P2		1I2
	20 sec.		Relaxation	
	10 sec.		3N1	
	20 sec.		Relaxation	
	10 sec.	1P3		1I3
	25 sec.		Self-report of vividness of item	
	30 sec.		Relaxation	
	10 sec.		4N1	
	20 sec.		Relaxation	

\* jPk refers to the kth presentation of the jth item of the hierarchy for the desensitization treatment;

jIk refers to the kth presentation of the jth item of the hierarchy for the imagination treatment;

jNk refers to the kth presentation of the jth neutral item.



Session One: Introduction and Relaxation Training

The first group session consisted of a tape recorded explanation of the experimental procedure and tape recorded training in progressive relaxation. (See Appendix F for a verbatim transcript of the first session.) Basically, the instructions explained that phobias are often learned, and that the current research was designed to explore different ways to help people unlearn their fears. The unlearning procedure itself, it was explained, would consist of visualization and relaxation. Since the fear was a result of the previous learning experiences in which snakes and fear had become associatively paired, the unlearning procedure would consist of breaking the associative bond between fear and snakes. This would be accomplished by having them image, while deeply relaxed, progressively more anxiety provoking situations. As a result, they would unlearn their fear.

Following these introductory explanations, training in progressive relaxation was begun. The procedure was a shortened version of Jacobson's (1938) training in progressive relaxation and lasted approximately 45 minutes. (See Appendix F for a verbatim transcript of the relaxation training.)

First, the concept of relaxing as "letting go" was explained; that is, relaxing was described as stopping muscular tension. Consequently, it was explained, the goal of the relaxation training was to teach the subjects how muscular tensing feels, how to increase (i.e., control) it, and then, how to stop tensing, to relax. This would be taught, they were informed, by having them tighten numerous muscle groups and then to "let go" or relax them. The subjects were then directed to tighten and relax muscle groups in the following areas: first, hands and arms; then face, neck, shoulders, back, stomach, lower back; and

finally legs and feet. Once their bodies were relaxed, the subjects were asked to breathe in a fashion designed to heighten their sense of relaxation. Finally, they were asked to practice relaxing twice daily. The session was then ended, and the subjects were asked to return at the same time the following week to begin unlearning their fear.

#### Sessions Two through Six: Desensitization

Sessions two through six consisted of standardized, tape recorded group desensitization procedures. In each of the five sessions, the subjects proceeded through four of 20 hierarchy items--always beginning a session with the highest item completed during the previous session. After imaging an item from the anxiety hierarchy, the subjects were directed to relax and then image a neutral item. Before imaging the next item from the anxiety hierarchy, the subjects were directed to relax again. (The sequence of events in the desensitization procedure has been illustrated in Table 9.) Below is an explanation and rationale for the design of the desensitization procedure.

#### Design of the Procedure: Control of Extraneous Variables

Gordon Paul (1969a, b, c) has written forcefully about the necessity of equating treatment procedures. In studying the effects of a particular treatment, it is important that, insofar as possible, individuals who are being given a particular treatment receive the identical treatment. However, research on desensitization is frequently guilty of failing to control certain variables such as differences in the item hierarchies, different duration, method, and manner of termination of item presentations, number of items per session, and number of sessions.

Differences in item hierarchies typically occur when the researcher asks each subject to construct his own, individualized hierarchy. Not

only does this procedure lead to different hierarchies, but it provides each subject a unique and uncontrolled experience with the researcher. Furthermore, it is difficult to ascertain the effects which might accrue to the subject from the very act of constructing an anxiety hierarchy. As a result of these considerations, the decision was made that the researcher would construct the anxiety hierarchy without even involving the subjects in its construction. (The details of the anxiety hierarchy construction are discussed on pp. 83-84.)

As mentioned above, uncontrolled duration, method, and manner of termination of item presentation might also affect the outcome of the procedure. These variables are uncontrolled in experiments in which the researcher asks the subject to signal when he experiences anxiety, and the subject's signal of anxiety terminates the item presentation. This procedure, however, is frequently used, since it is basic to the theory of systematic desensitization therapy which posits that extinction occurs only when the feared stimulus and relaxation occur concurrently. Another way in which these variables are uncontrolled is that in the typical desensitization procedure, a subject does not proceed from a less to a more anxiety provoking item until the lower item has been imaged several times without anxiety. Thus, the number of times an item is imaged varies from subject to subject, and item to item. Although such individualized treatment is theoretically appropriate, it does not allow the treatment of a large number of subjects to be equated experimentally. Consequently, for this research, it was decided to equate the duration of presentation, the manner of termination, and the sequence of item presentations.

In order to decide upon the most appropriate duration for item presentation, consideration was given to the results of research

studies summarized by Paul (1969c). He reported that the average duration of item presentation was 10 seconds, and the average duration of relaxation between item presentations was 20 seconds. These average times were adopted for this research; that is, each item was imaged for 10 seconds followed by 20 seconds of relaxation.

The choice of a specific time interval for the item presentation implied another decision: all item presentations would be terminated at the end of 10 seconds, not in response to a subject's signal of anxiety. However, since the occurrence of anxiety might affect the outcome, the subjects were asked to indicate at the end of each session whether they had experienced anxiety.

For reasons discussed above, the sequence of item presentations, the number of items per session and the number of sessions were held constant. Thus, the precise sequence of item presentations was predetermined by the researcher. Furthermore, each anxiety hierarchy item was imaged a fixed number of times--five--with a set number of sequential presentations of the same item before proceeding to the next item. (The exact order of item presentation is discussed on pp. 87-88.) Finally, four of the 20 anxiety hierarchy items were completed in each of five sessions.

#### Development of the Phobic Items

The purpose of constructing the anxiety hierarchy was to develop a series of graded stimulus situations involving snakes which produced progressively more anxiety for snake phobic people.

First, four students (two men and two women) who had indicated "terror" of snakes but had not scored extremely high or low on vividness of imagery were telephoned. Each was questioned about his fear of snakes

in order to ascertain the fear's dimensions. The following summary was made as a result of these conversations.

The fear of snakes seems to be a fear of getting hurt, poisoned or killed. So long as physical separation between the person and the snake is maintained, the fear is lessened. The possibility of physical contact, however, increases the fear. In general, the closer the snake, the greater is the fear; the larger the snake, the greater is the fear; and the greater the number of snakes, the greater is the fear. A snake moving towards the person creates more fear than a snake moving away from the person. The following characteristics seem to be associated with more fear provoking snakes: flicking tongues, hissing, slimy, large and black.

Based on these dimensions, a list of 20 items was developed. Using a snake phobic woman, the list was pilot tested to study the ordering of items and identify any item ambiguity. As a result of her reactions, several items were deleted and several new ones added. Using three snake phobic people, this second list was pilot tested to again study the ordering of items and identify any item ambiguity. The results of the second pilot test led to a third reconstruction of the list which was pilot tested on six snake phobic people. (The 20 items which finally comprised the anxiety hierarchy are listed in Appendix G.)

#### The Neutral Items

After each phobic item, the subject relaxed, imaged a neutral item, and relaxed again. The neutral item was included for several reasons. First, it provided a control task which all subjects performed between imaging phobic items. Second, by having the subject image a non-phobic--that is, neutral--item, any anxiety that might have developed while imaging the previous phobic item would dissipate more readily. Third, half of the items imaged by the desensitization and imagination groups would be identical. Thus, not only could the experimental procedures be more

closely equated, but the vividness of the imagery of the two groups in response to the same item could be compared. In this way, an experimental control for the vividness of imagery during the procedure could be made. (The actual construction of the neutral items was done in connection with the imagination procedure and, thus, will be discussed in the section on imagination, p. 93.) (The list of neutral items appears in Appendix I.)

#### The Desensitization Procedure

As mentioned earlier, the desensitization procedure was carried out during the second through sixth sessions. One session was held each week and lasted approximately 45 minutes. For expository convenience, the five desensitization sessions are discussed in the following sections: introductory comments, theoretical explanation, relaxation, desensitization, and concluding comments.

Introductory comments. The introductory comments for each session were designed to orient the subject to the procedures which would follow. The first desensitization session, session two, provided more specific introductory comments than any of the other sessions. (See Appendix J for a verbatim transcript of the introductory comments for session two.) It began with a brief description of the desensitization procedure. The experimenter then distributed booklets which contained a relaxation questionnaire, five copies of the Betts' rating scale, and an end of session questionnaire. (See Appendix N for a copy of the booklet.)

The subject was asked to record his name and the date on the first page of the booklet, and then to answer the three questions printed on the first page. The questions regarded the number of times the subject had relaxed during the week. This measure was obtained because one of

the variables which has been related to the effectiveness of desensitization is relaxation (Bandura, 1969).

The subjects were informed that occasionally during the procedure, they would be asked to rate the vividness of their image. The Betts' rating scale and key, printed on the second page of the booklet, were then described. In order to familiarize themselves with the rating procedure, they practiced rating the vividness of an image. Finally, the specific details--that is, the mechanics of juggling the materials--were given.

The introductory comments to sessions three and four were an abbreviated form of the introductory comments given in the first session. (See Appendix K for a verbatim transcript of the introductory comments for sessions three and four.) The desensitization procedure was described briefly, the booklets distributed, the relaxation practice questionnaire completed, and the details for rating the vividness of an image were reiterated. Based on comments volunteered by the subjects, repetition of these introductory comments appeared unnecessary for sessions five and six, and thus, they were omitted from the procedure.

Theoretical explanation. Following the introductory comments, the theory underlying the desensitization procedure was explained. (See Appendix L for a verbatim transcript of the theoretical explanation.) The importance of pairing imaging and relaxing was emphasized. After the fourth session, the theoretical explanation was unnecessary and thus was omitted from the procedure.

Relaxation. Following the theoretical explanation, the subjects were given some brief relaxation instructions. (See Appendix M for a verbatim transcript of the relaxation instructions.) Basically, the

instructions ask the subject to search for tension and turn it off, first in his feet, then in his legs, stomach, lower back, upper back, chest, shoulders, arms, hands, throat, and neck, and finally in his face.

Since the introductory comments and the theoretical rationale were omitted from sessions five and six, the relaxation instructions in these two sessions followed directly after the booklets had been distributed. Of course, in these and all other sessions, subjects were invited to ask questions before the desensitization procedures actually began.

Desensitization. The sequence of events proceeded identically for each session. Table 9 provides an illustration of the sequence. (Table 9 appears on p. 79.)

Following the relaxation instructions, the subjects were allowed to remain relaxed for a while. Then, the first neutral item was administered. In the first desensitization session, for example, the experimenter said, "Imagine that you are sitting on a chair in an office looking at a table. You can feel the chair's pressure on your back and buttocks. Begin." The experimenter waited ten seconds and then said, "Stop and relax." The relaxation proceeded for 20 seconds. At the end of 20 seconds, the first phobic item was presented. For example, the first phobic item said, "Imagine that you are sitting with several friends in the football stadium. The stadium is otherwise empty. You are sitting at the 25 yard line. Seventy-five yards away, at the far goal line, you see a snake. Begin." After ten seconds, the experimenter said, "Stop imaging that and relax. Turn off any tension you might find. . . ."

In all sessions, neutral and phobic items were presented alternately. The neutral items were presented sequentially, without repetition, until the list of 20 items had been exhausted; the experimenter then returned



to the first neutral item and proceeded through the list again. The phobic items were each repeated five times; three of the five presentations were always sequential. Every session started and ended with a neutral item; and the first phobic item of a given session was the last one imaged during the previous session. (See Appendix O for a list of the order in which the items were presented.)

Four times during the desensitization procedure, the subjects were asked to rate the vividness of their imagery. The procedure used to rate the vividness of all images was as follows. The subjects were asked to image the item to be rated, but the subjects did not know they would be asked to rate the vividness of the image. After the usual 10 second interval during which the item was imaged, the experimenter said,

Stop imagining that and rate the vividness of the image. Rate the vividness of the image on the rating scale. When you're done, turn the page all the way over and place the booklet back on the floor within easy reach of your non-dominant hand. Then, relax.

The subjects picked up their booklets and pencils, and while lying on their backs rated the vividness of their image. After an interval of 25 seconds was provided for the subject to record his rating, the experimenter returned to the desensitization procedures and gave relaxation instructions. However, since the subjects had to raise their heads and use their hands, arms and shoulders to rate the vividness of the image, the experimenter allowed 30 seconds--rather than the usual 20 seconds--for relaxation before the next item was presented. During these 30 seconds, the experimenter directed attention to specifically relaxing the neck, hands, arms, and shoulders.

As mentioned earlier, vividness ratings were recorded four times during each session. The first and fourth items rated were neutral;

the second and third items rated were phobic. (The specific items which were rated during the sessions are identified in Appendix O.) As a result, twenty vividness ratings were obtained during the five sessions--ten ratings of the vividness of neutral items, and ten ratings of the vividness of phobic items.

Concluding comments. For every session, after the last neutral item was presented, the subjects were informed that in a short while the session would end. The importance of relaxation was emphasized, and the subjects were reminded to practice relaxing twice daily. The subjects were then asked to increase their muscular tension, and, when they felt like it, to sit up, and then stand. (See Appendix P.)

Before leaving, the subjects were asked to answer the questions on the last page of their booklet--the end of session questionnaire. (See Appendix N for a copy of the questionnaire.) The questionnaire was designed to obtain information about the individual's reactions during the session. Questions were asked to discover whether the subject had been anxious during the session. Two other questions concerned whether the subject was able to control his imagery consistent with the directions given by the researcher.

### Imagination

The imagination procedure will be discussed following the same format as the discussion of the desensitization procedure: namely, session one--introduction and relaxation training; and sessions two through six--the imagination procedure itself. It should be emphasized that large portions of the imagination procedure were identical to the correlative portions of the desensitization procedure. Consequently,

the following discussion will focus primarily on the differences between the two procedures.

#### Session One: Introduction and Relaxation Training

The first group session consisted of a tape recorded explanation of the experimental procedure and tape recorded training in progressive relaxation. (See Appendix F for a verbatim transcript of the first session.) The introductory explanation was equated with that given to the desensitization group. In fact, there were only minor wording differences between the introductory comments given to the imagination group and the introductory comments given to the desensitization group. Basically, the instructions explained that phobias are often learned, and that the current research was designed to explore different ways to help people unlearn their fears. The unlearning procedure itself, it was explained, would consist of visualization and relaxation.

However, when the specific details and the theory of imagination procedure were described, it was necessary to completely diverge from what was said to the desensitization group. In the imagination group, London's theoretical rationale was explained. The subjects were informed that their fear was probably learned, and that it was the result of a lack of differentiation between what was inside and outside them. The unlearning procedure would help them make this differentiation. As a result of vividly imaging a variety of situations while relaxed, they would more clearly differentiate between what was inside and outside them, and thus, they would eliminate their fear.

Following this introduction, relaxation training identical to that provided to the desensitization group was given. (See Appendix F for a verbatim transcript of the relaxation training.)

### Sessions Two through Six: Imagination

Sessions two through six consisted of a standardized, tape recorded imagination procedure. The sequencing of events was identical to the desensitization procedure described above. However, the specific theoretical explanation of the imagination procedure differed from that of the desensitization procedure, and each item in the imagination condition had a non-phobic imaginal object substituted for the phobic imaginal object used in the desensitization condition. (The sequence of events in the imagination procedure has been illustrated in Table 9 on p. 79.)

#### Control of Extraneous Variables

The primary control used for the imagination procedure was equating it with the desensitization procedure. Consequently, the item sequencing, timing, and manner of presentation were identical to the desensitization condition. Additional variables were controlled by using equated tape recorded instructions for both sets of six sessions. The instructions were recorded concurrently on two different tape recorders. Large portions of the procedures were identical for both treatment groups, and thus, wherever possible, both groups received identical tape recorded instructions. As a result of this procedure, changes in inflection, rate of verbalization and the numerous, subtle variations in the experimenter's speech were identical, during these passages, for both groups.

Perhaps it would be helpful to reiterate the method by which the imagination and desensitization tape recordings were prepared. By using two tape recorders, both procedures were recorded at the same time. One tape recorder recorded the imagination procedures; the other tape recorder recorded the desensitization procedures. The passages which were identical for both conditions were recorded simultaneously. Whenever different

passages were to be recorded, the first recorder was temporarily stopped while the other recorded the passage for the desensitization condition. Then, the procedure was reversed and the second recorder was temporarily stopped while the first recorded the appropriate passage for the imagination condition.

#### Development of the Imaginal Items

The purpose of constructing the imaginal items was to obtain a list of stimulus situations similar to those of the anxiety hierarchy. As a result, each of the 20 items of the anxiety hierarchy was rewritten with the phobic referent omitted. (See Appendix H for the list of imaginal items.)

Wherever possible, the item from the desensitization condition's anxiety hierarchy was retained with a non-phobic referent substituted for the word "snake." In this way, the items would be truly equated. An example of such an item is the first item of the anxiety hierarchy: "Imagine that you are sitting with several friends in the football stadium. The stadium is otherwise empty. You are sitting at the 25 yard line. Seventy-five yards away, at the far goal line, you see a snake." After substituting a non-phobic object for the word "snake," the imaginal item states: "Imagine that you are sitting with several friends in the football stadium. The stadium is otherwise empty. You are sitting at the 25 yard line. Seventy-five yards away, at the far goal line, you see a football."

On occasion, substituting for the word "snake" created bizarre, meaningless or grammatically inappropriate items. In these cases, it was necessary to adjust other parts of the item so that a sensible statement could be obtained. The most extreme example of such an item

as item 16 of the anxiety hierarchy: "Imagine that as you enter a campus building, ten yards in front of you you see ten large, black, slimy snakes. They are moving around on the floor, hissing, their tongues flicking out." The imaginal item had to be considerably changed so that it now states: "Imagine that as you enter a hospital nursery, ten yards in front of you you see ten newborn babies wrapped in blankets. They are moving around, crying."

#### Development of the Neutral Items

The neutral items were identical in the imagination and desensitization conditions. As mentioned above, the neutral items provided a control task between each hierarchy item, and provided a criterion for comparing the imagination and desensitization groups on the vividness of their imagery. There was, however, an additional reason for including neutral items. London's theoretical rationale, as discussed in Chapter I, pp. 1-4, suggests that the success of the desensitization process results not only from mere vivid imagery, but also from vivid imagery of the interaction between the body and physical objects. The neutral items were constructed to provide explicit scenes relating to the interaction of the body with the physical world. It should be noted that the instructions at the beginning of each session emphasized this interaction.

Some examples of the neutral items are: "Imagine that you are sitting on a chair in an office looking at a table. You can feel the chair's pressure on your back and buttocks"; or "Imagine that you are throwing a tennis ball against a wall and then catching it as it bounces back. You can hear the ball strike the wall." Clearly, these items focus on the interaction between the body and the physical world. (See Appendix I for a list of the neutral items.)

## The Imagination Procedure

As mentioned several times above, the imagination procedure was equated to the desensitization procedure. For expository convenience, the imagination procedure will be discussed in the following sections: introductory comments, theoretical explanation of the procedure, relaxation, imagination, and concluding comments.

Introductory comments. The introductory comments provided to the imagination group were identical to those provided to the desensitization group. (See Appendices J and K for the introductory comments to session two and sessions three and four, respectively.) For sessions two, three, and four, the introductory comments were a shorter version of those used in session one and served to remind the subject of the details of the procedure. Introductory comments were not needed for sessions five and six since, by that time, the subjects were well acquainted with the procedure.

Theoretical explanation of the procedure. After the introductory comments had been given, the theory underlying the imagination procedure was explained. An explanation very similar to that provided during the first session was given in the three subsequent sessions; namely, the process of unlearning the fear would require that the subject more clearly differentiate the inside from the outside. This would be accomplished by having the subject vividly image the interaction of his body with the physical world while deeply relaxed. Since the theoretical explanation had been repeated four times previously, it was omitted from the fifth and sixth sessions.

Relaxation. Following the theoretical explanation, the subjects were given relaxation instructions identical in every respect to those

given to the desensitization subjects. (See Appendix M for a verbatim transcript of the relaxation instructions.)

Imagination. The sequence of events proceeded identically for each session and identically to those of the desensitization procedure.

(Table 9 on p. 79 provides an illustration of the sequence of events.)

As has been mentioned previously, wherever a phobic item would have been used in the desensitization procedure, an imaginal item was used in the imagination procedure. The neutral items, the timing between items, the relaxation instructions between items, and the timing and placement of the self-report of vividness of specific items were identical for both procedures. (The exact sequence of items used and an identification of those items for which self-report of vividness was obtained can be found in Appendix O.)

Concluding comments. The concluding comments following the last neutral item were identical to those given to the desensitization group. In other words, the importance of relaxation was emphasized, and subjects were encouraged to practice relaxing twice daily. Before leaving, the subjects were asked to answer the questions on the last page of their booklet--the end of the session questionnaire. (See Appendix N for a copy of the end of session questionnaire.) The questionnaire was identical to that used for the desensitization condition.

#### Post Test

When the experimental treatment had been completed, the change in the fear of snakes was assessed. Individual appointments were made with each of the subjects in each of the groups. At the prearranged time, each subject was individually administered the same two tests of fear



utilized in the pretest: namely, the behavioral measure of fear and the self-report measure of fear. (See Chapter III, pp. 65-68, for explicit descriptions of the tests used.)

Following the post tests, each subject was paid five dollars for his participation in the research.

### Summary

This research is designed to test London's (1964) hypothesis that the elicitation of vivid imagery will be as effective as systematic desensitization in reducing phobic behaviors. The experimental design includes one dependent and two independent variables. The dependent variable is reduction in phobic behaviors. The two independent variables are (1) ability to image vividly, and (2) conditions of imaging a phobic object (desensitization) or a non-phobic object (imagination).

The research procedures were divided into four stages: subject selection, pretest, experimental procedure and post test. The purpose of the "subject selection" stage of the research was to obtain volunteers who possessed two characteristics: a usable phobia and extremely high or extremely low vividness of imagery. The Betts' QMI and a fear survey were administered to 520 undergraduate students at Michigan State University. From the results of these instruments, fear of snakes was chosen as the phobia for this research; and extremely high and extremely low vividness of imagery were empirically defined. Thirty-nine subjects participated in the complete study.

The purpose of the "pretest" stage of this research was to measure the extent of the phobia and to obtain additional imagery measures. Each subject was individually administered (1) a behavioral measure of

fear, (2) a self-report measure of fear, (3) the Necker Cube, a perceptual measure of the ability to control visual imagery, and (4) selected items from the Juhasz test of the Ability to Imagine.

The purpose of the "experimental procedure" stage of this research was to implement the experimental conditions of desensitization--imaging the phobic object--and imagination--imaging a non-phobic object. The procedure consisted of six, 45 minute group sessions, which met once a week for six weeks. The first of the six sessions was standardized and administered via tape recording. It consisted of two parts: (1) an explanation of the experimental procedure and (2) the teaching of progressive relaxation. The subjects then completed five sessions in one of two conditions: (1) desensitization--a tape recorded, standardized group desensitization procedure, or (2) imagination--a tape recorded, standardized procedure identical to the desensitization procedure except that a non-phobic imaginal object was substituted for the phobic imaginal object. Four times during each session the subjects were asked to report the vividness of their imagery.

The purpose of the "post test" stage of this research was to assess the reduction in fear of the phobic object. Consequently, the behavioral measure of fear and the self-report measure of fear administered during the pretest were re-administered to obtain a post test measure of fear.

## CHAPTER IV

### RESULTS AND DISCUSSION

#### Preliminary Analyses

Since the tests of the hypotheses are based upon groups identified by the Betts' QMI, some preliminary analyses were conducted to judge the appropriateness of the procedures for group assignment. The first portion of this chapter will be concerned with the various measures of vividness of imagery.

#### Vividness of Imagery

##### Data Analysis

As one will recall, the total score on the Betts' QMI was used to select and classify subjects into (1) high ability to image vividly--indicated by a low score on the Betts' QMI--and (2) low ability to image vividly--indicated by a high score on the Betts' QMI. High and low imaging ability subjects were then randomly assigned to treatment procedures: imagination and desensitization. This 2 x 2 design is the basis for many of the analyses in this chapter. Table 10, displays, for each cell, the N, and the mean and standard deviation of the total score on the Betts' QMI.

TABLE 10

Mean Total Score on Betts' QMI for  
High and Low Vividness Subjects  
in the Two Treatment Procedures

			Ability to Image Vividly	
			High	Low
Treatment Procedure	Imagination	N	12	8
		Mean	60.19	120.00
		S.D.	10.44	15.35
	Desensiti- zation	N	9	10
		Mean	65.11	118.58
		S.D.	9.38	16.63

What is the relationship between the selection measure of the ability to image vividly--displayed in Table 10--and the vividness of imagery actually reported during the experimental procedures? As explained in Chapter III, during each session, the subjects rated the vividness of their imagery for two neutral items and for two hierarchy items--phobic items in the desensitization group and imaginal items in the imagination group. Table 11 displays the mean item vividness scores for the Betts' QMI, the neutral items, and the hierarchy items. In all cases, the mean score is higher--less vivid imagery--for the neutral and hierarchy items. However, the difference between mean item vividness scores is significant ( $p < .05$ , Duncan range) only for the high imagers in the desensitization procedure.

Correlations were computed between the vividness of imagery ratings reported during the experimental procedure and total score on the Betts' QMI administered in order to select subjects. These correlations are

TABLE 11

Mean Item Vividness for the Betts' QMI,  
the Neutral, and the Hierarchy Items  
for High and Low Vividness Subjects  
in the Two Treatment Procedures

			Ability to Image Vividly	
			High	Low
Treatment Procedure	Imagination	Betts' QMI Items	1.72	3.43
		Neutral Items	2.34	3.45
		Hierarchy Items	2.46	3.74
	Desensiti- zation	Betts' QMI Items	1.86	3.39
		Neutral Items	3.14	3.51
		Hierarchy Items	2.94	3.66

displayed in Table 12. All of the correlations reported in Table 12 are positive, but relatively low in magnitude; only one coefficient exceeds .60. For the imagination procedure, eight correlations are significantly different from zero; however, for the desensitization procedure, none of the correlations is significantly different from zero. When the correlations obtained for the imagination procedures are compared to the correlations obtained for the desensitization procedures, the magnitude of the former is larger for ten of the 12 correlations. Based on this set of correlations, one might justifiably question the value of the Betts' QMI as a selection criterion, especially for the desensitization procedure.

Further consideration was given to the relationship between the selection measure of the ability to image vividly and the vividness of imagery reported during the experimental procedures: the pretest classification of high and low imagers--based on the Betts' QMI--was compared

TABLE 12

Correlations Between Total Betts' QMI  
Score and Vividness of Imagery Reported  
for Neutral and Hierarchy Items  
During the Procedure

		Total Score on Betts' QMI		
Session	Item Type	Imagination Subjects	Desensitization Subjects	All Subjects
2	Neutral	.212	.314	.287
	Hierarchy	.334	.327	.350*
3	Neutral	.640**	.335	.521**
	Hierarchy	.476*	.353	.418**
4	Neutral	.514*	.093	.324*
	Hierarchy	.525*	.085	.318*
5	Neutral	.450*	.311	.387*
	Hierarchy	.574**	.391	.501**
6	Neutral	.363	.368	.382*
	Hierarchy	.443	.403	.429**
	Total Neutral	.577**	.363	.488**
	Total Hierarchy	.613**	.391	.514**

\*p &lt; .05

\*\*p &lt; .01

to a post test classification of high and low imagers--based on vividness ratings obtained during the experimental procedures. Table 13 compares the classification of high and low imagers using the Betts' QMI with a classification based on vividness ratings of the neutral items; Table

TABLE 13

Relationship Between Selection Classification  
into High and Low Imagery--Based on Betts'  
QMI--and Treatment Classification into  
High and Low Imagery--Based on Vividness  
Ratings of Neutral Items

	Selection Classifi- cation	Treatment Classification		Percent Crossover
		Low	High	
Imagination	Low	9	3	20
	High	1	7	
Desensiti- zation	Low	5	4	47
	High	5	5	

14 compares the classification of high and low imagers using the Betts' QMI with a classification based on vividness ratings of the hierarchy items.

Since extreme scorers were initially chosen, one would expect some regression to the mean during the procedure, and thus there might be some cross-over from one extreme to the other. However, inspection of Tables 13 and 14 reveals that the desensitization procedure leads to 37 or 47 percent cross-over, depending on whether the new classification is based on neutral items or hierarchy items, while the imagination treatment leads to 20 percent cross-over, regardless of whether the new classification is based on neutral or hierarchy items. This result

TABLE 14

Relationship Between Selection Classification  
into High and Low Imagers--Based on Betts'  
QMI--and Treatment Classification into  
High and Low Imagers--Based on Vividness  
Ratings of Hierarchy Items

	Selection Classifi- cation	Treatment Classification		Percent Crossover
		Low	High	
Imagination	Low	9	3	20
	High	1	7	
Desensiti- zation	Low	6	3	37
	High	4	6	

again suggests that when one considers the desensitization subjects, there is less consistency between the selection measure of the ability to image vividly and the vividness reported during the experimental procedures than when one considers the imagination subjects. This finding suggests that desensitization procedures differentially affect the subjects' ability to image vividly.

### Discussion

One result reported above warrants some discussion: why is there less consistency between scores on the Betts' QMI and vividness reported during the procedure for the desensitization subjects than for the imagination subjects? The obvious explanation is that the desensitization procedure somehow interferes with the ability to image vividly. The logical variable to consider in trying to explain this phenomenon is anxiety (Lang, 1969; Lang, Melamed, & Hart, 1970).



It can be hypothesized that the desensitization subjects became anxious during the treatment procedure, and thus, the vividness of their imagery decreased. This hypothesis is somewhat supported by the finding that the high vividness, desensitization subjects reported significantly less vivid imagery during the treatment procedure than when completing the Betts' QMI. (See Table 11.) However, if all subjects were consistently affected, the correlations between the Betts' QMI and the vividness ratings obtained during the experimental procedures would be high. Since this was not the case, it is necessary to look further for an explanation.

An examination was made of the relationship between vividness of imagery reported during the experimental procedure and amount of anxiety reported at the end of the experimental session. The amount of anxiety reported for a given session was obtained from item 3 of the end of session questionnaire. (See Appendix N.) Numerical scores to reflect amount of anxiety were assigned as follows: none = 0, very little = 1, little = 2, some = 3, much = 4, very much = 5, and terror = 6. The correlations between vividness of imagery and anxiety are reported in Table 15. As can be seen, anxiety and vividness of imagery tend to be directly related, especially when the item being imaged is a phobic item; that is, for the phobic items, the greater the vividness of the imagery--as indicated by a low score--the greater the anxiety--as indicated by a high score. (A similar result was reported by Lang, Melamed, & Hart [1970]. See pp. 47-49.) This finding might lead one to speculate that whereas vivid imagery results in high anxiety, if the potential anxiety is too high, the individual might defend against it by imaging less vividly and, consequently, experiencing less anxiety.

TABLE 15

Correlations Between Anxiety and Vividness  
of Imagery Reported During Treatment

Session	Desensitization		Imagination	
	Neutral Items	Phobic Items	Neutral Items	Imaginal Items
2	-.021	-.233	-.100	-.149
3	-.037	-.456*	-.512	+.036
4	-.094	-.442	-.097	-.358
5	-.203	-.490*	-.145	-.309
6	+.064	-.541*	-.236	-.211
All Sessions	-.074	-.516*	-.301	-.275

\*  $p < .05$

This speculation can explain, for the desensitization subjects, the lack of a consistent relationship between vividness of imagery scores obtained on the selection criterion--the Betts' QMI--and the vividness of imagery scores reported during the experimental procedures; that is, vividness ratings reported by the desensitization subjects during the experimental procedures were a function of both ability to image vividly and potential anxiety. Since the imagination subjects were not confronted with highly anxiety producing images, the vividness of their imagery during the experimental procedure would have remained primarily a function of their ability to vividly image.

### Test of the Hypotheses

As mentioned earlier, this research is designed to test London's (1964) hypothesis that the elicitation of vivid imagery will be as effective as systematic desensitization in reducing phobic behaviors. Given the general hypothesis and the relevant variables discussed in Chapter III, four specific hypotheses were to be tested.

Hypothesis one: The desensitization and imagination conditions will be equally effective in reducing fear of the phobic object.

Hypothesis two: Subjects possessing a high ability to image vividly will demonstrate a significantly greater decrease in fear of the phobic object than the subjects possessing a low ability to image vividly.

Hypothesis three: There will be no interaction between the experimental conditions and ability to image vividly.

Hypothesis four: Subjects who report more vivid imagery during the experimental procedures will demonstrate a larger decrement of fear than those subjects who report less vivid imagery.

Before actually testing these hypotheses, results obtained on the two dependent measures of fear will be presented.

### Results on the Dependent Measures

Pretest and post test scores were obtained on the two dependent measures: (1) self-report measure of fear, and (2) behavioral measure of fear. The results obtained on the self-report measure of fear for each of the two experimental procedures are displayed in Table 16. Figure 5 graphically portrays the difference scores--that is, the change from

TABLE 16

Means and Standard Deviations  
for the Self-Report of Fear

		Ability to Image Vividly					
		High			Low		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Imagination	N	12	12	12	8	8	8
	Mean	13.75	10.67	3.08	13.00	10.75	2.25
	S.D.	1.91	4.16	4.62	3.07	4.30	4.06
Desensitization	N	9	9	9	10	10	10
	Mean	12.00	9.78	2.22	11.60	9.10	2.50
	S.D.	3.57	3.00	3.73	1.78	4.46	4.70

pretest to post test--which are reported in Table 16. The results obtained on the behavioral measure of fear for each of the two experimental procedures are presented in Table 17. Figure 6 graphically portrays the difference scores reported in Table 17.

A significant decrease in fear was obtained for the imagination and desensitization procedures on both measures of fear. For the self-report measure of fear, the mean change for the imagination subjects was 2.75 ( $p < .01$ ) and for the desensitization subjects was 2.37 ( $p < .02$ ). For the behavioral measure of fear, the mean change for the imagination subjects was 2.05 ( $p < .0005$ ) and for the desensitization subjects was 2.63 ( $p < .000$ ).

In order to allow the reader to compare scores obtained on the self-report measure of fear with scores obtained on the behavioral measure of fear, Table 18 was prepared showing the correlations between the two measures.



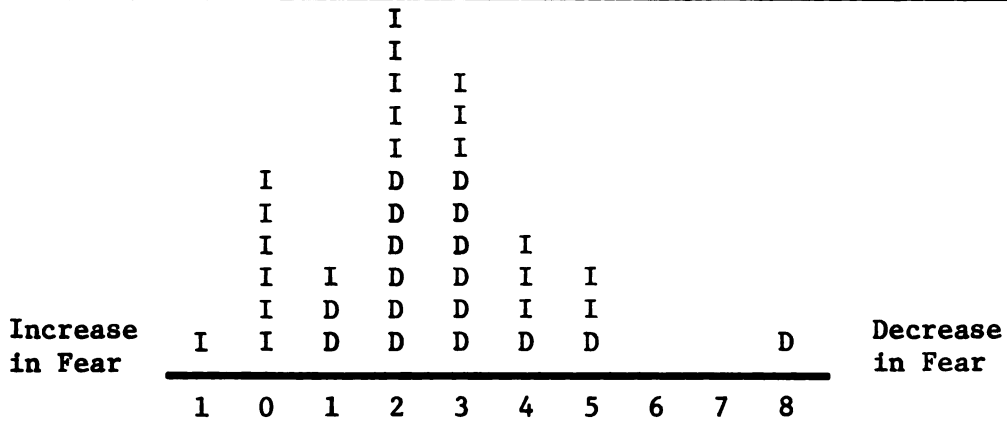
TABLE 17  
Means and Standard Deviations for  
the Behavioral Fear Test

		Ability to Image Vividly					
		High			Low		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Imagination	N	12	12	12	8	8	8
	Mean	5.92	8.25	2.33	6.38	8.00	1.63
	S.D.	1.98	1.29	1.92	1.69	1.60	1.69
Desensitization	N	9	9	9	10	10	10
	Mean	5.00	8.00	3.00	6.00	8.30	2.30
	S.D.	2.65	2.18	2.06	2.26	1.83	1.42

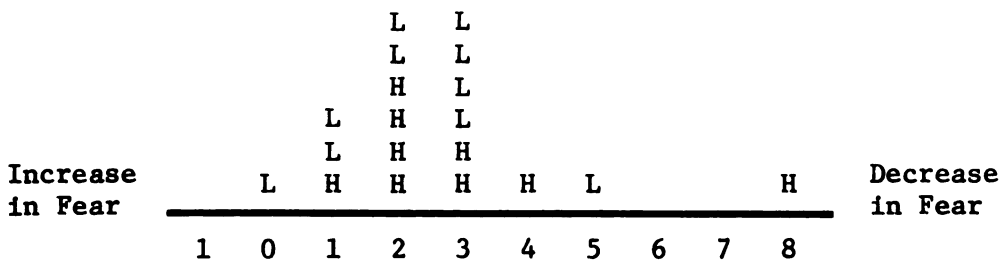
### Hypothesis One Through Three

#### Data Analysis

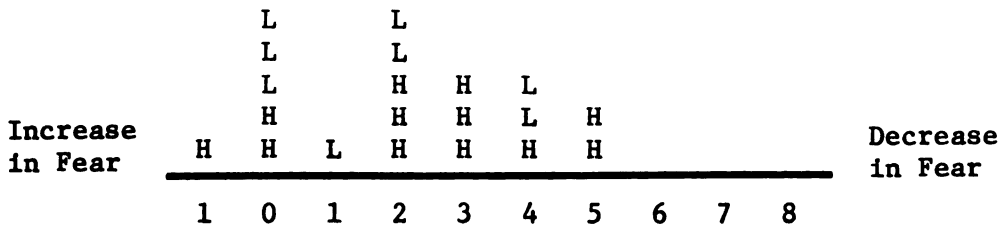
In order to test the first three hypotheses, a 2 x 2 analysis of variance was computed comparing means on the dependent measure. The two independent variables were ability to image vividly--high or low--and treatment procedure--imagination or desensitization. Table 19 is the analysis of variance table for the self-report measure of fear. (See Table 16 for means and standard deviations.) Table 20 is the analysis of variance table for the behavioral measure of fear. (See Table 17 for means and standard deviations.) As can be seen, there are no significant main effects and no significant interactions for either dependent measure. Thus, these results support hypotheses one and three, and fail to support



- (a) Change in Behavioral Measure of Fear for All Subjects: "I" indicates an Imagination Subject and "D" indicates a Desensitization Subject



- (b) Change in Behavioral Measure of Fear for Desensitization Subjects only: "H" indicates a Subject having a High Ability to Image Vividly and "L" a Subject having a Low Ability to Image Vividly



- (c) Change in Behavioral Measure of Fear for Imagination Subjects only: "H" indicates a Subject having a High Ability to Image Vividly and "L" indicates a Subject having a Low Ability to Image Vividly

FIGURE 6

Bar Graph Indicating the Amount of Change in the Behavioral Measure of Fear for (a) All Subjects, (b) the Desensitization Subjects and (c) the Imagination Subjects

TABLE 18

Correlations Between Self-report of Fear  
and Behavioral Fear Test for the  
Two Treatment Procedures

		Treatment Procedure	Self-report of Fear		Behavioral Fear Test		
			Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Self-Report of Fear	Pre-test Measure	Imagin.	.202	.363	-.239	-.164	.115
		Desens.	.202	.468*	-.084	-.183	-.088
		Total	.240	.408**	-.095	-.166	-.041
	Post Test Measure	Imagin.		-.839**	-.038	-.408	-.273
		Desens.		-.771**	-.227	-.633**	-.393
		Total		-.789**	-.111	-.512**	-.345*
	Difference Score	Imagin.			-.097	.297	.323
		Desens.			.150	.452	.297
		Total			.044	.377*	.299
Behavioral Fear Test	Pre-test Measure	Imagin.				.387	-.712**
		Desens.				.706**	-.608**
		Total				.585**	-.654**
	Post Test Measure	Imagin.					.372
		Desens.					.133
		Total					.231

\*p &lt; .05

\*\*p &lt; .01



TABLE 19

2 x 2 Analysis of Variance Comparing  
Mean Difference Scores Based on the  
Self-report of Fear

Source	Sum of Squares	df	Mean Square	F	p
Treatment	1.15	1	1.15	0.061	.807
Ability to Image	1.03	1	1.03	0.054	.817
Interaction	2.94	1	2.94	0.156	.695
Error	660.45	35	18.87		

TABLE 20

2 x 2 Analysis of Variance Comparing  
Mean Difference Scores Based on the  
Behavioral Fear Test

Source	Sum of Squares	df	Mean Square	F	p
Treatment	4.31	1	4.31	1.339	.256
Ability to Image	3.71	1	3.71	1.154	.290
Interaction	0.00	1	0.00		
Error	106.19	35	3.03		

hypothesis two. In other words: (1) when comparing the imagination and desensitization procedures, there was no significant difference in reducing fear of the phobic object; (2) subjects who possess a high ability to image vividly did not differ significantly in terms of reduction of fear of the phobic object when compared to subjects who possess a low ability to image vividly; and (3) there was no significant interaction between treatment condition--desensitization or imagination--and ability to image vividly.

Using essentially the same data, an analysis of covariance was computed covarying out the effects of the pretest on the post test scores. Table 21 displays the analysis of covariance table for the self-report measure of fear. Table 22 displays the analysis of covariance table for the behavioral measure of fear. An inspection of Tables 21 and 22 reveals that the conclusions drawn from the analysis of variance of difference scores are supported by the analysis of covariance of the post test scores.

TABLE 21

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Self-report of Fear:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	7.05	1	7.05	0.429	.517
Ability to Image	0.00	1	0.00		
Interaction	1.36	1	1.36	0.083	.776
Error	54.19	33	16.42		

TABLE 22

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Behavioral Fear Test:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	0.23	1	0.23	0.112	.740
Ability to Image	1.14	1	1.14	0.567	.457
Interaction	0.25	1	0.25	0.126	.725
Error	66.17	33	2.01		

Because there might be some concern regarding the use of parametric statistics on ordinal data, the analysis was repeated using non-parametric statistics. Post test results on the behavioral measure of fear were used to separate subjects into two categories: (1) subjects who at least picked up the snake during the post test, and (2) subjects who would at most touch and not pick up the snake during the post test. Maintaining the same high-low breakdown on the Betts' QMI, chi-square tests were performed. Table 23 displays the results for the desensitization group; Table 24 displays the results for the imagination group. As can readily be seen, the results in both cases are non-significant which is consistent with the results obtained using parametric tests.

### Discussion

The conclusion that merely imaging is as effective as desensitization in reducing phobias is consistent with London's hypothesis. However, this finding taken in combination with the finding that the experimental procedures were no more successful for good imagers than for poor imagers

TABLE 23

2 x 2 Chi Square Comparing Subjects who Handled Snake and Subjects who did not Handle Snake During Behavioral Fear Post Test and Comparing Subjects who were High and Subjects who were Low on Ability to Image Vividly: Desensitization Subjects Only

	Ability to Image Vividly	
	High	Low
Handled Snake	4	5
Did Not Handle Snake	5	5

$\chi^2$ , adjusted with Yates' correction for continuity, less than 1; not significant

TABLE 24

2 x 2 Chi Square Comparing Subjects who Handled Snake and Subjects who did not Handle Snake During Behavioral Fear Post Test and Comparing Subjects who were High and Subjects who were Low on Ability to Image Vividly: Imagination Subjects Only

	Ability to Image Vividly	
	High	Low
Handled Snake	4	4
Did Not Handle Snake	8	4

$\chi^2$ , adjusted with Yates' correction for continuity, less than 1; not significant

causes one to question London's theory. After all, London theorizes that the elicitation of vivid imagery is as effective as desensitization in reducing phobias, and that the vividness of the imagery is the critical component in the success of the treatment. However, these results demonstrate that merely imaging is as effective as systematic desensitization; the ability to image vividly is unrelated to the effectiveness of the procedure.

It should be emphasized that the above analyses were based on the ability to image vividly and not on the actual vividness of imagery reported during the treatment procedure. As was discussed in the preliminary analysis, the ability to image vividly and the vividness of imagery reported during the treatment are not highly correlated. Since the ability to image vividly seems to be differentially affected by the treatment procedures, a more adequate test of the hypothesis would entail vividness reported during treatment. Hypothesis four deals with precisely this variable: vividness of imagery during treatment.

#### Hypothesis Four

#### Data Analysis

In considering the fourth hypothesis, correlations were computed between pretest - post test change in each of the two dependent measures of fear, and the vividness of imagery ratings reported for the neutral items and the hierarchy items. The correlations for both treatment procedures are reported in Table 25. Of the eight correlations displayed in the table, only one is significantly different from zero: the correlation between change in the behavioral measure of fear and

TABLE 25

Correlations Between Vividness of Neutral and  
Hierarchy Items and Change in each Measure  
of Fear for each Treatment Procedure

	Imagination		Desensitization	
	Self-report of Fear	Behavioral Fear Test	Self-report of Fear	Behavioral Fear Test
Vividness of Neutral Items	-.109	-.241	.129	-.546*
Vividness of Hierarchy Items	-.011	-.013	-.054	-.416

\*  $p < .05$

vividness of imagery of the neutral items for the desensitization subjects. This finding suggests that, for the desensitization procedure, more vivid imagery during the procedure corresponded to greater reduction in fear.

In order to further test for a relationship between vivid imagery during the experimental procedures and reduction in fear, all of the subjects participating in the research were re-classified into high or low imagers. Instead of classifying them on the basis of a pretest measure--the Betts' QMI--subjects were classified on the basis of the vividness of imagery they reported during the experimental procedures. Using the vividness scores reported for the ten neutral items, the data from the 20 imagination subjects were divided into two equal groups: high imagers had vividness scores above the median and low imagers had vividness scores below the median. The same procedure was followed for re-classifying the 19 desensitization subjects. Neutral items, rather than hierarchy items, served as the basis of the classification because the correlations displayed in Table 25 suggest that vividness of imaging the neutral items might be related to reduction in fear.

Table 26 displays means and standard deviations on the self-report measure of fear for the new classification of subjects. Table 27 displays

TABLE 26

Means and Standard Deviations for Self-report of Fear for Subjects Reporting High Vividness of Imagery on the Neutral Items and for Subjects Reporting Low Vividness of Imagery on the Neutral Items

		Vividness Reported for Neutral Items					
		High			Low		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Imagination	N	10	10	10	10	10	10
	Mean	14.00	10.70	3.30	12.90	10.70	2.20
	S.D.	1.83	4.67	5.66	2.85	3.71	2.57
Desensitization	N	10	10	10	9	9	9
	Mean	11.20	9.30	1.90	12.40	9.60	2.89
	S.D.	3.26	3.13	3.78	1.88	4.53	4.70

means and standard deviations on the behavioral measure of fear for the new classification of subjects. In order to statistically test the fourth hypothesis, an analysis of covariance comparing post test means was computed. The effects of the pretest were covaried out. Table 28 presents the analysis of covariance table for the self-report measure of fear. Table 29 displays the analysis of covariance table for the behavioral measure of fear. As can be seen, the results in both cases are consistent with the results obtained using the original classification of subjects: there are no significant main effects and no significant

TABLE 27

Means and Standard Deviations for Behavioral  
Fear Test for Subjects Reporting High  
Vividness of Imagery on the Neutral  
Items and for Subjects Reporting  
Low Vividness of Imagery  
on the Neutral Items

		Vividness Reported for Neutral Items					
		High			Low		
		Pre- test Measure	Post Test Measure	Differ- ence Score	Pre- test Measure	Post Test Measure	Differ- ence Score
Imagination	N	10	10	10	10	10	10
	Mean	5.90	8.20	2.30	6.30	8.10	1.80
	S.D.	2.18	1.32	2.11	1.49	1.52	1.55
Desensiti- zation	N	10	10	10	9	9	9
	Mean	5.50	8.40	2.90	5.60	7.90	2.30
	S.D.	2.55	1.58	2.02	2.46	2.37	1.41

TABLE 28

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Self-report of Fear:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	6.88	1	6.88	0.419	.522
Reported Vividness	0.25	1	0.25	0.015	.903
Interaction	0.60	1	0.60	0.036	.850
Error	542.12	33	16.43		



TABLE 29

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Behavioral Fear Test:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	0.27	1	0.27	0.137	.713
Reported Vividness	1.59	1	1.59	.795	.379
Interaction	0.04	1	0.04	.018	.895
Error	46.74	33	1.42		

interaction. In other words, using the vividness of imagery reported during the treatment procedure as the basis for classifying subjects into high and low imagers, there is still no significant difference between the reduction in fear of high imagers and the reduction in fear of low imagers.

Again, the analysis was repeated using a non-parametric test. The post test results on the behavioral measure of fear were again used to separate the subjects into two groups: subjects who picked up the snake and subjects who at most touched the snake. Maintaining the high-low breakdown on the vividness of imagery reported during the treatment procedure, chi-square tests were performed. Table 30 displays the results for the desensitization group; Table 31 displays the results for the imagination group. The results in both cases are non-significant; this is consistent with the results above using parametric tests.

### Discussion

The results concerning the vividness of imagery during the treatment procedure fail to support the fourth hypothesis. Regardless of whether

TABLE 30

2 x 2 Chi Square Comparing Subjects who Handled Snake and Subjects who did not Handle Snake During Behavioral Fear Post Test and Comparing Subjects who were High and Subjects who were Low on Ability to Vividly Image the Neutral Items: Desensitization Subjects Only

	Vividness Reported For Neutral Items	
	High	Low
Handled Snake	5	4
Did Not Handle Snake	5	5

$\chi^2$ , adjusted with Yates' correction for continuity, less than 1; not significant

TABLE 31

2 x 2 Chi Square Comparing Subjects who Handled Snake and Subjects who did not Handle Snake During Behavioral Fear Post Test and Comparing Subjects who were High and Subjects who were Low on Ability to Vividly Image the Neutral Items: Imagination Subjects Only

	Vividness Reported For Neutral Items	
	High	Low
Handled Snake	4	4
Did Not Handle Snake	6	6

$\chi^2$ , adjusted with Yates' correction for continuity, less than 1; not significant

subjects are classified according to their ability to image vividly or whether they are classified according to the actual vividness of their imagery during the treatment, there is no significant difference between the success of the procedures for good imagers and the success of the procedures for poor imagers. This leads one to further question the accuracy of London's theory.

### Supplementary Analyses

As described in Chapter III, in addition to measures of vividness of imagery, two measures of the ability to control visual imagery--the Gordon Test and the Necker Cube--and one performance measure of the ability to image--the JAI--were obtained. This section will be devoted to examining the relationship between these two measures and the reduction in fear as a result of the treatment procedures.

### Control of Visual Imagery

#### Data Analysis

Table 32 displays the means and standard deviations for the two measures which theoretically relate to the control of visual imagery. As can be seen, the mean number of items answered on the Gordon Test is approximately eight; that is, on the average, subjects were able to obtain visual images of eight of the 12 items on the Gordon Test. The data also suggest that subjects endorsed vivid-autonomous and weak-unstable imagery about equally often as an explanation as to why they could not obtain images of items included in the Gordon Test.

In order to compare scores on the Gordon Test with scores on the Necker Cube, correlations were computed between the two measures.

TABLE 32

Means and Standard Deviations for  
Measures Related to Control  
of Visual Imagery

		Mean	Standard Deviation
Gordon Test	Total Score	8.33	2.61
	Vivid-Autonomous	1.34	1.54
	Weak-Unstable	1.38	1.60
	Other	0.59	1.19
Rate of Reversal of Necker Cube	Normal	18.59	10.82
	Fast	35.00	18.34
	Slow	12.72	7.77
	Fast minus Normal	16.41	12.85
	Fast minus Slow	22.21	15.22
	Normal minus Slow	5.87	9.53

These correlations are displayed in Table 33. As can be seen, there is no significant correlation between total score on the Gordon Test and any score on the Necker Cube. Apparently these measures assess different abilities. This contradicts findings which were reported in Chapter II, Related Literature.

The Betts' QMI and the Gordon Test are both self-report measures relating to imagery: the Betts' QMI purports to measure vividness of imagery whereas the Gordon Test purports to measure imagery control. The correlation between these two measures is  $-.457$  which is significantly different from zero ( $p < .01$ ). This correlation indicates that the more vivid the imagery reported by a subject on the Betts' QMI, the more likely he was to obtain the images requested on the Gordon Test.

TABLE 33

Correlations Between Score on the  
Gordon Test and Various Scores  
on the Necker Cube

Necker Score	Total Gordon
Normal	0.165
Fast	0.151
Slow	0.006
Fast minus Normal	0.076
Fast minus Slow	0.181
Normal minus Slow	0.183

What is the relationship between the measures of imagery control and the measures of fear? Table 34 displays the correlations between the Gordon Test and the measures of fear. As can be seen, none of the correlations is significantly different from zero. Thus, it appears that there is no relationship between the Gordon Test of visual imagery control and the amount of fear reduction as a result of either desensitization or imagination.

Table 35 displays the correlations between the various scores on the Necker Cube and the measures of fear. The "fast minus normal" scores appear to have the strongest relationship to the measures of fear. Therefore, additional analyses were conducted with this portion of the data.

The data from all subjects participating in the research were classified as high or low on "fast minus normal" score. The 20 imagination subjects were divided into two equal groups: high "fast minus normal" scorers were above the median and low "fast minus normal" scorers were

TABLE 34

Correlations Between Gordon  
Test and Measures of Fear

		Total Gordon	
		Imagination	Desensitization
Self-report of Fear	Pretest Measure	0.299	0.039
	Post Test Measure	0.132	0.056
	Difference Score	0.040	-0.025
Behav- ioral Fear Test	Pretest Measure	-0.122	-0.156
	Post Test Measure	0.011	-0.011
	Difference Score	0.132	0.207

below the median. The same procedure was used for classifying the 19 desensitization subjects.

Table 36 displays means and standard deviations on the self-report measure of fear for the new classification of subjects. Table 37 displays means and standard deviations on the behavioral measure of fear for the new classification of subjects. An analysis of covariance comparing post test means was calculated. Table 38 displays the analysis of covariance table for the self-report measure of fear; Table 39 displays the analysis of covariance table for the behavioral measure of fear. As can be seen from Table 38, when the dependent measure is self-report of fear, there are significant main effects due to classification: when compared to subjects who scored low on "fast minus normal," subjects who scored high

TABLE 35  
Correlations Between Necker Cube  
Measures and Fear Measures

		Normal		Fast		Slow		Fast minus Norm.		Fast minus Slow		Norm. minus Slow	
		Imagin.	Desens.	Imagin.	Desens.	Imagin.	Desens.	Imagin.	Desens.	Imagin.	Desens.	Imagin.	Desens.
Self-report of Fear	Pretest Measure	-.229	.106	-.132	.256	-.035	.432	.012	.241	-.147	.107	-.231	-.187
	Post Test Measure	-.303	.121	-.425	-.071	-.105	.192	-.453*	-.174	-.489*	-.184	-.248	-.005
	Difference Score	.161	-.038	.330	.230	.080	.107	.438	.314	.384	.235	.107	-.117
Behavioral Fear Test	Pretest Measure	.259	-.035	.153	-.406	.042	-.329	-.009	-.480*	.172	-.334	.260	.195
	Post Test Measure	.286	-.106	.429	-.124	.287	-.498*	.481*	-.079	.370	.072	.046	.237
	Difference Score	-.044	-.070	.173	.429	.177	-.099	.375	.584**	.109	.549*	-.227	.006

\*  $p < .05$  \*\*  $p < .01$

TABLE 36

Means and Standard Deviations for Self-report  
Measure of Fear for Subjects Scoring High  
and Subjects Scoring Low on "Fast Minus  
Normal" Score of Necker Cube

		Fast Minus Normal Score on Necker Cube					
		High			Low		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Imagination	N	10	10	10	10	10	10
	Mean	13.40	9.20	4.20	13.50	12.20	1.30
	S.D.	2.30	4.40	5.40	2.40	2.90	1.30
Desensitization	N	9	9	9	10	10	10
	Mean	12.70	8.30	4.40	11.00	10.40	0.60
	S.D.	2.40	3.30	1.60	2.60	3.70	4.60

on "fast minus normal" showed significantly less fear on the post test. According to Table 39, when the dependent measure is a behavioral measure of fear, there are no significant main effects and no significant interaction.

### Discussion

The techniques used to obtain a measure of the ability to control visual imagery were included merely as a supplement. The present results strongly suggest that further research should be executed to determine: (1) the relationship between various measures of the ability to control imagery, and (2) whether the significant difference between high and low "fast minus normal" scorers on the self-report measure of fear is replicable.



TABLE 37

Means and Standard Deviations for Behavioral  
Fear Test for Subjects Scoring High and  
Subjects Scoring Low on "Fast Minus  
Normal" Score of Necker Cube

		Fast Minus Normal Score on Necker Cube					
		High			Low		
		Pre- test Measure	Post Test Measure	Differ- ence Score	Pre- test Measure	Post Test Measure	Differ- ence Score
Imagination	N	10	10	10	10	10	10
	Mean	6.40	9.00	2.60	5.80	7.30	1.50
	S.D.	1.90	1.00	1.90	1.70	1.20	1.40
Desensiti- zation	N.	9	9	9	10	10	10
	Mean	5.30	8.10	2.80	5.70	8.20	2.50
	S.D.	2.70	2.10	2.00	2.00	1.70	1.30

TABLE 38

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Self-report of Fear:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	4.76	1	4.76	0.336	.566
Necker Reversals	74.77	1	74.77	5.270	.028
Interaction	0.03	1	0.03	0.002	.963
Error	468.19	33	14.19		

TABLE 39

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Behavioral Fear Test:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	0.18	1	0.18	0.104	.749
Necker Reversals	6.42	1	6.42	3.707	.063
Interaction	3.70	1	3.70	2.136	.153
Error	57.19	33	1.73		

#### Performance Measure of the Ability to Image

#### Data Analysis

The JAI was included in this research to provide a behavioral measure of the ability to image. How do results obtained on the JAI compare with the Betts' QMI--a self-report measure of vividness of imagery? Table 40 displays the correlation coefficients between (1) the JAI items, the JAI subscales, the JAI total score, and (2) the Betts' QMI, the ten neutral items rated during the experimental procedures, and the ten hierarchy items rated during the treatment procedures. As can be seen, none of the correlations is significantly different from zero. Thus, one can conclude that there is no relationship between the JAI and self-report of the vividness of imagery. This finding is consistent with that reported by Juhasz (1969) in which he indicates that the JAI demonstrated no relationship with a Betts-like measure of the ability to image.

TABLE 40

Correlations Between Various Scores on the  
JAI, and the Betts' QMI, Vividness  
Reported for the Neutral Items  
and Vividness Reported for  
the Hierarchy Items

	Betts' QMI	Neutral Items	Hierarchy Items
Yellow	.053	.219	.128
Tile A	.015	.102	.158
Tile B	-.015	-.175	.174
Tile C	-.239	-.301	-.241
Total ABC	-.123	-.181	.036
Poem 1A	-.003	-.015	-.074
Poem 1B	-.059	-.080	.054
Total 1A1B	-.045	-.068	-.009
Total JAI	-.085	-.057	.079

In order to see the relationship between the JAI and the measures of fear, correlations were computed. Table 41 displays the correlations between (1) the subscales and total JAI score, and (2) the various scores on the two dependent measures of fear. Based on these correlations, it was decided that two additional analyses would be conducted: one using score on Tiles ABC as an independent variable, and one using total JAI score as an independent variable.

As had been done previously in this analysis, the data from all subjects participating in this study were classified as high or low; this time the classification was based on score on Tiles ABC. First

TABLE 41

Correlations Between Various Scores on  
the JAI and the Measures of Fear

		Self-report of Fear			Behavioral Fear Test		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Yellow	Imag.	.060	.100	-.062	.013	-.247	-.201
	Desen.	-.239	-.286	.103	.136	.237	.076
Total ABC	Imag.	.102	-.604**	.632**	-.049	.618**	.520*
	Desen.	-.116	-.326	.218	.255	.395	.085
Total 1A1B	Imag.	-.441	-.186	-.068	.246	.225	-.076
	Desen.	-.247	-.339	.146	.370	.275	-.210
Total JAI	Imag.	-.245	-.516*	.355	.167	.477*	.196
	Desen.	-.314	-.512*	.258	.424	.495*	-.038

\* $p < .05$       \*\* $p < .01$

the 20 imagination subjects were divided into high scorers on Tiles ABC and low scorers on Tiles ABC; then the procedure was repeated for the 19 desensitization subjects.

Table 42 displays the means and standard deviations on the self-report measure of fear for the new classification of subjects; Table 43 presents the means and standard deviations on the behavioral measure of fear for the new classification of subjects. An analysis of covariance comparing post test means was calculated for each measure of fear. Table 44 displays the analysis of covariance table for the self-report measure of fear; Table 45 displays the analysis of covariance table for the behavioral measure of fear. As can be seen from Tables 44 and 45,

TABLE 42

Means and Standard Deviations for Self-report  
of Fear for Subjects Scoring High and  
Subjects Scoring Low on Total ABC

		Total ABC					
		High			Low		
		Pre- test Measure	Post Test Measure	Differ- ence Score	Pre- test Measure	Post Test Measure	Differ- ence Score
Imagination	N	7	7	7	13	13	13
	Mean	13.90	7.10	6.8	13.20	12.60	0.60
	S.D.	0.96	3.53	3.83	2.66	2.70	2.53
Desensiti- zation	N	11	11	11	8	8	8
	Mean	10.90	8.30	2.60	13.00	11.00	2.00
	S.D.	2.57	3.11	3.98	2.20	3.70	4.10

TABLE 43

Means and Standard Deviations for Behavioral  
Fear Test for Subjects Scoring High and  
Subjects Scoring Low on Total ABC

		Total ABC					
		High			Low		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Imagination	N	7	7	7	13	13	13
	Mean	6.40	9.00	2.60	5.90	7.70	1.80
	S.D.	1.76	0.76	1.99	1.77	1.38	1.58
Desensitization	N	11	11	11	8	8	8
	Mean	5.70	8.80	3.10	5.30	7.30	2.00
	S.D.	1.76	1.40	1.83	3.00	2.10	1.20

TABLE 44

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Self-report of Fear:  
Pre-test Scores Used as Covariate

Source	Sum of Square	df	Mean Square	F	p
Treatment	6.38	1	6.38	0.551	.463
Score on ABC Item	130.57	1	130.57	11.280	.002
Interaction	26.07	1	26.07	2.253	.143
Error	381.99	33	11.58		

TABLE 45

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Behavioral Fear Test:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	0.39	1	0.39	0.239	.628
Score on ABC Item	13.07	1	13.07	7.922	.008
Interaction	0.09	1	0.09	0.058	.811
Error	54.44	33	1.65		

regardless of which measure of fear is the dependent variable, there are significant main effects due to classification--that is, score on Tiles ABC. In other words, when compared to subjects who scored low on Tiles ABC, subjects who scored high on Tiles ABC showed significantly less fear on the post test--regardless of which treatment procedure they had experienced and regardless of whether a self-report or behavioral measure of fear was the dependent measure.

Subjects participating in the research were re-classified on the basis of total JAI score and the above analyses were repeated. Table 46 displays the means and standard deviations on the self-report measure of fear for subjects classified according to total score on the JAI. Table 47 presents means and standard deviations on the behavioral

TABLE 46

Means and Standard Deviations for Self-report  
of Fear for Subjects Classified According  
to the JAI as Having Low Ability to Image  
and Subjects Classified According to JAI  
as Having High Ability to Image

		Ability to Image According to JAI					
		High			Low		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Imagination	N	10	10	10	10	10	10
	Mean	12.6	9.5	3.1	14.3	11.9	2.4
	S.D.	2.5	4.2	4.2	2.0	3.8	4.6
Desensitization	N	9	9	9	10	10	10
	Mean	10.8	7.8	3.0	12.7	10.9	1.8
	S.D.	3.0	3.3	4.7	2.2	3.6	3.8



TABLE 47

Means and Standard Deviations for Behavioral Fear Test for Subjects Classified According to JAI as Having Low Ability to Image and Subjects Classified According to JAI as Having High Ability to Image

		Ability to Image According to JAI					
		High			Low		
		Pre-test Measure	Post Test Measure	Difference Score	Pre-test Measure	Post Test Measure	Difference Score
Imagination	N	10	10	10	10	10	10
	Mean	6.2	8.2	2.0	6.0	8.1	2.1
	S.D.	2.0	1.5	1.5	1.8	1.4	2.2
Desensitization	N	9	9	9	10	10	10
	Mean	6.6	8.9	2.3	4.6	7.5	2.9
	S.D.	1.5	1.5	1.2	2.8	2.1	2.1

measure of fear. The analyses of covariance are presented in Table 48, self-report measure of fear, and Table 49, behavioral measure of fear. As can be seen, these analyses produced no significant main effects and no significant interaction.

### Discussion

The one finding in this section which warrants some discussion is the significant main effect due to score on Tiles ABC. Because this outcome was not hypothesized a priori, one is hesitant to draw any strong conclusions from this result. It is recommended that this phase of the research be repeated to determine whether the outcome is replicable.

TABLE 48

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Self-report of Fear:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	10.54	1	10.54	0.704	.408
Total JAI Score	48.81	1	48.81	3.260	.080
Interaction	0.78	1	0.78	0.052	.821
Error	494.06	33	14.97		

TABLE 49

2 x 2 Analysis of Covariance Comparing Post  
Test Means on the Behavioral Fear Test:  
Pre-test Scores Used as Covariate

Source	Sum of Squares	df	Mean Square	F	p
Treatment	0.26	1	0.26	0.131	.720
Total JAI Score	0.28	1	0.28	0.139	.711
Interaction	0.63	1	0.63	0.311	.581
Error	66.67	33	2.02		.

However, it is interesting to speculate why the ability to draw an abstractly shaped tile, which was felt but never seen, might relate to the success of the treatment procedures. Perhaps the clue lies in the process the subject must use to be successful at the task, Tiles ABC. First, the subject must perceive the spatial patterning or shape of the tile solely through the use of his hands and fingers. He must remember this kinesthetic-tactual shape, and then translate it into visual-spatial relationships as he draws the outline of the tile. It would seem that a high score would necessitate several skills: good short-term memory, good kinesthetic-tactual imagery, and the ability to manipulate or translate kinesthetic-tactual imagery into visual-spatial imagery. Thus, this item seems to require the ability to image and the ability to manipulate imagery. Furthermore, it requires that the subject translate the kinesthetic-tactual image which occurred at his body boundary into the visual image of an external object. It would seem that this process would necessitate the ability to image one's body in relation to the world. The interpretation of London's theoretical rationale provided in Chapter I stated that differentiation between the "inside" and "outside" would occur as a result of imaging the physical body interacting with the physical world. Is it possible that subjects who scored high on Tiles ABC were also those subjects best able to perform these necessary internal operations?

#### Summary of Results

Of the four hypotheses tested in these analyses, two hypotheses were supported and two failed to be supported. The data indicated that the two treatment procedures--imagination and desensitization--

are equally effective in reducing phobias. The data also indicated that there is no statistically significant interaction between treatment procedure and vividness of imagery. On the other hand, the data failed to indicate that a greater ability to image vividly results in greater reduction in phobias. Similarly, the data failed to indicate that more vivid imagery during the treatment results in greater reduction in phobias.

Supplementary analyses were performed to examine some of the other measures obtained. Although the Gordon Test and the Necker Cube are both theoretically related to control of visual imagery, it was found that there is no significant correlation between the two measures. There is, however, a significant correlation between the Gordon Test of Visual Imagery Control and the Betts' QMI which measures vividness of imagery. In comparing the various scores on the two measures of visual imagery control with reduction in fear, it was found that classifying subjects on only one score, "fast minus normal," on the Necker Cube resulted in a significant difference on a post test measure of fear.

Correlations between a behavioral measure of imagery--the JAI--and a self-report measure of imagery--the Betts' QMI--were all non-significant. In comparing the various scores on the JAI with reduction in fear, it was found that classifying subjects on only one score, Tiles ABC, on the JAI resulted in a significant difference on the post test measures of fear.

## CHAPTER V

### SUMMARY AND CONCLUSIONS

Before detailing the conclusions which can be drawn from this research, it might be helpful to the reader to provide a brief summary of the earlier sections of this dissertation.

#### Summary

London (1964) hypothesizes that the crucial variable in both systematic desensitization and implosive therapy is the elicitation of vivid imagery. This research was designed to test London's hypothesis: namely, the elicitation of vivid imagery is as effective as systematic desensitization therapy in reducing phobic behaviors.

#### Related Literature

In order to conduct an experiment which would adequately test the hypothesis, the literature was searched for information and measures which might be useful in the design and execution of the research.

#### Imagination

There is a great diversity of approaches to measuring imagination. The measurement techniques can be conceptually classified into three

categories: physiological measures, self-report measures, and behavioral measures.

#### Physiological Measures of Imagination

Numerous reports (Jacobson, 1932; Max, 1935, 1937; Shaw, 1940) assert that physiological measures validly assess imaginal events. However, despite the objectivity deriving from the use of physiological measures, there are numerous disadvantages to using them. These disadvantages, itemized in Chapter II, mitigated their use.

#### Self-report Measures of Imagination

Two self-report measures of imagination seemed particularly valid and reliable. They are: (1) the short form of the Betts' QMI Vividness of Imagery Scale and (2) the Gordon Test of Visual Imagery Control.

Short form of the Betts' QMI Vividness of Imagery Scale. Early work towards developing the Betts' QMI was done by Galton (1880, 1883). Betts (1909) expanded upon Galton's work and developed a 150 item questionnaire covering seven sensory modalities. Sheehan (1966a, 1966b, 1967a, 1967b, 1967c, 1967d) factor analyzed, shortened, and validated the Betts' QMI.

The Betts' QMI now includes 35 items, five in each of seven sensory modalities. The subject is asked to image each of the 35 items. A seven point rating scale is provided for the subject to rate the vividness of each image. (See Appendix A for a copy of the Betts' QMI.)

Two factor analytic studies supported the construct validity of the Betts' QMI. Furthermore, research has demonstrated that the Betts' QMI measures a single, unitary factor--vividness of imagery.

The Betts' QMI was shown to be a reliable and valid instrument for measuring an individual's ability to image vividly. Individuals classified into good and poor imagers on the basis of the Betts' QMI consistently demonstrated differences in their ability to evoke images in experimental settings.

The Gordon Test of Visual Imagery Control. The Gordon Test is a 12 item questionnaire used to identify individuals with controlled and individuals with uncontrolled imagery. In each item, the subject is directed to manipulate a visual image of a car. The subject reports his success or failure for each item. (See Appendix B, Part 1, for a copy of the Gordon Test.) Using the responses from the Gordon Test, subjects can be classified as controlled or uncontrolled imagers. If additional information is obtained, uncontrolled imagers can be further classified as vivid-autonomous imagers and weak-unstable imagers.

No data are available regarding the reliability of the Gordon Test. Construct validity can be inferred from three research studies (Gordon, 1949, 1950; Costello, 1956). These studies confirmed hypothesized relationships between results on the Gordon Test and (1) an individual's rigidity or flexibility of stereotopy, and (2) an individual's ability to change his reversal rate on the Necker cube.

#### Behavioral Measure of Imagination

The Juhasz Test of the Ability to Imagine (JAI) includes exclusively behavioral measures of imagination. As such, it is unique among tests of imagination which typically rely upon self-report or problem solving.

The Juhasz Test of the Ability to Imagine. The JAI is a behavioral measure of imagination. It includes 14 items, each of which requires the subject to imaginably manipulate a sensory experience. The JAI

was developed from a novel theory of imagination (Sarbin & Juhasz, 1970) which conceives of imagination as hypothetical instantiation, "to act as if." A 12 item version of the test has been shown to have a test-retest reliability of .57. Construct validity of the JAI can be inferred from two research studies conducted by Juhasz (1969, 1970b).

### Systematic Desensitization Therapy

Systematic desensitization therapy is a therapeutic technique devised by Joseph Wolpe (1958) to help individuals eliminate specific fears and anxieties. Desensitization consists of a three-part package: (1) training in deep muscular relaxation; (2) construction of anxiety hierarchies; and (3) systematic desensitization itself. In the desensitization procedure, a subject, while deeply relaxed, images a graded series of stimulus situations. The series of stimulus situations create progressively more fear and anxiety; and the subject proceeds from the least to the most anxiety provoking situations.

Although there is some controversy about the psychological and physiological processes operating in systematic desensitization therapy, researchers consistently report that it is a highly effective technique to help individuals eliminate circumscribed fears and anxieties. Fairly extensive research has been conducted on desensitization; and some of the major variables influencing its effectiveness have been elucidated.

### Method

This research was designed to test London's (1964) hypothesis that the elicitation of vivid imagery will be as effective as systematic desensitization in reducing phobic behaviors. It is clear from this



hypothesis that the dependent variable is "reduction of phobic behavior." As a result, the measurement of phobic behavior was one aspect of the experimental design and method. The two independent variables included in this research are: (1) the ability of the subject to image vividly, and (2) the conditions of imaging a phobic object (desensitization) or a non-phobic object (imagination).

Given the hypothesis and the relevant variables, four specific hypotheses were tested.

Hypothesis one: The desensitization and imagination conditions will be equally effective in reducing fear of the phobic object.

Hypothesis two: Subjects possessing a high ability to image vividly will demonstrate a significantly greater decrease in fear of the phobic object than the subjects possessing a low ability to image vividly.

Hypothesis three: There will be no interaction between the experimental conditions and ability to image vividly.

Hypothesis four: Subjects who report more vivid imagery during the experimental procedures will demonstrate a larger decrement of fear than those subjects who report less vivid imagery.

#### Overview of the Procedure

The above discussion details three variables--two independent and one dependent--which had to be considered in testing the hypothesis: (1) subjects had to be identified who are high on the ability to image vividly, and subjects had to be identified who are low on the ability to image vividly; (2) two experimental conditions--imagination and systematic desensitization--had to be established; and (3) pre- and post test measures of fear of the phobic object had to be obtained.

Thus, the research procedures can be conceptually divided into four stages: subject selection, pretest, experimental procedure and post test.

### Subject Selection

The purpose of the "subject selection" stage of this study was to obtain volunteers who possessed two characteristics: a usable phobia and extremely high or extremely low vividness of imagery. The Betts' QMI and a fear survey were administered to 520 undergraduate students at Michigan State University. From the results, fear of snakes was chosen as the phobia for this research; and extremely high and extremely low vividness of imagery were empirically defined. Thirty-nine subjects participated in the complete study.

### Pretest

The purpose of the "pretest" stage of this research was to measure the extent of the phobia and to obtain additional imagery measures. Each subject was individually administered (1) a behavioral measure of fear, (2) a self-report measure of fear, (3) the Necker cube, a perceptual measure of the ability to control visual imagery, and (4) selected items from the Juhasz test of the Ability to Imagine. (The Gordon Test had been administered earlier, during the "subject selection" stage of this research.)

### Experimental Procedure

The purpose of the "experimental procedure" stage of this research was to implement the experimental conditions of desensitization--imaging the phobic object--and imagination--imaging a non-phobic object. The procedure consisted of six, 45-minute group sessions, which met once

a week for six weeks. The first of the six sessions was standardized and administered via tape recording. It consisted of two parts: (1) an explanation of the experimental procedure and (2) the teaching of progressive relaxation. The subjects then completed five sessions in one of two conditions: (1) desensitization--a tape-recorded, standardized group desensitization procedure--or (2) imagination--a tape-recorded, standardized procedure identical to the desensitization procedure except that a non-phobic imaginal object was substituted for the phobic imaginal object. Four times during each session the subjects were asked to report the vividness of their imagery.

#### Post Test

The purpose of the "post test" stage of this research was to assess the reduction in fear of the phobic object. Consequently, the behavioral measure of fear and the self-report measure of fear administered during the pretest were re-administered to obtain a post test measure of fear.

### Results and Discussion

#### Preliminary Analysis

The preliminary analysis focused on the vividness of imagery. In general, the vividness of imagery reported during the treatment procedure was less vivid than that reported while completing the Betts' QMI. There was less consistency between scores on the Betts' QMI and vividness reported during the procedure for the desensitization subjects than for the imagination subjects. It was hypothesized that anxiety occurring during the desensitization procedure interfered with the ability to image vividly. There was some empirical support for this hypothesis, since it

was found for the desensitization procedure that the greater the vividness of the imagery of the phobic items, the greater the reported anxiety. This finding led to the speculation that whereas vivid imagery of phobic items results in high anxiety, if the potential anxiety is too high, the subject might defend against it by imaging less vividly and, consequently, experience less anxiety. Consequently, according to these speculations, vividness ratings reported by the desensitization subjects during the experimental procedures were a function of both ability to image vividly and potential anxiety. Since the imagination subjects were not confronted with highly anxiety producing images, the vividness of their imagery during the experimental procedure would have remained primarily a function of their ability to image vividly.

#### Hypothesis Testing

With reference to the four specific hypotheses, two were supported and two were not supported. Hypothesis one, "the desensitization and imagination conditions will be equally effective in reducing fear of the phobic object," was supported. In other words, the imagination treatment was as effective as the desensitization treatment in reducing fear of snakes. Hypothesis three, "there will be no interaction between the experimental conditions and ability to image vividly," was also supported. Hypothesis two, "subjects possessing a high ability to image vividly will demonstrate a significantly greater decrease in fear of the phobic object than subjects possessing a low ability to image vividly," was not supported. Likewise, hypothesis four, "subjects who report more vivid imagery during the experimental procedures will demonstrate a larger decrement of fear than those subjects who report less vivid imagery," was not supported.

Although support for hypothesis one, that merely imaging is as effective as desensitization in reducing phobias, is consistent with London's theory, lack of support for hypotheses two and four, that the experimental procedures were equally effective for good and poor imagers, causes one to question London's theory. London hypothesizes that the vividness of imagery is the critical component in the success of the treatment. The results, however, demonstrate that merely imaging is as effective as systematic desensitization; the ability to image vividly seems unrelated to the effectiveness of either the imagination or desensitization procedures.

However, a cautionary note should be added. The absence of positive results for vividness of imagery might have been the result of unreliability or invalidity in the vividness' measure. That is, a more reliable or more valid measure of vividness might yield a significant difference in the effectiveness of the treatment procedures. Until a replication is made or a new measure is used, the present results must be considered ambiguous.

With these cautions in mind, the following can be stated: The results of this research do not support but do not disprove London's theory that the elicitation of vivid imagery is as effective as systematic desensitization therapy in reducing phobic behaviors.

#### Supplementary Analysis

Supplementary analyses were performed to ascertain the relationships between the ability to control visual imagery (measured by the Gordon Test and the Necker cube), a performance measure of the ability to image (measured by the JAI), and the effectiveness of the imagination and desensitization treatment procedures. No relationship between the

Gordon Test and the effectiveness of either treatment procedure was found. Of the various Necker cube measures, only the "fast minus normal" score had a significant relationship with treatment effectiveness: namely, when the self-report measure of fear is considered, subjects who scored high on "fast minus normal" showed significantly less fear on the post test than subjects who scored low on "fast minus normal." This result suggests that further research should be carried out to determine: (1) the relationship between various measures of the ability to control imagery, and (2) whether the significant difference between high and low "fast minus normal" scorers on the self-report measure of fear is replicable.

Although the JAI demonstrated no relationship to treatment effectiveness, Tiles ABC, one of the JAI subscales, did display a significant relationship with treatment effectiveness. In other words, when compared to subjects who scored low on Tiles ABC, subjects who scored high on Tiles ABC showed significantly less fear on the post test--regardless of which treatment procedure they had experienced and regardless of whether a self-report or behavioral measure of fear was the dependent measure. It was hypothesized that the skills necessary to be successful at Tiles ABC were the same skills described earlier in an interpretation of London's theoretical rationale: namely, that imagery of the body-boundary moving in relationship to the external world would be a critical component of the procedure.

### Conclusions

Two conclusions can be drawn from this research: (1) London's theory that the elicitation of vivid imagery will be as effective as systematic desensitization in reducing phobic behaviors has neither been supported nor disproved; and (2) an imagination treatment procedure, equated to a systematic desensitization treatment procedure in every respect except for the imaging of phobic items, was just as effective as desensitization in reducing fear of harmless snakes. It should be emphasized that these results do not imply that the critical factor leading to change for subjects experiencing the desensitization treatment is the same factor leading to change for subjects experiencing the imagination treatment. In other words, the desensitization and imagination treatments might entail different critical factors which are effective in reducing phobic behaviors.

Generalizing these conclusions, however, must be tempered by the following limitations. The conclusions are applicable only to college student volunteers who suffer from a fear of snakes which does not profoundly interfere with their daily lives. It remains to be demonstrated that the imagination treatment would also be effective for individuals with a phobia which profoundly interferes with their daily living. Likewise, it remains to be demonstrated that the imagination treatment will be effective in reducing phobias other than the fear of snakes. Finally, no evidence concerning long-range effectiveness of the procedure has been obtained.

Despite the limitations in generalizing these results, one finding is conclusive: an imagination treatment procedure equated to a desensitization treatment in every respect except for the imaging of phobic

items, was as effective as a desensitization treatment procedure in reducing phobic behaviors. This finding demands an explanation.

### Speculations

What explanation can account for the effectiveness of the imagination treatment procedure?

The possibility that vivid imagery, as hypothesized by London (1969), was critical in the process of change can not be dismissed. The results of this research do not support but do not disprove London's hypothesis. In this author's opinion, the unreliability and possible invalidity of the vividness' measure for the desensitization treatment makes it problematic to interpret the results. It would appear that other variables (such as, anxiety) might affect vividness of imagery. An examination of vividness of imagery, variables influencing vividness of imagery, and treatment effectiveness might be productive for future research.

However if vividness of imagery was not critical in obtaining these results, how can the results be explained? Three explanations have been formulated: two involve the concept of acquiring internal control--the "Switching hypothesis"\* and the "Acceptance of Internal Processes hypothesis"; the third explanation involves the concept of differentiating the self from the physical world--the "Differentiation hypothesis."

The "Switching hypothesis" derives from the activities a subject in the imagination treatment condition must perform. For example, the subject is asked to relax and to become aware of his bodily states.

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\* The author is indebted to Dozier W. Thornton, Associate Professor of Psychology, Michigan State University, for assistance in formulating this hypothesis.



If he finds tension, he is to turn it off. Then, at a signal, he must obtain a specific image. He must hold that image until he is given another signal. Then he must dismiss the image from consciousness and once again become aware of his bodily states. If he finds tension, he is to turn it off. And so on. . . .

The procedure is difficult: namely, because our cognitive, affective and bodily processes are in continual flux. Consequently, obtaining a specific image repeatedly is a frustrating task. Over a long period of time, the task becomes boring. The process requires the subject to switch his cognitive or imaginal processes on and off, and to switch muscular tension off while remaining aware of his bodily states. It is interesting to speculate that the actual process of repeatedly switching internal states allows the individual to obtain certain internal controls he did not possess previously.

How would the acquisition of internal controls reduce phobic behaviors? There is an implicit loss of control inherent in avoidance behavior. Namely, the individual can no longer control his approach behavior and flees. The "Switching hypothesis" speculates that the subject has learned to control his internal states as a result of the imagination treatment. Consequently, he can control, if not reduce, his fear and approach the snake despite any fear he might feel.

The second hypothesis, "The Acceptance of Internal Processes," also entails the development of internal controls. However, this hypothesis derives from an analytic conception of the phobia. From an analytic perspective, a phobia can be conceptualized as initially arising from the projection of an anxiety-laden impulse onto specific stimulus situations in the external world. A fearful state arises when the individual is

confronted with the stimulus. The external stimulus triggers the anxiety associated with the forbidden impulse; and the person feels fear.

One would expect such an individual to have repressed or controlled his affect. He would be unaware of emotions as they "pass through" him. The imagination procedure forces the subject (1) to become aware of his bodily processes, (2) to reduce muscular tension and relax and (3) to periodically create specific imaginal or cognitive states. The procedure involves a balance between internal cognitive control and abandonment to internal processes. Consequently, the individual will be confronted with the fact that while he cannot control certain internal processes--especially affect--he can control other internal processes--primarily certain cognitions, bodily states and muscles. This hypothesis asserts that when the individual experiences the balance between the internal controls and the continual flux of internal processes, he can relinquish his need to control or repress affect. Thus, he would accept his feelings more readily. Consequently, the defense mechanism which initially led to the fear--the repression or control of affect--no longer operates; and the phobia disappears.

Finally, the "Differentiation hypothesis" was initially derived from London's theory. Basically the hypothesis states that the phobic individual has confused his internal states (emotions, impulses and fantasies) with real, external events. As a result of this internal confusion, when confronted by an objectively harmless stimulus situation, the phobic individual feels fear. The "Differentiation hypothesis" asserts that the imagination treatment procedure is a process whereby the individual can differentiate himself from the physical world. When he has accomplished this, the phobia disappears.

The critical process for the "Differentiation hypothesis" is imaging the interaction of the physical body with the physical world. Since the neutral and hierarchy items used in this research often entailed the interaction of the physical body with the physical world, the "Differentiation hypothesis" might explain why the subjects in the imagination treatment changed.

Regardless of the reader's opinion of these four explanations of the results, an imagination treatment procedure, equated to a desensitization treatment procedure in every respect except for the imaging of phobic items, was just as effective as a desensitization treatment procedure in reducing fear of harmless snakes. This result is exciting and demands explanation and further research.

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## APPENDICES

## Appendix A

THE BETTS QMI VIVIDNESS OF IMAGERY SCALE

NAME \_\_\_\_\_ DATE \_\_\_\_\_

ADDRESS \_\_\_\_\_ TELEPHONE \_\_\_\_\_

Instructions for Doing the Test

The aim of this test is to determine the vividness of your imagery. The items of the test will bring certain images to your mind. You are to rate the vividness of each image by marking the accompanying rating scale, an example of which is shown at the bottom of this page. Record your answer by making a slash across the scale at the point which describes your image. Record only one response on each scale.

Before you turn to the items on the next page, familiarize yourself with the different categories on the rating scale. Throughout the test, refer to the rating scale key when judging the vividness of each image. A copy of the rating scale key will be printed on each page.

Complete each item in the order given. Do not return to an item once you have answered it. Try not to let your answer on one item affect your answer to another item.

Rating Scale Key

The image aroused by an item of this test may be:

Perfectly clear and as vivid as the actual experience . . . . . Rating 1

Very clear and comparable in vividness to the actual experience . . Rating 2

Moderately clear and vivid. . . . . Rating 3

Not clear or vivid, but recognizable. . . . . Rating 4

Vague and dim . . . . . Rating 5

So vague and dim as to be hardly discernible. . . . . Rating 6

No image present at all: only thinking of the object . . . . . Rating 7

An example of an item on the test might be one which asked you to consider the image of a red apple which comes to your mind's eye. If your visual image, for example, was not quite "moderately clear and vivid" (Rating 3) but readily "recognizable" (Rating 4), you would check the rating scale key and then might make a slash across the rating scale between 3 and 4 as follows:

<u>Item</u>	<u>Rating</u>						
	1	2	3	4	5	6	7
5. A red apple	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="flex: 1; border-bottom: 1px dashed black; position: relative;"> <div style="position: absolute; left: 0; top: -5px;">1</div> <div style="position: absolute; left: 10%; top: -5px;">2</div> <div style="position: absolute; left: 20%; top: -5px;">3</div> <div style="position: absolute; left: 30%; top: -5px;">4</div> <div style="position: absolute; left: 40%; top: -5px;">5</div> <div style="position: absolute; left: 50%; top: -5px;">6</div> <div style="position: absolute; left: 60%; top: -5px;">7</div> </div> <div style="flex: 1; border-bottom: 1px dashed black; position: relative;"> <div style="position: absolute; left: 0; top: -5px;">1</div> <div style="position: absolute; left: 10%; top: -5px;">2</div> <div style="position: absolute; left: 20%; top: -5px;">3</div> <div style="position: absolute; left: 30%; top: -5px;">4</div> <div style="position: absolute; left: 40%; top: -5px;">5</div> <div style="position: absolute; left: 50%; top: -5px;">6</div> <div style="position: absolute; left: 60%; top: -5px;">7</div> </div> </div>						

When you have understood these instructions, turn to the next page and begin the test.

## Appendix A - Continued

Think of some relative or friend whom you frequently see, considering carefully the picture that rises before your mind's eye. Classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale Key.

<u>Item</u>	<u>Rating</u>						
1. The exact contour of face, head, shoulders and body	1	2	3	4	5	6	7
	1	1	1	1	1	1	1
2. Characteristic poses of head, attitudes of body, etc.	1	2	3	4	5	6	7
	1	1	1	1	1	1	1
3. The precise carriage, length of step, etc. in walking	1	2	3	4	5	6	7
	1	1	1	1	1	1	1
4. The different colors worn in some familiar costume	1	2	3	4	5	6	7
	1	1	1	1	1	1	1

Think of seeing the following, considering carefully the picture which comes before your mind's eye. Classify the image suggested by the following question as indicated by the degrees of clearness and vividness specified on the Rating Scale Key.

5. The sun as it is sinking below the horizon	1	2	3	4	5	6	7
	1	1	1	1	1	1	1

Rating Scale Key

The image aroused by an item of this test may be:

- Perfectly clear and as vivid as the actual experience . . . . . Rating 1
- Very clear and comparable in vividness to the actual experience . . Rating 2
- Moderately clear and vivid. . . . . Rating 3
- Not clear or vivid, but recognizable. . . . . Rating 4
- Vague and dim . . . . . Rating 5
- So vague and dim as to be hardly discernible. . . . . Rating 6
- No image present at all: only thinking of the object . . . . . Rating 7

## Appendix A - Continued

Think of each of the following sounds, considering carefully the image which comes to your mind's ear. Classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale Key.

<u>Item</u>	<u>Rating</u>						
6. The whistle of a locomotive	1	2	3	4	5	6	7
	1	1	1	1	1	1	1
7. The honk of an automobile	1	2	3	4	5	6	7
	1	1	1	1	1	1	1
8. The mewling of a cat	1	2	3	4	5	6	7
	1	1	1	1	1	1	1
9. The sound of escaping steam	1	2	3	4	5	6	7
	1	1	1	1	1	1	1
10. The clapping of hands in applause	1	2	3	4	5	6	7
	1	1	1	1	1	1	1

---

Rating Scale Key

The image aroused by an item of this test may be:

- Perfectly clear and as vivid as the actual experience . . . . . Rating 1
- Very clear and comparable in vividness to the actual experience . . Rating 2
- Moderately clear and vivid. . . . . Rating 3
- Not clear or vivid, but recognizable. . . . . Rating 4
- Vague and dim . . . . . Rating 5
- So vague and dim as to be hardly discernible. . . . . Rating 6
- No image present at all: only thinking of the object . . . . . Rating 7

## Appendix A - Continued

Think of "feeling" or touching each of the following, considering carefully the image which comes to your mind's touch. Classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale Key.

<u>Item</u>	<u>Rating</u>
11. Sand	1      2      3      4      5      6      7  ----- ----- ----- ----- ----- -----
12. Linen	1      2      3      4      5      6      7  ----- ----- ----- ----- ----- -----
13. Fur	1      2      3      4      5      6      7  ----- ----- ----- ----- ----- -----
14. The prick of a pin	1      2      3      4      5      6      7  ----- ----- ----- ----- ----- -----
15. The warmth of a tepid bath	1      2      3      4      5      6      7  ----- ----- ----- ----- ----- -----

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Rating Scale Key

The image aroused by an item of this test may be:

- Perfectly clear and as vivid as the actual experience . . . . . Rating 1
- Very clear and comparable in vividness to the actual experience . . Rating 2
- Moderately clear and vivid. . . . . Rating 3
- Not clear or vivid, but recognizable. . . . . Rating 4
- Vague and dim . . . . . Rating 5
- So vague and dim as to be hardly discernible. . . . . Rating 6
- No image present at all: only thinking of the object . . . . . Rating 7

## Appendix A - Continued

Think of performing each of the following acts, considering carefully the image which comes to your mind's arms, legs, lips, etc. Classify the images suggested as indicated by the degree of clearness and vividness specified on the Rating Scale Key.

<u>Item</u>	<u>Rating</u>						
	1	2	3	4	5	6	7
16. Running upstairs	1	2	3	4	5	6	7
17. Springing across a gutter	1	2	3	4	5	6	7
18. Drawing a circle on paper	1	2	3	4	5	6	7
19. Reaching up to a high shelf	1	2	3	4	5	6	7
20. Kicking something out of your way	1	2	3	4	5	6	7

---

Rating Scale Key

The image aroused by an item of this test may be:

Perfectly clear and as vivid as the actual experience . . . . . Rating 1  
 Very clear and comparable in vividness to the actual experience . . Rating 2  
 Moderately clear and vivid. . . . . Rating 3  
 Not clear or vivid, but recognizable. . . . . Rating 4  
 Vague and dim . . . . . Rating 5  
 So vague and dim as to be hardly discernible. . . . . Rating 6  
 No image present at all: only thinking of the object . . . . . Rating 7

Item

Rating

### Rating Scale Key

Perfectly clear and as vivid as the actual experience . . . . . Rating 1

Very clear and comparable in vividness to the actual experience . . Rating 2

Moderately clear and vivid. . . . . Rating 3

Not clear or vivid, but recognizable. . . . . Rating 4

Vague and dim . . . . . Rating 5

So vague and dim as to be hardly discernible. . . . . Rating 6

No image present at all: only thinking of the object . . . . . Rating 7



## Appendix A - Continued

Think of smelling each of the following, considering carefully the image which comes to your mind's nose. Classify the images suggested by each of the following questions as indicated by the degrees of clearness and vividness specified on the Rating Scale Key.

<u>Item</u>	<u>Rating</u>
26. An ill-ventilated room	1 2 3 4 5 6 7  -----
27. Cooking cabbage	1 2 3 4 5 6 7  -----
28. Roast beef	1 2 3 4 5 6 7  -----
29. Fresh paint	1 2 3 4 5 6 7  -----
30. New leather	1 2 3 4 5 6 7  -----

---

Rating Scale Key

The image aroused by an item of this test may be:

- Perfectly clear and as vivid as the actual experience . . . . . Rating 1
- Very clear and comparable in vividness to the actual experience . . Rating 2
- Moderately clear and vivid. . . . . Rating 3
- Not clear or vivid, but recognizable. . . . . Rating 4
- Vague and dim . . . . . Rating 5
- So vague and dim as to be hardly discernible. . . . . Rating 6
- No image present at all: only thinking of the object . . . . . Rating 7

## Appendix A - Continued

Think of each of the following sensations, considering carefully the image which comes before your mind. Classify the images suggested as indicated by the degrees of clearness and vividness specified on the Rating Scale Key.

<u>Item</u>	<u>Rating</u>						
	1	2	3	4	5	6	7
31. Fatigue	1	2	3	4	5	6	7
32. Hunger	1	2	3	4	5	6	7
33. A sore throat	1	2	3	4	5	6	7
34. Drowsiness	1	2	3	4	5	6	7
35. Repletion as from a very full meal	1	2	3	4	5	6	7

---

Rating Scale Key

The image aroused by an item of this test may be:

- Perfectly clear and as vivid as the actual experience . . . . . Rating 1
- Very clear and comparable in vividness to the actual experience . . Rating 2
- Moderately clear and vivid. . . . . Rating 3
- Not clear or vivid, but recognizable. . . . . Rating 4
- Vague and dim . . . . . Rating 5
- So vague and dim as to be hardly discernible. . . . . Rating 6
- No image present at all: only thinking of the object . . . . . Rating 7

## Appendix B - Part I

THE GORDON TEST OF VISUAL IMAGERY CONTROL

You have just completed a questionnaire that was designed to measure the vividness of different kinds of imagery. In this present questionnaire some additional aspects of your imagery are being studied.

The following questions are concerned with the ease with which you can control or manipulate visual images. For some people this task is relatively easy and for others relatively hard. One subject who could not easily manipulate his imagery gave this illustration. He visualized a table, one of whose legs suddenly began to collapse. He then tried to visualize another table with four solid legs, but found it impossible. The image of the first table with its collapsing leg persisted. Another subject reported that when he visualized a table the image was rather vague and dim. He could visualize it briefly but it was difficult to retain by any voluntary effort. In both these illustrations the subjects had difficulty in controlling or manipulating their visual imagery.

Read each question, then close your eyes while you try to visualize the scene described. Record your answer by underlining "Yes," "No" or "Unsure," whichever is the most appropriate. Remember that your accurate and honest answer to these questions is most important for the validity of this questionnaire. If you have any doubts at all regarding the answer to a question, underline "Unsure." Please be certain that you answer each of the twelve questions.

## Appendix B - Part I - Continued

1. Can you see a car standing in the road in front of a house?	Yes	No	Unsure
2. Can you see it in color?	Yes	No	Unsure
3. Can you now see it in a different color?	Yes	No	Unsure
4. Can you now see the same car lying upside down?	Yes	No	Unsure
5. Can you now see the same car back on its own wheels again?	Yes	No	Unsure
6. Can you see the car running along the road?	Yes	No	Unsure
7. Can you see it climb up a very steep hill?	Yes	No	Unsure
8. Can you see it climb over the top?	Yes	No	Unsure
9. Can you see it get out of control and crash through a house?	Yes	No	Unsure
10. Can you now see the same car running along the road with a handsome couple inside?	Yes	No	Unsure
11. Can you see the car cross a bridge and fall over the side into the stream below?	Yes	No	Unsure
12. Can you see the car all old and dismantled in a car-cemetery?	Yes	No	Unsure

## Appendix B - Part II

SUPPLEMENT

The second part of this questionnaire concerns those questions to which you answered "No" or "Unsure." If you answered "Yes" to all the above questions, then, of course, the second part does not apply to you.

As mentioned before, some people control or manipulate their visual images easily. Other people find it more difficult. The following questions concern the reasons you might have found the manipulation difficult.

There are two typical reasons people find the manipulation of their imagery difficult. Needless to say, there are also numerous additional reasons -- but two predominate. Remember the one subject who visualized a table and one of its legs collapsed regardless of his efforts to keep it upright? He could not control his imagery because it seemed to be autonomous, that is to have a will of its own. Remember the second subject who reported that when he visualized a table it was vague, dim, and remained only briefly visualized? He could not control his imagery because it was weak and unstable. Both subjects could not control their images of the table: the first subject's imagery was autonomous of his voluntary efforts; the second subject's imagery was weak and unstable, and visualization could not be maintained. These are the two typical reasons people find it difficult to control and manipulate their imagery: either it is vivid-autonomous or weak-unstable.

On the following page you will find the same 12 questions you just answered. Please answer these questions in the following way.

(1) Circle the number of each item for which you underlined "No" or "Unsure" in part one.

(2) Re-read those items you circled and close your eyes while you re-visualize the scene described. Try to recapture the reason you underlined "No" or "Unsure," determine which response is appropriate, and record your answer by underlining "V-A" (vivid-autonomous), "W-U" (weak-unstable) or "O" (other). If you discover that the response alternatives are often inappropriate, so that you underline "Other" several times, please feel free to write explanations on the questionnaire. Definitions of the response alternatives will be written below the items.

Please be sure you answer all items to which you responded "No" or "Unsure" in part one.

## Appendix B - Part II - Continued

1. Can you see a car standing in the road in front of a house?	V-A	W-U	0
2. Can you see it in color?	V-A	W-U	0
3. Can you now see it in a different color?	V-A	W-U	0
4. Can you now see the same car lying upside down?	V-A	W-U	0
5. Can you now see the same car back on its own wheels again?	V-A	W-U	0
6. Can you see the car running along the road?	V-A	W-U	0
7. Can you see it climb up a very steep hill?	V-A	W-U	0
8. Can you see it climb over the top?	V-A	W-U	0
9. Can you see it get out of control and crash through a house?	V-A	W-U	0
10. Can you now see the same car running along the road with a handsome couple inside?	V-A	W-U	0
11. Can you see the car cross a bridge and fall over the side into the stream below?	V-A	W-U	0
12. Can you see the car all old and dismantled in a car-cemetery?	V-A	W-U	0

Definitions of the Response Alternatives

V-A: Vivid-autonomous imagery is sufficiently vivid to be visualized but changes contrary to the voluntary, conscious efforts of the subject.

W-U: Weak-unstable imagery is sufficiently vague and dim that visualization can not be maintained despite the conscious, voluntary efforts of the subject.

O: "Other" also refers to imagery which can not be manipulated or controlled. Its characteristics, however, are different from the vivid-autonomous and weak-unstable imagery described above.

## Appendix C

POEMS 1A1B

Before you are two poems. Your task will be to read each of them carefully. As you are reading, you will notice that some of the material is bracketed. The bracketed sections present you with two choices: these choices represent alternate images conceived by the poet at various times in the poem's evolution. Your task will be to decide which image represents the poet's revised and final decision. In other words, which image is most powerful, expressive, and appropriate, from the creator's point of view, in the context of the entire poem.

Please underline your choices, and do not omit any items. You will notice that sometimes an a. and b. appear before the alternative images in a bracket section. This means that within that bracket, if you choose image a. on the first line, you are committed to choosing image a. on the next line, and if you choose image b. on one line, you must choose image b. on the next. In other words, the poet wrote both lines together and then changed them. Within a bracket, the a. and b. represent two different versions, with the a.'s taken together as one alternative and the b.'s as the other.

Take as much time as you wish, and when you are done, please turn in your answer sheets. If you are familiar with either or both of these poems, please write a note to this effect after the title of the appropriate poem. Do you have any questions?

## Appendix C - Continued

## The Express

After the first powerful plain manifesto

The 

clear
black

 statement of pistons, without more fuss

But gliding like a queen, she leaves the station.

Without bowing and with restrained unconcern

She 

notices
passes

 the houses which humbly crowd outside,

The gasworks and at last the 

a. heavy page (goes with
"printed" on next line)
b. printed psalm (goes with
"written" on next line)

Of death 

a. printed
v. written

 by gravestones in the cemetery.

Beyond the town here lies the open country

Where, gathering speed, she acquires mystery,

The luminous self-possession of ships on ocean

It is now she begins to sing -- at first quite low

Then loud, and at last with a 

jazzy madness --
mad joy --

The sound of her whistle screaming at 

corners
curves

of 

deafening
blinding

 tunnels, brakes, innumerable bolts.

And always light, aerial, underneath

Goes the 

tapping
elate

 metre of her wheels.



## Appendix C - Continued

## The Express (continued)

Streaming through 

metal shining
------------------

 landscape on her lines

She plunges new eras of wild happiness

Where speed 

throws up strange evokes new shapes,
---

 shapes, broad curves

And parallels clean like the steel of guns.

At last, further than Edinburgh or Rome,

Beyond the crest of the world, she reaches night

Where only a low streamline brightness

Of 

moonlight phosphorous
--------------------------

 on the tossing hills is white.

Ah, like a comet through flame she moves entranced

Wrapt in her music no bird song, no, nor bough

Breaking with honey buds, shall ever equal.

## Appendix C - Continued

## Byzantium

[All the foul  
The unpurged] images of day recede;

[Soldier, robber and victim are abed;  
The Emperors' drunken soldiery are abed;]

Night resonance recedes, night-walkers' song

Afer great cathedral gong;

A starlit or a moonlit dome distains

All that man is,

All mere complexities,

The fury and the mire of human veins.

Before me [floats  
flits] an image, man or shade,

Shade more than man, more image than a shade;

- [a. An image that was bound in mummy-cloth
- b. For Hades' bobbin bound in mummy-cloth

Best knows the winding path; [a.  
May unwind the winding path; b.]

A mouth that has no moisture and no breath

Breathless mouths may summon;

I hail the superhuman;

I call it death-in-life and life-in-death.

Miracle, bird or golden handiwork,

More miracle than bird or handiwork,

- [a. Mutters upon a star-lit golden bough,  
Planted on the star-lit golden bough,

All that the birds of Hades know, [a.  
Can like the cocks of Hades crow, b.]

## Appendix C - Continued

## Byzantium (continued)

Or, by the moon embittered, scorn aloud  
 Or, by the star or moonlight mock aloud

In glory of changeless metal  
 In all simplicity of metal

Common bird or petal

And all complexities of wire or blood.

At midnight on the Emperor's pavement flit(s)

a. A flame nor faggot feeds nor tapers lights  
 b. Flames that no faggot feeds, nor steel has lit,

Nor breath disturbs, a flame begotten flame, a.  
 Nor storm disturbs, flames begotten of flame, b.

Where blood-besotted  
 blood-begotten spirits come

And all complexities of fury leave,

Dying into a dance,

An agony of trance,

An agony of fire  
 flame that cannot singe a sleeve.

Astraddle on the dolphin's mire and blood,

Spirit after spirit!  
 The crowds approach; the smithies break the flood,

The golden smithies of the Emperor!

Marbles of the dancing floor

Break bitter, bleak, aimless complexity,  
 Break bitter furies of complexity

Those images that yet

Fresh  
 More images beget,

That dolphin-torn,  
 fin-tortured, that gong-tormented sea.

## Appendix D

### A FEAR SURVEY

For each item circle the word that most nearly describes the amount of fear you feel toward the object or situation noted in the item.

1. Sharp objects	None	Very little	A little	Some	Much	Very much	Terror
2. Being in a passenger car	None	Very little	A little	Some	Much	Very much	Terror
3. Dead bodies	None	Very little	A little	Some	Much	Very much	Terror
4. Suffocating	None	Very little	A little	Some	Much	Very much	Terror
5. Failing a test	None	Very little	A little	Some	Much	Very much	Terror
6. Looking foolish	None	Very little	A little	Some	Much	Very much	Terror
7. Being a passenger in an airplane	None	Very little	A little	Some	Much	Very much	Terror
8. Worms	None	Very little	A little	Some	Much	Very much	Terror
9. Arguing with parents	None	Very little	A little	Some	Much	Very much	Terror
10. Rats and mice	None	Very little	A little	Some	Much	Very much	Terror
11. Life after death	None	Very little	A little	Some	Much	Very much	Terror
12. Hypodermic needles	None	Very little	A little	Some	Much	Very much	Terror

Appendix D - Continued

13. Being criticized	None	Very little	A little	Some	Much	Very much	Terror
14. Meeting someone for the first time	None	Very little	A little	Some	Much	Very much	Terror
15. Roller coasters	None	Very little	A little	Some	Much	Very much	Terror
16. Being alone	None	Very little	A little	Some	Much	Very much	Terror
17. Making mistakes	None	Very little	A little	Some	Much	Very much	Terror
18. Being misunderstood	None	Very little	A little	Some	Much	Very much	Terror
19. Death	None	Very little	A little	Some	Much	Very much	Terror
20. Being in a fight	None	Very little	A little	Some	Much	Very much	Terror
21. Crowded places	None	Very little	A little	Some	Much	Very much	Terror
22. Blood	None	Very little	A little	Some	Much	Very much	Terror
23. Heights	None	Very little	A little	Some	Much	Very much	Terror
24. Being a leader	None	Very little	A little	Some	Much	Very much	Terror
25. Swimming alone	None	Very little	A little	Some	Much	Very much	Terror
26. Illness	None	Very little	A little	Some	Much	Very much	Terror
27. Being with drunks	None	Very little	A little	Some	Much	Very much	Terror
28. Illness or injury to loved ones	None	Very little	A little	Some	Much	Very much	Terror
29. Being self-conscious	None	Very little	A little	Some	Much	Very much	Terror

Appendix D - Continued

30. Driving a car	None	Very little	A little	Some	Much	Very much	Terror
31. Meeting authority	None	Very little	A little	Some	Much	Very much	Terror
32. Mental illness	None	Very little	A little	Some	Much	Very much	Terror
33. Closed places	None	Very little	A little	Some	Much	Very much	Terror
34. Boating	None	Very little	A little	Some	Much	Very much	Terror
35. Spiders	None	Very little	A little	Some	Much	Very much	Terror
36. Thunderstorms	None	Very little	A little	Some	Much	Very much	Terror
37. Not being a success	None	Very little	A little	Some	Much	Very much	Terror
38. God	None	Very little	A little	Some	Much	Very much	Terror
39. Snakes	None	Very little	A little	Some	Much	Very much	Terror
40. Cemeteries	None	Very little	A little	Some	Much	Very much	Terror
41. Speaking before a group	None	Very little	A little	Some	Much	Very much	Terror
42. Seeing a fight	None	Very little	A little	Some	Much	Very much	Terror
43. Death of a loved one	None	Very little	A little	Some	Much	Very much	Terror
44. Dark places	None	Very little	A little	Some	Much	Very much	Terror
45. Strange dogs	None	Very little	A little	Some	Much	Very much	Terror
46. Deep water	None	Very little	A little	Some	Much	Very much	Terror

Appendix D - Continued

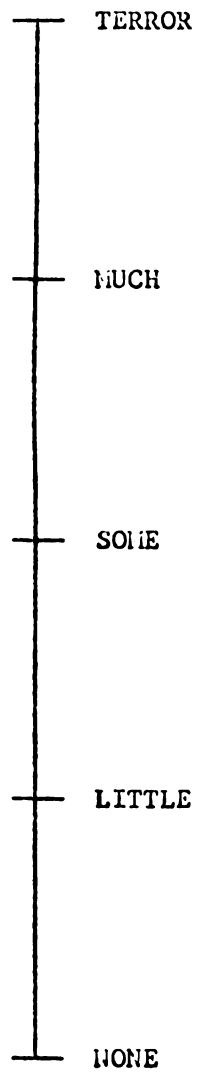
47. Being with a member of the opposite sex	None	Very little	A little	Some	Much	Very much	Terror
48. Stinging insects	None	Very little	A little	Some	Much	Very much	Terror
49. Untimely or early death	None	Very little	A little	Some	Much	Very much	Terror
50. Losing a job	None	Very little	A little	Some	Much	Very much	Terror
51. Auto accidents	None	Very little	A little	Some	Much	Very much	Terror

## Appendix E

SELF-REPORT MEASURE OF FEAR RATING SCALE

NAME \_\_\_\_\_

DATE \_\_\_\_\_





## Appendix F

VERBATIM TRANSCRIPT: SESSION ONE FOR  
DESENSITIZATION AND IMAGINATION TREATMENTS

In this experiment, we are looking into the effectiveness of different ways to help people reduce their fears. As you know, fears are learned. The procedure you will go through is designed to help you unlearn the fear.

The emotional reactions that you experience are a result of your previous experiences with people and situations; these reactions often-times lead to feelings of fear, anxiety or tenseness which are really inappropriate. Since perceptions of situations occur within ourselves, it is possible to work with your reactions by having you image or visualize those situations or objects.

The specific technique we will be using is one called systematic [desensitization] [imagination]\*. This technique utilizes two main procedures--relaxation and [counterconditioning] [imagination]--to reduce your anxiety. The relaxation procedure is based upon years of work that was started in the 1930's by Dr. Jacobson. Dr. Jacobson developed a method of inducing relaxation that can be learned very quickly, and which will allow you to become more deeply relaxed than ever before. Of course, the real advantage of relaxation is that the muscle systems in your body cannot be both tense and relaxed at the

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\*Throughout this transcript when two phrases appear in brackets the first was used in the desensitization treatment and the second in the imagination treatment.

## Appendix F - Continued

same time; therefore, once you have learned the relaxation technique, it can be used to counter anxiety, tenseness, and feelings like those you experience in the fearful situation.

Relaxation alone can be used to reduce anxiety and tension, and I'll be asking you to practice relaxation between our meetings. Often, however, relaxation is inconvenient to use, and really doesn't permanently overcome anxiety. Therefore, we combine the relaxation technique with the psychological principle of [counterconditioning] [psychological differentiation] to actually [desensitize] [change your perceptions of] situations so that anxiety no longer occurs.

Now, how are we going to help you get rid of the fear? First, we think about how the fear probably developed; and then put you through experiences that counteract that development. How did you learn the fear? Well, as you know the fear may not be realistic. Somehow the fear and the situation or object became tied together in your past experiences.

Desensitization only

In other words, you learned to be afraid when you were in that situation or around that object. Each of you has had unique experiences which led you to learn this fear. So, now, when you are confronted with the situation or object, you feel afraid.

If we want to get rid of the fear, what will we do? Well, we interfere with the association between fear and the situation. You learned the fear by having the two paired together; you can unlearn the association by having the two separated. To do this, we will have you imagine

## Appendix F - Continued

fear provoking situations without feeling fear. Fear and relaxation are mutually exclusive feelings. If you are relaxed, you can't be afraid; if you are afraid, you can't be relaxed. So I am going to teach you how to relax. Once you've learned to relax, I'll ask you to imagine certain situations that involve your fear. We'll start off easy, with items that are not very frightening. As you briefly imagine these situations while relaxed, the fear will diminish. As it diminishes, we'll move closer and closer to the object or situation, all the time keeping you relaxed and unafraid. In this way, by imagining the object or situations while you're relaxed, you will unlearn the fear. As you go through this process week by week, the fear will lessen, until it drops out.

Imagination only

Whatever feelings, fears, or fantasies you have about these situations or objects may never have been clearly separated from the actual situations or objects. Somehow, you may never have been very clear as to the difference, in this area, between what was inside and outside you. The fear may be a manifestation of this lack of clarity. Why, after all, would you be afraid of something objectively harmless?

If we want to help you get rid of the fear, what will we do? We provide you with experiences that will help you to make this differentiation and then the fear will drop out all on its own.

For you to learn to do this, you must learn to relax. The more able you are to relax, the more fully you will be able to enter into the process of discriminating between what is inside and outside you. How will we help you make this discrimination? Well, once you've relaxed you will

## Appendix F - Continued

be asked to imagine certain objects or situations. As you do so, the more real they become, the more clearly you'll come to understand and experience--learn, if you will--that sometimes fantasies and feelings may not correspond with what is happening outside you. As you go through this process week by week, the fear will lessen, until it drops out.

Relaxation instructions for both treatments

Do you have any questions before we continue?

In this first session, we'll only go through the relaxation training. In future sessions we'll go through the procedures to help you unlearn the fear. So let's begin with learning how to relax--really relax. Would you take a place on the floor a yard or more away from anyone else. Just lie back comfortably. . . .

In the relaxation training, I am going to ask you to systematically tighten some of your major muscle groups, and to hold them tense, until I say, "relax," when you should immediately let go. To let go you simply stop tensing the muscles. Don't move or attempt to move the muscle or the limb back to the non-tensed position. That would take effort. Just stop tensing. Let's say you extend your arm over your head. If you "let go," the arm will fall to your side. If, on the other hand, you lower your arm, the arm will not fall but come down somewhat more slowly. The latter requires tension and muscular effort; the former, the "letting go," requires no tension. "Letting go" results when you stop muscular tension. It's like turning off a light. Turning it off requires no additional energy. It's stopping the electricity or the effort which turns off the light.

## Appendix F - Continued

Throughout the following relaxation training, I'll ask you to tense certain muscle groups, to notice the tension, and then to let go--to stop tensing them. Relaxation is not active. It happens. It happens when you stop tensing your muscles, when you let your muscles remain relaxed. The purpose of the relaxation training is to teach you how muscular tensing feels, how to increase the tensing, and how to stop tensing. When you have learned this, you will be able to control relaxation and rid yourself of tension.

Let me repeat the crux of the procedure. First, notice what the tension feels like. Then, discover how to increase it. Finally, stop increasing it; stop tensing. We will follow this procedure for numerous muscle groups. Tighten only the muscles we're working on; and allow all others to remain relaxed.

Settle back as comfortably as you can. Keep your eyes closed so that you eliminate any distractions, so that you are less aware of objects and movements around you. . . . Let your arms and legs assume comfortable positions. . . . Let yourself relax. . . . Just relax. . . .

Now, as you relax like that, clench your right fist. . . tighter. . . . Study the tension as you do. Try to shove your fingers through your palm. Keep it clenched and feel the tension in your right fist, in the hand, in the forearm. . . . Now stop; stop tensing. Let the fingers of your right hand become loose, and observe the contrast in your feelings. . . . Now, let go more. Let the hand and arm become more relaxed. . . . Once more, clench your right fist really tight. Try to shove your fingers through your palm. . . . Notice the tension again. Notice it in the fingers, the back of the hand, and the lower arm. . . . Now, let go.

## Appendix F - Continued

Relax. Let your fingers straighten out, and notice the difference once more. . . . Now repeat that with your left fist. Clench your left fist while the rest of your body relaxes. Clench it tighter, and feel the tension. Try to push your fingers through your hand. . . . Now, relax. Let go. Again enjoy the contrast. . . . Remember to let go--to stop tensing. Don't make an effort to relax; allow it to happen. Just stop tensing. . . . Repeat that once more. Clench the left fist--tight and tense. . . . Now do the opposite of tension. Relax and feel the difference. . . . Let yourself relax like that for a while. Let the lower arms and the hands relax. . . . Try to detect any tension in them. Notice it. . . . If you find tension, try to increase it slightly. . . . Now stop. Let go. Allow them to relax even more. . . . Now clench both fists, tighter and tighter, both fists tense, forearms tense; other muscles relaxed. Study the tensions. . . . Relax. Let your fingers straighten out. Feel the relaxation. Feel the difference. . . .letting your hands and your forearms relax. . .more and more. . . . Now with your fists clenched bend your arms at the elbows by raising your lower arms toward your chest and pulling them hard against your upper arms. Tense them, harder, and study the tension. . . . All right, let them relax. Let go. Feel the difference again. . . . Let the relaxation develop. . . . Once more, bend your arms up. Try to force your lower arms into your upper arms. Keep other muscles relaxed. Observe the tension--in the upper arm, lower arm, hands. . . . Stop tensing. Relax; relax more and more. Wherever you find tension, relax. Pay close attention to the muscular sensations each time you tense and relax. . . .

## Appendix F - Continued

Now, bend your arms backwards at the elbows. Keeping your fingers relaxed, straighten both arms. Straighten them as if you were trying to break your arms at the elbows. Straighten them so that you feel most of the tension in the muscles along the back of your arms. . . . And now, relax. Let the muscles turn off. . . . Let the relaxation proceed on its own. The arms should feel comfortably heavy as you allow them to relax. . . . Now bend your arms backwards, again. Now straighten both arms once more. Pull your lower arms back at the elbows as if to break them. Feel the tension in the muscles along the back of your arms. Straighten them. Notice the sensations. . . . Relax; let go. . . . Now concentrate on pure relaxation in the arms without any tension--arms comfortable, letting them relax further and further, more and more. . . . Allow your arms to continue relaxing even further. Go through both arms and seek out any tension that might be there. Where you find it, turn it off. Relax. . . .

Now wrinkle up your forehead by lifting your eyebrows as high as you can. Wrinkle it, tighter. Don't recruit other muscles. Don't tighten any other muscles; just tighten the forehead. . . . Now stop wrinkling it; relax. Allow it to smoothe out. Feel your entire forehead and scalp becoming smoother as the relaxation increases. . . . Now frown and crease your brows by pulling your eyebrows down and into the bridge of your nose. . . .harder. . . . Now, let go. Let the tension disappear. Allow your forehead to become smoothe once again. Notice the feeling as your forehead becomes smoothe. Let the relaxation develop. Notice the difference between tension and relaxation. . . . Now close

## Appendix F - Continued

your eyes, tighter, tighter. Try to push your eye lids into your eyes. Pull your forehead down and push your cheeks up as if trying to cover your eyes, harder. Feel the tension, the warmth, the tingling. . . . Now, relax. Stop tensing. Let your eyes remain closed, gently, comfortably, and notice the difference. Notice the relaxation. . . . Remember, as you tense one muscle, don't recruit any other muscles; keep the others relaxed. . . . Now, grin by pulling the corners of your mouth back. Try to force them back to your ears. Notice where the tension is--in your cheeks. . . . Let go; relax. Feel the difference. . . . Now clench your jaws. Bite your teeth together--hard. Study the tension through your jaws and in your temples. . . . Relax your jaws. Allow your lips to part slightly. . . . Appreciate the difference--the relaxation. . . . Turning off the muscles in your face. . . . Now press the tip of your tongue against the back of your teeth. Push it hard, as if you were trying to go right through your teeth. Look for the tension. Notice it. . . . All right, let go. Let your tongue return to a comfortable, relaxed position. Just relax. . . . Now purse your lips as if you were going to kiss someone. Press them into a small, tight circle--tighter, tighter. . . . Relax; let go. Note the contrast between tension and relaxation. . . . Make sure your whole face is relaxed: all over your forehead and scalp, all over your eyes, all over your jaws, all over your lips, all over your tongue. Let the relaxation progress further and further. . . ever more extensive. . . .

Now attend to your neck muscles. . . . Press your head back as far as it can go. Press back as if you were trying to break your head off.



## Appendix F - Continued

Feel the tension in the back of the neck. . . . Let go; relax. Feel the difference. . . . Now roll your head to the right. Roll it as if you were trying to twist your head all the way around. Feel the tension in the side of the neck. . . . Let go. Relax. Notice the difference. . . . Now roll your head to the left. Roll it as if you were trying to twist your head all the way around. Feel the tension in the side of the neck. . . . Now let go; relax. . . . Pull your head forward. Press your chin against your chest. Try to push your chin right through your chest. Feel the tension--on the front sides of the neck. . . . Now let your head return to a comfortable position. Notice the difference. Feel where the tension was and where the relaxation is.

Let the relaxation develop. . . . Search out any tension that may have developed in your neck, face or arms--and turn it off. . . . Be sure not to recruit other muscles when you tense up. Be sure to let go--to stop tensing. Don't try to move the muscles or limbs in the opposite direction of the tension. Just let go; relax. . . .

Now, shrug your shoulders, right up. Push them up as if you want to cover your ears. Hold the tension. Notice it--along the tops of the shoulders and the sides of the neck. . . . Drop your shoulders. Let go. Feel the relaxation--shoulders relaxed, heavy. . . . Keeping your hands and arms relaxed, bring your shoulders forward by crossing your arms over your stomach and by trying to touch your shoulders together in front of you--tighter. Notice the tension in the chest muscles and in the shoulder blades. . . . Let go; relax. Notice the difference. . . . Now pull your shoulders back, hard, as if to touch them together behind

## Appendix F - Continued

you--tighter. Feel the tension--in your upper back, between the shoulder blades. . . . Drop them. Relax. Let the relaxation deepen. Search out any tension that might have developed as you tensed, and turn it off. Search the shoulders, upper back, neck, face, arms, tongue, lips, cheeks, eyes, forehead, upper arm, lower arm, fingers. Make sure no tension has crept into your throat. If it has, turn it of. . . .

Now pay attention to your abdominal muscles, the stomach area. Draw your stomach in. Pull the muscles right in. Try to touch your spine with your stomach. Feel the tension all over your stomach. . . . Let go; relax. Feel the difference. . . . Tighten your stomach muscles by showing them out. Enlarge it, as if your stomach was going to pop. Notice the tension all over the stomach. . . . And relax; let go. Let the muscles loosen and notice the contrast. . . . Tighten your stomach muscles by making them as hard and as flat as a sheet of steel. Hold the tension. Feel the tension all over your abdomen. Don't recruit other muscles. . . . Relax; let go. Notice the general well-being that comes with relaxing your stomach. . . . Now pull your stomach in again. Try to touch your spine with it. Notice the tensions. . . . Now push your stomach out; enlarge it as if it's about to pop. Notice the tension all over your stomach. . . . Now pull it in again. Try to touch your spine with your stomach. Feel the tension. . . . Let go; relax. Let the tension dissolve as the relaxation grows ever deeper. . . . Search out any tension that might have developed elsewhere, and turn it off. . . .

Now direct your attention to your lower back. Arch your lower back. Make your lower back quite hollow. Try to arch so that it's completely

## Appendix F - Continued

round and hollow. Feel the tension along both sides of your spine. . . . Now let go. Let yourself settle back down, relaxing the lower back. . . . Relax. . . . Now arch your lower back again. Feel the tension as you do-- the tension along both sides of the spine. Keep the rest of your body relaxed. . . . Now, let go. Relax. Continue relaxing--relaxing further and further. . . . Search out your muscles for tension; if you find any, turn it off. Let them hang loose and limp: your lower back, your upper back, chest, shoulders, face, arms. Letting them relax further and further, ever more deeply relaxed. . . .

Now attend to your body from the waist down--your hips, buttocks, legs and feet. . . . Keeping your feet relaxed, tighten both your upper thighs by straightening both legs as if you were trying to break them at the knee. Pull the lower legs up at the knee. Feel the tension in the thighs. . . . Let go; relax. Relax the thighs. . . . Allow the relaxation to proceed on its own. . . . Now tighten both calf muscles by pressing your toes away from your face, as if you're trying to break them at the ankle--harder. Study the tension in the calves and the bottom of your feet. . . . Now let go. Relax your feet and calves. . . . Tense your shins by bringing your toes right up toward your shins--toward your face. Bend your feet as if you were trying to break them at the ankle in this direction. Notice the tension in the shin and the top of the feet. . . . Let go; relax. . . . Keep relaxing for a while--searching out any tension, and turning it off. Be sure not to recruit any muscles while you tense. . . . Now keeping your feet and other body parts relaxed, tense both buttocks and thighs by pressing your heels down into the floor as hard as you can.

## Appendix F - Continued

Try to push them right through the floor. Notice the tension in your buttocks and in the backs of your legs. . . . Let go; relax. Notice the difference. . . .

Now go through your whole body and search out any tension. If you find some, turn it off. Discover how to increase it ever so slightly, and then stop. Stop tensing. Search for tension and turn it off in your feet, ankles, calves, shins, knees, thighs, buttocks, hips. Feel the heaviness of your lower body as you relax still further. . . . Search for tension and turn it off in your stomach, waist, lower back, upper back, chest, shoulders, upper arms, lower arms, right to the tips of your fingers. Make sure no tension has crept into your throat. If it has, turn it off. Search for tension and turn it off in your neck, the back of your neck, right side of your neck, left side of your neck, front of your neck, jaws, facial muscles. . .lips, cheeks, eyes, forehead. . .all muscles hanging limp and loose--pleasantly heavy, pleasantly relaxed. . . .

Now you can enhance your feeling of relaxation by inhaling and exhaling in the following way. As you count silently to yourself, inhale for the count of four, hold your breath for a count of one, and then exhale for the count of seven. Breathe this way four or five times. Notice how your sense of relaxation is enhanced. When you're finished just breathe normally. . . .

As time goes by, you'll find it easier and easier to relax. You'll be able to find where you are tensing and then to stop tensing. This skill can become a part of you; and you can acquire the ability to relax the muscles you don't need as you engage in your everyday activities. To

## Appendix F - Continued

help you do this, practice relaxing twice a day. Don't exceed 15 minutes at a stretch. Practice tensing your muscles, as you did today every third time. Relax once before going to sleep at night, and once again during the day when you're not engaged in something too active; for example, sitting in a boring lecture. Or, if you have to take notes, relax everything but your hands and arms. In this way, you will find that you can run yourself more efficiently, be able to rid yourself of tension and feel more relaxed.

In a short while I'll end today's session by asking you to increase your tension levels. After you are up, if there are any questions you would like to ask me before leaving, please come over and ask them.

Now I'm going to count from four to one. As I do, I'll ask you to begin moving certain areas of your body, until you are somewhat more tensed. O.K. Four--move your feet and legs around; wiggle your toes. Three--move your shoulders, arms and hands; wiggle your fingers. Two--roll slightly on the floor, move your body slightly. One--move your lips, cheeks, and face around. Now move your eyes and forehead. Open your eyes. And when you feel like it sit up, stand.

Thank you. That's all for today. See you next week at this time.

## Appendix G

HIERARCHY ITEMS FOR THE DESENSITIZATION TREATMENT  
(PHOBIC ITEMS)

- 1P. Imagine that you are sitting with several friends in the football stadium. The stadium is otherwise empty. You are sitting at the 25 yardline. Seventy-five yards away, at the far goal line, you see a snake.
- 2P. Imagine that you are walking with a friend near the library. Seventy-five yards away you see two black snakes.
- 3P. Imagine that you are walking near Beaumont tower by yourself. Seventy-five yards away you see four large black snakes on the sidewalk.
- 4P. Imagine that you are walking down a deserted street in your hometown. Two blocks away, in the middle of the street, you see ten large black snakes slithering on the pavement.
- 5P. Imagine that you are walking across a large parking lot. Seventy-five yards directly in front of you, you see 15 large black snakes. You can see them moving around.
- 6P. Imagine that you are having a picnic alone, out in a large field in the country. Seventy-five yards away, you see 20 large black snakes moving around.
- 7P. Imagine that you are walking down a deserted city sidewalk. A city block away from you are 20 large black snakes. You can see them writhing on the sidewalk.
- 8P. Imagine that you are walking down a lonely campus road. Thirty-five yards in front of you, you see ten large black snakes.
- 9P. Imagine that you are walking down a street in your hometown. About half a block in front of you, you see ten large black snakes. You can see them moving and hear them hissing.
- 10P. Imagine that you are walking down a deserted country road. Twenty-five yards away, in the middle of the road, you see ten large black snakes. They are moving in many different directions--some of them toward you.
- 11P. Imagine that you are walking across campus alone. Twenty yards away you see ten small black snakes. They are slithering around, hissing.
- 12P. Imagine that you are walking across a grassy field. Fifteen yards away you see ten large black snakes. They are moving in many different directions.

## Appendix G - Continued

- 13P. Imagine that as you enter a campus building, 12 yards in front of you, you see ten large black snakes slithering on the floor.
- 14P. Imagine that you are in a pet shop. Five yards away in a glass aquarium are ten black garden snakes. A young boy reaches in, picks up a snake and puts the snake on the floor.
- 15P. Imagine that you are in a pet shop. You walk over to an aquarium and rest your arm along its edge. You glance into the aquarium and notice that less than ten inches from your hand and arm are ten green and brown garden snakes.
- 16P. Imagine that as you enter a campus building, ten yards in front of you, you see ten large black slimy snakes. They are moving on the floor, hissing, their tongues flicking out.
- 17P. Imagine that as you are crossing a large country field, seven yards away you see ten large black slimy snakes slithering around.
- 18P. Imagine that you are in an acquaintances room. He has just told you that he bought a pet garden snake. He is about five feet from you. He reaches into a box, pulls out a two foot long snake, and begins to put it on the floor.
- 19P. Imagine that you are in a pet shop. You are standing next to a large glass container which holds ten black garden snakes. You can hear them hissing. You reach into the container and touch one of the snakes.
- 20P. Imagine that you are in a pet shop. You are standing next to a large box which contains ten black garden snakes. You can hear them hissing. You reach into the box, feel them wriggling around, pick one up and look at it.

## Appendix H

HIERARCHY ITEMS FOR THE IMAGINATION TREATMENT  
(IMAGINAL ITEMS)

- 1I. Imagine that you are sitting with several friends in the football stadium. The stadium is otherwise empty. You are sitting at the 25 yardline. Seventy-five yards away, at the far goal line, you see a football.
- 2I. Imagine that you are walking with a friend near the library. Seventy-five yards away you see two black bicycles.
- 3I. Imagine that you are walking near Beaumont tower by yourself. Seventy-five yards away, you see four large black rocks on the sidewalk.
- 4I. Imagine that you are walking down a street in your hometown. Two blocks away, at the side of the street, you see cars parked in a parking lot.
- 5I. Imagine that you are walking across a large parking lot. Seventy-five yards directly in front of you, you see 15 children playing tag. You can see them running.
- 6I. Imagine that you are having a picnic alone, out in a large field in the country. Seventy-five yards away, you see 20 trees moving in the wind.
- 7I. Imagine that you are walking down a deserted city sidewalk. A city block away from you are 20 campaign posters. Some are blowing in the wind.
- 8I. Imagine that you are walking down a lonely campus road. Thirty-five yards in front of you, you see ten large black fenceposts.
- 9I. Imagine that you are walking down a street in your hometown. About half a block in front of you, you see ten sheets of newspaper. You can see them moving in the wind and hear the rustling on the ground.
- 10I. Imagine that you are walking down a deserted country road. Twenty-five yards away, in the middle of the road, you see ten dried-up leaves. They are blowing in many different directions--some of them toward you.
- 11I. Imagine that you are walking across campus alone. Twenty yards away you see a small black garden hose. It is punctured and as the water spurts out it slithers on the ground, hissing.



## Appendix H - Continued

- 12I. Imagine that you are walking across a grassy field. Fifteen yards away, you see ten large trees. They are blowing in many different directions.
- 13I. Imagine that as you enter a campus building, 12 yards in front of you, you see ten large cans of black paint.
- 14I. Imagine that you are in a grocery store. Five yards away in a glass case are ten cartons of cottage cheese. A young boy reaches in, picks up a carton and puts it on the floor.
- 15I. Imagine that you are in a pet shop. You walk over to an aquarium and rest your arm along its edge. You glance into the aquarium and notice that less than ten inches from your hand and arm are ten green and brown garden plants.
- 16I. Imagine that as you enter a hospital nursery, ten yards in front of you, you see ten newborn babies wrapped in blankets. They are moving around, crying.
- 17I. Imagine that as you are crossing a large country field, seven yards away you see ten wet muddy leaves, blowing around in the wind.
- 18I. Imagine that you are in an acquaintance's room. He has just told you that he bought a metal sculpture. He is about five feet from you. He reaches into a box, pulls out the two foot sculpture and begins to put it on the floor.
- 19I. Imagine that you are in a pet shop. You are standing next to a large glass container which holds ten black garden snails. You can see them moving. You reach into the container and touch one of the snails.
- 20I. Imagine that you are in a toy store. You are standing next to a large box which contains ten talking dolls. You can hear them talking. You reach into the box, feel them, pick one up and look at it.

## Appendix I

LIST OF NEUTRAL ITEMS

- 1N. Imagine that you are sitting on a chair, in an office, looking at a table. You can feel the chair's pressure on your back and buttocks.
- 2N. Imagine that you are looking at an intense, bright spot of light about eighteen inches in front of you. (Taken from M. Erikson; mentioned in Wolpe, 1969, p. 125.)
- 3N. Imagine that you are walking through a park, stepping on spongy earth. You can just barely feel branches as they brush by.
- 4N. Imagine that you are entering a restaurant. You can smell food, and your mouth begins to water.
- 5N. Imagine that you are lying, with your eyes closed, on a sandy beach. You can feel the warmth of the sand and sun, and can hear the surf.
- 6N. Imagine that you are walking between two shelves of books in a library. You stop, take one of them down and begin to leaf through it. You can feel the pages slip through your fingers.
- 7N. Imagine that near a river's bank you see a leaf moving erratically on little waves. You notice that it moves in time with the breeze as it strikes your face. (Modified from Wolpe, 1969, p. 125.)
- 8N. Imagine that you are lying on a bed looking at a white ceiling. You can feel the softness of the bed underneath you.
- 9N. Imagine that it is spring, and you are riding a bicycle down a green wooded path. Your legs are pumping. You can feel the breeze against your face.
- 10N. Imagine that on a calm summer's day you lie on your back on a soft lawn and watch clouds move slowly overhead. Notice especially the brilliant edges of the clouds (Wolpe, 1969, p. 125).
- 11N. Imagine that you lick the edges of an envelope flap, and then seal the envelope. You can taste the glue.
- 12N. Imagine that you put your hand under some cold water running from a faucet. You can feel the cold wetness, as the water flows over your hand.
- 13N. Imagine that you are sitting at a desk. You pick up a pencil and begin drawing random lines and figures on a piece of paper in front of you.

## Appendix I - Continued

- 14N. Imagine that you are lying face down on the floor with your hands next to your chest. You do several push-ups. Notice how the floor rises and falls along with each push-up.
- 15N. Imagine that you see a bowl of fruit on a table. You reach out, pick up an apple, and take a bite from it. You can taste the tart-sweetness of the apple as you chew it.
- 16N. Imagine that with both hands you are feeling a large piece of felt.
- 17N. Imagine that you have to belch. You feel the pressure in your stomach, and the release as you finally belch.
- 18N. Imagine that you are walking over crisp frozen snow. You can hear it crackle with each step. You stop, turn and see your footprints behind you.
- 19N. Imagine that you are throwing a tennis ball against a wall and then catching it as it bounces back. You can hear the ball strike the wall.
- 20N. Imagine that you are walking through a warm stuffy building. As you leave the building, you take a deep breath and feel the crisp cold winter air as it enters your lungs.

## Appendix J

VERBATIM TRANSCRIPT: INTRODUCTORY COMMENTS--SESSION TWO--  
FOR DESENSITIZATION AND IMAGINATION TREATMENTS

This is the first of five sessions in which you will unlearn your fear. It should last about 45 minutes. I'll give you some brief explanations and instructions; and then we'll begin the unlearning procedures. The unlearning procedure itself will be as follows: I'll give you some brief relaxation instructions. Then, while you're relaxed and calm, I'll read an item for you to imagine. For example, I might say, "Imagine that you are reading a newspaper." Then I'll say, "Begin," and you should start to imagine the scene described until I say "Stop" or "Stop imagining that." After you've stopped imagining an item, I'll ask you to continue relaxing. After a short while, I'll read you the next item. . .and so on. It's important that you start and stop imagining on the signals. Also, when you imagine an item, imagine that you are actively engaged in the situation described. In the item, "Imagine that you are reading a newspaper"--you should imagine that you yourself are reading a newspaper--holding it, rustling it, looking at the print--not seeing yourself from afar as you read it.

We'll proceed in this fashion: have you imagine different items or scenes; and between items, give you relaxation instructions.

[*The researcher begins to distribute some booklets.*] I'll distribute some booklets and pencils. Please don't look through them. On the first page would you write your name and the date. On the page you'll find three questions. Please answer them. Number one: Have you

## Appendix J - Continued

practiced relaxation daily since our last meeting? Yes or No. If you did practice, how many times? Once, twice, three or more. If not, have you practiced relaxation at all? Yes or No. Please practice relaxing twice a day--tensing your muscles every third time. Relax once before sleep, and once some other time of day.

On a few occasions during the procedure, I'll ask you to rate the vividness of your image by marking a scale printed on the pages of the booklet. If you'll turn the page all the way over, you'll find a copy of the scale printed on the next page. To rate an image, all you have to do is draw a line across the scale at the appropriate point. As you can see, the scoring categories range from "one" to "seven": "seven," no image present at all--only thinking of the object; "one," perfectly clear and as vivid as the actual experience. The rating scale key is printed on each page, so you can look at it when you do the rating.

Let's do one for practice. Close your eyes and imagine that you are looking at a red apple. Begin. [*Experimenter pauses ten seconds.*] Stop. Now rate the vividness of the item on the rating scale. . . . Fine.

The procedure we will follow while engaged in the actual procedure will be as follows. When you are lying on the floor, place the booklet next to your non-dominant hand, and the pencil next to your dominant hand. [*The experimenter demonstrates by lying on the floor with a booklet and pencil.*] If you're right handed, the booklet should be next to your left hand and the pencil next to your right hand. When I'm going to ask you to stop imagining an item and rate its vividness, I'll say,

## Appendix J - Continued

Stop imagining that and rate the vividness of the image. Rate the vividness of the image on the rating scale. When you're done, turn the page all the way over and place the booklet back on the floor within easy reach of your non-dominant hand.

As soon as I've said "Rate the vividness of the image," you should pick up the booklet, rate the vividness, turn the page all the way over, and place the booklet back on the floor. Then relax. So turn the page all the way over. Do you have any questions?

## Appendix K

VERBATIM TRANSCRIPT: INTRODUCTORY COMMENTS--SESSIONS THREE AND FOUR--  
FOR DESENSITIZATION AND IMAGINATION TREATMENTS

This is the [second] [third] of five sessions in which you will unlearn your fear. It should last about 45 minutes. We will proceed in the same way we did last time. First, I'll give you some brief explanations and instructions, then some time to relax, and finally, we'll continue with the unlearning procedure.

As we did last time, the unlearning procedure will proceed as follows. First, I'll give you some brief relaxation instructions. Then, while you're relaxed and calm, I'll read you an item to be imagined. Then I'll say, "Begin," and you should start to imagine the scene described until I say, "Stop." After you've stopped imagining an item, continue relaxing. After a short while, I'll read you the next item. . .and so on. It's important that you start and stop imagining on the signals. Also, when you imagine an item, imagine that you are actively engaged in the situation described; that you yourself are doing what the item describes, not looking at yourself doing it. Try to remain as relaxed, as calm and as tension free as possible throughout the session. To help you remain relaxed, I'll be giving you relaxation instructions between the items.

[*The experimenter distributes the booklets.*] These booklets are identical to the ones you used last time. Would you please write your name and the date on the first page, and then answer the questions on the page. When you've answered the questions would you turn the page all the way over.

## Appendix K - Continued

As before, on a few occasions during the procedure, I'll be asking you to rate the vividness of your image by marking the scale you'll find printed on the next page. To rate an image's vividness, just draw a line across the scale at the appropriate point. The scoring categories are printed on each page so that you can look at it while you're doing the rating. When you are lying on the floor, place the booklet next to your non-dominant hand and the pencil next to your dominant hand. If you're right handed, the booklet should be next to your left hand and the pencil next to your right hand. When I'm going to ask you to stop imagining an item and to rate its vividness, I'll say, "Stop imagining that and rate the vividness of the image. Rate the vividness of the image on the rating scale. When you're done, relax." As soon as I've said, "Stop imagining that," you should pick up your booklet and pencil, rate the vividness of your image, turn the page all the way over, and place the booklet back on the floor within easy reach of your hand. Then, relax. Do you have any questions?



## Appendix L

VERBATIM TRANSCRIPT: THEORETICAL EXPLANATION--SESSIONS TWO THROUGH FOUR--  
FOR DESENSITIZATION AND IMAGINATION TREATMENTS

Desensitization only: Remember, the crux of the procedure is for you to remain relaxed--especially while imagining the items. Today we will go through a few mildly anxiety provoking items. Each time you imagine an item remain relaxed. It is through the combination of relaxing and imagining the item that the anxiety or fear you feel will be unlearned. Do you have any questions?

Imagination only: Remember, the crux of the procedure is to have you imagine vividly. When I describe a situation, the more real the image, the clearer you will be able to differentiate between what's inside and outside you. I should emphasize another aspect of this. Imagine yourself in moving contact with the world: for example, as you imagine that you are reaching out, "see" your hand move in relation to background objects, and then feel the pressure on your fingers as they close around the object. In other words, emphasize images that occur at your body boundary--touch, pressure--and body movement--sense of motion in musculature and limbs--all in combination with seeing, hearing, smelling and so on. Do you have any questions?

## Appendix M

VERBATIM TRANSCRIPT: RELAXATION INSTRUCTIONS--SESSIONS TWO THROUGH SIX--  
FOR DESENSITIZATION AND IMAGINATION TREATMENTS

Well let's get you relaxed and then continue with the procedure. Would you take a place on the floor several yards from anyone else. Settle back as comfortably as you can. Move your hands, arms, legs and feet around to get them comfortable. Don't cross your legs. Let your arms lie at your sides. Just relax. . . . Now as you lie there take a deep breath and then slowly exhale. Feel yourself relax.

Now go through your whole body and search out any tension. If you find some, turn it off. Discover how to increase it ever so slightly, and then stop. Stop tensing. Search for tension and turn it off in your feet, ankles, calves, shins, knees, thighs, buttocks, hips. Feel the heaviness of your lower body as you relax still further. . . . Search for tension and turn it off in your stomach, waist, lower back, upper back, chest, shoulders, upper arms, lower arms, right to the tips of your fingers. Make sure no tension has crept into your throat. If it has, turn it off. Search for tension and turn it off in your neck, the back of your neck, the left side of your neck, the right side of your neck, the front of your neck, jaws, facial muscles. . . lips, tongue, cheeks, eyes, forehead. . . all muscles hanging limp and loose--pleasantly heavy, pleasantly relaxed. . . .

Now enhance your feeling of relaxation by inhaling and exhaling in the following way. As you count silently to yourself, inhale for the count of four, hold your breath for a count of one, and then exhale for

## Appendix M - Continued

the count of seven. Breathe this way three or four times. Notice how your sense of relaxation is enhanced. When you're finished just breathe normally. . . .

## Appendix N - Part I

RELAXATION QUESTIONNAIRE

NAME \_\_\_\_\_

DATE \_\_\_\_\_

1. Did you practice relaxing every day?  
(Circle one)

YES

NO

2. If "YES," how many times daily?  
(Circle one)

ONE

TWO

THREE

MORE

3. If "NO," did you practice at all?  
(Circle one)

YES

NO

If you did, how many times? \_\_\_\_\_

## Appendix N - Part II

BETTS' RATING SCALE

1            2            3            4            5            6            7  
 |-----|-----|-----|-----|-----|-----|-----|

Rating Scale Key

The image aroused by an item of this procedure may be:

Perfectly clear and as vivid as the actual experience . . . . . Rating 1

Very clear and comparable in vividness to the actual experience . . Rating 2

Moderately clear and vivid. . . . . Rating 3

Not clear or vivid, but recognizable. . . . . Rating 4

Vague and dim . . . . . Rating 5

So vague and dim as to be hardly discernible. . . . . Rating 6

No image present at all; only thinking of the object. . . . . Rating 7

Appendix N - Part III

END OF SESSION QUESTIONNAIRE

1. Were you anxious during the session?

YES

NO

(If "NO" please skip to question 6.)

2. Was it in response to a specific item?

YES

NO

If you remember what the item was, please write it briefly. \_\_\_\_\_

3. How much anxiety did you feel?

TERROR

VERY MUCH

MUCH

SOME

LITTLE

VERY LITTLE

4. Were you experiencing it at the session's end?

YES

NO

5. Has it disappeared?

YES

NO

Appendix N - Part III - Continued

6. Could you start and stop your imagery at the signals?

YES

NO

7. Did you imagine yourself doing what the item described  
(as opposed to imagining watching yourself perform the item)?

YES

NO

## Appendix O

ITEM PRESENTATION ORDER

NOTE: jPk refers to the kth presentation of the jth item of the hierarchy for the desensitization treatment;  
 jlk refers to the kth presentation of the jth item of the hierarchy for the imagination treatment; and  
 jNk refers to the kth presentation of the jth neutral item.

<u>Session Two</u>	<u>Session Three</u>	<u>Session Four</u>	<u>Session Five</u>	<u>Session Six</u>
1N1	2N2	4N3	6N4	8N5
1P/11	4P/16	8P/16	12P/16	16P/16
2N1	3N2	5N3	7N4	9N5
1P/12	5P/11	9P/11	13P/11	17P/11
3N1	4N2	6N3	8N4	10N5
1P/13	5P/12	9P/12	13P/12	17P/12
4N1	5N2	7N3	9N4	11N5
1P/14	5P/13	9P/13	13P/13	17P/13
5N1	6N2	8N3	10N4	12N5
2P/11	5P/14	9P/14	13P/14	17P/14
6N1*	7N2*	9N3*	11N4*	13N5*
1P/15	6P/11	10P/11	14P/11	18P/11
7N1	8N2	10N3	12N4	14N5
2P/12	5P/15	9P/15	13P/15	17P/15
8N1	9N2	11N3	13N4	15N5
2P/13	6P/12	10P/12	14P/12	18P/12
9N1	10N2	12N3	14N4	16N5
2P/14	6P/13	10P/13	14P/13	18P/13
10N1	11N2	13N3	15N4	17N5
2P/15*	6P/14*	10P/14*	14P/14*	18P/14*
11N1	13N2	14N3	16N4	18N5
3P/11	6P/15	10P/15	14P/15	18P/15
12N1	12N2	15N3	17N4	19N5
3P/12	7P/11	11P/11	15P/11	19P/11
13N1	14N2	16N3	18N4	20N5
3P/13	7P/12	11P/12	15P/12	19P/12
14N1	15N2	17N3	19N4	1N6
3P/14	7P/13	11P/13	15P/13	19P/13
15N1	16N2	18N3	20N4	2N6
4P/11*	7P/14	11P/14	15P/14	19P/14
16N1	17N2	19N3	1N5	3N6
3P/15	8P/11*	12P/11*	16P/11*	20P/11*
17N1	18N2	20N3	2N5	4N6
4P/12	7P/15	11P/15	15P/15	19P/15
18N1	19N2	1N4	3N5	5N6
4P/13	8P/12	12P/12	16P/12	20P/12
19N1	20N3	2N4	4N5	6N6
4P/14	8P/13	12P/13	16P/13	20P/13
20N1*	1N3	3N4	5N5	7N6
4P/15	8P/14	12P/14	16P/14	20P/14
1N2	2N3*	4N4*	6N5*	8N6*
	8P/15	12P/15	16P/15	20P/15
	3N3	5N4	7N5	9N6

\* A starred item (\*) indicates that a vividness rating was obtained.



## Appendix P

VERBATIM TRANSCRIPT: CONCLUDING COMMENTS--SESSIONS TWO THROUGH SIX--  
FOR DESENSITIZATION AND IMAGINATION TREATMENTS

In a short while I'll end today's session by asking you to increase your tension levels. After you are up, if there are any questions you would like to ask me before leaving, please come over and ask them.

As you can tell, relaxation is an important part of this procedure. It is important that you practice relaxing between our sessions. As time goes by, you'll find it easier and easier to relax. You'll be able to find where you are tensing and then to stop tensing. This skill can become a part of you; and you can acquire the ability to relax the muscles you don't need as you engage in your everyday activities. Practice relaxing twice a day. Don't exceed 15 minutes at a stretch. Relax once before going to sleep at night, and once again during the day when you're not engaged in something too active. Tense your muscles every third time. In this way, you will find that you can run yourself more efficiently, be able to rid yourself of tension and feel more relaxed.

Now I'm going to count from four to one. As I do, I'll ask you to begin moving certain areas of your body, until you are somewhat more tensed. O.K. Four--move your feet and legs around; wiggle your toes. Three--move your shoulders, arms and hands; wiggle your fingers. Two--roll slightly on the floor, move your body slightly. One--move your lips, cheeks, and face around. Now move your eyes and forehead. Open your eyes. And when you feel like it, sit up and stand.

Thank you. That's all for today. See you next week at this time.

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