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An Investigation of Semantic Desensitization as a Therapy in the Treatment of Snake Phobia

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AN INVESTIGATION OF SEMANTIC DESENSITIZATION AS A THERAPY IN THE TREATMENT OF SNAKE PHOBIA

By

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Abstract

The initial study of the present research was conducted to determine the effect of low versus high imagery stimulus words on the outcome of semantic desensitization as conducted by Hekmat and Vanian (1971). The overall lack of significant findings led to a more intense examination of the basic underlying assumptions of semantic desensitization. Study II was designed in an attempt to find a method which would successfully achieve meaning change while maintaining interest. A paired associate method was more powerful than the Hekmat procedure in producing meaning change. Study III compared the potency of the paired associate and Hekmat procedure as applied to phobic individuals. The paired associate method brought about a greater reduction in phobic behavior than the Hekmat procedure and it was concluded that the paired associate technique warranted further investigation and consideration as a therapeutic approach to the treatment of phobias.

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Introduction

The present series of studies was designed to investigate the assumptions and variables involved in semantic desensitization in order to determine its value as a viable alternative in the treatment of specific phobias.

The first study of the present series was proposed to determine the effects of word properties on semantic desensitization. The most interesting aspect of the results, however, turned out to be the overall lack of significant change and lead the present author into a more intensive investigation of the very basic assumptions and techniques involved. The outcome was a new approach in semantic desensitization which needs further investigation but from the initial findings appears to be an effective and efficient method for the treatment of specific phobias.

Review of the Literature

A phobia can be defined as a special form of fear which 1) is out of proportion to the demands of the situation 2) cannot be explained or reasoned away 3) is beyond voluntary control 4) leads to avoidance of the feared situation (Marks, 1969). The development of this "special fear" can be explained using several theoretical bases, the two main ones being the medical model and learning theory.

The medical model of the development of phobias postulates that phobic behavior is an indicator of a deeper internal disturbance. This aspect is reflected by Laughlin (1967) as he defines a phobia as a specific pathologic fear in which "the painful affect has been automatically and unconsciously displaced from its original internal object to become attached to a specific external object or situation. Displacement from the original source of threat and danger has taken place to an external object-source" (p. 547). The displacement takes place in an attempt to resolve internal emotional conflicts. Thus, if an individual suffers from a phobia of dogs, simply removing this phobic behavior will not cure the real underlying problems which have deemed the formation

of the phobia necessary. Without treatment of these underlying problems the old phobic behavior will only be replaced by new unadaptive behaviors. To successfully free the individual of his phobic reactions an intensive psychotherapy program is necessary to draw out the real unconscious causes.

Why do some individuals employ this technique to deal with anxiety while others do not? Based on studies by Pavlov, in which animals with different nervous systems, when exposed to similar stresses were found to develop different kinds of reactions, Eysenck and Beech (1971) suggest that there is a physiological predisposition which causes some people to develop a phobia to cope with internal conflicts while others do not. These individuals typically score highly on neuroticism, anxiety and emotionality scales (Eysenck, 1967). There is also a relationship between extraversion-introversion and phobic development. Phobias are most likely to develop in people who are innately predisposed towards introverted patterns of behavior. The fearfulness of introverted people rests on the fact that they acquire conditioned responses more readily under specific conditions than extraverts who tend to condition with difficulty under these conditions (Eysenck, 1967).

The learning theory based model focuses on behavior. An attempt is made to change maladaptive behavior or

symptoms directly, not to modify traits, impulses, or other hypothesized personality structures (Patterson, 1973). There is no attempt to search for deep underlying causes.

Mowrer (1947), employing his two factor learning theory, proposes that one learns to be fearful of otherwise neutral things by being accidentally confronted with them at the same time that some frightening event occurs. The learning of fear by contiguity follows the principles of classical conditioning. Mowrer goes on to observe that anxiety or avoidance responses, once learned tend to last almost indefinitely. His theory offers an explanation of this phenomenon in that a behavior is most likely to be learned and sustained if it affects the solution to some problem. Mowrer proposes that anxiety is learned in the first place by contiguity, as suggested by Pavlov, but that the avoidance behaviors which result from it are maintained because they successfully reduce anxiety even though the unconditioned stimulus does not occur again. In other words, "avoidance behaviors are self-reinforcing by virtue of their very success in escaping the sources of anxiety" (London, 1964).

The main difference in the two theoretical explanations as previously stated is that in the medical model the phobic behavior is considered to be merely a symptom of the real problem to be treated, whereas according to

learning theory the phobic behavior is the problem. This distinction is reflected in the medical versus the behavioral therapeutic approach.

The medical model typically uses a program of psychotherapy to reach the deep underlying causes of the phobic reaction. Deep characterologic study is needed (Laughlin,1967). Recall of the original traumatic experience is stressed as it is felt that its clarification can result in the rapid dissolution of the phobia. The therapist tries to focus the patient's attention away from the external object of phobic dread as it is felt to be much less important than the underlying need for it. The indirect approach through association is preferred as it is supposedly more efficient and more effective in the long run. It is true that in many psychiatric disorders, expressing one's feelings freely and openly tends to promote success but where attempts have been made to systematically evaluate psychotherapy in the treatment of specific phobias, the results have not been favorable. There are relatively few studies which have attempted such a systematic evaluation of this approach and it is to early to make a decisive statement.

The behavioral approach takes the view that the phobic reaction should not be considered as a surface manifestation of other fears and problems but rather should be dealt with as being the problem itself. Many behavioral techniques have been developed, the two main

ones being systematic desensitization and implosive therapy.

Wolpe (1958) argues that anxiety responses are acquired through a process of conditioning where the individual is hurt or frightened by some physically noxious stimulus and his subsequent fear response to the situation generalizes to other similar situations. The technique of systematic desensitization is based on Wolpe's (1958) assumption that if an antagonistic response to anxiety can be made to occur in the presence of the anxiety provoking stimuli so that the anxiety response is suppressed, "the bond between the aversive stimuli and anxiety response will be broken and the unadaptive behavior will be eliminated" (p. 71). The antagonistic response to anxiety is considered to be relaxation (Wolpe, 1958).

The therapy proceeds as follows. First the patient is trained in deep relaxation techniques. Then an anxiety hierarchy, which is a graded list of anxiety evoking stimuli which constitute a reasonably spaced progression, is set up by the patient and therapist. While in a state of deep relaxation the patient is then asked to imagine the items in the hierarchy, beginning with the item which elicits least anxiety. The procedure assumes that the decrements in anxiety to each item are additive so that once a weak stimulus has ceased to arouse any

anxiety it is possible to present a somewhat stronger stimulus to the fully relaxed patient and this stronger stimulus will now evoke less anxiety than it would have before (Wolpe and Lazarus, 1966). Therapy is terminated when all items in the hierarchy can be presented to the subject without evoking any anxiety response.

Experimental studies looking at the effectiveness of systematic desensitization typically use the Fear Survey Schedule III (FSS III) (Wolpe and Lang, 1964) and a live behavior avoidance test to assess improvement due to therapy. The FSS III consists of a checklist on which the patient rates his fear response to 72 items as not at all, a little, a fair amount, much, and very much. Only those who rate fear as much or very much are considered phobic. The behavior avoidance test (BAT) is used as a live measure of phobic response to the feared situation or object. In the case of a feared object, such as a snake, the BAT consists of a checklist of a graded series of steps, ranging from standing outside the test area to approaching the snake, touching it and finally picking it up. Each subject is given an individual score in terms of proximity to the phobic object.

While most experimental studies have shown that systematic desensitization results in either the disappearance of phobic responses or great improvement

(Wolpe, 1958; Rachman, 1965), there is controversy as to whether or not relaxation is a necessary component of systematic desensitization. Sue (1972) tested the comparative effectiveness of muscle relaxation and muscle tension in desensitization. His findings indicated that participants who practiced muscle tension between imaginal presentations did as well as participants who practiced deep relaxation. Wolpin and Raines (1966) also found that desensitization paired with muscle tension produced behavioral improvement in the treatment of snake phobia. Sue (1972) suggested that some process other than reciprocal inhibition was responsible for these therapeutic results.

Nawas, Welsh and Fishman (1970) found that having participants practice neutral tasks or muscle tension between aversive imaginings resulted in a significant reduction of fear in snake phobics as measured on a behavior avoidance test with a live snake. Wilkins and Domitor (1973) studied the role of attentional shifts as a factor underlying the effectiveness of systematic desensitization. Subjects were asked to imagine fear related scenes. Between scenes, to shift their attention from the imagined scenes, they were asked to attend to a sound cue which was presented. Results indicated that these individuals showed as much fear reduction as a desensitization group using relaxation techniques.

These findings support Sue's suggestion that some process other than reciprocal inhibition is taking place since tension, neutral tasks and audio cues do not appear to be antagonistic to anxiety and yet, produced equally effective results. If relaxation training is not necessary, a great deal of time could be saved and therapeutic results could be achieved more efficiently.

Contrary to Wolpe's substitution of a new behavior to replace the anxiety response, Stampfl and Levis' (1967) prime interest in implosive therapy is to reduce the frightening cues that arouse the old avoidance behaviors. Their view of neuroses is that neurotic behavior is the learned avoidance of conditioned anxiety-provoking stimuli. As long as a person is able to successfully avoid confronting whatever frightened him, he is unable to learn that the frightening stimulus is harmless as the information that he is safe never reaches him until he has completed his avoidance response. What is needed is a means of presenting the individual with the aversive stimuli, while preventing the avoidance response, in order to show him that he has nothing to fear.

In implosive therapy the person is flooded with imaginings of the aversive stimuli throughout the entire session, without escape, until his anxiety level reaches a peak and then begins to decrease. London (1964) describes the technique in a single sentence, "he uses

every possible means to frighten patients as much as he can for as long as he can at a sitting, taking care only to avoid hurting them physically in any way" (p. 103). Just as anxiety which is learned to the phobic object generalizes to other stimuli which are more removed from it, Stampfl and Levis (1967) assume that the effects of extinction generalizes from stimuli of greater to stimuli of lesser anxiety arousing potential. They do not use a graded hierarchy as their procedure does not require that they prevent the occurrence of anxiety.

There is controversy as to what exactly is taking place in implosive therapy, system exhaustion or habituation. In system exhaustion, anxiety is emitted until the system is exhausted and can no longer evoke anxiety to further presentations. Therefore, it would seem to follow that it would not matter if it were relevant (pertaining directly to the phobic situation) or irrelevant (fear situation not involving the phobic object) fear stimuli which cause exhaustion but rather the important part being that if the system is completely exhausted, aversive stimuli if presented, will not elicit an anxiety response. This hypothesis is supported by Watson and Marks (1971) who found in a crossover study using eight irrelevant and eight relevant fear sessions that both were equally effective at reducing phobic behavior.

Habituation, on the other hand, is decreased sensitivity to a repeated stimulus and this hypothesis would suggest that only fear relevant images would be effective in bringing about phobic improvement. Hodgson and Rachman support this hypothesis. Their findings (1970) indicated that a group receiving taped instructions of phobic irrelevant fear images showed no significant improvement.

Experimental studies looking at the comparative effectiveness of systematic desensitization and implosive therapy have yielded varied and conflicting results. Some have shown systematic desensitization to be more effective; some have shown implosive therapy to be more effective; and still others have shown no difference in the two therapies (McNamara, 1972).

Rachman (1965) using four groups, systematic desensitization, relaxation only, item imagining only, and no treatment, found that only systematic desensitization yielded a marked reduction in fear. Lomont and Edwards' (1967) findings indicated that imagining aversive stimuli resulted in improvements only when paired with relaxation. These findings were supported by Davison (1968), using a method similar to Rachman's. In a study employing snake phobics, Mealiea and Nawas (1971) found systematic desensitization to be superior to implosive therapy. These findings were similar to those of Willis

and Edwards (1969). On the other hand, Boulougouris, Marks and Marset (1971) found that implosive therapy was superior to systematic desensitization in reducing anxiety.

These discrepencies can be explained to some extent by differences in methodology and indicate the need for procedures to be carried out carefully and correctly in experimental comparisons. If implosive therapy is applied properly, anxiety is allowed to increase until it peaks and then begins to decrease. Looking at implosion studies in these terms, possible factors influencing their success and failure are revealed such as session length and presentation of aversive stimuli. Rachman (1965) and Davison (1968) both used two minute imaginings of the stimuli instead of the continual bombardment. The two minutes was unlikely to be long enough to allow the subject to reach peak anxiety and at termination of imagining anxiety would still be increasing. The result can be sensitization rather than desensitization to the aversive stimuli. The time factor was a crucial variable in the Mealiea and Nawas study where each participant received five thirty minute sessions. It may well be that thirty minutes was not a long enough period of bombardment to allow the individual to reach maximal anxiety and "peak out".

Willis and Edwards (1969) reported that in several implosion cases the therapist terminated treatment while the individual was still increasing in anxiety level. This would be the most appropriate time to continue if implosive therapy was to have any chance of producing effective results as the anxiety response must be exhausted before bombardment is terminated. Willis and Edwards suggest that perhaps if stimulus materials elicited anxiety responses beyond a level where the individual could tolerate anxiety, he might simply terminate his attention to the material, temporarily reducing anxiety by escaping and never allowing himself to reach a peak level as is necessary.

The Lomont and Edwards (1967) study suffered from methodological flaws which cast doubt on the findings. Implosive therapy was not carried out properly as imagination was only one minute at a time, not long enough for the participants to reach a sufficiently high arousal level to produce effective results.

Further evidence suggests that not only is the length of session relevant to positive results but also the amount of time between the last session and post-treatment behavior avoidance test. Hodgson and Rachman (1970) found that when they tested subjects immediately after the implosion session, those who were tested first showed no improvement while those who waited ten to

fifteen minutes did show improvement. They suggest that immediately after the session, subjects were likely to be in a high anxiety state whereas those who waited a few minutes before being tested had a chance for anxiety levels to decrease.

In the Boulougouris, Marks and Marset study which found implosive therapy to be superior to systematic desensitization the results can be explained in terms of the sample used. The participants were psychiatric patients, nine agoraphobics, and seven specific phobics, (specific phobias being the fear of one specific item or situation). Systematic desensitization has been found to be less effective in the treatment of agoraphobia than specific phobias (Lader and Mathews, 1968). The extra number of agoraphobics, paired with the fact that it was a psychiatric population explains the slight advantage that implosive therapy had as systematic desensitization is also not as effective with psychiatric populations as it is with normals (Serber, 1971).

It is in the later studies which give more attention to methodology and proper administration of therapies, where no difference was found between systematic desensitization and implosive therapy.

Barrett (1969) and Calef and McLean (1970) found the two therapies to be equally effective. Both studies used fifty minute sessions, suggesting that this was a

long enough session for the subject to reach peak anxiety and then begin to decrease. Myler and Clement (1972) used continuous bombardment of aversive stimuli for one hour. Results indicated that systematic desensitization and implosive therapy were equally effective.

These studies may suggest that there is no difference in the two therapies when applied in the proper manner.

The operations at work in both systematic and implosive therapy can be explained within a cognitive framework where vivid imagery is held as the most critical variable (Nawas, Fishman and Pucal, 1970). When vivid imagery is elicited, gradually and progressively the subject develops a discrimination set which repetition renders finer and finer. The discriminations are compelling evidence to the subject that the imagery is very different from the real feared object. Moreover the subject realizes that reliving these imaginary experiences will not lead to the previously expected disastrous consequences. This knowledge leads to an increasingly calmer response which gives way to some alternative within the individual's behavioral repertoire which can be now employed when he is confronted with the live situation.

Guthrian principles can also be used to explain the processes at work in the two therapies. Guthrie (1952) states that the simplest rule for breaking a

habit is to find the cues that initiate the action and to produce another response to these cues. He termed the loss of associative connection between a stimulus and a response "negative adaptation". In order for negative adaptation to occur, the cue and the prevention of the old response must take place. There are three possible sets of circumstances when negative adaptation can occur: (1) a conditioned stimulus may be acting and a response fail because the stimulus is below the threshold (toleration); (2) the response may be extinguished through exhaustion (exhaustion); (3) the response may be inhibited by the action of an incompatible response (planned response substitution). Systematic desensitization is explained in terms of toleration and planned response substitution and implosive therapy is explained in terms of exhaustion.

A new line of behavior therapy for phobias was developed by Hekmat and Vanian (1971). Semantic desensitization is a behavior therapy technique based on the principles of semantic counterconditioning. It assumes that neurotic behavior in general, and phobic reactions in particular, represent disorders characterized by the polarization of dominant meaning of concepts. Research has indicated that when a neutral sign acquires an unpleasant or negative value by semantic conditioning

processes, behavior avoidance occurs toward the object it represents (Hekmat and Vanian, 1971).

The basis of the therapy is the assumption that by changing subjective meaning of a phobic concept, one can then change objective behavior to the phobic object. Staats and Staats (1957) found that not only could meaning be classically conditioned to nonsense syllables but also that attitudes could be conditioned by a similar process (1958).

Phelan, Hekmat and Tang (1967) verbally conditioned nonsense syllables using the Staats and Staats procedure. The syllables, which had been pre-rated on Osgood's semanitc differential scale, were then presented as the names of blocks. After negative conditioning of one of the syllables, subjects were asked to chose one of the blocks. None of the thirty experimental participants chose the block which had been negatively conditioned; however, three of the ten control subjects did. Post-test semantic differential ratings of the negatively conditioned syllable showed a significant decrement. These results were felt to indicate that not only could meaning of a concept be semantically conditioned but also meaning of the object which it represents.

Following this line of thought Hekmat and Vanian (1971) hypothesized that by pairing the feared object of a phobia with positive evaluative words they could

semantically desensitize the individual. Using Staats and Staats' list of positive evaluative words (1957), they tested their hypothesis with thirty snake phobic subjects. Snake was always the stimulus word and was paired six times with each of the positive evaluative words. Results indicated that snake phobic subjects initially rated the word snake on the semantic differential as significantly more negative than did non-phobics. Experimental participants showed a significant change in meaning of the word 'snake' as measured by the semantic differential rating on the evaluative scale, (6.73 to 4.06), as well as a significant increment in behavior approach to a live snake (12.76 to .20). Based on these changes the treatment was interpreted to form the basis for some semantic desensitization procedure through conditioning of both verbal and non-verbal behavior.

In a study comparing the effectiveness of systematic desensitization, implosive therapy and semantic desensitization (Hekmat, 1973) no difference was found between systematic and semantic desensitization which both brought about more improvement than implosive therapy. Semantic desensitization was more efficient, requiring three sessions to produce the same improvements evidenced after five sessions of systematic desensitization.

The evidence that semantic desensitization is not only an effective but efficient behavior therapy for the treatment of specific phobias justifies a more intensive investigation into the variables in its procedure.

Study I

It seems plausible to assume that different word properties could affect not only the type but also the strength of associations which are made in semantic conditioning. The work of Paivio (1965, 1966, 1968, 1969) indicates that imagery values (I) of words have an effect on paired associate learning; high imagery words are learned more easily than low imagery words. For all word classes I seems to be generally effective on both sides, regardless of the nature of the associative value. It appears to be one of the most important word components with others such as concreteness being so closely related to I that it has been suggested that their separation may be more an artifact of insensitive measurement than the result of any differences in underlying processes (Paivio et al., 1966). Meaningfulness effects also have been found to be inconsistent and small relative to the effect of I (Paivio et al., 1968).

Given these findings, it appears that the imagery values of a word should be as important a variable in determining the strength of the associations which are formed as the evaluative values are in determining the

type of associations which are formed. To bring about lasting meaning change, it is desirable to have not only a positive association but also a strong association. Study I was designed to employ high versus low imagery words in the semantic desensitization procedure, to determine the effect of imagery values in bringing about meaning change and subsequent behavior change. It is hypothesized that the high imagery words will bring about a greater reduction in subjective and behavioral measures of a phobic object than will the low imagery words.

METHOD

Subjects

The participants in Study I were 15 volunteers from introductory psychology classes at Wilfrid Laurier University selected from an initial pool of 396 students who were administered the Fear Survey Schedule III (Wolpe and Lang, 1964). Only those people who responded with "much" or "very much" fear to harmless snakes (item 63) on the FSS III and who had never participated in a behavior modification program were contacted for further participation. Sixy participants selected by the above criteria were given semantic differential scales to fill out and were asked to participate in a live behavior avoidance test which entailed approaching a live three foot garter snake housed in a covered glass terrarium. Only students who did not approach closer than .75 metres were asked to take part in the therapy session. The final experimental group consisted of 14 females and 1 male, proportional to population statistics (Marks, 1969).

Measures

In addition to the FSS III, semantic differential

scales were administered to all participants. They were asked to rate such words as 'rats', 'snakes', 'spiders', 'crawling insects', 'me', 'father', 'mother', 'homosexual', 'being alone' and 'nude men' on strong-weak, active-passive and pleasant-unpleasant bipolar adjectives (Hekmat and Vanian, 1971). Only the evaluative scale for the word 'snake' was scored.

The behavior avoidance test (BAT) was similar to that used for animal phobics by Lang, Lazowik and Reynolds (1965). The test was designed to measure the intensity of the individual's avoidance response to the feared object. It consisted of a checklist of a graded series of steps ranging from standing outside the test area to approaching the snake and finally picking it up. The subject was invited to approach the snake in the controlled setting and instructed to stop at any point if he was too anxious to go any further. The test was conducted in a darkened hall, 5.25 m X 1.65 m, containing a table at one end where an illuminated, covered glass terrarium housing a harmless snake was located. Each subject received a score in terms of proximity to the snake from 26, refusal to enter the hall, decreasing for each quarter metre approached, to 0, picking up the snake.

After the behavior avoidance test, the participants

were also asked to rate the degree of fear or anxiety they felt while approaching the live snake. The scale consisted of ten points, 1 'completely calm' and 10 'as frightened as I have ever been' (Walk, 1956).

Procedure

The procedure closely followed that of Hekmat and Vanian (1971) with the exception that participants were conditioned individually.

Participants were matched on the basis of their performance on the behavior avoidance test and total FSS III results, and assigned to one of two experimental groups.

In the first experimental group (Gr. 1), the word snake was paired with ten highly pleasant, high imagery words. The words were matched on imagery ratings (Paivio, 1974) with a mean rating of 6.08, as well as on positive evaluative meaning where the mean rating was 6.16 (Brown and Ure, 1969).

Instructions presented to the participants were as follows:

> You will be presented with pairs of words together. I would like you to imagine the second word as vividly and clearly as you can, following the first. For example, I would say 'light-shiny'. I will stay silent for fifteen seconds during which time I would like you to imagine 'shiny'. Remember that it is important to imagine the second word as quickly as you can. I will not repeat these instructions again. If you have any questions about the task, please ask me now.

The experimenter then responded to any questions raised regarding the task.

The second experimental group (Gr. 2) followed exactly the same procedure with the exception that the ten highly pleasant words ($\bar{E}$ = 6.29) were low in imagery ratings ($\bar{I}$ = 3.68).

The stimulus word in both groups was always the word 'snake', which was paired with the ten pleasant words, each occurring ten times for a total of 100 trials. Word pairs were taped, following Hekmat and Vanian's procedure.

Following completion of the task, all participants in both groups were readministered the FSS III, BAT, FT, and semantic differential scales.

Results

Results will be reported for the five assessment measures employed. Statistical analysis of two of the five measures (semantic differential and BAT) was performed with non-parametric tests due to the ordinal nature of the data. A t-test (Ferguson, 1959) was used for the FSS III total, FSS III (item 63), and the FT which yielded internal data. Table 1 summarizes the pre-posttest conditioning means and standard deviations.

Cochran's C test for homogeneity of variance showed that this assumption was met in all cases with the exception of the semantic differential scores for the high imagery group. A chi square test (Siegel, 1959, p. 109), looking at the frequency of change versus no change, was used to assess the amount of overall change. There was no significant change in meaning overall as measured by the semantic differential scale. The calculated χ^2 value was .03, df = 1 (Critical χ^2 = 3.84, p. $\leq$ .05).

The Wilcoxan Matched Pairs Signed Ranks test done on pre-posttest difference distance scores indicated that there was no significant change for the high imagery group but there was a significant change in approach

TABLE 1

Means and Standard Deviations of the Various Assessment Measures for both Groups Before and After Treatment.

Measure	Preconditioning N	$\bar{X}$	SD	Postconditioning N	$\bar{X}$	SD
SD-E(Hi)	8	6.87	.35	8	6.0	.75
SD-E(Lo)	7	7.00	0	7	5.9	1.14
FSSt(Hi)	8	173.62	32.60	8	164.38	41.93
FSSt(Lo)	7	173.28	37.94	7	160.86	41.05
FSS(Hi)	8	4.25	.46	8	3.75	.89
FSS(Lo)	7	4.43	.54	7	3.29	1.11
BAT(Hi)	8	15.37	5.21	8	13.75	4.03
BAT(Lo)	7	12.86	2.61	7	9.86	3.24
FT(Hi)	8	6.38	1.92	8	5.25	2.12
FT(Lo)	7	5.00	1.73	7	3.71	1.50

behavior for the low imagery group at the .05 level of significance. For the high imagery group, T = 3.5, N = 6 (critical T = 0, $p \leq .05$) for a two-tailed test. For the low imagery group, T = 0, N = 7 (critical T=2, $p \leq .05$) for a two-tailed test.

A t-test performed on the pre-posttest difference scores, indicated that there was no change in subjective fear as measured by the fear thermometer, for either group. For the high imagery group, t = .69, df = 7 (critical t = 2.36, $p \leq .05$ for a two-tailed test). For the low imagery group t = .82, df = 6 (critical t = 2.45, $p \leq .05$ for a two-tailed test).

No significant difference in the total FSS III score was indicated for either group. The calculated t value for the high imagery group was .56, df = 7 (critical t = 2.36, $p \leq .05$). For the low imagery group t = .62, df = 6 (critical t = 2.45, $p \leq .05$).

A t-test performed on item 63, harmless snakes, pre-posttest ratings, indicated that there was no significant change for either group. The t values were .59 and .92 for the high imagery (df = 7) and the low imagery (df = 6) groups, respectively.

The degree of relationship between measures on pre-test ratings and on post-test ratings was assessed with the Spearman Rank Order Correlation Coefficient (Siegel, 1956, p. 204). Table 2 summarizes these results.

TABLE 2

Spearman Rank Order Correlation Coefficient Values

Assessing the Relationship Between Measures

	Preconditioning				Postconditioning			
Measures	BAT	FT	SD	PSSt	BAT	FT	SD	PSSt
BAT(Hi)		.24	.35	-.02		.90*	.90*	-.23
(Lo)		.85*	.51	.12		.86*	.25	-.32
FT(Hi)			.51	.42			.30	-.06
FT(Lo)			.52	.45			.33	.33
SD(Hi)				.38				-.02
(Lo)				.50				.12
PSSt(Hi)								
PSSt(Lo)								

Critical σ for high imagery is .64, N = 8.

Critical σ for low imagery is .71, N = 7.

*significant relationship .05

Discussion

In Study I, there was no effect of imagery values of words on subjective ratings; but for the low imagery group there was a significant ($p \leq .05$), though small, improvement in behavior. It was not, however, of the magnitude reported by Hekmat and Vanian (1971) ($p \leq .01$). Pre-posttest means reported by Hekmat and Vanian for the behavior avoidance test were 12.76 and .20, respectively, whereas the means for pre-posttest behavior avoidance test for Study I were 12.86 and 9.86, respectively. This lack of behavior change could be due to the lack of meaning change as indicated by change on the semantic differential for both groups.

Looking at the semantic differential ratings, the mean change between pre-posttest ratings were .87 and 1.1 for the high and low imagery groups, respectively. Norman (1959) states that random error for ratings of individual words varies from .92 to 1.28. Therefore, the change evidenced in both groups can be more than explained by random error. Osgood and Snider (1969) feel that in testing of the same individuals, values or changes in value less than 2 should not be taken

seriously and are to be considered no more than random error. In addition, only the evaluative scale for the word 'snake' was scored in Hekmat and Vanian's study and in this study. According to Osgood and Snider (1969), there is a general instability of ratings on single scales and factor scores should be calculated on the basis of several scales rather than one single value. This information suggests that the slight fluctuations in ratings on the semantic differential should be considered random fluctuations rather than behaviorally significant meaning change.

Spearman Rank Order Correlation Coefficients showed few significant relationships between the different assessment measures employed. An exception was the BAT and the FT, where in three out of four correlations a significant relationship was evidenced. The only other significant relationship was between the BAT and semantic differential ratings in the pretest for the high imagery group. The possible reason for the greater relationship between the FT and the BAT is clear. The FT is administered following the BAT and is a clear reflection of the individual's objective behavior whereas, the semantic differential is administered prior to the BAT and is based on subjective feelings.

Overall, in this study Hekmat's and Vanian's semantic desensitization failed to produce the meaning

and behavior change reported in their initial study (1971). During the therapy sessions, several people appeared very restless and in the debriefing session, they mentioned difficulty in maintaining interest in the imagining task. It is possible that the lack of meaning change is due to the fact that participants did become bored and restless and were not fully attending to the task at hand.

Study II was proposed in an attempt to find a method which both ensures attention on the part of the individual and successfully brings about meaning change.

Study II

The failure of Study I to bring about meaning and behavior change suggested that a further investigation into the development and basic assumptions of semantic desensitization was required.

Hekmat and Vanian's (1971) semantic desensitization procedure is based on the assumption that meaning change is a prerequisite for behavior change. Looking at the development of the treatment (Staats and Staats, 1957, 1958; Phelan et al., 1967), changing meaning of the concept does appear to be a key factor in changing behavior towards the object which represents the concept. Since the method employed in Study I failed to bring about change in meaning and behavior, Study II was proposed in an attempt to find a method which would be more effective in producing change in meaning as measured by change in the semantic differential ratings. Several of the participants in Study I did not appear to be attending to the word pairs throughout the duration of the session and during the debriefing they volunteered that they had been bored. The failure to maintain attention could be responsible for the relatively small

change as a result of the treatment. A paired associate learning task which would require both formation and attenuation of associations by the participants, was proposed as an alternative method. It was assumed that if by pairing components of a concept with high positive evaluative words on a paired associate learning task, one could change meaning of the components, then one could also change meaning of the concept itself as measured by change in semantic differential ratings. Study II was designed to investigate the overall amount of meaning change brought about by the Hekmat procedure of Study I and a paired associate learning task in the three scales measuring meaning of the word 'snake'.

Normals were used in this explorative study due to the lack of available participants who could be classified as phobic.

Method

Subjects

The participants in Study II were 46 volunteers from introductory Psychology classes at Wilfrid Laurier University, selected from an initial pool of 396 students who were administered the Fear Survey Schedule III (Wolpe and Lang, 1964). Only those people who responded with 'not at all' or 'a little' fear to harmless snakes (item 63) on the FSS III and had never participated in a behavior therapy program were contacted for further participation. The final experimental group consisted of 24 females and 22 males.

Measures

In addition to the FSS III, the same semantic differential scales used in Study I were administered. Once again only the snake item was considered, but unlike Study I the potency and activity scales were scored as well as the evaluative scale.

Procedure

All participants took part in two sessions. They were assigned to one of two experimental groups. During

the first session they were asked to fill out the semantic differential scales and an appointment was made for a second session the following week.

Participants in Group 1 received the paired associate learning task. Ten snake names were paired with the positive evaluative, low imagery words used in Study I. Pairs were presented on a memory drum at four second intervals and participants were required to learn the list to a criterion of one trial error free. They were then asked to fill out the semantic differential scales again.

Participants in Group 2 were given the Hekmat procedure used in Study I. As only the low imagery group in Study I showed improvement on any of the assessment measures, the low imagery, positive evaluative word pairings were used in an attempt to maximize the opportunity for improvement with both procedures. Following the taped presentation of the word pairings, participants were again given the semantic differential scales to fill out.

Participants in Group 1 were questioned as to what method if any they used to learn the paired associates. Participants in Group 2 were questioned as to the type of image they paired with the different words.

Results

Results are reported for semantic differential ratings of the word 'snake', for each scale, for both the paired associate method and the Hekmat procedure. Cochran's C statistic revealed that homogeneity of variance could be assumed in all cases.

For the paired associate procedure mean number of trials to criterion was 19. Wilcoxan's Matched Pairs Signed Ranks test was performed on the difference scales for the three scales. Changes on the activity and potency scales were significant at the .01 level of confidence, while changes on the evaluative scale were significant at the .05 level of confidence. Results for potency, activity and evaluative scales were $T = 0$, $N = 17$; $T = 6.5$, $N = 19$; $T = 3.5$, $N = 9$, respectively. Critical T for a two-tailed test, $p \leq .01$, $N = 17$, $N = 19$, is 23 and 32, respectively. Critical T for a two-tailed test, $p \leq .05$, is 7.

For the Hekmat procedure Wilcoxan Matched Pairs Signed Ranks test indicated no significant difference for the potency scale and significant change at the .05 level of confidence for the activity scale. Since only

TABLE 3

Percentage of Participants Whose Semantic Differential Rating Showed Change for Each Scale for the Hekmat and Paired Associate Procedure.

Scale	Hekmat	Paired Associate
Potency	41.18%	58.62%
Activity	47.06%	65.52%
Evaluative	29.41%	31.04%
Average	39.22%	51.73%

five participants changed on the evaluative scale (one of these in the negative direction) the N was not large enough to calculate the Wilcoxan T statistic. For the potency and activity scales T values were 3 (N = 7) and 3.5 (N = 8), respectively.

Table 3 summarizes percentage change for each scale for the two procedures.

A median test performed to determine if one median was higher than the other indicated that there was a significant difference between the two medians at the .01 level of confidence. Analysis yielded $\chi^2 = 9.4$, df = 1 (critical $\chi^2 = 6.64$, $p \leq .01$).

To assess the relationship between change on each scale and number of trials to criterion, the Spearman Rank Order Correlation Coefficient was used. Results indicated that there was no significant relationship between overall change and number of trials to criterion, or for change on any of the individual scales and number of trials to criterion.

Discussion

Unlike the semantic differential data from Study I, ratings for Study II did not tend to the extreme and therefore were amenable to statistical evaluation. The paired associate learning task was found to be significantly more effective than the Hekmat procedure in bringing about meaning change as measured by movement on the semantic differential.

In debriefing, again several participants who received the Hekmat procedure volunteered that they had become very bored and inattentive to the point where some began to feel antagonistic towards snakes and positive images became more difficult to think of. No such comments were made by the participants who received the paired associate learning task. Several felt that the pairings were unique and caught their interest. These comments lend support to the supposition that maintaining interest in the task at hand is an important factor in bringing about meaning change. The Hekmat procedure appears to have failed with participants in this regard whereas the paired associate technique required active involvement to learn the word pairings.

One might assume that the stronger the dislike for snakes and therefore, the more negative the ratings, the longer it would take to learn the antagonistic word pairs in the paired associate learning task. However, this was not supported by the Spearman Rank Order Correlation Coefficient which indicated no significant relationship between change in meaning and number of trials to criterion.

Since the paired associate method has proved effective in bringing about meaning change with normals, it could now be applied to phobic individuals. Study III was proposed to compare the effectiveness of the paired associate and Hekmat procedure in affecting therapeutic improvement in phobic individuals. It was expected that the paired associate technique would maintain a higher level of phobic improvement than the Hekmat procedure.

Study III

The results of Study II indicated that the paired associate technique was more effective than the Hekmat procedure in bringing about meaning change of the word 'snake' in non-phobic individuals. Study III was proposed to compare the effectiveness of the paired associate and Hekmat procedures in bringing about meaning change and subsequent behavior change in phobic individuals.

It should be noted that with non-phobics whose ratings tend to be neutral, we are conditioning an evaluative component to a previously neutral object. With phobic individuals, however, it is a process of counterconditioning, attempting to condition positive meaning to a previously strongly negative object.

Method

Subjects

The participants in Study III were 15 volunteers from an initial pool of 343 students enrolled in psychology classes at Wilfrid Laurier University and participants who were recruited by posters at Wilfrid Laurier University and the University of Waterloo. All participants were administered the FSS III initially. Only those people who responded with 'much' or 'very much' fear to harmless snakes (item 63) on the FSS III and had never participated in a behavior modification program were contacted for further participation. Fifty participants selected by the above criteria were met individually and were administered semantic differential scales. At this time, they were also asked to participate in a live behavior avoidance test which entailed approaching a live three foot garter snake housed in a covered glass terrarium. Only people who did not approach closer than .75 metres were asked to take part in the therapy sessions. The final experimental group consisted of 13 females and 2 males.

Measures

Assessment measures were the same as in Study I with the exception of the semantic differential scales. The same items were rated but instead of 'strong-weak', 'active-passive' and 'pleasant-unpleasant', the items were rated on 'bad-good', 'clean-dirty', and 'pleasant-unpleasant' bipolar adjective. This alteration was made so that the evaluative factor was rated on three scales instead of the one scale previously employed. It was felt that this change was justified in light of Osgood's (1969) statement that measuring a factor with only one scale gives an unstable rating which fluctuates more greatly from one rating to another than when more than one scale is used.

Only the three semantic differential scales for the word 'snake' were scored.

Procedure

The procedure for Group 1 and 2 followed that used in Study II. The participants were matched on the basis of their performance on the behavior avoidance test and total FSS III results, and assigned to one of the two experimental groups.

Following the conditioning sessions all participants were readministered the FSS III, BAT, FT and semantic differential scales.

Results

Results will be reported for the five assessment measures employed. Statistical analysis of two of the five measures (semantic differential and BAT) was performed with non-parametric tests due to the ordinal nature of the data. A t-test was used for the FSS III total, FSS (item 63), and the FT which yielded interval data. Table 4 summarizes the pre-posttest conditioning means and standard deviations for all measures.

Cochran's C statistic for homogeneity of variance showed that his assumption was met in all cases except for the FSS (item 63) scores for the paired associate group.

Looking at the results for the semantic differential ratings of the word 'snake', Wilcoxan's Matched Pairs Signed Ranks test indicated no significant change for the Hekmat group ($T = -7$, $N = 6$). For the paired associate group, 5 of the eight participants showed a change in score; however, this was not large enough a sample to calculate a T value. A t-test (two-tailed) (Perguson, 1959), however, indicated that the posttest mean for the paired associate group differed significantly from

TABLE 4

Means and Standard Deviations of the Various Assessment Measures for Both Groups Before and After Treatment

Measure	Preconditioning N	X	SD	Postconditioning N	X	SD
SD(P-A)	8	18.12	2.85	8	15.5	5.29
(Hek)	7	18.14	2.41	7	17.86	2.43
FSSt(P-A)	8	175.0	43.97	8	175.0	58.71
(Hek)	7	170.57	35.58	7	172.57	34.20
FSS(P-A)	8	4.5	.53	8	3.87	1.46
(Hek)	7	4.57	.53	7	4.14	.90
BAT(P-A)	8	15.37	7.35	8	13.37	7.82
(Hek)	7	15.71	8.08	7	15.57	8.28
FT(P-A)	8	7.37	1.68	8	5.0	2.14
(Hek)	7	5.86	1.77	7	5.29	1.25

the posttest mean for the Hekmat group ($t = 2.43$, $N = 13$, $p \leq .05$) while this difference did not exist in the pretest means.

A Wilcoxan test performed on the pre-posttest difference scores for the paired associate group, indicated significant change in approach behavior towards a live garter snake. For the paired associate group, $T = 0$, $N = 7$ (two-tailed test, $p \leq .05$).

For the Hekmat group only 2 of the 7 participants showed any change, one of these in the negative direction. Not only is this not a large enough sample to perform a Wilcoxan, but one would expect more change than this by random variation. Looking at the percentage change for each group, 87.5% of the paired associate group changed in the positive direction and 14.28% of the Hekmat group changed in the positive direction.

A t-test which was performed on the pre-posttest difference scores indicated no significant change in subjective fear as measured by the fear thermometer, for either group. For the paired associate group, $t = .74$, $df = 7$ (critical $t = 2.36$, for a two-tailed test, $p \leq .05$). For the Hekmat group, $t = .42$, $df = 6$ (critical $t = 2.45$, for a two-tailed test, $p \leq .05$).

No significant change in the total FSS III score was indicated for either group. For the paired associate group, $t = 0$, $df = 7$; for the Hekmat group, $t = -.47$, $df = 6$.

A t-test performed on item 63, harmless snakes, pre-posttest ratings, indicated no significant change for either group. The t values were .49 and .66 for the paired associate (df = 7) and Hekmat group (df = 6), respectively.

The degree of relationship between measures on pretest and posttest ratings was assessed with the Spearman Rank Order Correlation Coefficient. Table 5 summarizes these results.

Percentage of participants whose ratings on each measure changed in the positive direction for the paired associate and Hekmat procedures are summarized in Table 6.

TABLE 5

Spearman Rank Order Correlation Coefficient Values

Assessing the Relationship Between Measures

	Preconditioning				Postconditioning			
Measures	BAT	FT	SD	PSSt	BAT	FT	SD	PSSt
BAT(P-A)		.39	.20	.24		.67*	.39	.29
(Hek)		-.19	.06	.05		.53	.53	.47
FT(P-A)			.07	.66*			.66*	.23
FT(Hek)			-.69	-.95*			-.06	.01
SD(P-A)				-.31				.35
(Hek)				.77*				.64
PSS(P-A)								
(Hek)								

Critical r for paired associate is .64, N = 8.
Critical r for Hekmat procedure is .71, N = 7.

*significant relationship .05

TABLE 6

Percentage of Participants Whose Ratings on Each Measure Changed in the Positive Direction for the Paired Associate and Hekmat Procedure

Measure	Paired Associate	Hekmat
BAT	87.5%	14.28%
SD	50%	42.86%
PT	87.5%	28.57%
FSSt	75%	42.86%
FSS	50%	42.86%

Discussion

The results of Study III indicated that the paired associate technique was more effective than the Hekmat procedure in bringing about behavior change.

No significant change in semantic differential ratings measuring meaning was evidenced for the Hekmat group. The small N and test restrictions did not allow a statistical evaluation of the semantic differential data for the paired associate group. The posttest means for the two groups, however, did differ significantly, suggesting that some change which we could not evaluate was taking place in the paired associate group.

Looking at the lack of correlation between the behavior avoidance test scores and the semantic differential ratings for both groups on the pre-posttest ratings, the assumption that changing one brings about a change in the other can be questioned. Lang (1966) asserts that the subjective, physiological and behavioral components of fear form a complex but not necessarily unitary response. Not only are they not related but also Rachman (1974) states that subjective reports of fear tend to diminish more slowly than overt signs of fear and avoidance behavior. If the semantic differential

ratings are not related to the behavior avoidance test scores and the subjective and behavioral components change at different rates, then can we really make the assumption that by changing meaning as measured by the semantic differential ratings, we can also change behavior as measured by the BAT?

Several relationships between measures existed. These seemed to be mainly between the subjective measures. Paul (1966) found a reasonably high correlation between self-report measures but little relationship between others. There was, however, a correlation between BAT and FT on the post-test for paired associate group. As previously explained, once the individual sees how they perform and feel during the BAT, this objective behavior is likely to be reflected in the FT which is filled out following.

Overall, the paired associate procedure appeared to be more effective than the Hekmat procedure in bringing about behavior change and possibly in bringing about meaning change as well. Although sample size for both groups was small, this exploratory study opens a new area which requires further investigation before being applied in a therapeutic setting.

Discussion

In summary, the failure of Study I to replicate Hekmat and Vanian's (1971) findings led to questions regarding the method being employed. Study II was conducted in an attempt to find a more effective method of bringing about meaning change. A paired associate method was more powerful than the Hekmat procedure in producing meaning change with non-phobic individuals. Finally, Study III compared the potency of the paired associate and Hekmat procedure as applied to phobic individuals. Results indicated a difference in these two techniques with the paired associate method bringing about a greater reduction in phobic behavior. It is appropriate to comment, here, on the differences in the two therapies.

Clearly, the attentional/motivational factor cannot be ignored. The participants in the Hekmat group appeared restless and during the debriefing session volunteered that they had been bored and some on the verge of sleep. Indeed, the paired associate approach was devised specifically in an attempt to combat this boredom. Several participants in the paired associate group mentioned that they had found the task

interesting and the word pairings unique. Thus, it may simply be that the differences between the two approaches reflect a lack of involvement of the subjects in the Hekmat group with a concomitant reduction in strength of conditioning.

There was a difference, of course, in the mode of stimulus presentation. However, Hekmat (1972) found that there was no difference in results whether words were presented using visual or auditory methods. Thus, it appears unlikely that the differences obtained between the two procedures in the present research were due to mode of presentation.

The underlying assumption of semantic desensitization is that changing the evaluative meaning of the verbal representative of the phobic stimulus will change the behavior towards the object. That is, meaning change is a necessary precursor to behavior change. It is possible that it was precisely because of the lack of significant change in meaning that the change produced by either technique in the BAT was poorer than that reported by Hekmat and Vanian. Their results indicated a greater tendency to approach a live snake than did the results for subjects in the present studies. As well, Hekmat and Vanian reported a significant change in ratings of the word 'snake'. However, the fact that Hekmat and Vanian obtained significant change in

meaning while I did not, could be an artifact of their statistical procedure. Although Hekmat and Vanian felt that their data was such that they could use the Wilcoxan Matched Pairs Signed Ranks test, I did not feel that I could employ this test. With all scores but one during the pretest at the extreme negative end, there were only two possibilities for 14 of the 15 scores, a positive change or no change; a negative change with these scores was impossible. Since zero change scores are eliminated from the analysis, with data of this nature an experimenter is heavily weighting the analysis in his favour by using the Wilcoxan which is based on positive versus negative score changes. Even with Hekmat and Vanian's data, where a pretest mean of 6.73 for 15 participants is reported, this is true. To achieve a mean of this magnitude a minimum of 11 of 15 participants had to rate the word 'snake' during the pretest at the extreme of 7; that is, 11 of 15 people had no possibility of changing in the negative direction. This appears to be a heavy weighting in favour of statistically significant results.

Thus, given this argument there appears some reason for caution in interpreting the validity of the semantic differential data reported by Hekmat and Vanian. Meaning change has yet to be shown as a necessary precursor to behavior change; indeed, Rachman (1974) has

suggested that behavior change may, in fact, precede meaning change. In the present research there were instances where behavior change was measured in the absence of any measurable change in meaning and further, where both meaning change and behavior change were evidenced, the magnitude of these changes was found not to be significantly correlated change. The possibility remains, of course, that the failure to obtain meaning change in the present studies reflects more the differential sensitivities of two measuring instruments than a flaw in the assumptions underlying semantic desensitization. The behavioral measure may be a more sensitive assessment technique of both early meaning and behavior change.

One must also keep in mind that in Studies I and III we are not dealing with a case of conditioning meaning to a previously neutral stimulus as in Staats and Staats, 1957, 1958; Phelan, et al, 1967; Study II of the present series but with a case of counter-conditioning which may be a more difficult task and therefore, require more than one session.

The present research suggests an alternative approach to the treatment of phobias. However, in a sense it also adds confusion to an already confusing literature as to which is the best technique. The end to this confusion may be facilitated by accepting the possibility that one technique may be appropriate to one group

of people while another is appropriate to another group of people, one technique appropriate with one group of phobias, another with another group of phobias. That is, perhaps we should be concentrating on tailoring the therapy to the individual and his specific problems.

Whatever the value of these preceding speculations, the fact remains that the paired associate technique produced a larger change in behavior towards a live snake for snake phobic subjects than did the procedure initially employed by Hekmat and Vanian. Thus, it would seem that the technique does warrant further investigation and consideration as a therapeutic approach to the treatment of phobias.

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APPENDIX A

ASSESSMENT MEASURES

FEAR SURVEY SCHEDULE III

The items in this questionnaire refer to things and experiences that may cause fear or other unpleasant feelings. Write the number of each item in the column that describes how much you are disturbed by it nowadays. Your name and telephone number are required only so that I can get in touch with some of you to request further assistance. Thank you very much for your participation.

Linda Brown

NAME: _____ SEX: ___ PHONE: _____

	NOT AT ALL	A LITTLE	A FAIR AMOUNT	MUCH	VERY MUCH
1) Noise of vacuum cleaners					
2) Open wounds					
3) Being alone					
4) Being in a strange place					
5) Loud voices					
6) Dead people					
7) Speaking in public					
8) Crossing streets					
9) People who seem insane					
10) Falling					
11) Automobiles					
12) Being teased					
13) Dentists					
14) Thunder					
15) Sirens					
16) Failure					
17) Entering a room where other people are already seated					
18) High places on land					
19) People with deformities					
20) Worms					

	NOT AT ALL	A LITTLE	A FAIR AMOUNT	MUCH	VERY MUCH
21) Imaginary creatures					
22) Receiving injections					
23) Strangers					
24) Bats					
25) Journeys					
a) train					
b) bus					
c) car					
26) Feeling angry					
27) People in authority					
28) Flying insects					
29) Seeing other people injected					
30) Sudden noises					
31) Dull weather					
32) Crowds					
33) Large open spaces					
34) Cats					
35) One person bullying another					
36) Tough looking people					
37) Birds					
38) Sight of deep water					
39) Being watched working					
40) Dead animals					
41) Weapons					
42) Dirt					
43) Crawling insects					
44) Sight of fighting					
45) Ugly people					
46) Fire					
47) Sick people					
48) Dogs					
49) Being criticized					

	NOT AT ALL	A LITTLE	A FAIR AMOUNT	MUCH	VERY MUCH
50) Strange shapes					
51) Being in an elevator					
52) Witnessing surgical operations					
53) Angry people					
54) Mice					
55) Blood a) human b) animal					
56) Parting from friends					
57) Enclosed spaces					
58) Prospect of a surgical operation					
59) Feeling rejected by others					
60) Airplanes					
61) Medical odours					
62) Feeling disapproved of					
63) Harmless snakes					
64) Cemeteries					
65) Being ignored					
66) Darkness					
67) Premature heart beats					
68) a) nude men b) nude women					
69) Lightning					
70) Doctors					
71) Making mistakes					
72) Looking foolish					

Semantic Differential
Study I and II

Please check the position on the scales which best represents how you feel about the following words.

SPIDERS

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

ME

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

NUDE MEN

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

BATS

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

HOMOSEXUALS

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

FATHER

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

MOTHER

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

CRAWLING INSECTS

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

SNAKES

strong __ : __ : __ : __ : __ : __ : __ weak

active __ : __ : __ : __ : __ : __ : __ passive

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

BEING ALONE

strong	__	: __	: __	: __	: __	: __	: __	weak
active	__	: __	: __	: __	: __	: __	: __	passive
pleasant	__	: __	: __	: __	: __	: __	: __	unpleasant

Semantic Differential

Study III

Please check the position on the scales which best represents how you feel about the following words.

SPIDERS

bad	__	: __	: __	: __	: __	: __	: __	good
clean	__	: __	: __	: __	: __	: __	: __	dirty
pleasant	__	: __	: __	: __	: __	: __	: __	unpleasant

ME

bad	__	: __	: __	: __	: __	: __	: __	good
clean	__	: __	: __	: __	: __	: __	: __	dirty
pleasant	__	: __	: __	: __	: __	: __	: __	unpleasant

NUDE MEN

bad	__	: __	: __	: __	: __	: __	: __	good
clean	__	: __	: __	: __	: __	: __	: __	dirty
pleasant	__	: __	: __	: __	: __	: __	: __	unpleasant

BATS

bad	__	: __	: __	: __	: __	: __	: __	good
clean	__	: __	: __	: __	: __	: __	: __	dirty
pleasant	__	: __	: __	: __	: __	: __	: __	unpleasant

HOMOSEXUALS

bad __ : __ : __ : __ : __ : __ : __ good

clean __ : __ : __ : __ : __ : __ : __ dirty

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

FATHER

bad __ : __ : __ : __ : __ : __ : __ good

clean __ : __ : __ : __ : __ : __ : __ dirty

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

MOTHER

bad __ : __ : __ : __ : __ : __ : __ good

clean __ : __ : __ : __ : __ : __ : __ dirty

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

CRAWLING INSECTS

bad __ : __ : __ : __ : __ : __ : __ good

clean __ : __ : __ : __ : __ : __ : __ dirty

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

SNAKES

bad __ : __ : __ : __ : __ : __ : __ good

clean __ : __ : __ : __ : __ : __ : __ dirty

SNAKES

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

BEING ALONE

bad __ : __ : __ : __ : __ : __ : __ good

clean __ : __ : __ : __ : __ : __ : __ dirty

pleasant __ : __ : __ : __ : __ : __ : __ unpleasant

Fear Thermometer

Please check the position on the scale below which best represents the degree of fear you felt while approaching the live snake.

Completely calm										As frightened as you have ever been
___:	___:	___:	___:	___:	___:	___:	___:	___:	___	

Scoring for BAT

Distance*	Score
5-1/4	27
5	26
4-3/4	25
4-1/2	24
4-1/4	23
4	22
3-3/4	21
3-1/2	20
3-1/4	19
3	18
2-3/4	17
2-1/2	16
2-1/4	15
2	14
1-3/4	13
1-1/2	12
1-1/4	11
1	10
3/4	9
1/2	8
1/4	7
0	6
Hand in terrarium	4

Distance	Score
Touches snake	2
Picks up snake	0

*Distance in metres

APPENDIX B

RESPONSE WORDS FOR STUDY I

Response Words for Study I

	Word	Evalutive	Imagery	
High	Kiss	6.50	6.80	
	White	5.63	5.84	
	Warmth	6.41	5.70	
	Candy	5.20	6.63	
	Flower	5.80	6.57	
	Music	6.09	5.44	
	Money	5.91	6.43	
	Friend	6.57	6.37	
	Love	6.86	5.60	
	Joy	6.66	5.43	$\bar{E} = 6.16$ $\bar{I} = 6.08$
Low	Pure	6.43	3.31	
	Nice	5.79	2.78	
	Kindness	6.62	4.20	
	Health	6.26	4.10	
	Friendly	6.41	4.25	
	Clean	6.41	4.25	
	Comfort	6.06	3.34	
	Brave	6.09	4.13	
	Truth	6.57	2.73	
	Virtue	6.21	3.33	$\bar{E} = 6.29$ $\bar{I} = 3.68$

APPENDIX C

PAIRED ASSOCIATES FOR STUDY II

Paired Associates Study II

cobra	-	kindness
water moccasin	-	friendly
viper	-	brave
garter snake	-	virtue
rattler	-	pure
boa constrictor	-	nice
anaconda	-	truth
copperhead	-	comfort
corral	-	health
python	-	clean

APPENDIX D

RAW DATA

STUDY I

TABLE 7

Raw Data

High Imagery

	Preconditioning					Postconditioning				
Subject	BAT	FT	SD	FSSt	FSS	BAT	FT	SD	FSST	FSS
1	16	8	7	217	5	10	4	7	237	4
2	15	8	7	196	4	19	8	6	156	4
3	12	7	7	160	4	8	3	6	132	3
4	12	3	7	211	4	7	2	6	172	3
5	14	6	6	183	4	13	7	5	189	3
6	27	7	7	138	4	27	7	7	145	5
7	10	8	7	194	4	9	5	5	186	3
8	14	4	7	130	5	14	6	6	98	5

TABLE 8

Raw Data

Low Imagery

	Preconditioning					Postconditioning				
Subject	BAT	FT	SD	FSSt	FSS	BAT	FT	SD	FSSt	FSS
1	12	4	7	155	4	11	4	5	160	3
2	14	6	7	162	4	13	4	5	121	2
3	13	7	7	234	5	8	4	7	216	4
4	10	3	7	180	4	6	1	5	176	2
5	11	3	7	117	5	8	3	7	94	5
6	18	7	7	159	4	15	6	7	173	3
7	12	5	7	206	5	8	4	5	186	4

APPENDIX E

RAW DATA

STUDY II

TABLE 9

Raw Data

Paired Associate

Subject	Preconditioning			Postconditioning		
	s-w	a-p	p-u	s-w	a-p	p-u
1	4	3	4	4	3	4
2	3	4	6	3	4	5
3	5	6	5	6	6	5
4	4	3	4	4	4	4
5	4	5	4	3	6	4
6	2	5	4	1	5	4
7	2	2	2	3	3	2
8	3	3	3	2	2	3
9	4	4	4	4	3	3
10	4	3	4	4	4	5
11	3	3	3	3	2	3
12	3	3	2	4	3	2
13	3	2	3	2	2	3
14	3	5	4	2	5	3
15	4	1	5	5	1	5
16	2	2	4	3	3	4
17	3	5	5	4	6	5
18	3	5	5	3	4	5
19	7	7	4	4	5	4
20	1	1	5	4	2	5
21	4	5	7	4	4	7
22	5	2	6	5	5	6
23	3	5	4	3	3	3
24	3	4	3	3	4	3
25	4	4	5	2	2	3
26	4	5	6	3	3	3
27	4	5	5	3	2	3
28	3	3	7	6	6	6
29	2	2	3	2	3	3

TABLE 10

Raw Data
Hekmat Procedure

Subject	Preconditioning			Postconditioning		
	s-w	a-p	p-u	s-w	a-p	p-u
1	4	3	5	4	4	5
2	3	3	4	4	3	4
3	2	3	2	2	2	2
4	2	7	4	2	6	4
5	4	5	4	4	4	4
6	3	3	6	2	3	6
7	2	2	4	2	2	3
8	4	3	4	4	3	4
9	4	3	5	4	3	5
10	5	3	4	5	3	4
11	2	3	6	2	3	6
12	4	4	6	4	4	4
13	4	4	4	3	3	5
14	3	2	1	1	1	1
15	4	2	4	3	2	2
16	4	6	5	2	2	5
17	5	2	7	4	6	5

APPENDIX F

RAW DATA

STUDY III

TABLE 11

Raw Data

Paired Associate

	Preconditioning					Postconditioning				
Subject	BAT	FT	SD	FSSt	FSS	BAT	FT	SD	FSSt	FSS
1	27	10	21	131	5	27	7	21	123	5
2	27	8	14	172	5	24	7	15	150	5
3	9	7	14	123	4	6	2	7	121	1
4	12	8	19	179	5	10	7	19	234	5
5	11	7	20	139	4	8	5	16	121	3
6	14	7	17	208	4	13	2	8	190	3
7	10	8	19	195	4	8	4	19	180	5
8	13	4	21	253	5	11	6	19	281	4

TABLE 12

Raw Data

Hekmat Procedure

	Preconditioning					Postconditioning				
Subject	BAT	FT	SD	FSSt	FSS	BAT	FT	SD	FSSt	FSS
1	9	7	16	170	5	11	3	19	170	5
2	27	7	16	134	4	27	7	17	149	4
3	16	3	20	219	5	16	5	20	217	5
4	12	4	19	190	4	12	5	14	192	3
5	10	8	15	114	4	7	5	14	113	3
6	9	6	21	184	5	9	6	18	171	5
7	27	6	20	183	5	27	6	19	196	4