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The Relative Efficacy of Live Graded Exposure, Live Modeling, and Computer-Based Symbolic Modeling in the Treatment of Spider Phobia: A Perspective of Emotion

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1. Introduction

This chapter describes a research work that investigated whether a computer-based symbolic modeling procedure could be successfully used in the treatment of a maladaptive emotional condition, namely spider phobia. It also examined whether the procedure would prove to be as effective as other conventional treatments for the same clinical condition.

The efficacy of any therapeutic strategy presumably depends considerably on the accuracy with which the systems of the human body, as well as the ways in which they function, are conceived. Accordingly, an accurate model of human emotional functioning is crucial for the construction of a therapeutic framework that expresses an integral set of scientifically established facts about emotion and sets forth relevant objectives and specific principles for clinical application. A major line of investigation in this research was concerned with the diversity of existing concepts of emotion (such as fear and anxiety) and its components, which has led the various therapeutic approaches to emphasize different emotional components as the major target of their therapeutic techniques. The objective in this respect was to investigate whether specific conceptualizations of emotion, fear and anxiety in particular, could be consolidated to form a coherent theoretical basis for the proposed, computer-based, delivery system. In this respect, a specific psychological problem (i.e., specific phobia) was targeted to provide a reference point in exploring the theoretical and clinical dimensions of this investigation. This principal line of research is reviewed in detail in the next section below.

Another line of investigation in this research concerned the usability of computers in delivering treatment for behavioral problems such as anxiety-related disorders including phobias. The objective was to verify the efficacy of a self-administered, computer-based, treatment technique in producing effective therapeutic change, hence providing theoretical and empirical bases for expanding behavioral treatment to meet a substantial proportion of the current demand. This line of research is outlined in section 3 on human-computer interaction.

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Subsequently, a prototype computer-based symbolic modeling technique for the treatment of spider phobia, which was constructed on the basis of a proposed theoretical concept of emotion, was described in section 4. The effectiveness of the technique was compared with that of two conventional methods for treating spider phobia in order to validate its clinical efficacy. Spider phobia was selected as the clinical problem of investigation mainly because of its clinical specificity. The clinical results, described and discussed in sections 5 and 6, further suggest that the effect induced in either of the cognitive or overt verbal response systems underlying respective fear components is likely to similarly and equally affect the fear component manifested by the other systems. The findings of this work may warrant the development of similar techniques for the treatment of other similar behavioral problems concerned with anxiety and fear.

2. Emotion: review and implications

The literature on emotion shows that the nature of emotion and the mechanisms involved in its experience and expression constitute a field of long-standing controversy (e.g., James, 1890/1950; Cannon, 1927; Papez, 1937; MacLean, 1950; Schachter, 1964; Lazarus, 1984; Zajonc, 1984; Panksepp, 1988, 1990; Gray, 1982, 1990; Hassan and Ward, 1991). The result of this controversy has been a set of concepts of emotion that are neither exclusive nor complementary, and which have projected a range of divergent clinical implications (e.g., Rachman, 1981). In fact, different theories of emotion are found to be emphasizing different response systems as being underlying the mechanisms involved in emotional experience or expression (Leventhal and Tomarken, 1986, 1988). A brief outline of controversies about emotion will follow.

Early theories of emotion (e.g., James, 1950/1890; Lange, 1967/1885; Zajonc, 1980, 1984) point out that the autonomic processes are the prime determinant of emotion, or that emotion is potentially independent of cognition. Further, the primary role of subcortical structures within the brain in mediating emotional functioning is emphasized by yet another set of theories on emotion (e.g., Cannon, 1927; Papez, 1937; McLean, 1950). Each of these theories offers its own concepts of emotion and proposes specific mechanisms for its experiencing and expression. One major implication of such controversy on psychotherapy is that the various therapeutic approaches tend to place a primary emphasis on one response system to the relative neglect of the others (Wilson, 1978). This can be clearly observed by looking to the therapeutic strategies of these approaches in the treatment of an emotion such as fear. For example, behavioral approaches to therapy focus on overt behavior as the subject matter of therapy. They explain emotional responses in terms of learning principles (e.g., Eysenck, 1987). They argue that fear reactions, for instance, are learned as a way of reducing the anxiety elicited by a particular object or situation. Therefore, exposure to the feared stimulus without harmful consequences leads to extinction of the fear; hence, exposure to the un-reinforced conditioned stimulus (i.e., the harmless object of fear) is the conceptual basis of behavior therapy. Wolpe's (1958) counter-conditioning approach emphasizes autonomic responsiveness. Based on his theory of reciprocal inhibition, Wolpe argues that the induction of an autonomic responsiveness of relaxation can reduce or eliminate pre-existing anxiety symptoms since the autonomic states of relaxation and anxiety are incompatible and cannot co-exist. Cognitive approaches, on the other hand, conceptualize emotion as a post-cognition phenomenon (e.g., Beck, 1976; Lazarus, 1982, 1984). Generally

speaking, these approaches argue that an individual's emotional reactions are determined by the way he/she interprets events (Greenberg and Safran, 1987). Therefore, these personal meanings of events are the primary targets of change in cognitive therapy; hence they focus on maladaptive thought patterns and related cognitive processes.

These, rather 'skewed', concepts of the emotion of fear, which underlie the therapeutic approaches so far outlined, are probably a contributory factor in the frequently observed discordance between autonomic, somatic motor, and cognitive components of fear in their rate of response to treatment (Rachman, 1978, 1990). However, despite the diverse notions about emotion, there seems to be a consensus on the multi-component nature of emotion (Lang, 1971, 1985; Scherer, 1984; Frijda, 1986; Gray, 1990). Lang's (1968, 1971) three-system model of emotion conceptualizes fear and anxiety in terms of overt behavioral, cognitive, and autonomic components. Further, Rachman (1977) has found that the response systems underlying these three components of fear do not always co-vary and, therefore, a treatment procedure that affects only one or two response systems may result in incomplete treatment in terms of residual fear in other response systems. On the basis of this proposition, an effective treatment of, for example, phobia would be expected to induce a therapeutic change in all response systems. Nevertheless, different theoretical and therapeutic perspectives of emotion tend to emphasize the primacy of one component over the others. Rachman (1981), for example, suggests that behaviorally-based treatments will probably prove more effective than cognitive treatments of emotional disorders. Further, Zajonc (1984) proposes the independence of emotion from cognition (For a critical review of Zajonc's (1984) proposition on the primacy of emotion, see Hassan and Ward, 1991). Accordingly, one may logically argue that if a behaviorally based treatment of an irrational emotional state, such as phobia, would prove effective, then there must be a central mechanism whereby the behaviorally induced therapeutic change also mediates cognitive and autonomic change. This proposition is pursued below after reviewing some major concepts of emotion.

The cognitive-appraisal theories of emotion (e.g., Schachter, 1964; Lazarus, 1982, 1984; Scherer, 1984) argue for the primacy of cognitive processes in determining an emotional state. They hold that an emotional state is the product of an interaction between two components: physiological arousal, and cognition about the cause of that arousal. Therefore, the perception or attribution of a causal connection between the two components is necessary for the generation of an emotional state. According to these theories, cognitions determine the quality of emotions, while arousal determines the intensity of these emotions. Hence, like Cannon's (1927) assertion, it is proposed that arousal in itself is emotionally non-specific. However, the various studies conducted to test the predictions derived from the cognitive-appraisal theory, concerning the mis-attribution of drug-induced arousal to emotional or neutral cues, revealed that the evidence for the theory was generally weak (Leventhal and Tomarken, 1986). Further, some studies (e.g., Rogers and Deckner, 1975; Marshal and Zimbardo, 1979; Maslach, 1979) showed that the unexplained arousal was in fact found to induce heightened negative affect. Similarly, the manipulation of attributions concerning anxiety and other negative emotional states, in clinical settings, have generally failed (e.g., Bootzin, Herman and Nicassio, 1976; Chamblis and Murray, 1979; Cotton, Baron and Borkovec, 1980).

On the other hand, Leventhal (1984) identifies a hierarchical emotional processing mechanism, consisting of a series of temporal stages, in the cognitive system. He argues that

the mechanism mediates, in a fast acting and rapidly processed manner, between stimulus situations and response. The first stage involves the reception and coding of information, which results in the construction of a 'representation' of the stimulus situation and an 'emotional representation' (or experience) of the situation. The second, 'coping', stage involves the generation and execution of action to cope with the perceived situation and with the emotional reaction to it. The third, 'appraisal', stage involves setting criteria and evaluating the outcome of coping efforts. Accordingly, the creation of an emotional representation (or experience) is a product of a multi-level system that is usually simultaneously active and congruent in their emotional output, although at times may act differently or become in conflict with each other. The lowest level is a 'sensory-motor' processing, followed by a 'schematic processing' level, with the highest level is the 'conceptual processing'. This model of emotion proposes a reciprocal relationship between emotion and cognition, rather than the primacy of one over another. According to this model, emotion is either elicited by cognition or it generates cognition by activating schematic memory once aroused.

Leventhal's (1984) model provides a basis for explaining some clinical observations, such as the fear reactions of individuals with phobia despite their acknowledgement of the irrationality of their fears. According to the model, although the individual may recognize, at the conceptual processing level, the non-harmfulness of the object of his/her fear, yet he/she displays strong sensory-motor reactions of anxiety when confronted with the same object. The model suggests that emotion is experienced and generated centrally, with the expressive responses (verbal reports; overt motor responses, such as bodily movements; and autonomic reactions, such as sweating) being an outer reflection of an inner emotional state. That is, outer emotional expression and inner emotional experience are linked in sensory-motor processing and in emotional schematic processing. Similarly, outer emotional expression, the theory proposes, can initiate, strengthen, or sustain inner experience by the same two routes of processing. However, outer expression is more frequently preceded by the activation of an emotional state; for example, a stimulus situation may evoke an expressive-motor process.

Leventhal's (1984) model of cognitive processing of emotion reflects an integrative image of emotion and emotional processing. For example, emotional reflexes (activated by sensory-motor processing) are integrated with concrete (schematic processing) and abstract (conceptual processing) memory structures in the presence of fear and anxiety. In addition, the model reflects a concept of emotional processing that proposes a number of interactions among the systems of behavioral machinery. This proposition of systemic interactivity may be extended to assume, for example in the case of phobias, that the influence of environmental factors may affect cognitive responding, or that cognitive events may be sufficient to induce behavioral and autonomic change. The latter proposition has been hypothesized by Lang (1971) in relation to the three-system model of fear and anxiety. The accuracy of Leventhal's (1984) conceptual model of emotion may be examined at a neuro-biological level of analysis.

The neuro-biological perspective of emotion attempts to explain the nature of emotional experience and expression by exploring the different neural systems implicated in emotion. The belief (e.g., Panksepp, 1988) is that the neuro-biological approach has a better chance of generating factual knowledge about brain structures, pathways, and processes implicated in emotionality. This approach represents a molecular level of analysis, and the evidence

yielded by which may help guide the search for solid understanding of emotion at the psychological level. All psychological phenomena can not be reduced to intrinsic brain processes (Panksepp, 1988); therefore, the two domains can reciprocate to produce a much more accurate model of human emotional functioning (Hassan and Ward, 1991). Cannon's (1927) theory of emotion proposes that the thalamus is the center that mediates the various processes associated with emotional expression (somatic-motor, autonomic, and subjective/cognitive). The theory argues that, upon the discharge of 'thalamic processes', bodily changes occur almost simultaneously with the emotional experience. The evidence quoted for supporting this proposition included the observation that emotional expressions could be elicited in decorticated and decerebrated animals (Cannon, 1927), but not when thalamic structures were additionally ablated (Bard and Rioch, 1937). This theory was later challenged by Papez (1937) and MacLean (1950), who concluded that the anatomical interconnections among limbic structures in the forebrain were responsible for emotional experience, and that the limbic portion of the brain was the locus of emotion. However, Wall and Pribram (1950) have shown the relationship between the limbic structures and emotion to be non-conclusive. They demonstrated that other cerebral regions, when electrically stimulated, also evoke a visceral response. In addition, they observed that emotional changes were found to accompany lesions in forebrain centers other than the limbic areas. When the limbic structures themselves were stimulated, behavior of a cognitive nature, such as problem-solving and memory deficiencies, was affected in ways which could not be related to emotional changes.

Following the above review on emotion, certain conclusions may be summarized. First, emotion seems to be unexplainable in terms of the processes of a single brain structure. Second, the neuro-biological basis of emotion seems to give the forebrain cortex, rather than peripheral (i.e., visceral) processes, a central role in emotional control and experience. Third, the evidence on central neural interconnections (Dimond, 1980; Brodal, 1981) shows that a convergence of information as sensory impulses of different kinds is evident in many regions of the cerebral cortex. This fact suggests that highly integrative processes occur in the brain, whether in emotional or non-emotional states.

What are the implications of this line of evidence on the propositions that advocate the primacy of one response system over the others?

First, there does not seem to be, at least in the available literature, strong evidence for assuming that overt behavior is the primary indicator of an emotional state. The same probably applies to cognitive responding and autonomic reactions associated with such a state.

Second, the brain seems to sustain a dynamic two-way exchange with external as well as internal environment (Panksepp, 1988). In so doing, the brain is equipped with intrinsic but experientially refined sensory, attentional, perceptual, emotional, and motor systems. The richness of neural interconnections of the CNS adds to the complexity of ways in which these systems interact to mediate different behaviors, including emotional ones, whether normal or abnormal.

Third, intrinsic perceptual and memory properties of the brain suggest that the latter probably never remains empty or still (Panksepp, 1988). Leventhal's (1984) model, and particularly his concept of central schematic and propositional storage, may explain how emotional states are influenced by previous emotional and non-emotional events. This

proposition gives a significant importance, but not primacy, to the cognitive system with regard to emotional processing.

With this view of human emotional functioning in mind, one would hypothesize that different effects produced by cognitively directed or behaviorally based techniques are not necessarily the result of targeting a specific, presumably prime, response system. It is rather due to the interactive nature of brain processes. This conclusion seems to favor the view suggested by Lang (1971) that the three response systems (overt behavioral, cognitive, and autonomic) tend to mutually augment, sustain, or attenuate each other. For example, high levels of physiological arousal during an emotional state are likely to affect cognitive performance (Williams, Watts, MacLeod and Mathews, 1988). Williams, et al., (1988) argues that phobic clients are usually highly sensitive to stimuli in their environment that represent their fear; they become more vigilant towards, or preoccupied with ideas related to, these stimuli than others. This attentional bias is demonstrated by Watts, McKenna, Sharrock and Trezise (1986) in a study involving spider-avoidant subjects. Subjects were required to name the color of words in two lists: one containing words such as fear, death, and grief; the other consisted of spider-related words, such as hairy and crawl. They found that the subjects showed little disruption in responding to the first list, but a very large disruption in colour-naming spider words. Following treatment, these subjects showed significant reduction in disruption in comparison to controls.

On the other hand, factors associated with cognitive processing during an emotional state may be the underlying source of the reported dissociation between different response systems in phobias (Rachman and Hodgson, 1974; Rachman, 1977; Hugdahl, 1989). Leventhal's (1988) model offers an explanation for the effects of such factors on other response systems. For example, people with specific phobias may acknowledge the irrationality of their fear reactions at the conceptual level of cognitive processing; yet, they may show fear reactions at the sensory-motor level, in the form of overt avoidance responses and/or autonomic reactions, when faced with the object of their phobia.

The proposition, therefore, is that a cognitively directed treatment of specific phobia is likely to prove effective if it takes into consideration all relevant, cognitive and non-cognitive, components of emotion. For example, in conducting a therapeutic symbolic modeling procedure, the adequacy of modeled behaviors in instigating lasting effects (whether in terms of overt responses or autonomic functioning) on observing clients is likely to depend on clients' previous and subsequent overt behavioral responses, and the autonomic events associated with such behaviors. By means of graded sequence of fear-provoking symbolic stimuli, the level of arousal induced by these stimuli in clients is likely to be reasonably below the threshold that may instigate avoidance. In addition, a coping, rather than mastering, style of the model in performing approach responses to these stimuli is expected to contribute positively and to match the cognitive image of the observing phobic client. The same applies to behaviorally based therapies. This proposition, which reflects the core of the conceptual framework of the symbolic modeling technique, is examined empirically in Section 4.

3. Human-computer interaction

The practical help that computers provide in many domains of today's human life is well recognized (e.g., Zoltan and Chapanis, 1982). The usability of computers by humans has

been thoroughly investigated (e.g., Rasmussen, 1986; Woods and Roth, 1988). In this respect, a usable computer system is defined by Landauer (1988) as the one that is "easy and pleasant to learn and operate" (p. 905). This definition involves two factors, knowledge and attitude, which seem to be interrelated. However, several studies (e.g., Zoltan and Chapanis, 1982; Bertino, 1985) concluded that the mere lack of knowledge about, or experience with, computers may not be in itself a sufficient condition for negative attitudes towards computers; having such knowledge or experience is also not likely to be sufficient for producing positive attitudes towards computers. However, the use of computers for treatment or in treatment-related contexts, where a patient is required to interact with a computer rather than a human clinician, raises important issues. Of these, the more salient are: whether the adoption of such procedures is justified; the acceptability of the procedure by patients; and the validity of clinical outcome of these computer-based procedures.

Patients have been required to interact with computers in many different situations, which included medical history taking (Slack, Hicks, Reed and Van Cura, 1966; Slack and Van Cura, 1968; Greist, Gustafson and Stauss, 1973; Lucas, Mullin, Luna and McIlroy, 1977; Fitter and Cruickshank, 1982; Carr, Ghosh and Ancill, 1983), behavioral assessment (Carr and Ghosh, 1983a), and psychiatric assessment (Lewis, Pelosi, Glover, Wilkinson, Stansfeld, Williams and Sheperd, 1988; Wright, 1990). Various justifications have been offered in these previous studies for using computer-based methods to achieve certain clinical objectives, ranging from pressures of short appointment times and differing abilities of individual doctors (Wright, 1990) that may result in failure to detect problems, to shortage of experienced staff and limited availability of treatment to patients in areas away from appropriate treatment centers (Carr and Ghosh, 1983a). All the reported studies so far on computer-based clinical procedures have agreed that the results that emerged from such interactions were as accurate and valid as those obtained by human clinicians. Further, Carr and Ghosh (1983b), in a study on phobia patients, concluded that some of their clients found the computer-based interview more acceptable and found it easier to communicate with the computer than with the clinician.

However, the use of computers in all the previous studies was restricted to history taking and assessment. That is, there has been no attempt to use computers for delivering active behavioral treatment. Nevertheless, there seems to be a broadly held conviction that behavioral and emotional malfunctioning constitutes a problem of a considerable prevalence (e.g., Sines, 1980). Existing therapeutic procedures often require the expertise and the actual involvement of specialist therapists and lengthy durations of management (Carr and Ghosh, 1983b; Carr, Ghosh and Ancill, 1983). This situation effectively has meant the restriction of such expertise to specialist behavioral units, out of reach of many sufferers (Carr and Ghosh, 1983b), as well as long client waiting lists. Given the findings of Carr and Ghosh (1983a) that a computer interview was as acceptable as a conventional interview to clients with phobia, and that computer-derived target behaviors for treatment were accurate, a subsequent question may be whether a computer-based exposure treatment of phobia will be equally accurate and acceptable to such clients. One possible justification for raising such a question is that treatment of phobias, and specific phobias in particular, has frequently involved exposure to the phobic object, whether *in vivo*, imagined or as symbolic representations. In fact, equipment other than computers, such as film projectors (e.g., Bandura, 1965; Bandura, Blanchard and Ritter, 1969) has been

utilized in treating specific phobias by symbolic representations of the phobic object. Therefore, it seems reasonable to investigate whether computers can be used in the same context. Since no empirical evidence for answering this question was available at the time of this study, some encouraging indications of relevance to this issue have been derived from the study by Lang, Melamed and Hart (1970) on an automated treatment of snake phobia. Computers were not involved in the study by Lang, et al. (1970), and, instead, an apparatus consisting of audio transmitters to convey imagery instructions and buttons for clients to interact with the equipment were used. Nevertheless, the principle of automated behavioral treatment was applied. The findings were that the automated procedure was found to be effective in inducing the desired behavioral change, and the technique was acceptable to all clients. Along these lines, a computer-based symbolic modeling technique was conceived, constructed, and then applied in order to examine the clinical validity and efficacy of such a computer-based therapeutic approach to behavioral treatment.

In this study, the knowledge of a group of individuals with spider phobia about computers, as well as their attitudes towards a proposition of using computers in behavioral treatment, were investigated using a questionnaire designed and validated for the purpose. The results showed a generally positive attitude towards interacting with a computer for treatment purposes. This positive attitude was independent of the level of computer knowledge acquired by respondents.

4. Method and procedure

Sample

A group of self-identified spider phobic individuals responded to an advertisement in the local media offering treatment for spider phobia. Of the 44 individuals who attended the first pre-treatment session, 42 were found suitable for psychological treatment of their spider phobia, decided on the basis of (a) a clinical interview; and (b) a behavioral approach test (BAT). Consequently, the 42 individuals were identified as having spider phobia on the basis of the BAT results and in accordance with the DSM-III-R (American Psychiatric Association, 1987) criteria for the diagnosis of simple phobia.

Using a matched-group design technique, four client groups matched on the basis of their BAT scores were obtained and each client was then designated, on a random basis, to one of the four treatment conditions: Live Graded Exposure (LGE), Live Modeling (LM), Computer-Based Symbolic Modeling (CBSM), and Waiting List Control (WLC) groups. Of the 42 clients, three failed to attend subsequent sessions; a fourth client decided to withdraw from the study (because she was self-convinced that her anxiety and fear of spiders were "beyond treatment"). The final number of clients included in the study was, therefore, 38 (8 males and 30 females); the mean age was 28.7 (SD = 13.3). The LGE group contained 2 males and 7 females, the LM group contained one male and 10 female, and the CBSM group contained 3 males and 7 females, while the WLC group contained 2 males and 6 females. Clients in the four groups of the study received pre- and post-treatment assessment, whereas clients in the three treatment conditions also received a follow-up assessment at least 45 days after the completion of treatment.

Treatments

1. Live Graded Exposure (LGE)

It involved exposing the client with spider phobia to live spiders in a graded sequence of fear provoking items/tasks, whereas the client made his/her progression through the increasingly fearful steps of the sequence with the help of muscle relaxation exercises. Two sets of pictorial representations of the spiders were used as a baseline exposure. Three live tarantula spiders, of different sizes, and a garden spider were used in the live exposure sessions.

2. Live Modeling (LM)

The client with phobia here first observed the therapist performing a similarly graded sequence of tasks involving live spiders. Next, the client was required to repeat what he/she had observed the therapist performing. The procedure continued, with the help of muscle relaxation exercises in response to client's anxiety or fear, until the client was capable of performing all the tasks in the graded sequence without experiencing anxiety or fear. Two sets of pictorial representations of the spiders were used as a baseline exposure. Three live tarantula spiders and a garden spider, identical to those used with the LGE group, were used in the LM sessions.

3. Computer-Based Symbolic Modeling (CBSM)

This prototype treatment procedure was based on Bandura's (1969) principles of modeling and the findings of studies on human-computer interaction for behavioral treatment purposes (Hassan, 1992, unpublished PhD Thesis). The system used in this technique involved an optical disc that contained the programmed audio-visual therapeutic material. The therapeutic material included real life pictures of spiders, filmed human-spider interactions, as well as a filmed demonstration of muscle relaxation exercises. A laser vision player was used to control the display of the optical disc material on an interconnected TV screen. A computer system (IBM PS/2), consisting of a Guide programme (prepared by the researcher with the help of a computer specialist), was used to control the laser vision player. The client's interaction with the programme was effected using a computer mouse. Communication with the laser vision player and the display of material from the optical disc were achieved using labeled buttons created with Guide programme and displayed on the computer screen.

The procedure, which involved the use of still and motion pictures in a graded sequence of fear provoking pictures or instructions, consisted of an adult female who approached the spiders in a coping, rather than mastering, manner. The contents of the CBSM programme were prepared so that all information necessary for a client's interaction with the equipment were provided by the system directly to the client. The therapist, however, was present in the treatment room during sessions to monitor the smooth running of equipment, and to answer queries related to that matter; otherwise, no help was offered to clients in this group or, in fact, was requested by them.

4. Waiting List Control (WLC)

The clients in this group were left untreated until the treatment sessions of the other three groups were completed, and then the WLC clients were assessed for the second time using

the same assessment procedures as used in the pre-treatment assessment protocol. Finally, all clients in the WLC group were provided with treatment of their spider phobia condition.

Measures

1. Behavioral Approach Test (BAT)

The BAT objectively observed and then scored each client's overt behavioral approach responses to the spiders. It involved 11 increasingly fearful tasks. A completed task was scored 2, an attempted but not completed task was scored 1, and a score of 0 was given if the task was not attempted. A video recorder was mounted in the BAT room, so that it monitored the full length of the room, to record each client's performance during the BAT.

2. Fear Scale (FS)

The FS was designed by the researcher to identify, in a self-report form, the fear reactions of clients to various dimensions of spiders – type, size, color, proximity, movement, and various physical contacts with spiders. Clients' responses to each item were made on an 8-point scale, ranging from no fear (0) to extreme fear (7).

3. Spider Phobia Questionnaire (SPQ)

To be answered at a computer screen, the researcher adopted the SPQ (Watts and Sharrock, 1984), which focused on clients' responsiveness relevant to their spider phobia (rather than the dimensions of the phobic object).

4. Anticipatory Fear Arousal (assessed in terms of HR acceleration)

This index of fear was measured in terms of the acceleration in heart rate (HR) in response to anticipatory fear. The measure was represented in terms of the difference between 'baseline HR' and 'the HR during an instruction phase' – involving verbal statements describing to clients the tasks of the BAT that they were required to perform.

Procedure

1. Pre-treatment sessions

The first of the two pre-treatment sessions involved educating each client on the study's objectives, carrying out a semi-structured clinical interview, and then explaining the treatment procedures to the 'suitable' client and obtaining an informed consent from him or her. Also, the client was required to answer the SPQ at the computer screen. Then, the client was given: (a) the written instructions on muscle relaxation training, and was instructed to exercise the steps at least once daily at home and to report any difficulties experienced at the second assessment session; (b) the FS, to complete at home; the clients were also required to rate the 20 items of the FS in terms of fear or anxiety induced by each, starting from the most fearful downward. The rankings were then used to build the standard graded hierarchy of the phobic object.

In the second pre-treatment session, clients' performance in the relaxation exercise was reviewed and difficulties were dealt with accordingly. Then, clients' HR was measured using the Grass polygraph machine and disposable surface electrodes. The procedure consisted of a baseline recording and a subsequent instructional phase recording during which the client listened to the BAT instructions.

2. Treatment sessions

All treatment procedures provided specific and essentially similar factual knowledge about spiders, either verbally by the therapist (as in the LGE and LM conditions) or contained in the audio-visually presented dialogue between two adult females (as in the CBSM condition). The treatment sessions, across the conditions, lasted for 40 minutes each, and were held twice a week for each client. The sessions in the LGE and LM conditions continued until the client was capable of performing all approach tasks, involving live spiders, fearlessly and confidently. In the CBSM condition, the sessions continued until the client was confident that he or she would perform the subsequent BAT fearlessly and confidently. Otherwise, each treatment condition progressed as described above.

3. Post-treatment assessment

It was carried out approximately one weak after the completion of treatment, and consisted of the measurements as those contained in the pre-treatment assessment.

4. Follow-up assessment

It took place at least 45 days from the date of the post-treatment assessment. It followed, in assessing treatment effects, the same procedure as that of the pre-treatment assessment. However, clients were not asked to complete the FS because the SPQ and the FS were found to be showing a high positive correlation.

5. Results

Table 1 shows the distribution of age, sex, and occupation of clients in the four study groups. On the pre-treatment data, an Anova procedure showed no significant difference between the four groups on age, sex, or duration of phobia. As the four groups were matched on the basis of their pre-treatment BAT scores, subsequent analysis of variance for BAT scores confirmed the appropriateness of the matching procedure [$F(3, 37) = .292$; $p>.10$].

Group	N	Sex		Age		Occupation		
		M	F	Mean	SD	Employed	Unemployed	Student
LGE	09	02	07	32.89	14.66	05	02	02
LM	11	01	10	27.27	12.63	07	01	03
CBSM	10	03	07	31.30	11.98	07	01	02
WLC	08	02	06	22.88	14.31	01	01	06
Total	38	08	30	28.74	13.31	20	05	13

Key: LGE = Live Graded Exposure; LM = Live Modeling; CBSM = Computer-based Symbolic Modeling; WLC = Waiting List Control; M = Male; F = Female; SD = Standard Deviation.

Table 1. Distribution of Age, Sex, and Occupation in the Four Study Groups.

5.1 The statistical significance of results

The Statistical Analysis of Treatment Effects (post-treatment)

Table 2 shows the mean scores and the standard deviations (SD) of the three treated groups and the WLC group, before and after treatment, in each of the four measures of fear (BAT, FS, SPQ, and HR acceleration). The table also shows that the four groups differed significantly in terms of the difference between pre-treatment and post-treatment scores on BAT, FS, and SPQt (i.e., SPQ total score). The four groups, however, showed a non-significant difference between their pre-treatment and post-treatment scores on the HR acceleration. It is note worthy that subsequent *Scheffe's test* results showed a significant difference (at the 0.05 level) between the WLC group and each of the three treated groups (LGE, LM, and CBSM) in respect of post-treatment BAT, FS, and SPQt. No other significant differences were obtained among the groups.

GROUPS	BAT				FS				SPQt				HR Acceleration			
	Before		After		Before		After		Before		After		Before		After	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
LGE	8.2	3.3	22.0	0.0	88.1	17.5	21.2	17.0	36.1	10.9	17.2	7.8	09.4	5.9	6.1	2.8
LM	7.1	4.4	21.6	1.2	92.6	17.1	18.0	14.5	41.4	08.7	18.2	6.5	11.5	6.9	7.3	4.9
CBSM	7.8	4.2	21.8	0.6	81.7	20.0	13.6	11.3	37.8	10.7	18.7	9.9	07.7	7.1	4.6	3.1
WLC	6.6	3.3	09.8	2.8	85.5	12.2	75.1	07.5	42.1	06.0	41.6	5.5	04.9	2.7	2.6	4.3
Treatment Effects (Post-treatment Assessment)	F(3, 33) = 143.8; p<.001				F(3, 32) = 40.3; p<.001				F(3, 26) = 28.4; p<.001				F(3, 32) = 1.797; p>.10			

Groups: LGE = Live Graded Exposure; LM = Live Modeling; CBSM = Computer-Based Symbolic Modeling; WLC = Waiting List Control
Measures: BAT = Behavioral Approach Test; FS = Fear Scale; SPQt = Spider Phobia Questionnaire (total score); HR Acceleration = Heart Rate Acceleration.
Statistics: M = Arithmetic means; SD = Standard Deviations; Before = Before treatment; After = After treatment.

Table 2. Means and Standard Deviations for the Four Study Groups in BAT, FS, SPQt, and HR Acceleration Before and After Treatment, and Treatment Effects at Post-Treatment Assessment.

A combined fear index (*CFI*) was calculated for the analysis of treatment effects. That is, the focus was on the overall pattern of groups' responding to treatment, since no single phobic client will load in only one component of fear but will rather show more or less activation in each of the three systems of responding. The *CFI* was computed by transforming pre- and post-treatment scores in each of the four fear indices into z scores, then adding together each client's resultant z scores in each of the two stages of assessment to form his or her *CFI* for that stage of assessment. Each client's BAT score was adjusted to represent an avoidance (indicating a fearful response), rather than approach, score so as to unify the directionality of all combined scores. The Anova procedure on the post-treatment *CFI* of the four groups, with the pre-treatment *CFI* serving as a covariate, showed a significant group difference [F (3, 37) = 53.63; p<.001], indicating that the four groups differed significantly in terms of their

post-treatment *CFI*. The pre-treatment *CFI* emerged as a significant source of variation [F (1, 33) = 11.02; p<.01]. Further, to examine the source of the observed group difference and to determine whether the different treatment conditions produced differential effects, *Scheffe's test* was computed. The result showed that the WLC group (Mean *CFI* = 4.28) differed significantly (at the 0.05 level) from each of the three treatment groups (which had the following *CFI* means: LGE = -1.14; LM = -0.88; CBSM = -1.73), such that the WLC group's combined fear score was significantly higher than that of each of the treatment groups. No other significant differences were obtained among the groups. These results indicate that all treatment groups showed improvement that was significantly greater than what was obtained by the WLC group as a function of time or repeated exposure to the phobic object in pre- and post-treatment assessments. These results also indicate that the three treated groups did not differ significantly from each other in the degree of change produced by treatment in them.

An Anova procedure was performed on post-treatment BAT scores of the four groups, with the pre-treatment BAT scores serving as a covariate, to specifically examine the efficacy of treatment in affecting the overt behavioral component of fear (assessed by the BAT). This is because the overt behavioral component is a necessary criterion in the definition of specific phobia (formerly simple phobia) that the spider phobia is a subtype (American Psychiatric Association, 1987). The Anova results showed a significant group difference [F (3, 33) = 143.81; p<.001], such that the four groups differed significantly in terms of their post-treatment BAT scores. The pre-treatment BAT did not emerge as a significant source of this variation. Subsequent *Scheffe's test* results showed that the WLC group differed significantly (at the 0.05 level) from each of the other three groups. No other significant differences were observed among the groups. This result indicates that the three treated groups showed pre- to post-treatment improvement in the overt behavioral component of fear that was significantly greater than that shown by the WLC group. The result also indicates that the three treatment procedures induced analogous effects in the overt behavioral component of their clients' phobic behavioral responses.

The Statistical Analysis of Treatment Effects (Follow-up)

Each treated client's 45-day follow-up assessment scores on the BAT, HR acceleration, and SPQt (i.e., SPQ total score) were transformed into z scores and added together to obtain that client's combined fear index (*CFI*). Clients' post-treatment *CFI* scores were adjusted accordingly. Hence, the Manova procedure included the post-treatment *CFI*, the follow-up *CFI*, and the three treated groups that represented the three levels of the between-groups factors. Manova results showed that there was no overall significant difference between the three treated groups. The same result of non-significant difference was obtained when the three treated groups were compared in terms of differences between post-treatment and follow-up *CFI*s (i.e., there was no Group X Measure interaction). Finally, the within-group results showed no significant difference between post-treatment and follow-up measures (*CFI*s). These results indicate that the treated groups maintained the improvement over at least 45 days after the completion of treatment.

Manova procedure was also performed on the treated groups' follow-up BAT scores and their post-treatment equivalent. The result showed that there was no overall significant group difference. The results related to within-group effects also showed no significant Measure difference, indicating that the three treated groups' scores in these two BAT

measures did not differ significantly. Finally, there was no significant Group X Measure interaction, such that the non-significant difference between the two BAT measures was true across the three treated groups. These results indicate that all the three treated groups had maintained their improvement in terms of overt behavioral approach responses at the follow-up stage.

An Anova procedure was performed on treated clients' pre-treatment and follow-up HR acceleration scores, to examine if treated clients' HR scores in these two stages of treatment differed significantly. The results showed that the pre-treatment to follow-up difference in HR acceleration was significantly different [$F(1, 24) = 13.02$; $p<.01$], such that clients' HR acceleration at the follow-up stage was significantly smaller than that observed in the pre-treatment assessment. The *Scheffe's test* results showed that the three treated groups did not differ significantly (at the 0.05 level) in this respect. These results suggest that clients' HR acceleration scores reflected a delayed response to treatment across the three treatment conditions.

5.2 The clinical significance of results

Introductory

The treatment effects presented in the previous section were inferred on the basis of the conventional method of statistical comparisons between mean changes resulting from the four treatment conditions (LGE, LM, CBSM, and the WLC). However, it has been argued (e.g., Kendall and Norton-Ford, 1982; Jacobson, Follette and Revenstorf, 1984) that such use of statistical significance tests to evaluate treatment efficacy has at least one major limitation: the tests provide no information on the variability of response to treatment in terms of *individual members of the sample*. In addition, the clinical significance of a treatment's effects is seen to refer to the treatment's impact on clients and to its ability to induce a change in their respective pattern of functioning (Jacobson and Truax, 1991). In this respect, Jacobson and Truax (1991) argue that conventional statistical comparisons between groups provide limited information about the efficacy of psychotherapy. Along the line of these arguments, Jacobson, Follette and Revenstorf (1984) proposed that a clinically significant change is the therapeutic change which returns a client to normal functioning. In other words, clients entering therapy are viewed as belonging to a dysfunctional population; whereby those completing the treatment are viewed as no longer belonging to that population. It follows, from this conception of clinically significant change, that a precise method is needed to classify respective clients, upon the completion of treatment, as "changed" or "unchanged" on the basis of the clinical significance conceptualization. For the purpose of this study, the application of a method that may provide information about the treatment impact on individual clients was deemed relevant. Hence, the treatment effects described in the previous sections were also examined on the basis of the clinical significance criterion. Jacobson and Truax (1991) have outlined three alternative methods for putting this process into operational terms. Generally speaking, these methods differ in terms of the information (the mean and standard deviation) from functional and dysfunctional populations that their execution may require. The method used here does not require data from a normative sample; rather, it uses the mean and standard deviation of the dysfunctional sample. This method defines the range of the dysfunctional population as extending, in the direction of functionality, to two standard deviations beyond the mean for that population. Hence, the

level of functioning following treatment is expected to fall outside this range. In other words, of the treated clients, the post-treatment scores of those whose treatment was clinically significant would be expected to fall beyond the 'cutoff' point for clinically significant change. The cutoff point is defined by Jacobson and Truax (1991) as "the point that the client has to cross at the time of the post-treatment assessment in order to be classified as changed to clinically significant degree" (p. 13).

The Clinical Significance of Treatment Effects (post-treatment stage)

Accordingly, the method for assessing the clinical significance of change was applied to the three treatment groups (LGE, LM, and CBSM) of this study to examine the clinical significance of changes induced by the treatment in the fear indices on *individual clients* in the three treated groups. The scores of clients in the WLC group were also included to demonstrate that these clients were still within the range of dysfunctional population, and that the change in treated clients' scores was a function of the treatment they had received rather than the effect of time or repeated assessment.

Figure 1, which specifies the cutoff point (denoted 'a') for BAT, shows that all clients in the three treated groups crossed the cutoff point (a). That is, they were able, at the post-treatment assessment, to perform all or most of the tasks specified in BAT. This result indicates that the clients in these groups have changed to a clinically significant degree as far as the overt behavioral index of fear is concerned. On the other hand, all clients in the WLC group remained, at the post-treatment assessment, below the cutoff point; in other words, they were still among the dysfunctional population in terms of the overt behavioral index of fear.

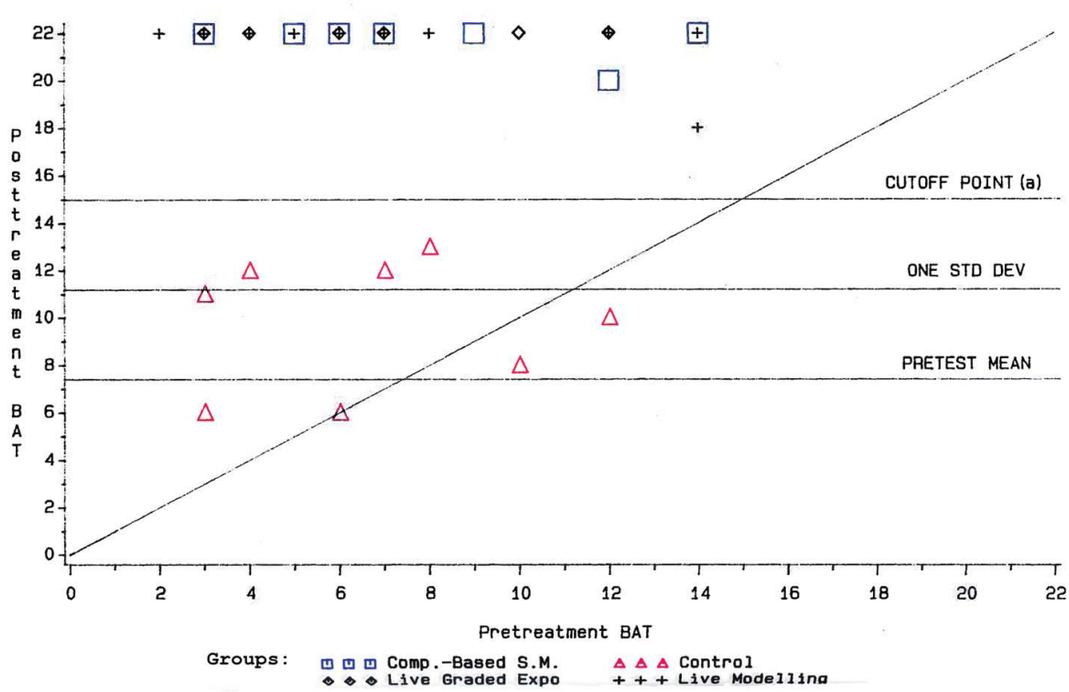

Fig. 1. The clinical significance of change in BAT at post-treatment assessment.

With regard to the cognitive/subjective fear, as assessed by the FS, **Figure 2** shows that all clients in the LGE, LM and CBSM groups crossed the cutoff point, indicating that they were improved to a clinically significant degree. Their post-treatment scores in the FS indicated 'less fear' and, therefore, appeared below the cutoff point and outside the range of dysfunctional population. The figure also shows that all clients in the WLC group remained above the cutoff point and within the range of dysfunctional population, which indicates that the amount of fear expressed by clients in the WLC group at the post-treatment assessment did not differ significantly, in clinical terms, from what they had reported at the pre-treatment assessment.

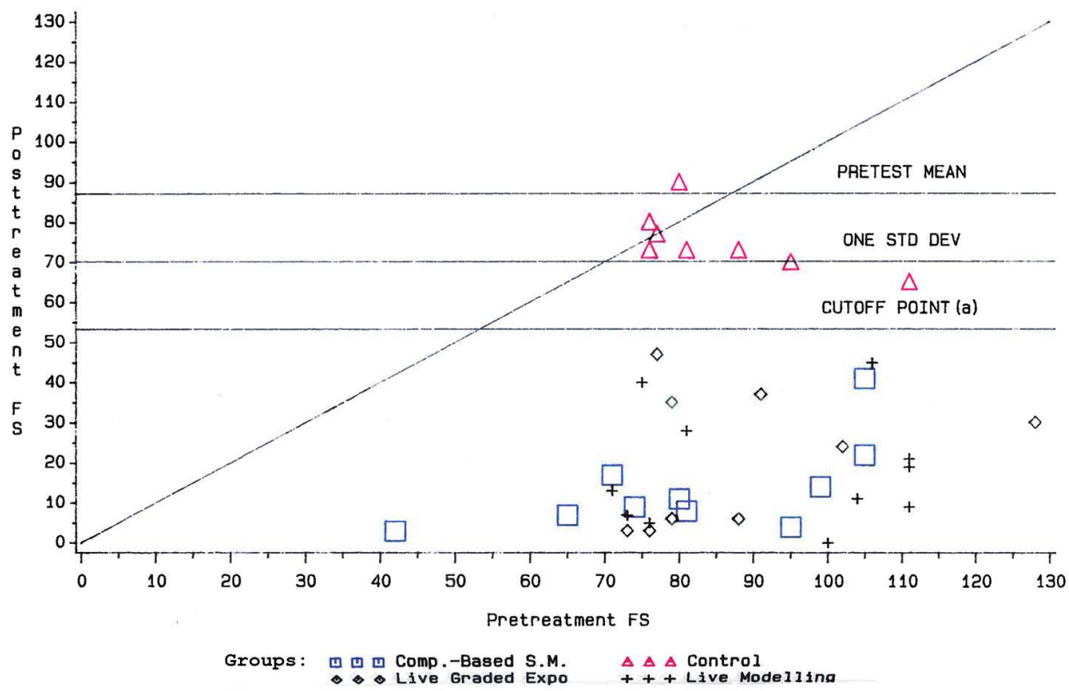

Fig. 2. The clinical significance of change in FS at post-treatment assessment.

Figure 3 shows the clinical significance of change induced by treatment in the treated clients as assessed by the SPQ total score (SPQt). From the figure, it is clear that few clients from the treated groups did not cross the cutoff point (a) into the range of functional population below the cutoff line. In fact, 4 clients from the LM and 2 clients from the LGE group appeared within one standard deviation above the cutoff point and in the range of dysfunctional population; the scores of 2 clients from the CBSM were more than one standard deviation above the cutoff point and in the range of dysfunctional population. The rest of the treated clients crossed the cutoff point into the range of functional population. On the other hand, all the WLC clients remained above the cutoff point and within the range of dysfunctional population. This result indicates that the improvement induced by each of the three treatment methods in its respective clients, as far as the SPQt measure is concerned, was of similar clinical significance. It also indicates that the improvement of clients in each of the treated groups was clinically more significant than that of the clients in the WLC group. One important observation is that the results of the clinical significance of change in

clients' fear as assessed by the SPQt were less impressive than those related to the other cognitive measure of fear (i.e., the FS). This might be due to the fact that the SPQt contained an assessment of clients' vigilance, preoccupation, cognitive-behavioral, and avoidance/coping responses associated with fear; whereas the FS assessed only those phobic responses which were of behavioral nature (such as escape and avoidance).

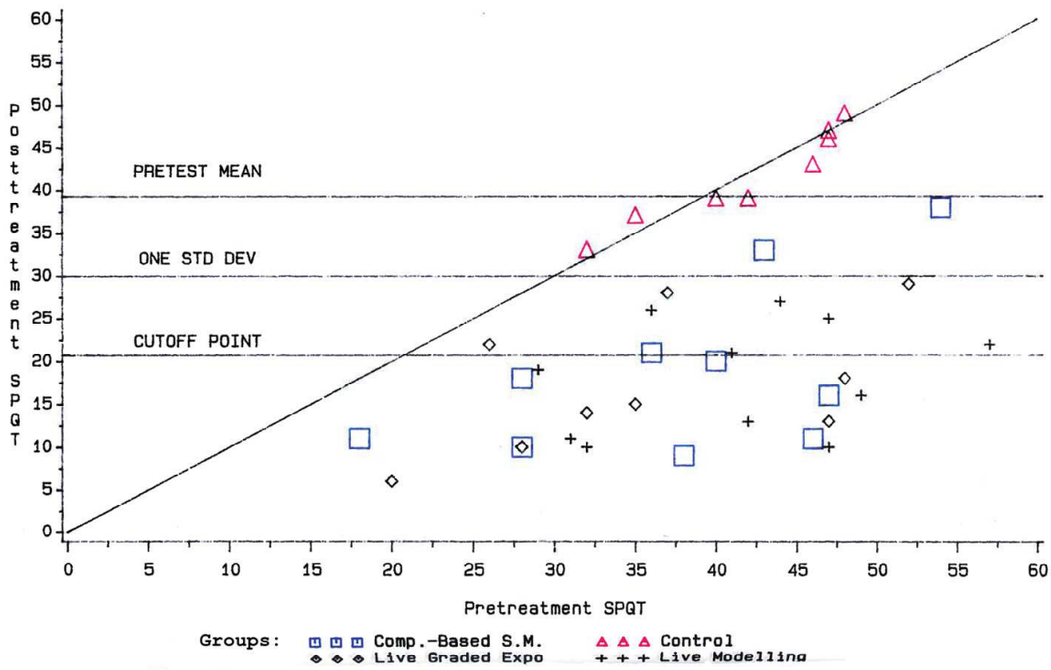

Fig. 3. The clinical significance of change in SPQ (total score) at post-treatment assessment.

Figure 4 shows the clinical significance of change induced by the treatment in HR Acceleration. The scales presented in the figure represent the HR Acceleration in response to fear-provoking instructions before and after the treatment. Hence, for a client's improvement to be classified as clinically significant (as far as the psychophysiological index of fear was concerned), his or her post-treatment heart rate was required to be indicative of no physiological arousal and, hence, sufficiently low; in other words, at least two standard deviations below the pre-treatment mean. An initial observation is that none of the clients in any of the groups crossed the cutoff point (of two standard deviations below the treatment mean) into the range of a functional population. Another equally important observation is that the scores of two clients in the WLC group were more than one standard deviation *below* the pre-treatment mean; the score of a third client from the WLC group was, in fact, on the cutoff point itself. These latter observations suggest that some factors other than the treatment (such as exposure to the phobic object during assessment) had contributed to the improvement of these three untreated clients from the WLC group to levels above those reached by treated clients in other groups. However, none of the treated groups was particularly uniformly *better* than the others with respect to improvement in HR index of fear. Generally speaking, decrement in HR responses to the fear-provoking instructions did not reflect a clinically significant improvement at the post-treatment stage. The latter conclusion was true for all treated groups. It is noteworthy that, of the treated clients, only

six scored more than one standard deviation below the pre-treatment mean. Of these clients, three were from the CBSM group, two from the LM group, and one from the LGE group.

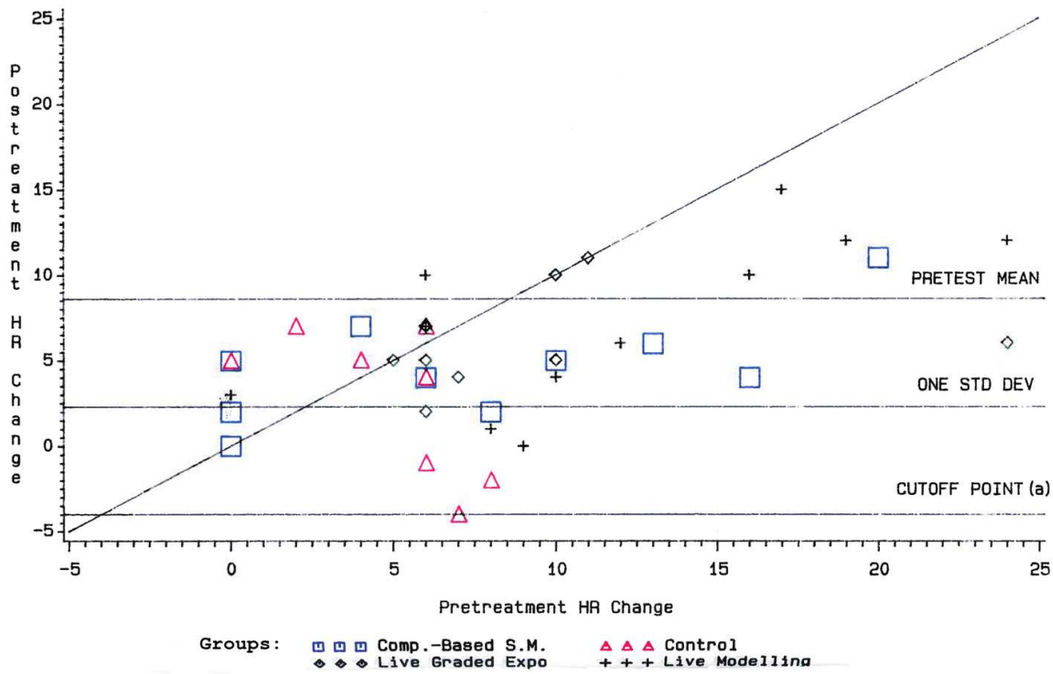

Fig. 4. The clinical significance of change in HR acceleration at post-treatment assessment.

The Clinical Significance of Treatment Effects (Follow-up Stage)

The clinical significance of treatment effects at the follow-up stage was also examined following the concept and procedure outlined above for the post-treatment assessment. Despite the non-significant difference observed, using statistical significance tests, between clients' post-treatment and follow-up scores (hence, proving that the clients did sustain their significant improvement at least 45 days after treatment completion), the clinical significance of treatment effects was examined at the follow-up stage since this procedure, as explained earlier, provides information about treatment impact on 'individual' clients rather than in terms of the overall 'group' performance.

The follow-up assessment involved clients' scores in the BAT, HR and SPQt, and included the Live Graded Exposure (LGE), Live Modeling (LM), and Computer-Based Symbolic Modeling (CBSM) groups.

Figure 5 shows that all clients retained a clinically significant change in their approach behavior (as assessed by BAT). That is, the BAT scores of clients in each of the three treated groups appeared well above the cutoff line (a), two standard deviations away from the pre-treatment (i.e., dysfunctional stage) mean in the direction of functionality. This observation confirms that the impact of each of the three treatment methods on the overt behavioral component of each individual client proved to be clinically significant, as was also proved to be statistically significant, after at least a 45-day follow-up period. From the figure, it is clear that this observation is applicable to all three treatment methods such that the treatment

effects on overt behavior were sustained at the follow-up stage by the clients in each of the three treatment conditions.

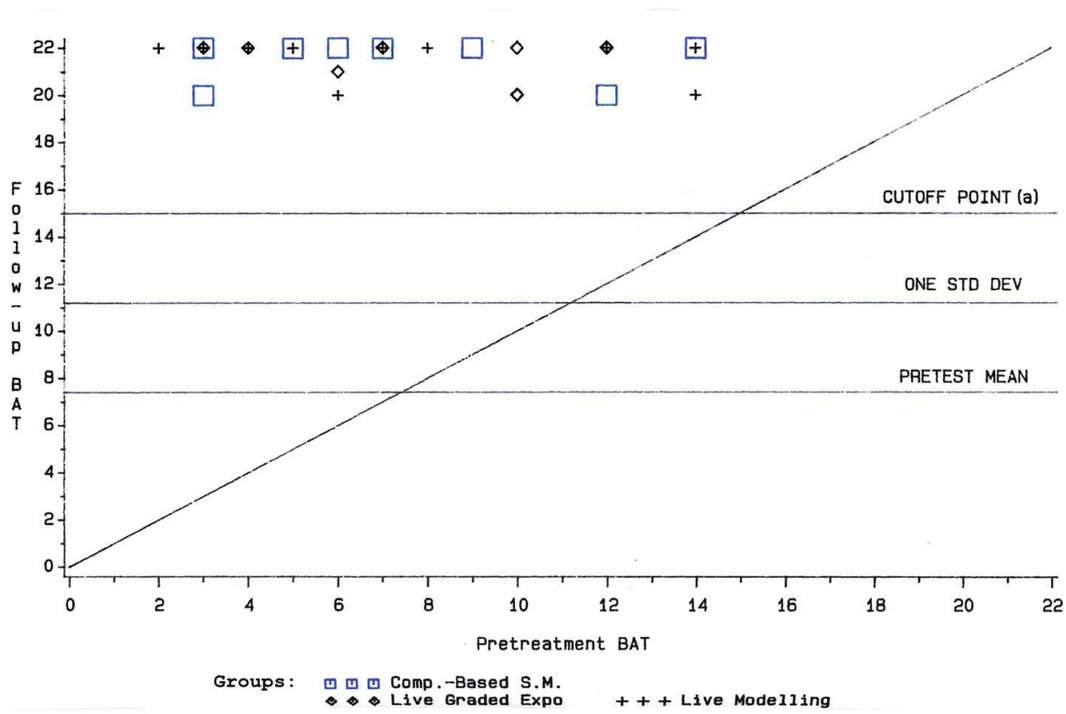

Fig. 5. The clinical significance of change in BAT acceleration at follow-up assessment.

Figure 6 represents the clinical significance of change induced by treatment in the cognitive/subjective component of fear as assessed by the SPQt. The majority of clients either crossed the cutoff point (a) into the range of normal functioning, or they reached it. The scores of additional 3 clients (2 from the LM group, and one from the LGE group) appeared just below the cutoff point and within the range of dysfunctional population. The scores of two clients from the CBSM group, however, remained within the range of dysfunctional population (within one and two standard deviations, respectively, below the pre-treatment mean). From the distribution of individual clients in Figure 6, it can be concluded that the effects of the three treatment procedures on the cognitive/subjective component of fear (as assessed by the SPQt) were similar in terms of their clinical significance on individual clients. When compared with Figure 3, this figure indicates that some clients in the conventional treatment groups (i.e., LGE and LM groups) showed a clear improvement from post-treatment to follow-up assessment with regard to their cognitive/subjective component of fear as assessed by the SPQt. Some improvement, although less dramatic than that shown by the latter groups, was also shown by two clients in the CBSM group.

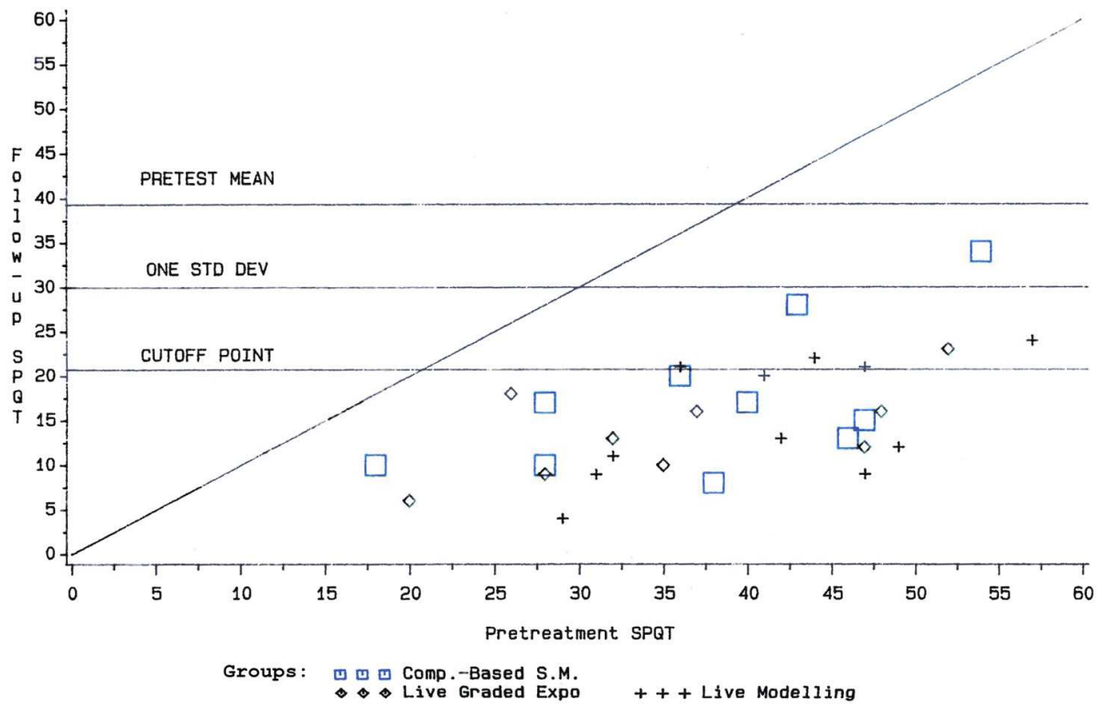

Fig. 6. The clinical significance of change in SPQ (total score) at follow-up assessment.

Figure 7 shows the clinical significance of changes in HR responses to fear-inducing instructions at the follow-up stage. Although none of the clients crossed the cutoff point into the range of a functional population, the figure shows a slight improvement when compared with that for the post-treatment assessment (see Figure 4). In this figure, the scores of only six clients remained above the pre-treatment mean (indicating relatively high HR responses to fear-inducing verbal instructions), compared to eight at the post-treatment stage. Similarly, the scores of seven treated clients were more than one standard deviation below the pre-treatment mean, compared to six at the pre-treatment stage. Of these seven clients, five belonged to the CBSM group, compared to three in the pre-treatment assessment. This observation suggests that the CBSM procedure induced a relatively more effect in the physiological component of fear than the other non-symbolic procedure did (i.e., the LGE and LM). To conclude, the figure showed a consistent trend in the direction of functionality, although no client actually moved into the range of functionality.

To conclude, this method of examining the clinical significance of the therapeutic change induced by the treatment provided additional information to the results obtained by inferential statistics procedures. The method has confirmed the clinical significance of the statistically significant change induced in clients' BAT and indicated the significance of change induced by treatment in the two indices of self-reported fear (i.e., FS and SPQt). The effect of the treatment on the psychophysiological component of fear (in terms of HR Acceleration in response to fear-inducing instructions) was shown not to be clinically significant, at least in the post-treatment assessment. It confirmed that the three treatment methods produced similar improvement which, with the exception of HR fear index, was significantly more than the WLC condition did.

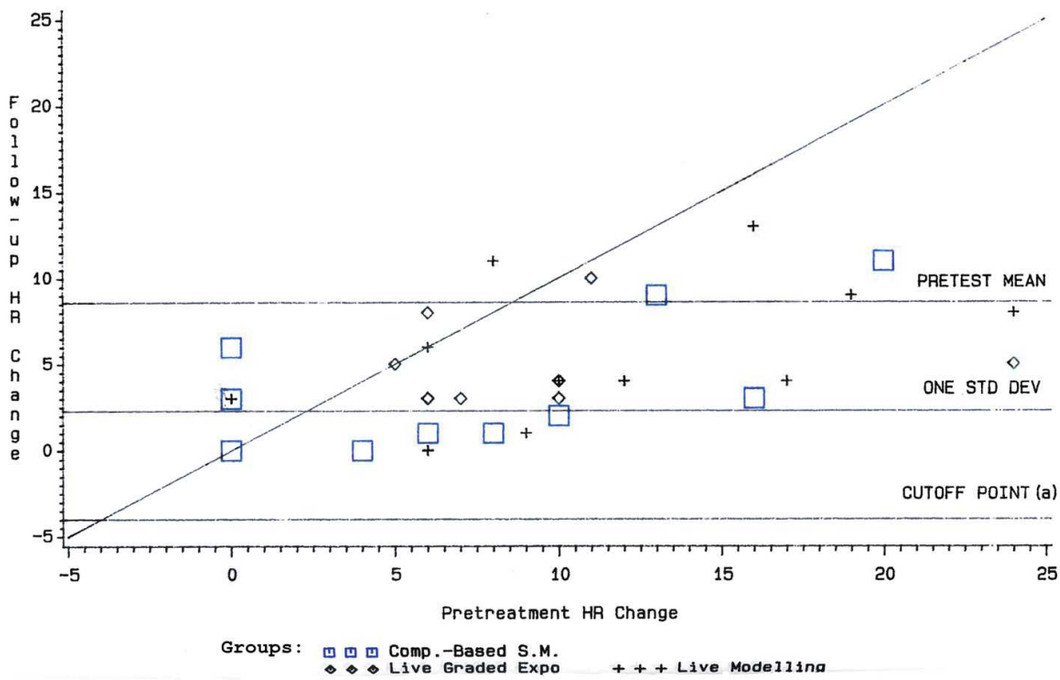

Fig. 7. The clinical significance of change in HR acceleration at follow-up assessment.

6. Discussion

The results described above have revealed that the therapeutic effects induced by the prototype CBSM technique in clients' fear components (including the overt behavioral and cognitive components) were similar to that induced by the conventional live exposure and modeling techniques. All treated groups, however, showed only a delayed *statistically* significant improvement (i.e., at the follow-up stage) over the control group on the measure of autonomic fear component that was assessed in terms of HR acceleration scores. It might be suggested that a direct measure of clients' HR during exposure to the fear object would have reflected the significance of the fear object as a fear-provoking entity and, hence, a clear picture of the treatment effect on the heart rate as a fear index might have been obtained. In this respect, Lang, Melamed and Hart (1970), who observed the heart rate of clients with snake phobia while imagining fear-relevant scenes, have demonstrated a positive correlation of heart rate acceleration and self-reported fear intensity. Sartory, Rachman and Grey (1977), however, showed that the linear relationship between heart rate acceleration and fear intensity was consistent only at relatively intense fear levels. Thus, one may argue that fear-eliciting material in the form of verbal instructions was probably insufficient for provoking levels of fear intensity that were capable of differentiating between groups in terms of change in heart rate acceleration. Such an argument, however, may not hold firmly since the treated groups in this study did show a relatively clear, and statistically significant, therapeutic reduction in the heart rate acceleration to the same fear-eliciting material in the follow-up assessment. A possible reason why the treated groups did not show a similar reduction in their heart rate acceleration scores in the post-treatment assessment is that the clients were not sufficiently relaxed during the recording of their baseline heart rate. This might be because the clients were anticipating an eventual encounter with the phobic object

during the subsequent BAT session. That is, as ethical considerations required, all clients were briefed ahead of each session about what that session would involve. Other arguments may include that clients' baseline heart rate measures were contaminated with some anticipatory fear arousal, or they were a reflection of the differential effect of clients' age groups on the change in the heart rate acceleration. At present, the results related to change in clients' heart rate acceleration from pre-treatment to post-treatment and follow-up stages suggest an overall delayed treatment effect on the autonomic fear component across the three treated groups. In looking for the possible causes of such a delay, the issue of interaction between treatment factors and individual characteristics may be raised. That is, some individuals may be high physiological responders while others are medium or low in that respect (e.g., Ost, Johansson and Jerremalm, 1982; for more detail).

The three treated groups did not show a substantial difference in terms of the average number of sessions required for the completion of treatment. Hence, the CBSM treatment did not seem to be more demanding than the two conventional treatments (LGE and LM) in terms of the time required for treatment completion (the three treatments: LGE, LM, and CBSM required 3.34, 3.19, and 4.45 hours, respectively).

With respect to the therapist involvement, the CBSM did not require the active involvement of the therapist in the treatment process since the clients interacted with the computer system directly and at their own rate of progression. The therapist involvement throughout this prototype clinical intervention was restricted to monitoring the treatment sessions and ensuring the smooth running of equipment. However, because the concept of self-help was also emphasized for all clients in the two conventional treatment conditions, the therapist's role was restricted to a large extent in administering the exposure according to the pre-determined sequence and at the discretion of the client.

To conclude, the computer-Based version of treatment was shown to be capable of producing therapeutic results that were as clinically effective as those produced by conventional procedures. It has been observed (Hassan, 1992; unpublished PhD Thesis) that clients' positive opinion about the role that the computer can play in delivering behavioral treatment did not seem to be associated with the degree of improvement that they obtained from the treatment delivered by this technique. In fact, most clients maintained this positive view after the treatment was given, regardless of the level of their improvement. Nevertheless, the difficulty perceived by the majority of clients of interacting with a computer for treatment purposes raises an important implication. That is, further research work and clinical trials may focus on ensuring that the mechanisms of client-computer interaction for therapeutic purposes are made even simpler and easier. Achieving such an end will help making behavioral treatments more widely available for those in need for.

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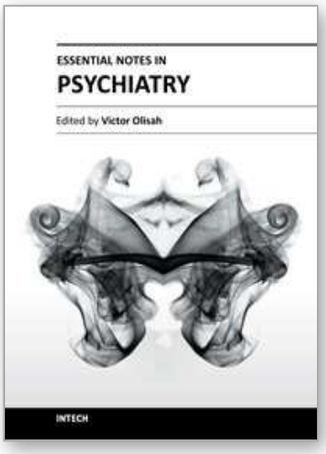

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Psychiatry is one of the major specialties of medicine, and is concerned with the study and treatment of mental disorders. In recent times the field is growing with the discovery of effective therapies and interventions that alleviate suffering in people with mental disorders. This book of psychiatry is concise and clearly written so that it is usable for doctors in training, students and clinicians dealing with psychiatric illness in everyday practice. The book is a primer for those beginning to learn about emotional disorders and psychosocial consequences of severe physical and psychological trauma; and violence. Emphasis is placed on effective therapies and interventions for selected conditions such as dementia and suicide among others and the consequences of stress in the workplace. The book also highlights important causes of mental disorders in children.

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