An Investigation of Computer-Delivered Treatment for Spider Phobia

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I declare that this thesis is solely my own work and that the contributions of others have been duly acknowledged.

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Table of Contents

Table of Figures and Tables

FIGURES

TABLES

Literature Review

Aetiology of Specific phobias and Modalities of Exposure Therapy including Computer-Delivered Treatment.

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Abstract

Specific phobias are persistent fears of circumscribed situations which lead to avoidance of those situations, impairing daily functioning, even though the fears are recognised as unreasonable (American Psychiatric Association, 1994). This literature review looks at the aetiological theories for specific phobias and the corresponding behavioural treatments that arise from these theories. Where possible research conducted into spider phobias will be highlighted.

The literature suggests that the behavioural 'exposure' techniques such as systematic desensitisation and flooding, which require participants to remain in fearful situations until distress subsides, provide the most effective treatment outcomes. Exposure treatments can be administered in a number of different modalities, from *in-vivo* to imaginal to virtual reality. Exposure may also be modelled by another to further facilitate treatment efficacy. All of these modalities are based on the same principles, such as conditioning experiences and habituation/ extinction of anxiety responses, which arise from the aetiological theories . A recent trend has been to allow participants to direct their own exposure therapy as an effective, cost saving alternative (Marks, 1985). One method of self-directed exposure has been to follow instructions on self-help style manuals (Marks, 1980).

Another modality for self-directed treatment delivery is computers. Initial research into computer-delivered treatments have shown statistically significant treatment efficacy. However this area of research is still relatively new, with interest only being generated from the late 1980s (Mruk, 1987). One example of computer-delivered treatment currently being validated is the Fearmaster program. This software has been based on the empirically validated techniques of modelling and teaches the principles of exposure therapy. While findings are preliminary, treatment outcomes have been positive enough to encourage future research.

Introduction

The aim of this literature review is to discuss the current behavioural treatment options available to sufferers of specific phobias. The definition, epidemiology, aetiology and treatment of specific phobias are discussed. The focus is narrowed onto the behavioural exposure therapies, as these have proven the most proficient (Barlow & Wolfe, 1981) . The different modalities for delivering these treatment techniques, including the use of computers is outlined. Computer delivered treatments are based on the ideas of symbolic modelling, self-directed treatment and exposure therapy. A number of studies using computer-delivered behavioural treatments will be highlighted. While research is still in its infancy, present results indicate that this is a viable area for future research.

Chapter 1

Specific phobias

1.1 Diagnosis

Specific phobias fall into the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (American Psychiatric Association, 1994) category for Anxiety Disorders. Clinical anxiety is an unpleasant emotional state experienced as intense, unreasonable fear, and characterised by physiological discomforts such as dyspnoea, tachycardia, sweating and nausea, in the absence of environmental threats (Roth & Argyle, 1988). A phobic disorder involves persistent and irrational fear of a specific object, activity, or situation that results in a compelling desire to avoid that specific stimuli. People with phobias are prone to panic when in contact with the phobic stimulus and may avoid situations where this can occur. The fear is recognised by the individual as excessive and unreasonable in proportion to the actual danger of the stimulus (Marks, 1985).

Simple or specific phobias are restricted to specific situations or objects, such as spiders, other animals, heights, air travel, closed spaces and blood or tissue injury (Marks, 1987). The DSM-IV (American Psychiatric Association, 1994) defines specific phobias as consisting of (i) a persistent fear of a circumscribed situation which is (ii) distressing and (iii) leads to avoidance that (iv) significantly interferes with the person's normal routine and (v) the fear is recognise as excessive or unreasonable. Anxiety increases or decreases in relation to the location or nature of the particular phobic stimuli. Marked anticipatory anxiety may also occur if the individual must approach the phobic stimuli.

1.2 Epidemiology

Anxiety disorders, especially phobias, are highly prevalent in the general population, placing high demands on health care resources to provide treatment (Marks, 1986). Weissman (1988) reviewed 14 population studies on the epidemiology of anxiety disorders conducted throughout the world. Although different diagnostic criteria and time periods were used between the studies, surprising agreement was found in the results. Prevalence rates for anxiety disorders ranged from 2.0 -4.7 %, with specific phobias estimated at 2.3%. In a prevalence study conducted within the Greater Burlington area of Vermont, a population reasonably representative of a smaller to medium sized city, the total prevalence for phobias was estimated at 7.6% of the population (Agras, Sylvester, & Oliveau, 1969). Of these 7.4% were considered mild and 0.2% severe. Severe disability was defined as absence from work for an employed person and inability to manage the common household tasks for a housewife (Agras, et al., 1969).

Data reported from the US National Comorbidity Survey (NCS), indicated that 49.5% of respondents reported the lifetime occurrence of an unreasonably strong fear of one or more phobic stimuli/ Fears of animals were reported by 22.2%, heights by 20.4%, being alone by 7.3%, storms by 8.7%, and water by 9.4%. Of these, 22.7% of respondents met full DSM-III-R criteria (Curtis, Magee, Eaton, Wittchen, & Kessler, 1998).

Prevalence is greatest among females particularly younger women between 16 -40 years of age (Weissman, 1988). For example, the female to male ratio for spider phobia has been estimated at 2:1 (Reich, 1986). In the United States Epidemiological Catchment Area (ECA) study, from a sample size of 18571, one month prevalence rates of specific phobias were reported as 8.4% of the adult female population, and 3.8% of the males (Regier, 1990). These rates are higher than those reported by Weissman (1988) due to differing diagnostic criteria and inclusion of mild phobias.

Data also supports the notion that anxiety disorders are familial, heterogeneous, and some times related to depression (Weissman, 1988). It suggests that there is an increased probability that a person with one anxiety disorder will have another or will have a major depression during their lifetime. Mixed anxiety-depression is the most common presenting problem in primary care, accounting for a sixth to a third of all attendees to general practitioners, whether in industrial or developing countries (Marks, 1986).

Anxiety disorders thus impose a heavy demand on health care services which would be swamped if all sufferers asked for help. The need for efficient, widespread and cost affective treatments is paramount (Lindemann, 1989).

Chapter 2

Aetiology

2.1 Genetics

The genetic epidemiology data suggests that anxiety disorders are partly genetically inheritable (Weissman, 1988). Australian researchers using data gathered from 7,596 individual twins estimated that genetic variance constitutes 34-46% of the causes of anxiety symptoms and the individual's life experiences constitute the remaining percentage (Humble, 1987). The concordance rate of the monozygotic twins was .30 to .50. Kendler and colleagues (1992) studied 2163 female twins were personally interviewed for a history

of agoraphobia, social phobia, and specific phobia. Results were consistent with an inherited proneness model of phobias, where familial aggregation appeared to result from genetic and not familial-environmental factors. Estimates of inheritability of liability ranged from 30-40%.

This literature review will cite empirical studies and theoretical treatises of other phobic disorders such as agoraphobia, in order to illustrate possible core commonalities between the disorders. Research to date has focussed less on specific phobias and more on agoraphobia. Common hyotheses can be extrapolated from these studies, although this is not to imply that aetiologies and responses to treatment do not differ across the various anxiety disorders. In using the broader dicussion of aetiology and treatment for anxiety disorders, the data specific to specific phobias will be highlighted. The above data suggests that specific phobias appear to arise from the joint effects of modest genetic vulnerability and phobia-specific traumatic events in childhood (Kendler, Neale, Kessler, Heath, & Eaves, 1992).

2.2 Behavioural Learning Theories

The behavioural-learning theories rely on environmental factors to explain the aetiology of phobias. These theories suggest that a neutral stimulus, such as a spider, is associated with an aversive stimulus. Learning or conditioning occurs when the neutral stimulus (CS) comes to elicit the same negative response as the aversive stimulus (UCS) (Marks, 1987). Thus the formation of a phobia may occur when an originally neutral situation, activity or object begins to elicit strong anxiety because on a particular occasion the individual experienced panic in the presence of that object, situation or activity. In a study of 42 participants with a spider phobia, eleven attributed their fear to a history of having been teased with spiders. In terms of classical conditioning, the spider became conditioned through its pairing with social humiliation (Merckelbach, Arntz, Arrindell, & de Jong, 1992).

Acquisition of phobias via vicarious conditioning has also been hypothesised (Rimm & Lefebvre, 1981). Observing another person experience an aversive reaction towards a certain stimuli may result in the observer developing an aversive autonomic response in the presence of that same stimulus. This vicarious learning is called 'modelling' (Rimm & Lefebvre, 1981). Childhood fears especially may be due to modelling. In fearful situations children tend to look at any adult who happens to be present. If the adult shows fear the child may pick it up quite easily (Marks, 1980). Though such modelling of fear may start a phobia, this is not always the case, and only about one-sixth of adults with phobias have close relatives with a similar phobia (Marks, 1980).

Another influential pathway for phobia onset is the transmission of information or instructions. Rachman (1977) posits that negative information and instructions from parents and family members are likely to be influential in phobia acquisition. Rachman (1977) notes that information-giving is administered in an almost unceasing fashion and may provide the basis for our commonly encountered fears of every-day life. Fears acquired informationally are more likely to be mild than severe. This pathway explains the fact that people display fear of situations or objects which they have never encountered.

A number of recent studies using the Phobic Origin Questionnaire (POQ), have supported the behavioural learning theories (Öst & Hugdahl, 1991). In a study of 137 participants with specific phobias, using the POQ, 53.5% of the participants attributed their phobias to conditioning experiences, 24.4% recalled vicarious learning experiences, and 6.1% attributed onset to instruction/information.

Similarly the POQ scores of 41 severe participants with spider phobias were compared to the POQ score of 30 participants with no phobias (Merckelbach, et al., 1992). 71% of the participants with spider phobias reported modelling experiences as attributing to their phobia, 57% reported conditioning experiences and 45% reported informational learning experiences. However the control participants did not differ from the participants

with spider phobias with regard to the overall frequency of conditioning or modelling experiences. It must be noted however that no attempt was made to measure the intensity of conditioning experiences. It may be that the intensity rather than the occurrence differentiates phobic from non phobic individuals. It also may be that some individuals are genetically more predisposed to develop phobias, and thus react more intensely to certain conditioning experiences.

Interestingly the POQ does not have a specific question or category for non-associative acquisition of phobias. The results supporting acquisition of a substantial proportion of phobias by classical conditioning, may reflect inherent bias in the instrument (Kirkby, Menzies, Daniels, & Smith, 1995). In a study comparing results from 33 participants with a spider phobia on the POQ and the Origins Questionnaire (OQ) (Menzies & Clarke, 1993) the assignment of origin for the two questionnaires showed widely discrepant results. The POQ returned 17 positive responses for classical conditioning, the OQ only 2. The main origins returned by the OQ was a 'non-conditioning traumatic event' or 'always been this way', neither of which entail the presence of CS-UCS pairings at the time of onset of the phobia. One reason for this disparity of results may be that Menzies and colleagues specifically excluded the occurrance of unexpected fear as an aversive UCS. Although there may not be an initial pairing of the phobic stimuli with a fearful stimuli, this does not mean that the associations between 1) the phobic stimuli and fear; and 2) avoidance and a sense of relief, is not learnt to maintain the phobic behaviour.

It has been noted that phobic fears are extremely resistant to extinction if they were merely acquired by conditioning (Rimm & Lefebvre, 1981). Extinction is the removal of the conditioned response, by removing the association between the previously neutral and the aversive stimuli. This has been used as a criticism of behavioural theories. However O.H. Mower (1960) put forth his two-factor theory to explain this resistance to extinction. According to Mower (1960) when the individual confronts the feared stimuli and begins to experience anxiety, an habitual response to escape or avoidance follows. Associated with

avoidance is a reduction in fear, which in turn reinforces the phobic avoidance. Thus the fear is not extinguished as this requires repeated presentation of the conditioned stimulus (ie spiders) without the unconditioned stimulus (ie hyperventilation) , until the emotional response of fear gradually dies away (a process called habituation) (Rimm & Lefebvre, 1981). This theory is not the whole story because some phobias appear to remain without avoidance consistently occurring in the feared situation.(Rimm & Lefebvre, 1981).

2.3 Preparedness Hypothesis

One revision to the Classical Conditioning model is the biologically orientated Preparedness Hypothesis, which attempts to account for the limitations of behavioural learning in explaining specific phobias. It is argued that humans, like other species are preprogrammed to respond to certain situations with anxiety as a survival mechanism. This revision hypothesises that aversive experiences associated with more evolutionary recent objects, such as electricity, are less likely to produce phobic fear than aversive experiences associated with more evolutionary relevant objects, such as spiders (Seligman, 1971). Studies have supported this theory, by demonstrating that acquired, conditioned responses to evolutionary relevant cues are slower to extinguish than conditioned responses to evolutionary neutral cues (Hugdahl & Fredrickson, 1978). Evolutionary, preprogrammed fear may also account for origins of phobias where no CS-UCS pairings occur at the time of onset.

2.4 Cognitive Theories

Another component to the aetiology of phobias may be cognitive factors. It has long been assumed that specific phobias are by definition non-cognitive, an example of evolutionary prepared learning not subject to conscious control (Seligman 1971). However idiosyncratic cognitions may be primary to the occurrence and maintenance of phobic anxiety. A combined biological and cognitive theory hypothesises that panic arises as a

result of a combination of physiological anxiety symptoms, such as hyperventilation and heart palpitations, and the individual's cognitive interpretation of these symptoms as catastrophic (Zucker, Taylor, Brouillard, Ehlers, Margraf, Telch, et al., 1989). Thoughts may center around fears of dying or losing control, which in turn increase anxiety and bodily sensations in a vicious circle of anxiety (Margraf, Barlow, Clark, & Telch, 1993). Additionally panic is not the only emotion which may be central to the formation of phobias. Panic is only one of an array of potential aversive experiences that may occassion the onset of a phobia; others include pain or ridicule.

Research indicates that participants with spider phobias strongly believe various negative thoughts about spiders and their own reactions to encounters with spiders (Arntz, Lavy, van den Berg, & van Rijsoort, 1993). Frequently believed ideas are that spiders jump at the person, that they are uncontrollable and unpredictable, that spiders bite and are poisonous, and that the person will have a heart-attack or jump out of a moving car if they saw a spider (Arntz, et al., 1993). In a study of 25 participants with spider phobias the majority reported numerous beliefs about the perceived harm caused by spiders, beliefs about their catastrophic responses to spiders, and beliefs about their helplessness against spiders (Thorpe & Salkovskis, 1995). These beliefs were held to maintain the phobic behaviour, and the strength of the negative cognitions was related to the intensity of the phobic fear.

Chapter 3

Treatment of Specific Phobias

3.1 Different Treatment Strategies

Current thinking thus proposes that a number of factors; biological; environmental; and psychological, give rise to phobic fears. These different theories of aetiology have directed different treatment strategies. Cognitive theories have stimulated the use of techniques such as problem solving (Jannoun, Munby, Catalan, & Gelder, 1980) and

cognitive restructuring (Biran & Wilson, 1981; Craske, Mohlman, Glover, & Valeri, 1995). Cognitive restructuring entails asking participants to 1) identify irrational thoughts regarding the feared stimuli, 2) to replace these irrational thoughts with more realistic appraisals of the situation, and 3) to develop positive coping thoughts.

Physiological theories have implied the use of relaxation therapy, which involves teaching the skill of reducing muscular tension, which directly competes with sympathetic nervous system activation and facilitates a perception of control(Al-Kubaisy, Marks, Logsdail, Marks, Lovell, Sungur, et al., 1992; Jansson, Jerremalm, & Ost, 1986; McNamee, O'Sullivan, Lelliot, & Marks, 1989). The behavioural learning theories have supported the use of behavioural therapies with an exposure component (Al-Kubaisy, et al., 1992; Biran & Wilson, 1981; Hoffart & Martinsen, 1990). These treatments aim to produce habituation and extinction of conditioned fears by pairing exposure to the phobic stimuli with positive consequences. Behavioural treatments may also include the technique called modelling which is based on the principles of vicarious conditioning.

Behavioural exposure treatments are considered to be more proficient than cognitive restructuring (Biran and Wilson, 1981); relaxation training (McNamee, et al., 1989) and problem solving (Jannoun, et al., 1980; McDonald, Sartory, Grey, Cobb, Stern, & Marks, 1979). For example, ten out of eleven participants to receive guided exposure rated their phobic situation as much improved, whereas eight out of eleven participants with a specific phobia who received cognitive restructuring treatment rated their phobic situation as not improved (Biran and Wilson, 1981). Additionally, participants receiving exposure treatment improved a mean 55-80% after 26 weeks, compared to only 10-21% mean improvement in participants receiving relaxation training (Al-Kubaisy, et al., 1992). In another study 13 participants with agoraphobia received telephone-guided exposure treatment (E) and a further 10 participants received telephone-guided relaxation treatment (R). By 32 weeks, the number much improved was 2 (E), 0 (R), moderately improved 2

(E), 1 (R), and unimproved 2 (E) and 7 (R) (McNamee, et al., 1989). The review will now focus on behavioural exposure treatments only.

3.2 Exposure Therapy

"Exposure" is a generic term used to describe a complex set of therapeutic procedures that share the common element in which patients are exposed to situations that usually evoke discomfort until the distress subsides (Marks, 1985). Delegates of the 1981 Albany National Institute of Medical Health Conference declared that exposure therapy is the treatment of choice (Barlow & Wolfe, 1981), an assertion supported by Butler (1985); Chambless (1990); & Marks (1975). Exposure has been identified as an essential part of overcoming phobic avoidance in a study which compared exposure-based instructions to instructions to avoid phobic stimuli (Greist, Marks, Berlin, Gournay, & Noshirvani, 1980). The participants with phobias slightly improved after exposure, whereas instructions to avoid the feared stimuli aggravated symptoms. This finding, and the success of exposure treatments support the notion that avoidance is at the core of the disability (Emmelkamp, 1982).

Exposure treatment can take many forms. The feared stimuli may be presented in fantasy, pictures, tapes or real life (Marks, 1985). The three main subtypes of exposure treatment will now be outlined.

3.2.1 Systematic desensitisation

Systematic desensitisation utilises graduated exposure. Developed by Joseph Wolpe, the technique requires the participant with a phobia to imagine a hierarchical list of panic-inducing situations while in a deep state of relaxation. The hierarchy of scenes is usually ordered from least arousing to the most fearful scene. The early signs of arousal are the cues for relaxation (Rimm & Lefebvre, 1981). Wolpe believed that reciprocal

inhibition occurs, whereby relaxation inhibits anxiety and is conditioned to each hierarchy scene, so that the client experiences relaxation instead of anxiety when confronted with the real stimuli (Wolpe, 1973). Other theoretical interpretations of the underlying process argue that the client is learning active coping skills for relaxing away anxiety (Cormier, & Cormier, 1991).

Outcome studies indicate that systematic desensitisation produces significantly better results than a variety of comparison treatments, such as group psychotherapy (Gelder & Marks, 1968; & Wolpe, 1973). Authors have concluded that systematic desensitisation is most effective when participants present with few other problems, such as social problems and personality disorders (Gelder & Marks, 1968). While systematic desensitisation may be acceptable to clients, many clinicians view the treatment as rather slow and laborious (Mathews, Gelder, & Johnston, 1981).

3.2.2. Flooding

Flooding provides more immediate results than systematic desensitisation, however it is viewed as more daunting and unacceptable by many participants (Boulougouris & Marks, 1969; Rachman, 1966; Stern & Marks, 1973). The aim of flooding is to invalidate fears by requiring participants with phobias to confront feared situations, while evoking an intense emotional reaction, until the fear habituates. Implosive therapy is flooding which involves imagining the feared scenes as much as possible, until anxiety subsides (Boulougouris & Marks, 1969).

The assumed underlying processes of flooding include 1) extinction of the conditioned avoidance response; 2) habituation of the physiological response; 3) and challenging of irrational cognitions (Marks, 1975). Evidence for physiological habituation followed by subjective improvement in phobic participants treated with flooding has been reported (Mavissakalian & Michelson, 1982).

Flooding has been demonstrated as superior to desensitisation for the reduction of phobic fear in a cross-over study (Marks, Boulougouris, & Morset, 1971). Results were measured by doctors' ratings of phobic behaviour, subjective experience of anxiety in participants during phobic imagery, and physiological recordings of participants' heart-rates and skin conductance's. Flooding was superior as a first and second treatment, hence order effects did not account for results.

3.2.3 A Third Variation to Exposure In Vivo

The majority of treatment outcome studies reviewed for this paper have employed a variation of *invivo* exposure which does not meet the full guidelines of the above exposure treatments. In this variation the participant is encouraged to repeatedly approach and remain in the feared situation without the therapist attempting to heighten anxiety or induce relaxation (Zitrin, Klein, & Woerner, 1978). It has been suggested that the role of relaxation is less crucial than once thought (Marks, et al., 1971). The provocation of a strong emotional reaction alone has also been demonstrated as insufficient to reduce phobic fear (Rachman, 1966). This method of exposure treatment produced statistically significant results in a sample of 39 agoraphobics (Jansson, et al., 1986). After 12 treatment sessions 59% of the sample demonstrated clinically significant improvement at 15 months follow-up.

The success of treatment may be modified by certain treatment parameters such as the length and the type of exposure. The number of participants involved in the sessions and the roles of the participants in directing the exposure may also influence results. These issues will be discussed next.

3.3 Factors Which Influence Exposure Treatment Effects

3.3.1 Prolonged versus Brief Exposure

It has been suggested that prolonged exposure is more successful than exposure periods of shorter duration, although shorter sessions can still be of moderate help (Marks, 1987; Stern & Marks, 1973). In one study, 16 participants with life-time agoraphobia were administered four sessions of long (80 minutes of continuous flooding) or short (10 minutes of flooding administered in bursts over two hours) flooding in *in vivo* (Stern & Marks, 1973). During the long exposure sessions, heart-rate and subjective anxiety decreased more than during the shorter sessions, supporting the notion that habituation of arousal is occurring.

The effectiveness of prolonged flooding was demonstrated in a study with ten participants who had long standing specific phobias (Watson & Marks, 1971). Participants underwent 2 to 3 sessions of four to five hours duration, of prolonged imaginal and *in vivo* exposure. The treatment was efficient and economical with the degree of improvement being equivalent to that found with fifteen or more sessions of systematic desensitisation. The ineffectiveness of short flooding sessions has also been highlighted (Rachman, 1966). Three participants with spider phobias received ten sessions lasting twenty minutes consisting of two-minute epochs of exposure to intensely disturbing imaginal stimuli involving spiders. The results of these participants were found to be inferior to those of participants previously treated with systematic desensitisation, and to a non-treatment control group. The author concluded that prolonged exposure is the crucial element to successful treatment.

3.3.2 Imaginal versus In Vivo

In vivo exposure has been claimed to be superior to imaginal exposure (Marks, 1987). One study noted no signs of physiological habituation with imaginal sessions, whereas habituation was observed in the same participants during *in vivo* exposure (Stern & Marks, 1973). Authors suggested that flooding should proceed to the stage of prolonged exposure in real life as quickly as possible, with imaginal exposure treatment only used in those participants who need preparation before they can endure real life exposure, or where *in vivo* exposure is not possible, eg. with phobias of thunderstorms. Indeed imaginal exposure may play an important role in preparing participants for later exposure *in vivo* (Mathews, Johnston, Lancashire, Munby, Shaw, & Gelder, 1976).

Results indicating no difference between the two techniques have also been reported however. In one study 36 females with agoraphobia were treated by one of three methods: 1) 8 sessions of imaginal exposure followed by 8 sessions of *in vivo* exposure ; 2) 16 sessions of combined imaginal and *in vivo* exposure; and 3) 16 sessions of *in vivo* exposure alone (Mathews, et al., 1976). Based on a wide range of measurements, authors concluded that there are no long term differences between the effects of the above treatments, provided that participants are encouraged to practice exposure between sessions. In view of this finding, the choice of exposure technique utilised would seem to be mainly a matter of convenience.

3.4 Influence of Participant Numbers and Roles

3.4.1 Individual versus Group Exposure

It has been suggested that group exposure provides a cost effective alternative to individual treatment as it reduces therapist's time (Marks, 1987). Successful results from group *in vivo* exposure therapy were reported in a sample of 13 participants with agoraphobia (Mavissakalian & Michelson, 1982). The group of thirteen improved significantly on a clinical basis and across behavioural, physiological and subjective

measures. Similar positive findings have been attained with group sizes of eight participants and five participants (Hoffart & Martinsen, 1990; Teasdale, Walsh, Lancashire, & Mathews, 1977). High social cohesion of the groups may be an important factor for continued improvement in follow-up, by motivating continued self-exposure practice (Teasdale, 1977).

3.4.2 Self-Exposure versus Therapist-directed Exposure

Recently the trend has been to allow participants to take over the management of their own exposure therapy, sometimes with the help of relatives as cotherapists (Marks, 1985). Numerous studies have demonstrated the success of this strategy (Jannoun, et al., 1980) The potential advantages of self-exposure include the reduction in therapist's time required for treatment and the resultant saving in costs for the participant; the decreased likelihood of participants becoming dependant on the therapist; increased likelihood of improvement continuing after formal therapy ends; and the increased generalising of results to the natural environment (Mathews, Teasdale, Munby, Johnston, & Shaw, 1977). The self-exposure procedure still has to be properly structured to achieve optimum benefit, although an informed therapist can teach the principles to a participant in a short time (Ghosh & Marks, 1987).

Self-exposure with only brief therapist contact to monitor and negotiate homework exercises has produced results equivalent to therapist-directed exposure (Al-Kubaisy, et al., 1992). In this study 150% longer therapist time yielded few dividends over self-exposure, prompting the authors to comment that even after hundreds of hours of therapist-directed exposure, participants will relapse if they have not been doing self- exposure alone. Indeed, it was concluded that for most participants it seems inefficient to administer more than a couple of hours of therapist-direct exposure, if at all, for ultimately the participant has to move to self-exposure alone. Others have disagreed however, stressing the point that while self-exposure with brief therapist monitoring may be enough for some

participants, most will require additional treatment with therapist-directed exposure (McDonald, Sartory, Grey, Cobb, Stern, & Marks, 1979).

One of the first self-exposure programs was devised after researchers noted that while participants with agoraphobia demonstrated changes during treatment in the clinical setting, no further gains were achieved in the home environment (Mathews, et al., 1977). The program was used with 12 married women, with spouses acting as co-therapists to monitor the participants' graduated self-exposure. In comparison with clinic-based programs the home program produced equivalent change with reduced expenditure of therapist time.

Limited success with self-exposure has also been demonstrated where the participants had no face-to-face contact with the therapist (McNamee, et al., 1989). Thirteen participants with agoraphobia were diagnosed over the phone and then instructed to practice self-exposure for twelve weeks. Regular brief phone contact was made by the therapist to negotiate and monitor exposure tasks. Unfortunately only six of the initial thirteen participants completed the study. However all six demonstrated improvement at 32 weeks follow-up. The phone-guided, self-exposure participants responded more slowly and less completely to similar participants administered self-exposure plus some face-to-face contact with a therapist (Ghosh & Marks, 1987). At the very least self-exposure is an important part of the maintenance program to continue improvement after formal therapy (Jansson, et al., 1986).

Chapter 4

Modelling

4.1 The Modelling Technique

A technique that is frequently combined with exposure therapies and which makes a significant contribution to symptom reduction is modelling. Indeed, modelling techniques

in conjunction with exposure therapy have more recently become the treatment of choice for anxiety disorders (Öst, 1989). Modelling is based on the principles of vicarious conditioning. Modelling entails the participant learning a new behaviour from the observation of another (the model) engaging in that behaviour. If the consequence of the behaviour is negative, the behaviour is removed from the participant's repertoire. If the consequence experienced by the model is positive, then the behaviour is acquired by the participant (Bandura, 1968). Bandura (1968) states that one of the fundamental means by which human behaviour is acquired and modified is via modelling, hence it follows that modelling procedures are ideally suited for influencing change in psychological functioning. By viewing a model perform approach behaviour to a feared stimuli without experiencing any adverse consequences, the phobic anxiety experienced by the participant is assumed to be extinguished vicariously (Emmelkamp, 1982).

4.2 Mode of Presentation of the Model

The presentation of the model may either be *in vivo* (overt modelling); imagined (covert modelling) or displayed on a film or by other means (symbolic modelling). While some have claimed that live models are the most effective (Blanchard, 1970), others have claimed that filmed models and even cartoon models are just as effective in bringing about vicarious extinction, and that any loss in relation to fear reduction is offset by the potential for a broader range of samples and situations (Bandura & Menlove, 1968). Symbolic modelling eliminates the necessity of having the feared object present and enables the use of multiple models which facilitates generalisation of results (Denny, Sullivan, & Thiry, 1977). Covert models, where the model is imagined, also appear to be as effective as overt models (Cautela, Flannery, & Hanley, 1974).

4.3 Style of the Model

Treatments may employ a mastery model or a coping model. The mastery model demonstrates complete competency and ease while performing the approach behaviour, whereas the coping model demonstrates initial anxiety towards the feared stimuli which then gives way to mastery of the behaviour. The basis for using the mastery model is that modelled responses accompanied by positive affective expression should engender less fear in the observer, and hence foster more vicarious extinction than if the models demonstrated fear (Bandura, Blanchard, & Ritter, 1969). The theory behind the coping model is that if the model demonstrates initial anxiety, and then progressively overcomes this anxiety to experience mastery, the observer will experience greater identification with the model. There is evidence to suggest that the transmission of imitative behaviours is increased when the model is viewed as more similar to the observer (Flanders, 1968). Using symbolic modelling, the coping model was demonstrated as superior to the mastery model (Meichenbaum, 1971).

4.4 Efficacy of Modelling

The potency of modelling influences has been questioned on the grounds that modelling frequently occurs in real life conditions yet fears persist. However the effectiveness of the treatment depends upon consistent and carefully planned sequencing of experiences (Bandura, 1968). In a comparative study of the effects of modelling, informational factors and guided participation, modelling accounted for approximately 60% of the behaviour change in 48 participants with snake-phobias, 80% of the attitudinal change and 80% of the change in fear arousal. Guided participation contributed the remaining increment, with informational influences having no effect (Blanchard, 1970). Similarly in another study employing 72 participants with spider phobias, modelling accounted for 70% of the treatment effect, and behaviour rehearsal 12% (Denny, et al., 1977).

Chapter 5

Computer-delivered Behavioural Treatments

5.1 The Use of Computers to Deliver Treatment

Another mode for delivering behavioural treatments, including modelling is via computers. Computer delivered treatments are based on the same principles of exposure therapy, whereby the participant is instructed to imagine or view an image of the phobic stimuli on the computer screen until distress subsides. The principles of symbolic modelling may be easily incorporated into the computer treatment, allowing a broad range of models and situations to be depicted via computer graphics. The move towards self-directed exposure with only brief therapist contact is also possible using computer-delivered treatments, as participants can control the pace of computer programs.

Computer-delivered treatments are thus based on empirically validated techniques grounded in aetiological theories, however formal studies are still needed to explore the efficacy of this new modality of treatment delivery, and the mechanisms by which change is produced. Computer-delivered treatments were pioneered in the 1960s, however early attempts were unsuccessful and not pursued. Interested was not renewed again until the late 1980s and the development of powerful microcomputers and programming languages. Since this time much conversation has been generated about the implications of computer-delivered treatments but the number of formal studies are limited.

The use of computers to deliver treatments has been both fervently supported and fervently opposed. Arguments in favour of computers include the fact that behavioural therapies are particularly suited to computerisation as treatments are structured into series of operational steps addressing specific objectives (Butcher, 1985; Ford, 1993; Lawrence, 1986). Computer-delivered treatments may also increasing availability of treatment and free up therapists' time to attend to other clients' demands (Carr & Ghosh, 1983;

Lawrence, 1986). Unlike the therapist, the computer is tireless, replaceable and can function at any time of the day or night (Ghosh & Greist, 1988a). Studies also show that participants will 'talk' to a computer and that the computer is even preferred over a therapist when the problematic behaviour is embarrassing (Greist, 1989; Lucas, 1977; Slack, Porter, Balkin, Kowaloff, & Slack, 1990). Computers have a perfect memory and are highly reliable (Plutchik & Karasu, 1991), and the computer has no superior social standing and does not make moral judgments (Erdman, Klein, & Greist, 1985). Finally data can be easily recorded and stored (Kirkby, In press).

Some researchers have vehemently opposed the therapeutic use of computers. It has been asserted that machines are incapable of the warmth and empathy which leads the individual to realise the possibility that they are worthy of affection (Weizenbaum, 1966); and that they can negatively impact upon participants by being impersonal (Sampson, 1986). Most practitioners take a middle line and suggest that computer-delivered treatments be used as an adjunct to traditional therapies and not as a replacement for human therapists (Ford, 1993). It has been suggested that training in the clinical use of computers would alleviate some of the therapists' resistance to computerisation (Ford, 1993; Fowler, 1985). Further research is required into the actual efficacy of computer-delivered treatments if this debate is to be answered.

Studies which have been conducted, have utilised a number of different approaches in delivering behavioural treatments. One approach has been to deliver self-exposure instructions via a computer, which the participant then performs as homework. Alternatively, when exposure has been administered by the computer, techniques used include imaginal exposure or replication of the feared situation via virtual reality. These approaches will now be discussed.

5.2 Computer-Delivered Self Exposure Instructions

A number of studies have been conducted in which self-exposure instructions have been computer-delivered, to provide a treatment that utilises less therapist time (Ghosh & Greist, 1988b, Carr, Gosh, & Marks, 1988; Ghosh, Marks, & Carr, 1984). In a controlled treatment comparison study of 40 participants with agoraphobia, allocated to receive either self-exposure instructions from a psychiatrist, a self-help book, or a computer program, all three groups improved substantially up to 6 months follow-up. There where no significant differences between the groups. The computer-instructed participants planned their self-exposure treatment by interacting with a microcomputer via a typewriter terminal and a video screen. The computer program explained the rationale of self-exposure, monitored homework performance, provided lists of new exposure tasks, and printed out homework diaries. The mean therapy time for the psychiatrist per participant was 3.1 hours (in the psychiatrist condition), 0 hours (self help book condition), and 1.2 hours (computer program condition) (Ghosh & Marks, 1987). The outcome was comparable to results obtained from therapist-directed exposure or antidepressants (Ghosh & Marks, 1987). Results supports the use of computers in delivering treatment but does not indicate that this modality for administering treatment is superior to others such as self-help books.

This study has since been replicated by the same authors, employing 71 participants with chronic phobias (Ghosh & Greist, 1988a). The findings again reflected the usefulness of computer-delivered self exposure instructions in reducing symptoms and allowing time saving benefits for therapists. As in the previous study, no patient expressed any difficulty or resistance to working with a computer. However whether computer-delivered self-exposure instructions confers greater treatment benefits over book-instructed self-exposure is unknown (Ghosh & Greist, 1988c). Nevertheless the replication of studies and the use of greater participant numbers is a necessary step in validating this

treatment modality. A further improvement would have been the inclusion of a behavioural approach test in the repeated measures in addition to the subjective rating scales used.

5.3 Computer-delivered Imaginal Exposure Techniques

Studies have also employed computer-delivered imaginal exposure techniques, in which graduated exposure hierarchies are presented in written form on the computer screen, and participants are asked to imagine the scenes (Biglan, Villwock, & Wick, 1979; Chandler, Burck, & Sampson, 1986; Wilson, Omeltschenko, & Yager, 1991). These studies have employed small numbers of participants however, and have not included controlled comparisons with alternative treatments.

A computer program called "Coping with Test Stress" has been developed and tested to deliver imaginal exposure instructions to participants (Wilson, et al., 1991). The computer program assesses the participant's level of test anxiety, trains the participant in progressive muscle relaxation, and leads the participant through a series of test-taking scenes (15 possibilities), as a means for conducting systematic desensitisation. The participant determines the starting point in the scene hierarchy and may work through five scenes per 36 minute session. The participant is instructed to relax while imagining each scene. If at anytime the participant indicates anxiety by hitting the space bar on the keyboard, the screen is changed to instructions to imagine a neutral scene.

Initial case studies have been reported using this program (Wilson, et al., 1991). While the results highlighted in these reports have been promising, the studies reported have only been single case studies of Caucasian, female, highly educated participants with strong motivations to overcome symptoms. The generalisability of these findings are thus minimal, and more controlled treatment outcome studies are needed. The program used is also very specific to test anxiety so research is needed to determined whether the program is applicable to other anxiety disorders.

A similar program has been trialed on nine college students who reported significant reduction of test anxiety (Biglan, et al., 1979). In this study however there was a forty percent drop out rate, once again leaving only highly motivated, well educated participants, and limiting generalisability of results.

A more general computer program has also been successful devised which allows participants with any phobia to created their own individualised scene hierarchy to be presented by the computer in systematic desensitisation treatment (Chandler, et al. 1986). This provides wider applicability than the previous highly specified programs. A single case study reported that the participant required 13 sessions to work through 30 individualised scenes, to achieve significant reductions in his agoraphobic symptoms at 8 months follow-up. This case study employed a 35 year old male referred by a community psychiatrist. While results tentatively support the computer-delivered treatment, a greater number of participants need to be studied and comparisons with alternative treatments analysed. Further plans for the program include speech synthesis and speech recognition boards (Chandler, et al., 1986).

5.4 Virtual Reality Exposure Treatment

The latest and most powerful interface between humans and computers is virtual reality (VR) (Muscott, & Gifford, 1994). It is an interactive, 3-dimensional, multisensory experience that immerses the individual in a computer simulated world. Researchers have produced simulations of heights, different kinds of spaces, the experience of flying, and objects such as spiders indicating many potential applications of virtual reality in treatment (Gantz, Durlach, Barnett, & Aviles, 1996). An array of computer technologies are employed to immerse a participant into VR. These include head mounted display (HMD),which allows the participant's viewpoint to alter naturally and new objects to come into view as the participant moves his head (Lamson, 1997).

The effectiveness of VR graded exposure in the treatment of acrophobia has been examined (Rothbaum, Hodges, Kooper, Opdyke, Williford, & North, 1995a; Rothbaum, Hodges, Kooper, Opdyke, Williford, & North, 1995b). 17 college students with acrophobia were randomly assigned to VR exposure treatment (N=10) or to a waiting list comparison group. Sessions were conducted individually over 8 weeks. Simulations were of footbridges over water, balconies on different floors, and a glass elevator rising 49 floors. Outcome was assessed using subjective measures of anxiety, attitudes towards heights, and distress associated with heights, at pre- and post treatment. Participants in the treatment group were significantly improved on all measures whereas the comparison group remained unchanged. Many of the treatment participants also completed *in vivo* exposure even though they were not specifically instructed to do so. Thus initial findings support the potential use of VR graded exposure in reducing fear of heights (Rothbaum, et al., 1995b). Results need to be interpreted carefully however as the study did not include a treatment comparison group, a behavioural approach test, or follow-up analyses.

The same authors have also reported a case study of a 42 year old woman treated for a debilitating fear of flying with VR exposure therapy (Rothbaum, Hodges, Watson, Kessler, et at. 1996). VR exposure involved 7 sessions of graded exposure to flying in a virtual aeroplane. Again results indicated clinically significant improvement in subjective ratings of fear, but are of limited generalisability.

Another case report has demonstrated the efficacy of VR exposure therapy and mixed reality (touching real objects which the patient also saw in VR) for the treatment of spider phobia (Carlin, Hoffman, & Weghorst, 1997). A 37 year old female with severe fear of spiders completed 12 weekly, one hour sessions of VR exposure. Outcome measures indicated improvement on anxiety measures, and changes in behaviour towards real spiders. These results converge to support the notion of computers as an effective medium for delivering exposure therapy, but again are limited by the lack of participant numbers.

5.5 Non-Immersive Virtual Reality Modelling

Most treatments incorporating virtual reality have involved the simulation of physical aspects of the environment (Gantz, et al., 1996). Unlike immersive virtual reality in which computer generated displays are wrapped around the participant's visual and auditory fields, non immersive reality involves exposing the client to a virtual world, by being included in the depicted scenario. An interactive computer software, called 'The FearMaster', has been developed to simulate exposure therapy for spider, lift and obsessive-compulsive disorders, using a non-immersive virtual reality approach (Kirkby, Watson, & Daniels, 1991). Less emphasis has been placed on simulating the physical environment and more on replicating treatment processes.

The Fearmaster program is a computerised symbolic modelling treatment for phobia designed to teach the principles of exposure therapy. It requires the participant to act as a therapist and treat an on-screen figure for a phobia eg., spider phobia. They do this by repeatedly guiding the figure closer to spiders. Although guiding a computer figure to approach a feared object is clearly different from watching someone else approach a feared object (the element of control is stronger in the first case), participants may identify with the on-screen figure and imagine it to be themselves, as in modeling therapy. An on-screen anxiety thermometer reflects the computer figure's level of anxiety. The anxiety of the figure rises with initial exposure, and then demonstrates habituation by relaxing in the presence of the phobic stimuli. When the participant directs the screen figure to engage in a phobic situation positive reinforcement is received via a feedback score. The aim is to reach a target score of 2000 points. By learning to treat the on-screen figure, the user can apply these therapeutic skills to their own phobias.

This program differs from the computer-delivered self-exposure or imaginal exposure techniques in that the Fearmaster is not instructional in nature. Instead participants must discover for themselves the principles of exposure therapy based on

response contingent reinforcement. Another unique feature is the symbolic modelling included in the program which allows for a broad range of models for the participant to identify with. The Fearmaster thus represents a further development in computerised treatment methods and modelling techniques.

Several clinical studies using this computer program have been completed, investigating clinical outcomes, and mechanisms for change in different phobic groups. All the studies have demonstrated a decrease in participants' anxiety after treatment indicating that the program is a potentially successful treatment for a variety of phobias. This series of studies demonstrates the evolution of research that needs to occur with all new computerised treatments.

The first study conducted using this program investigated treatment outcomes for eleven participants with agoraphobia compared to eleven control participants, administered 3 x 45 minute treatment sessions (Hutchinson, 1992). The computer program presented an array of lift phobic scenarios. The clinical efficacy of the program was unable to be assessed, however the potentiality of the program was confirmed. Both groups improved on the Fearmaster across the three sessions indicating learning of the principles of exposure.

Results were limited by the small participant numbers decreasing statistical power (a criticism of most studies in this area) and the use of only a subjective rating measure of phobic fear. The study only used participants with agoraphobia so no inferences could be made about the program's potential or suitability in the treatment of other phobic disorders; and data was not collected on the participants' actual approach behaviours or application of exposure principles to their daily lives after completion of the treatment.

This study also neglected to investigate the actual mechanisms for the treatment effect. Computer programs have an advantage in that a number of different treatment variables can be systematically removed to assess their treatment effects. However few studies have utilised this research option. The specific treatment effects of the feed-back

score and anxiety thermometer in the Fearmaster were analysed in a later study (Smith, 1994). The feedback score provides the positive reinforcement to learn the principles of exposure and the anxiety thermometer indicates the level of anxiety in the on-screen figure to demonstrate the principle of habituation. These components were specified as independent variables and omitted from the screen. The study also investigated whether the treatment effect is specific to participants whose phobia is the same as the computer scenarios or whether the treatment effects generalise to other participants. This was accomplished by administering lift phobic scenarios to participants with a spider phobias.

Significant phobic improvement was demonstrated, indicating the potential of the program to treat a variety of phobic disorders. The outcome was not significantly affected by either the relevance of the modelled exposure to the participants' phobias or by the manipulation of the onscreen feedback.

Additionally two to three weeks follow-up assessment was conducted which included administering a Homework questionnaire. Data gathered indicated that to some extent the program facilitates self-exposure *in-vivo*, which correlates with phobic improvement (Smith, 1997). The Homework questionnaire is an interesting inclusion in this study, however the questionnaire has not been validated on a previous sample and consists of only ten items so the reliability of results can be queried.

The type of anxiety displayed by the on-screen model has also been manipulated in another controlled study to investigate its treatment effect (Gail, 1993). The on screen model was manipulated to displayed three types of anxiety 1) no anxiety; 2) anticipatory and situational anxiety; and 3) situational anxiety. The participants demonstrated anxiety when the on-screen model did, however this was only indicated subjectively and not via significant changes in cardiac arousal.

Similarly the effect of the participant's personality on treatment outcome has been initially investigated, using participants with agoraphobia (Harcourt, 1997). Two personality factors 'openness' (openmindedness, aestheticism, and intellectual curiosity);

and 'agreeableness' (trust, straightforwardness, altruism, compliance, modesty, and tendermindedness) were shown to interact with Fearmaster proficiency. The author concluded that treatments also need to be evaluated in terms of their utility for various personality types.

These studies have not confirmed the efficacy of the Fearmaster program as they have not included in their design a controlled treatment comparison group. However, Gilroy (1998) compared the treatment outcomes for participants with spider phobias administered either the 'Fearmaster' program, therapist-guided *in vivo* exposure, or a placebo relaxation treatment (n = 15 per group). Results demonstrated that both exposure treatments were better than relaxation therapy. The live exposure produced the best outcomes overall, but the differences between this and the computer group were minimal and not significantly different. Overall results suggested that the program was an effective alternative to live exposure therapy in spider phobia. One strength of these results was the inclusion of a behavioural approach test in the repeated measures.

5.6 Size of Treatment Effect

While these studies have made some headway into investigating the efficacy of this mode of treatment and the mechanism mediating behaviour change further research is still needed and warranted by the current positive trends in results. Perhaps most noteworthy is the fact that the above studies have administered no more than 3 x 45 minutes of treatment per participant. At this dosage of treatment not all participants are improving. The treatment results are promising but the treatment effect still needs to be stronger.

In a study using the Fearmaster program to treat 16 participants with Obsessive Compulsive Disorder statistically significant decreases in symptomatology were observed on the Padua Inventory (25%0, Beck Depression Inventory (32%) and Irrational Beliefs Inventory (9%) (Clark, 1996). However according to criteria for clinical significance, where a 70% or more reduction equals 'much improvement'; a 31% to 69% reduction is

considered moderate improvement; and 30% or less is considered a treatment failure (Stanley & Turner, 1995), the above findings would be considered treatment failure. However the author notes that in studies where this criteria has been used, the behavioural treatment has usually been administered over an average of twenty sessions (Clark, 1996). Comparing this to the three sessions used in this study, and the fact that minimal therapist time was required, the modest gains were reasonable and cost-effective.

The performance on the program appears to follow a learning curve with results failing to reach ceiling effect at the end of three sessions. This would indicated that their is still room for further learning and hopefully phobic improvement with additional treatment sessions. A future area of research may thus be to increase the number of treatment sessions administered. This is only one of the many manipulations still to be investigated.

Conclusions

This review has outlined the nature and extent of specific phobias in to-days society. The relatively high incidence of specific phobias has necessitated the continual development of effective and affordable treatments. The review has outlined the most recommended treatments, the behavioural exposure treatments. Unfortunately behavioural treatments are often unaffordable and impractical due to the relative shortage of therapists (Greist, 1989). The use of computers to administer these treatments may present the solution to this problem. However this is still a relatively new area of research and the majority of computer-delivered treatment studies are limited by design constraints. These constraints include small participant numbers; the lack of treatment comparison groups and control groups; the lack of follow-up assessments; and the lack of behavioural approach tests in repeated measures. The actual mechanisms of change in computer-delivered treatments has also been a neglected area of research. Presently, results can only indicate the potential usefulness of this treatment delivery alternative, but not confirm the clinical significance of treatment outcomes. These results are still exciting however as the

theoretical applications and implications of computer-delivered treatments are virtually unlimited in terms of what problem behaviours may be addressed and the number of people who could receive treatment if further research is conducted.

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Journal Article

Computer-Delivered Modelling of Exposure Therapy for Spider Phobia: 3 versus 6 Sessions.

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Abstract

This study investigates the treatment efficacy of an interactive computer program, called 'Fearmaster', for the treatment of spider phobia, when administered at two different dosages (three treatment sessions versus six treatment sessions). The Fearmaster (Kirkby, Watson, & Daniels, 1991) is designed to teach the principles of self exposure via symbolic modelling technique by allowing participants to practise treating an 'on-screen' computer person. Thirty participants with spider phobia, meeting DSM-IV criteria for spider phobia and achieving a CIDI-A diagnosis of Specific phobia, were randomly allocated to receive either three or six treatment sessions within three weeks (n= 15 per treatment condition). Phobic symptom severity was measured at pre-treatment, post-treatment (on the same day as the final treatment session) and at one month follow-up assessment by Spider Questionnaire, Fear Questionnaire, Phobic Targets and Work Adjustment Rating Scales, and a live Behavioural Approach Test. The results showed significant symptom reduction for both groups across treatment, where participants were able to engage in approach behaviours with less anxiety. Statistically significant reductions occurred in self ratings of spider phobia symptoms, fear levels, anxiety levels and depression levels. Clinically significant improvements were obtained in depression levels and ability to perform approach behaviours towards the phobic stimulus. Results on the Behavioural Approach Test showed that additional sessions produced a greater treatment effect. A similar trend was observed on self ratings of spider phobia symptoms but did not reach significance. Thus six treatment sessions produced better treatment outcomes than three treatment sessions on behavioural measures. Results indicate further investigation into dosage effects, employing greater participant numbers is warranted.

Many of us are frightened by certain objects, animals or situations. However when this fear becomes unrealistic or excessive it can dramatically reduce one's quality of life, and clinical intervention is often warranted. The Diagnostic and Statistical Manual of Mental Disorders -DSM-IV (American Psychiatric Association, 1994) defines Specific phobias as consisting of (i) a persistent fear of a circumscribed situation which is (ii) distressing and (iii) leads to avoidance that (iv) significantly interferes with the person's normal routine and (v) the fear is recognise as excessive or unreasonable. Anxiety increases or decreases in relation to the location or nature of the particular phobic stimulus, and marked anticipatory anxiety may also occur if the individual must approach the phobic stimulus.

The prevalence of Specific phobias has been estimated at 7.6% of the population (Agras, Sylvester, & Oliveau, 1969). This anxiety disorder is thus imposing a heavy demand on health care services which would be swamped if all sufferers asked for help (Ghosh, 1988). The need for efficient treatments, which are widely available, is paramount (Lindemann, 1989). The most efficient treatments to date are the exposure therapies (Butler, 1985; Chambless, 1990; & Marks, 1975). Delegates of the 1981 Albany National Institute of Medical Health Conference declared that exposure therapy is the treatment of choice for Specific phobias (Barlow & Wolfe, 1981).

"Exposure" is a generic term used to describe a complex set of therapeutic procedures that share the common element that patients are exposed to situations that usually evoke discomfort until the distress subsides (Marks, 1985). Specific exposure techniques include flooding, systematic desensitisation, exposure *in vivo* and modelling. The exposure treatments aim to produce habituation and extinction of phobic fears by pairing exposure to the phobic stimulus with positive consequences. Previously when the individual confronted the feared stimulus and began to experience anxiety, an habitual

response to escape or avoid the situation may have followed. The exposure therapies prevent this pattern of behaviour and instruct approach behaviours instead.

Acquisition of phobias via vicarious conditioning has also been hypothesised (Rimm & Lefebvre, 1981). Observing another person experience an aversive reaction towards a certain stimulus may result in the observer developing a similar aversive response in the presence of that same stimulus (Rimm & Lefebvre, 1981). Similarly by viewing a model perform approach behaviour to a feared stimulus without experiencing any adverse consequences, the phobic anxiety experienced by the observer is assumed to be extinguished vicariously (Emmelkamp, 1982). The same process of vicarious conditioning may be occurring (Bandura & Menlove, 1968).

The means for administering these treatments varies. Exposure may be conducted *in vivo* where the individual actually enters the feared situation, or in fantasy, where the participant only imagines entering the feared situation. There is some evidence to indicate that *in vivo* exposure has greater effects in the short-term (Stern & Marks, 1973) but that the two procedures are of equal effectiveness in the long term (Mathews, Johnston, Lancashire, Mundy, Shaw, & Gelder, 1976). Similarly the presentation of a model may be either *in vivo* (overt modelling); imagined (covert modelling) or displayed on a film or by other means (symbolic modelling). While some have claimed that live models are most effectual (Blanchard, 1970), others have claimed that filmed models and even cartoon models are just as effective in bringing about vicarious extinction, and that any loss in relation to fear reduction is offset by the potential for a broader range of samples and situations (Bandura & Menlove, 1968).

A recent trend has been to allow participants to administer their own exposure therapy, sometimes with the help of relatives as co-therapists (Marks, 1985). Numerous studies have demonstrated the success of this strategy (Jannoun, Mundy, Catalan, & Gelder, 1980). The potential advantages of self-exposure include the reduction in therapist's time required for treatment and the resultant saving in costs for the participant;

the decreased likelihood of participants becoming dependant upon the therapist; increased likelihood of improvement continuing after formal therapy ends; and the increased generalising of results to the natural environment (Mathews, Teasdale, Munby, Johnston, & Shaw, 1977).

Generally self-directed exposure has been administered with the use of a self-help manual (Marks, 1980), however an alternative mode for delivering self-directed exposure treatments, including modelling, is via computers. Computer-delivered treatments are based on the same principles of exposure therapy, whereby the participant is instructed to imagine or view an image of the phobic stimulus on the computer screen, until distress subsides. The principles of symbolic modelling may be incorporated into the computer treatment, allowing a broad range of models and situations to be depicted via computer graphics. The move towards self-directed exposure with only brief therapist contact is also possible using computer-delivered treatments, as participants can control the pace of computer programs.

Formal studies are still needed however, to explore the efficacy of this new modality of treatment delivery, and the mechanisms by which change is produced. Computer-delivered treatments were discussed in the 1960s, with therapeutic programs appearing in the late 1980s, due in part to the development of powerful microcomputers and programming languages (Mruk, 1987). Since this time the number of formal studies conducted have been limited, with studies constrained by small participant numbers, little multi-method assessment of treatment outcomes, and a lack of control groups (waiting lists, placebo treatments or comparison treatments such as therapist-directed exposure) (Margraf, Barlow, Clark, & Telch, 1993).

One computer program in the initial stages of empirical validation is the Fearmaster (Kirkby, 1992). The Fearmaster program is a computerised symbolic modelling treatment for phobia, designed to teach the principles of exposure therapy, using a non-immersive virtual reality approach (Kirkby, Watson, & Daniels, 1991). Less emphasis has been

placed on simulating the physical environment and more on replicating the treatment processes. It requires the participant to act as a therapist and treat an on-screen person for a phobia eg., spider phobia. By learning to treat the on-screen person, the user can apply these therapeutic skills to their own phobias. Participants must discover for themselves the principles of exposure therapy based on response contingent reinforcement provided by a feedback score. Another unique feature is the symbolic modelling included in the program which allows participants to customise the on-screen person in terms of gender, name and address, to increase participants' identification with the model. The Fearmaster thus represents a further development in computerised treatment methods and modelling techniques.

Several clinical studies using this computer program have reported promising results for treatment outcome (Gail, 1993; Harcourt, 1997; Hutchinson, 1992; & Smith, 1994). In these studies participants have improved performance on the program by achieving higher scores across sessions, indicating that learning of the exposure technique was occurring. Gilroy (1998) compared the treatment outcomes for participants with spider phobias administered either the 'Fearmaster' program, therapist-guided *in vivo* exposure, or a placebo relaxation treatment (n = 15 per group). Results demonstrated that both exposure treatments were better than relaxation therapy. The live exposure produced the best outcomes overall, but the differences between this and the computer group were minimal and not statistically significant. Overall results suggested that the program was an effective alternative to live exposure therapy in spider phobia.

While the results of the program have been promising, the size of the treatment effect still needs to be improved. In a study using the Fearmaster program to treat 16 participants with Obsessive Compulsive Disorder (OCD) statistically significant decreases in symptomatology were observed on the Padua Inventory (25%), Beck Depression Inventory (32%) and Irrational Beliefs Inventory (9%) (Clark, 1996). However according to criteria for clinical significance, where a 70% or more reduction equals 'much

improvement'; a 31% to 69% reduction is considered moderate improvement; and 30% or less is considered a treatment failure (Stanley & Turner, 1995), the above findings would be considered treatment failure. However the author notes that in studies where this criteria has been used, the behavioural treatment has usually been administered over an average of twenty sessions (Clark, 1996). Considering that the present study administered only three treatment sessions and that only minimal therapist time was required, the modest gains were reasonable and cost-effective. It is unknown however whether additional treatment sessions would produce clinically significant results.

The previous studies have all employed three treatment sessions of 45 minutes per participant. At this dosage of treatment not all participants are improving. Performance on the program is indicated by the feedback score achieved. Each time the participant directs the on-screen computer person towards the spider points are accumulated and displayed on the screen. Performance on the program appears to follow a learning curve with group results not reaching ceiling effect at the end of the three sessions. This would indicated that there is still room for further learning and hopefully phobic improvement with additional treatment sessions.

Only two studies investigating the Fearmaster program to date have employed a behavioural assessment component (Clark, 1996; & Gilroy, 1998). In both studies the results of the Behavioural Approach Tests (BAT) have indicated statistically significant improvement. In the study by Clark (1996) the number of participants with OCD who washed their hands after planting a daffodil bulb decreased from 12 to 7, from pre- to post-treatment. It has been demonstrated that with exposure treatment behavioural gains occur earlier in treatment, followed by subjective experiences of improvement (Mavissakilian & Michelson, 1982). Authors concluded that the first beneficial effect of exposure treatment was to control unwanted responses at a behavioural level, and that autonomic and subjective signs of distress associated with non avoidance initially occur, only to be gradually extinguished later. It may be that the limited number of Fearmaster treatment

sessions administered per participant to date, has been insufficient to make substantial improvements in the more slow to respond, subjective measures.

The aim of the present study therefore is to examine whether additional treatment sessions result in further clinical improvement. The design of the study therefore is to compare participants who receive three x 45 minute sessions of the Fearmaster program, to participants who undertake six x 45 minute sessions in the same time frame, on a number of treatment outcome measures. It is hypothesised that:

1) that both groups will improve performance on the Fearmaster across sessions;

2) participants in both treatment conditions (three versus six sessions) will demonstrate symptom improvement with treatment;

3) that the participants in the six session group will demonstrate a greater reduction in symptoms from pre-treatment to post-treatment to follow-up, on a number of self rating scales and a behavioural approach test; and

4) that six session participants will also engage in more self-exposure homework activities from post-treatment to follow-up at 4 weeks.

Methodology

Participants

Participants were recruited by newspaper advertisements and community notices (Appendix A). Responses were received from 61 people. Of these, 21 people did not proceed with the study after being informed of the study requirements. The remaining participants read and signed information and consent forms (see Appendix B). One participant was omitted because he did not meet inclusion criteria. A further nine people discontinued with the study at various points throughout the procedure, after receiving at least one treatment session. Reasons for attrition cited were work commitments (n=2);

travel commitments (n=3); sports commitments (n=1); hospitalisation (n=1); fear of the Behavioural Approach Test (n=1); and the participant's decision that they were cured (n=1). No participants expressed concerns with the treatment as their reason for terminating involvement. Of the remaining 30 participants, 15 were randomly allocated to receive three treatment sessions and 15 were allocated to receive six treatment sessions. Of the 61 initial responses, 8 were from males. Only two of these males commenced treatment, and neither completed treatment until the final assessment. Participation was voluntary and no payment was offered.

Participants all met the DSM-IV criteria for specific phobia (American Psychiatric Association, 1994) (see Appendix C), as determined by the Composite International Diagnostic Interview-Automated (CIDI-A) (Andrews, Morris-Yates, Peter, & Teerson, 1993). Participants had a minimum of one year duration of the phobia, and were unable to perform step five and beyond in the initial Behavioural Approach Test (BAT) (Hassan, 1992). This step required participants to hold a jar containing a live Delanea Canceride (Araneae: Sparassidae) more commonly known as the Huntsman spider, close to their faces to observe the spider inside. No participants had a concurrent psychotic disorder, were taking psychotropic medication, or had a substance abuse problem. No participants had a medical condition that could place them at risk during fear arousal. Participants were aged between 17 to 54 years and were randomly allocated to the treatment groups (n=15 per group)

Materials

Each participant received the following diagnostic and symptomatology assessments at the initial interview.

1. CIDI-A (Andrews et al., 1993) to confirm that participants met DSM IV criteria for Specific phobia of spiders. A WHO Field Trial of the Core CIDI demonstrated a interrater reliabilty and test-retest reliability with KAPPA values above 0.9

2. National Adult Reading Test (NART) (Nelson 1983) to compare the treatment groups for mean intelligence, and control for the possible influence of intelligent on treatment outcome. The NART was selected as vocabulary correlates best with overall ability levels (Lezak, 1983). The NART comprises 50 phonetically irregular words. A standard score is calculated by the formula 128-(0.83*NART Errors). This gives a minimum score of 86.5 and a maximum score of 128.

3. The Fear Questionnaire (FQ) (Marks and Matthews, 1979). This provides four scores:

Main phobia refers only to the target phobia (ie. spider phobia), and is rated on a scale from '0-would not avoid it' to '8-would always avoid it'. Interrater reliability of the main phobia score is high, varying from 0.8 to 0.95

Global phobia refers to all phobic symptoms rated on a scale from '0-no phobias present' to '8-very severely disabling/disturbing'. Test-retest reliability is 0.79.

Total phobia is the sum of the agoraphobia, blood-injury, and social phobia subscores determined via a short questionnaire on 14 common phobia situations. Test-retest reliability is 0.85.

Anxiety-depression is the sum of 5 questions about emotions, rated on a scale from '0- hardly at all' to '8-very severely troublesome'. Test-retest reliability is 0.86.

4. Phobic Targets (PT) and Work and Adjustment Rating Scales (WARS) (Watson and Marks, 1971) which were administered by computer. The phobic problem (ie spiders) was rated for how much it upset and/or interfered with the participant's daily activities on a scale ranging from '0-does not' to '8-very seriously/continuously. Four targets were then

identified by the participant (eg. to be able to look at a spider without undue anxiety). These were rated for progress towards achieving each target on a scale ranging from '0-complete success/ no discomfort' to '8-no success/ very severe discomfort'. Finally the amount of impairment the phobia caused in the participant's work, family life, home management, social leisure, private leisure and level of depression were each rated on a scale from '0-not at all' to '8-very seriously'.

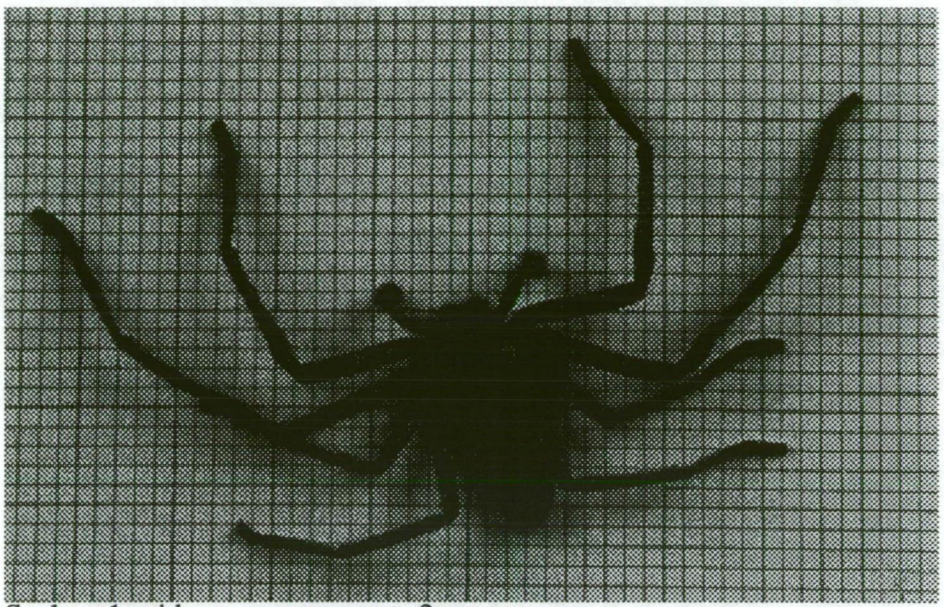
5. The Spider Questionnaire (SQ) (Watts and Sharrock, 1984). This comprises of 43 items rated as true or false. Questions reflect phobic vigilance, internal preoccupation, avoidance/coping, and factual knowledge of spiders. A higher score indicated more self reported fear. External validity studies have confirmed the vallidity of the scales, with scores generally very stable at retest in a no-treatment group. The questionnaire also relates well to more conventional measures such as avoidance tests.

6. A Behavioural Approach Test (BAT) adapted from Hassan (1992), including a Subjective Units of Distress Scale (SUDS). This test involved 11 increasingly difficult tasks in approaching a spider (see Table 1). Each completed step scored 2 points, with an incomplete attempt scoring 1 point. Higher scores reflected less avoidance. At each step participants indicated their SUDS score on a scale ranging from '0-no anxiety' to '100-extreme anxiety'.

The BAT room was 6 x 3 metres, well illuminated, with the spider placed in a transparent plastic container on a table about 4 metres from the door. Over the course of the study two 10-12cm Delaneas Cancerides, Aranae: Sparassidae (Huntsmen) spiders matched for appearance were used, due to the death of the initial spider (see Figure 1). The researcher remained in the room during the test, and provided debriefing afterwards.

Two outcome measures were derived from this assessment. Firstly the Highest BAT Step Attempted was recorded to indicate performance in approaching the spider.

Secondly the SUDS score at the Highest BAT Step Completed (ie. achieved a score of 2 points) was recorded to indicate the level of distress whilst approaching the spider.



Scale = 1 grid square represents 2 mm.

Figure 1: A photo of the first Delanea Cancerides, Aranae: Sparassidae (Huntsman Spider) used during the BAT. A second, identical spider was used during follow-up assessment BATS.

Table 1: The Behavioural Approach Test.

Behavioral Approach Test (BAT) adapted from Hassan (1992)

You are required to perform the following steps in the same order of presentation.

Please stop performing these steps and immediately leave the room whenever you begin to feel increasingly anxious.

At each level you will be stopped and asked several brief questions relating to your levels of anxiety in completing the task.

Step 1	Open the door and enter the room;
Step 2	Reach the table in which the transparent box containing the live spider is placed;
Step 3	Look at the spider therein;
Step 4	Touch the box with your hand;
Step 5	Lift the box and hold it using both hands;
Step 6	Hold the box close to your face and observe the details of the spider therein;
Step 7	Put the box on the table and open it without removing the lid completely;
Step 8	Remove the lid and let the spider loose on the table;
Step 9	Replace the spider in the box, and close it;
Step 10	Re-open the box, have the spider on the table and handle it using both hands;
Step 11	Replace the spider in the box and close it.

The FQ, SQ, PT, WARS, and BAT including SUDS were also administered at post treatment (directly following the final treatment session) and 4 weeks follow-up assessment. At these two assessment periods participants also completed the Homework Questionnaire (see Table 2).

7. The Homework Questionnaire (HW) (Smith, 1994) contains 10 items rated Yes, NO, or Prior to indicate the occurrence of self-exposure activities. The higher the Yes_HW

score the more self-exposure tasks the participant engaged in following the commencement of treatment.

Table 2: The Home work Questionnaire

HOMEWORK QUESTIONNAIRE

Subject No._____ **Date:**_____
Session:_____

Please indicate whether you have done any of the following activities since the commencement of your treatment by placing a tick in the appropriate box provided. If you engaged in this activity prior to you treatment, please indicate this as well by placing a cross in the box labelled prior.

		Yes	No	Prior
1.	Have you held a toy spider in your hand?	❐	❐	❐
2.	Have you in the past weeks looked at any pictures of spiders?	❐	❐	❐
3.	Have you gone to any places where you thought spiders may be?	❐	❐	❐
4.	Have you been reading any articles about spiders?	❐	❐	❐
5.	Have you touched or looked at a dead spider?	❐	❐	❐
6.	Have you held or let a spider crawl on to you?	❐	❐	❐
7.	Have you purposefully approached a live spider?	❐	❐	❐
8.	Have you watched any films or documentaries about spiders?	❐	❐	❐
9.	Have you attempted to find a live spider that you could catch and look at?	❐	❐	❐
10.	Have you purposefully kept a spider in your house	❐	❐	❐

Procedure

Once selected, participants were randomly allocated to receive either 3 treatment sessions (n=15) or 6 treatment sessions (n=15) within 3 weeks . During the initial session, participants were administered the CIDI-A, the NART, Fear Questionnaire, Phobic Targets, WARS, Spider Questionnaire, BAT, and SUDS.

Treatment sessions commenced one week after this initial screening and pre-treatment session. Participants receiving three treatment sessions completed each 45 minutes treatment sessions at weekly intervals. Participants receiving six treatment sessions completed 45 minute treatment sessions scheduled twice weekly.

The above assessments were readministered including the Home Work Questionnaire on the same day as the final treatment session, to provide a post treatment analysis of treatment outcome. At least four weeks following the final treatment these assessments were again administered at a follow-up assessment session.

The Treatment

The treatment consisted of either three sessions or six sessions of the Fearmaster program (Kirkby, et al., 1991), an interactive computerised teaching program for self-exposure therapy in anxiety disorders. The program was presented on an Apple Macintosh computer (SE/30) using Hypercard software.

The Fearmaster program instructed participants in vicarious exposure for spider phobia. Participants were asked to treat by exposure techniques an on-screen computer person who was stated as having a fear of spiders. The program first provided a brief tutorial on how to operate the computer mouse using a 'point and click' method to guide the on-screen person around the computer graphics of a home. An outline of the on-screen person's anxiety problem and the participant's task to treat the on-screen person were also provided (see Figure 2). In later sessions the participant could choose to skip this introduction if desired.

At the beginning of each session the participant was required to customise the on-screen computer person by assigning it a gender, name and address. In the initial session the researcher remained with the participant for approximately the first five minutes to answer any questions, before leaving the participant to work alone. No instructions were

given on how to improve performance on the program, and no self-exposure homework instructions were given.

During the sessions, the participants were required to take the on-screen person through an exposure sequence in order to reduce the on-screen person's fear of spiders. The only treatment rationale given was the rationale for exposure therapy and the rationale that in treating the computer figure, participants would learn to treat themselves. On the first screen there was a selection of four buttons titled 'spider picture', 'plastic spider', 'dead spider', and 'live spider'. Each button opened the respective scenario, and scenarios could be opened in any order. The participants could select a button to return to the first screen to change scenarios at any time.

An on-screen thermometer reflected the on-screen person's level of anxiety (varying from 'comfortable' to 'panic'). The anxiety of the on-screen person increased with initial exposure to the phobic stimulus, and then decreased, demonstrating habituation. When the participant directed the on-screen person to engage in a phobic situation points were accumulated towards a target score of 2000 points. A participant's score was recorded automatically by the computer at five minute intervals (9 x 5 = 45 mins) and displayed in the upper left hand corner of the screen (see Figure 3). Performance scores on the program were calculated as the maximum score attained at the end of the session. The program automatically terminated after 45 minutes.

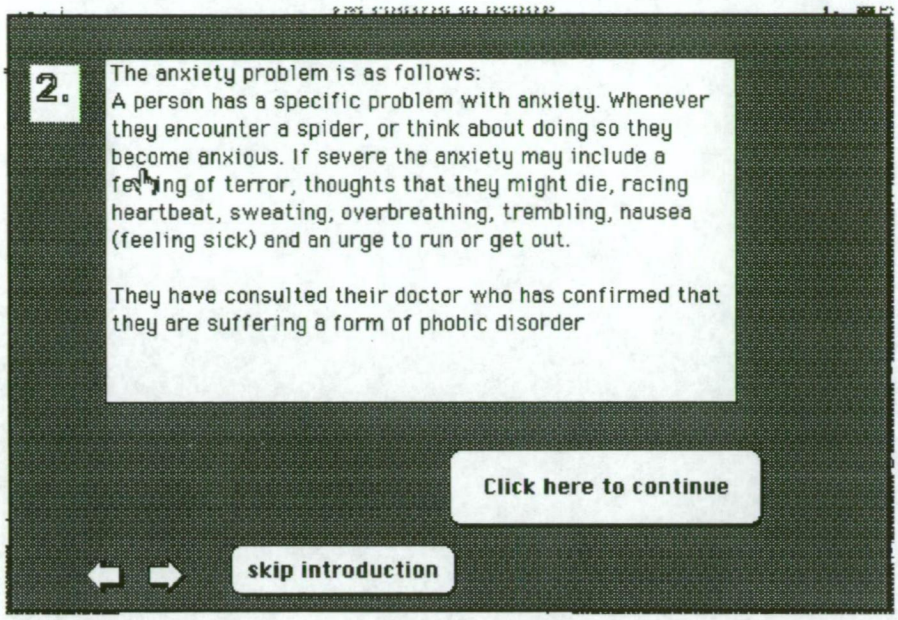
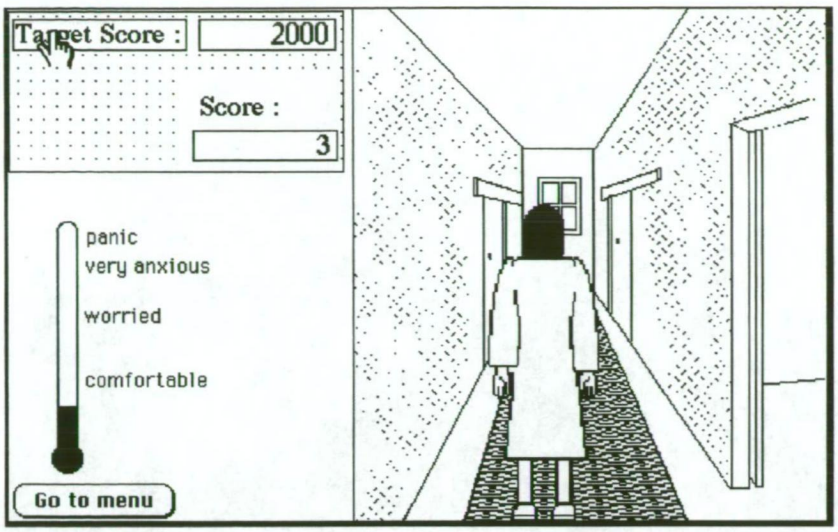


Figure 2: The outline of the on-screen person's phobic anxiety disorder and the participant's instructions to treat the on-screen person.



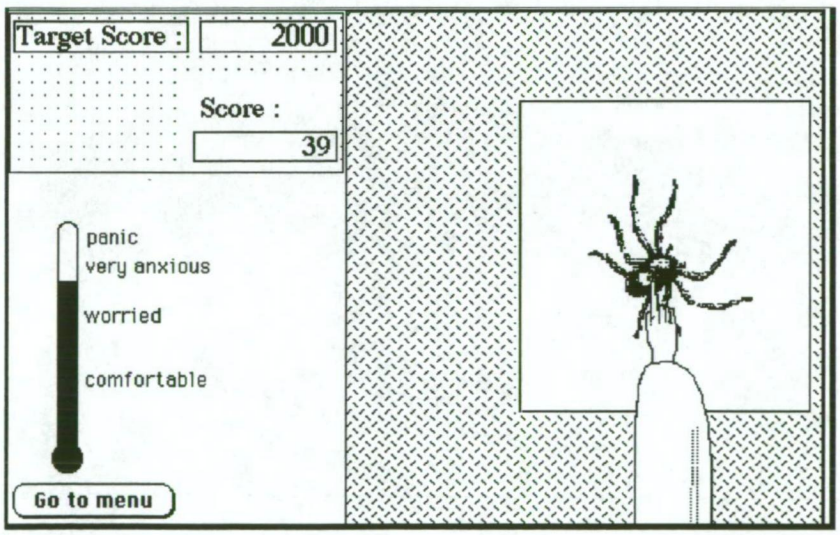


Figure 3: A sample of the screens to appear during a treatment session. The above graphic illustrates the corridor the on-screen person enters into before entering a room with the selected scenario. The second graphic illustrates the 'spider picture' scenario. Both the anxiety displayed via the 'thermometer' and the feedback score have increased as exposure occurs.

Design and Analysis

The study was thus a 2 x 3 mixed design. The between group variable was treatment condition (3 sessions or 6 sessions). The dependant variables were the repeated measures across sessions (pre-treatment, post treatment, and follow-up). The effect of the between group variable of treatment condition was examined using repeated measures analysis of variance (ANOVA). Post-hoc analysis were used where necessary. The raw data can be found in Appendix D.

Results

Group Characteristics

No significant difference occurred between the groups on any of the pre-treatment anxiety measures; on the NART ($F(1,28)=1.548, p>0.05$); or on Age ($F(1,28)=.356, p>0.05$), indicating that both groups were equivalent on these parameters and presented with comparable symptom severity. The two groups did not differ significantly on the time taken to complete the study from pre-treatment assessment to follow-up assessment ($F(1,28)=2.238$, $p=.1458$). The 3 session group took a mean of 60 days and the 6 session group a mean of 74 days. Across both conditions some participants took longer than the three weeks to complete their assigned number of treatments, with the longest time being 7 weeks for one six session participant. Due to various reasons (eg. participants moving house or going on holiday) the follow-up period extended for as long as 16 weeks in some cases (n=5).

Table 3: Means and standard deviations of treatment groups for the group characteristic measures.

	Three Session Group	Six Session Group
NART (SD)	117.9 (5.9)	120.2 (3.9)
AGE (SD)	31.4 (13.7)	33.7 (6.4)
Total Time Taken in Days (SD)	59.7 (16.3)	74.1 (33.7)

Treatment Outcome Measures

The following measures were analysed with repeated measures ANOVAs. Table 4 presents the means for the groups, 3 sessions or 6 sessions, on the outcome measures Spider Questionnaire, FQ Main, FQ Total, FQ Anx/Dep, and FQ Global.

Significant main effects for session (pre, post, and follow-up) were found for all these outcome measures: SQ $F(1,2)=15.609, p<.0001$; FQ Main $F(1,2)=9.008, p=.0004$; FQ Anx/Dep $F(1,2)=5.114, p=.0092$; FQ Global $F(1,2)=15.630, p<.0001$, with the exception of FQ Total ($F(1, 2)=.686$, $p>.05$). No significant interactions were found. Inspection of the means indicates that both groups scored less for phobic symptomatology on these measures, excluding FQ Total, with treatment. A differential group effect on the post SQ means was approached but did not reach significance as indicated by a post hoc t-test ($t=-1.95$, $p=0.06$)

Table 4: Mean outcome measures and standard deviations of treatment groups for SQ, FQ Main, FQ Total, FQ Anx/Dep, and FQ Global, at pre-treatment, post-treatment, and follow-up assessment.

	3 Sessions			6 Sessions		
	Pre	Post	F-Up	Pre	Post	F-Up
SQ (SD)	25.1 (3.8)	23.5 (4.6)	21.5 (5.6)	23.1 (5.3)	19.6 (6.3)	17.3 (6.6)
FQ Main (SD)	7.7 (0.8)	7.1 (1.6)	5.9 (2.5)	8 (0)	6.1 (2.6)	6.1 (2.4)
FQ Total (SD)	23.6 (22)	19.5 (16)	23 (15.3)	27.4 (26)	28.7 (23)	28.4 (24)
Anx/Dep (SD)	10.1 (8.3)	10 (8.2)	6.9 (4.6)	14.2 (13)	11.4 (9.6)	10.7 (10)
FQ Global (SD)	5.8 (2.0)	4.7 (2.3)	3.9 (1.9)	5.1 (2)	4.4 (2)	3.9 (2.1)

Table 5 represents the means for Problem, Target 1, Target 2, Target 3, Target 4, Social Leisure, Private Leisure, Home Management and Family Life. Significant main effects were found for session for Problem $F(1,2)=14.195$, $p<.0001$; Target 1 $F(1,2)=22.688$, $p<.0001$; Target 2 $F(1,2)=11.394$, $p<.0001$; Target 3 $F(1,2)=17.508$, $p<.0001$; Target 4 $F(1,2)=3.736$, $p=.0308$; Private Leisure $F(1,2)=6.679$, $p=.0026$; and for Home Management $F(1,2)=10.473$, $p=.0002$. Again inspection of the means indicates a decrease in symptoms across treatment for both groups. A significant interaction effect was found between group allocation and session for Target 1 $F(1,2)=4.660$, $p=.0138$. Post hoc t-test indicates that six session participants decreased significantly more at post - treatment assessment in their anxiety about performing their first target behaviour

(t = - 2.53,p=.0177).

Table 5: Mean outcome measures and standard deviations of treatment groups for Problem, Target 1, Target 2, Target 3, Target 4, Social Leisure, Private Leisure, Home Management and Family Life.

		3 Session			6 Session	
Measure	Pre	Post	F-Up	Pre	Post	F-Up
Prob (SD)	5.5 (2.6)	4.8 (2.0)	3.7 (1.5)	5.5 (1.9)	4.2 (2.3)	2.9 (2.0)
Targ1 (SD)	7.1 (1.2)	6.3 (1.5)	4.9 (1.9)	7.7 (0.9)	4.4 (2.4)	4.5 (2.8)
Tar2 (SD)	7.3 (0.9)	5.9 (2.3)	5.1 (2.2)	6.5 (2.2)	5.4 (2.2)	4.5 (2.7)
Tar3 (SD)	7.1 (1.4)	5.7 (2.2)	4.1 (2.3)	6.6 (1.5)	4.9 (2.6)	3.8 (1.4)
Tar4 (SD)	6.6 (2.0)	5.1 (2.5)	5.1 (2.3)	6.5 (2.3)	5.7 (2.7)	5.1 (3.3)
WR (SD)	0.8 (1.2)	0.8 (1.2)	0.7 (1.4)	0.9 (2.3)	0.6 (1.7)	0.1 (0.3)
SL (SD)	0.7 (1.6)	1.0 (1.5)	0.3 (0.6)	0.6 (1.5)	0.8 (1.8)	0.3 (0.8)
PL (SD)	2.9 (2.6)	1.5 (2.0)	1.9 (2.3)	2.5 (2.3)	1.3 (2.3)	1.3 (2.1)
HM (SD)	2.7 (2.4)	1.9 (2.0)	1.7 (1.9)	3.6 (2.4)	1.7 (2.3)	1.1 (1.8)
FL (SD)	0.8 (1.4)	0.7 (1.1)	1.1 (2.4)	1.6 (2.3)	0.8 (2.0)	0.5 (1.1)

Table 6 represents the means for the Depression rating on the WARS, the number of Home Work Activities engaged in by participants, the SUDS for the Highest BAT Step Completed, and the Highest BAT Step Attempted. Significant main effects for session were found for Depression F(1,2)=3.435,p=.0397; the SUDS for the Highest BAT Step Completed F(1,2)=6.131, p=.0051; and for the Highest BAT Step Attempted F(1,2)=32.057,p<.0001. Inspection of the means indicate that participants reported less depression with treatment, and that they were able to perform higher BAT steps with less subjective experience of distress. A post hoc unpaired t-test for the follow-up Highest BAT Attempted means, indicated significant difference between the groups, with the six

session group performing more difficult steps than the three session group (T=2.25, p=0.03).

Table 6: Mean outcome measures and standard deviations of treatment groups for the Depression rating on the WARS, the Home Work Activities performed, the SUDS for the Highest BAT Step Completed, and the Highest BAT Step Attempted, at pre-treatment, post-treatment and follow-up assessment.

	3 Sessions			6 Sessions		
	Pre	Post	F-Up	Pre	Post	F-Up
Dep (SD)	1.5 (1.9)	1 (1.5)	0.9 (1.4)	1.9 (2.5)	0.8 (2)	0.8 (1.5)
HW_Yes (SD)	.	2.2 (1.9)	2.3 (1.8)	.	2.3 (1.3)	2.7 (1.5)
SUDS (SD)	75 (28.7)	57.7 (32)	56.4 (37)	77.3 (26)	54.2 (24)	42.3 (23)
BAT (SD)	2.7 (1.9)	4.7 (2.7)	5.1 (3.1)	3.1 (1.5)	5.5 (2.4)	7 (2.5)

Fearmaster Proficiency Data

Performance scores on the Fearmaster program were calculated as the maximum score attained at the end of each session. This score was then divided by the time taken within each session to indicate the speed of performance. The means for final score at each session, time taken, and speed of performance are depicted in Table 7.

A significant main effect was not found for final score across sessions for either the six session group (F(13, 5)=.71, p=.620) or the three session group (F(14, 2)=.93,

p=.4046), indicating fairly constant performance. The two groups also did not differ significantly on the final score (score at FM6 for the six session group, and score at FM3 for the three session group) as t=1.66, p=0.1088, although means indicate that the six session group did score slightly higher. Similarly unpaired t-tests at FM1, 2, and 3 indicate no differences between the two groups. This was expected as at this stage treatment dosage did not differ.

A significant main effect for the six session group was demonstrated on the time taken to reach final score across sessions, $F(13, 5)=14.51$, $p<.0001$, where time taken decreased with each session. A similar main effect was also indicated in the three session group, $F(14, 2)=18.45$, $p<.0001$, again with time taken to achieve final score decreasing across sessions. The speed at which points were accrued also increased significantly across sessions for the six session group, $F(13, 5)=10.63$, $p<.0001$, and the three session group, $F(14,2)=19.96$, $p<.0001$. This indicates that although participants attained fairly constant scores across sessions, their efficiency in reaching these scores increased.

The two groups did not differ significantly at respective final session on the speed at which points were accrued, t=1.14, p=0.1702, although means again indicate that the six session group performed slightly faster. Inspection of the means indicate that participants in the six session group were accumulating approximately 40 more points per minute than participants in the three treatment group. As mentioned above, the speed in accumulating points increased significantly across all six sessions. At the sixth session there was no evidence that participants had reached a ceiling speed. It is possible that with additional treatment sessions the increase in proficiency on the program will continue to increase.

Table 7: Mean Fearmaster performance scores and standard deviations for both six session and three session groups, for final score, time taken, and speed at which points were accrued.

	3 Sessions			6 Sessions					
	FM1	FM2	FM3	FM1	FM2	FM3	FM4	FM5	FM6
Final Score	1520	1736	1454	1723.1	1890.7	1700.1	1838.9	1580.4	1751.1
(SD)	(741.6)	(495.4)	(471.3)	(767.4)	(519.9)	(393.1)	(353.7)	(440)	(326)
Time(mins)	31 (13)	20 (11)	13.3 (8.8)	27.9 (8.7)	20.7 (11.1)	19.3 (12.5)	15 (8.1)	12.9 (6.4)	12.5 (5.5)
(SD)									
PTS/Min	55.8 (34.7)	111 (52.6)	129.9	67 (41.8)	109.6	130 (88.6)	154.1	143.4	170 (92.1)
(SD)			(47.1)		(44.9)		(78.4)	(59.6)	

Discussion

The following provides a discussion of the results in relation to the hypotheses made. A number of methodological issues of the study are then addressed, and finally issues that future research should address are described in the concluding section.

Performance on the Fearmaster

The hypothesis that both groups would demonstrate an increase in performance on the Fearmaster, as indicated by the maximum final score was not supported. Instead participants demonstrated a fairly constant final score across all sessions. This finding is not in keeping with those of the previous studies using the Fearmaster program (Clark, 1996; Gilroy, 1998; Harcourt, 1996; Hutchinson, 1992; & Smith, 1994). In all of these studies participants demonstrated highly significant increases in performance across sessions.

The failure to support this hypothesis in the present study may have resulted from the fact that participants did not have to continue with the program for the full 45 minutes, once a score of 2000 points had been reached. Unlike the earlier studies few participants continued with the program to achieve scores much higher than 2000 points each session. Additionally it is also possible that high scores were achieved in earlier sessions due to the simplicity of the graphics decreasing the realism of the spider, and the distance created by the participant acting as 'therapist' rather than the patient. These factors may have decreased the anxiety provoked by the program. The graphics in the program were kept simple as the emphasis of the program was on teaching the principles of exposure treatment rather than direct exposure of the participant to images of spiders.

Although final scores did not increase significantly across sessions, this does not mean that the principles of exposure therapy were not learnt. Indeed the time taken to reach

final score, and the speed at which points were accrued, increased significantly for both groups across sessions, indicating that learning did occur, to increase efficiency in performing the program. Furthermore results indicated that further increases in performance may occur with additional treatment sessions. This increase in performance may correlate with further treatment gains.

The Effect of the Fearmaster on Phobic Symptomatology

The hypothesis that both groups would demonstrate significant improvement in symptomatology on a range of subjective measures and the Behavioural Approach Test was supported. Both groups reported fewer spider phobia symptoms; less general anxiety and depression; less interference of the phobia experienced during private leisure; social leisure and home management time; and more success achieving phobic relevant approach behaviours with less anxiety. These results replicate findings by Smith (1994) and Gilroy (1998) where participants with spider phobias demonstrated symptom improvement after treatment with the Fearmaster.

These findings ranged from 'moderate' to 'much improvement' in terms of clinical significance. These results compare favourably to those of Clark's (1996). Clark (1996) found only moderate improvement in ratings for depression and treatment failure for symptoms of obsessive compulsive disorder. It may be that participants with spider phobia are less resistant to this form of computer-delivered treatments than participants with OCD.

Differential Group Effects

The hypothesis that the six session group would demonstrate greater symptom reduction than the three session group was supported. A differential group effect on the Spider Questionnaire at post-treatment assessment was approached but did not reach significance. The trend indicated that the six session group reported less phobic

symptoms. This result may have reached significance with an increase in participant numbers to increase statistical power.

A significant group effect was found for Target 1 at post-treatment assessment, indicating that the six session group decreased significantly more in their anxiety about performing their first target approach behaviour. Finally a significant group effect was found on the Behavioural Approach Test at follow-up, with the six session group performing more difficult steps than the three session group.

This finding is of particular importance as the Behavioural Approach Test assimilates real life tasks, so improvements indicate increased ability to cope with the phobic stimulus in real life. These differential group effects are interesting in light of the fact that the two groups were comparable in symptom severity at pre-treatment and that both groups received that same treatment, only at different dosages.

Methodological Issues

The significant finding on the Behavioural Approach Test highlights a particular strength of this study. Only two of the previous studies investigating the Fearmaster program employed a Behavioural Approach Test (Clark, 1996; & Gilroy, 1998). In both studies the results, like the present findings, were statistically significant. It has been demonstrated that with exposure treatment behavioural gains occur earlier in treatment, followed by subjective experiences of improvement (Mavissakilian & Michelson, 1982). It is therefore advantageous to employ a behavioural assessment, as this is more sensitive to initial improvements. The Behavioural Approach Test is also important as it is a more objective measure, less influenced by demand effects, and it has more face validity in that it approximates real life situations. The differential group effect found on the Behavioural Approach Test is therefore significant as it suggests that with additional sessions greater improvements in overcoming phobic avoidance behaviour can be achieved. These findings

need to be qualified however as they where the result of a post-hoc analysis on an interaction effect that was not significant. The initial interaction effect may have been insignificant due to the small sample size limiting statistical power.

Two limitations in the methodology of the study may account for the failure to demonstrate more differential group effects. Firstly the small sample size may have limited statistical power of the analysis. A strength of the sample however was the stringent inclusion criteria employed. Each participant was screened firstly to meet DSM-IV criteria for Specific phobia, and secondly with the CIDI-A, to confirm the diagnosis. The second limitation may have been the difference in the number of sessions administered to each group. It may be that with a greater difference between the two groups in terms of the number of treatment sessions administered, the greater the differential effects between the two groups on treatment outcomes. The present difference of only three treatment sessions may not have been enough to highlight increases in improvement, especially in subjective measures, with additional treatment sessions.

Another limitation of design was the failure to control for therapist contact. Thus the design fails to rule out the alternative hypothesis that three additional sessions of any type of therapeutic contact would be beneficial. This confound could have been avoided by comparing three sessions of computer-based treatment plus three sessions of nonspecific treatment to six sessions of computer-based treatment. Although this failure of design could have been avoided time constraints of the researcher did not permit the assessment and treatment of a third group of participants. It is also noted that participants completed the treatment sessions on their own with only minimal contact with the therapist at the start and end of sessions.

Implications and Conclusions

Overall, the general findings support the clinical utility of the Fearmaster program and the use of symbolic modelling techniques. The study has followed a series of

investigations into the validity of the program and replicated and supported these previous findings. The present results have shown that additional treatment sessions result in increases in treatment effect. The stronger treatment effect reinforces the efficacy of this treatment approach, which has the potential to be widely available and cost-effective.

An important direction for future research would thus be to continue investigating dosage effects by further increasing session numbers. The fact that participants did not reach a ceiling effect in their performance on the program suggests that further learning and improvements in performance of the program may be achieved with additional sessions. Additional treatment sessions may result in further improvement on the subjecting rating measures which take longer to appear than behavioural gains (Mavissakilian & Michelson, 1982).

The inclusion of the Behavioural Approach Test in assessment is also recommended. Other treatment factors which may also be manipulated to examine their effects on treatment outcome could be the amount of therapist contact, the realism of the computer graphics, the instructions administered to participants, and the difficulty of tasks within the program. Initial findings are very promising and show that six treatment sessions are better than three treatment sessions on some treatment outcome measures.

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Appendix A.

Newspaper Adervisement and Poster for Mental Health Centres.

Newspaper Advertisement.

Spiders Spiders Spiders?

Do you have a persistent and excessive fear of spiders? When you are near to spiders do you feel nervous or the need to escape? The University of Tasmania is currently investigating computer based treatment for spider phobia, and is looking for volunteers to receive free treatment as part of this study. For more information contact Jacqui Fraser on (03) 62 354885.

Poster for Mental Health Centre and Comunity Noticeboards.

Spiders Spiders

Volunteers Wanted

Do you have an excessive and persistent fear of spiders? When you are near spiders do you feel **anxious or panicked**?

I am a psychology masters student investigating computer based treatment for these symptoms. Volunteers are needed to undertake free treatment as part of this study. If you are interested in participating please call me (jacqui fraser) or leave a message on (03) 62 26 4885.

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Appendix B.

Information Sheet, Consent Form and Personal Data Sheet.

Information Sheet

Title of Investigation: Computer-based Modelling of Exposure for Spider Phobia.

Chief Investigator: Dr Kenneth Kirkby *Researcher:* Jacqui Fraser

Purpose of Study: This study aims to evaluate the usefulness of a computer-based treatment for phobias. The development of a more effective, low cost treatment will allow help to become more available for people with spider phobias.

As part of this research, we require the assistance of people suffering from spider phobia. There is no payment for your participation, or any charges for the treatment. The information that you give us will be kept in the strictest confidentiality. Only the researchers conducting the investigation will have access to the identifying data. The results of the study will be available on request.

If you decide to participate in the study, your task will be to use a computer program several times over a three week period. Each session will last 45 minutes, adding up to between 3 to 6 hours in total. We will also measure your level of anxiety before and after treatment with a number of short questionnaires. We also ask to see participants for 1 hour, two month after treatment for a follow-up assessment.

The computer treatment is a bit like a computer game. It does not require any previous computer experience. We will teach you what you need to know. The program is designed to help you learn the skills to treat spider phobia. Your task will be to direct screen "patient" into different scenarios involving a spider (e.g. entering a room with a picture of a spider on the wall). Seeing the spider-like symbols may make you feel anxious. If this occurs we will try to help you remain calm, however if you do not wish to continue you are completely entitled to withdraw from the program. This does not affect your right to other treatments. **Participation is entirely voluntary**.

If you require any further information at any stage **please contact Dr K. Kirkby or Jacqui Fraser on 62264885**. If you have any ethical concerns or complaints about the manner in which the project is being conducted, you may contact the following member of the University of Tasmania Ethics Committee:

Mrs Chris Hooper : 62262763

This study has been approved by the University of Tasmania Ethics Committee and complies with the laws of the state. Should you require any further assistance with your phobia, staff is available to discuss and assist with an appropriate referral. You will be given copies of the information sheet and consent forms to keep. **Thank you for your participation.**

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH INTO COMPUTER-BASED TREATMENT FOR SPIDER PHOBIA.

Title of Investigation: Computer-based Modelling of Exposure for Spider Phobia.
Chief Investigator: Dr Kenneth Kirkby *Researcher:* Jacqui Fraser

PLEASE READ THE FOLLOWING AND SIGN AND DATE THIS FORM

1. I have read and understood the information sheet for this study.

2. I understood that the study involves the following procedures:
   - Completing interviews and questionnaires at different stages.
   - Taking part in a four week treatment program of which three weeks will be interacting with a computer.

3. I understood that I may feel mental and physical symptoms of anxiety.

4. I understood that information I provide and concerning my performance is strictly confidential (to be shared with me at my request, but with no-one else unless I give permission).

5. I agree to participate in this investigation and understand that I may withdraw at any time without effecting my future medical care.

6. I agree that the research data gathered for the study may be published providing that I cannot be identified as a participant.

Name of Participant----------
Date----------/----------/----------*Signature*----------
Name of Witness----------*Date*---
----------/----------/----------*Signature*----------

I have explained this study and the implications of participation to this volunteer and I believe that the consent is informed and that he/she understands the implications of the participation.

Name of Researcher----------
Date----------/----------/----------*Signature*----------

Appendix C.

DSM IV Criteria Confirmation Sheet

A. Marked and persistent fear that is excessive and unreasonable, cued by presense or anticipation of spiders. **Fulifilled criteria y n**

How do you describe your fear of spiders?.....
.....
What happens when you see a spider?.....
.....
What happens when you think you might see a spider?.....
.....

B. Exposure to spiders almost invariably provokes an immediate anxiety response, which may take the form of a situationally specific panic attack.
Fulifilled criteria y n

How do you feel when you are confronted by a spider?.....
.....

C. The person recognises that the fear is excessive or unreasonable.
Fulifilled criteria y n

Do you think that this fear is unreasonable?.....
.....

D. The phobic stimuli is avoided or else endured with anxiety or distress.
Fulifilled criteria y n

How do you cope with your fear of spiders?.....
.....

E. The avoidance, anxious anticipation, or distress in the feared situations interferes significantly with the daily routine, occupational functioning, or social activities/ relationships, or there is marked distress.
Fulifilled criteria y n

Does this fear of spiders interefere significantly with your daily routine, occupation, or schooling, or social life, or cause you marked distress?.....
.....

Subject ID	Group	Pre_SQ	Post_SQ	F/Up_SQ	Pre_FQ Main	Post_FQ Main	F/Up_FQ Main	Pre_FQ Tot	Post_FQ Tot	F/Up_FQ Tot	Pre_FQ Anx/D
98jf002	6_SPDSESS	13	13	17	8	6	7	14	18	15	4
98jf003	6_SPDSESS	16	8	10	8	0	8	2	7	7	4
98jf007	6_SPDSESS	25	17	18	8	5	6	7	11	9	1
98jf008	3_SPDSESS	24	29	25	8	8	5	15	19	22	13
98jf009	6_SPDSESS	30	24	14	8	5	6	8	20	20	0
98jf010	3_SPDSESS	21	21	22	8	4	3	10	9	15	8
98jf011	3_SPDSESS	30	29	28	8	7	6	7	7	6	6
98jf012	3_SPDSESS	26	22	20	8	8	8	24	21	32	0
98jf013	6_SPDSESS	21	23	21	8	8	8	1	7	6	6
98jf014	6_SPDSESS	26	19	17	8	8	8	20	18	16	24
98jf016	3_SPDSESS	31	23	21	7	8	4	50	27	27	21
98jf018	6_SPDSESS	15	16	10	8	8	4	11	20	13	4
98jf019	6_SPDSESS	23	17	10	7	•	1	8	•	1	6
98jf020	3_SPDSESS	22	19	17	5	6	8	52	50	58	26
98jf022	3_SPDSESS	25	22	19	8	8	8	11	10	7	0
98jf023	6_SPDSESS	25	24	24	8	8	3	33	30	38	14
98jf024	6_SPDSESS	27	21	10	8	2	1	36	37	39	22
98jf025	3_SPDSESS	26	25	25	8	8	8	32	31	31	9
98jf026	6_SPDSESS	30	32	29	8	8	8	94	95	78	46
98jf027	3_SPDSESS	27	23	14	8	6	2	22	24	18	7
98jf029	6_SPDSESS	26	26	27	8	8	8	57	50	58	20
98jf030	3_SPDSESS	28	28	28	8	8	8	27	21	19	3
98jf031	3_SPDSESS	26	27	28	8	8	3	80	54	53	11
98jf034	3_SPDSESS	19	25	22	8	8	8	0	2	15	0
98jf035	3_SPDSESS	29	28	27	8	8	8	10	9	18	23
98jf036	3_SPDSESS	18	12	9	7	3	2	3	6	15	9
98jf039	6_SPDSESS	27	25	24	8	8	8	60	49	69	30
98jf040	6_SPDSESS	19	18	19	8	7	7	20	24	15	8
98jf041	6_SPDSESS	24	11	10	8	4	3	20	16	14	16
98jf042	3_SPDSESS	25	20	18	8	8	8	12	3	10	15

Subject ID	Post_FQ Anx/D	F/Up_FQ Anx/D	Pre_FQ Pres	Post_FQ Pres	F/Up_FQ Pres	Pre_Dist	Post_Dist	F/Up_Dist	Pre_Target 1	Post_Target 1	F/Up_Target 1
98jf002	9	5	4	2	3	5	.	2	8	.	8
98jf003	6	5	2	2	2	2	2	2	8	8	6
98jf007	2	2	6	5	5	6	.	5	8	.	6
98jf008	9	4	7	7	4	8	7	4	8	6	2
98jf009	2	0	6	5	4	6	5	3	8	3	5
98jf010	6	7	5	4	3	4	4	3	7	4	3
98jf011	6	10	7	7	6	4	7	6	6	8	6
98jf012	5	2	7	1	1	2	2	3	6	7	7
98jf013	0	1	5	7	7	6	7	2	8	1	7
98jf014	19	13	7	3	2	7	3	2	8	4	4
98jf016	18	12	5	3	3	8	5	2	6	4	4
98jf018	4	3	4	3	2	2	3	1	8	6	2
98jf019	.	2	4	.	2	6	1	0	8	2	1
98jf020	16	14	4	2	2	2	2	5	8	7	6
98jf022	0	0	6	4	3	4	4	3	8	6	8
98jf023	16	11	2	3	2	6	2	3	8	6	8
98jf024	21	20	6	4	3	6	4	4	5	2	1
98jf025	10	10	8	7	4	8	5	3	8	8	5
98jf026	34	34	8	8	8	8	8	8	8	8	8
98jf027	8	5	2	5	3	2	6	3	4	7	2
98jf029	15	16	4	3	3	4	5	3	8	4	4
98jf030	18	2	8	8	8	8	6	2	8	8	7
98jf031	7	11	8	5	5	8	7	6	8	6	5
98jf034	0	0	5	4	4	7	4	4	8	8	4
98jf035	13	11	8	8	7	8	8	6	6	6	5
98jf036	3	5	4	2	3	3	3	2	7	5	6
98jf039	17	26	8	6	6	8	6	3	8	7	7
98jf040	3	5	7	7	6	6	7	5	7	4	5
98jf041	12	9	3	3	2	4	2	2	8	2	0
98jf042	31	10	3	3	3	7	2	3	8	4	3

Subject ID	Pre_Target 2	Post_Target 2	F/Up_Target 2	Pre_Target 3	Post_Target 3	F/Up_Target 3	Pre_Target 4	Post_Target 4	F/Up_Target 4	Pre_Work	Post_Work
98jf002	8	•	6	8	•	7	6	•	3	0	•
98jf003	1	7	6	8	8	8	1	8	6	0	0
98jf007	8	•	8	8	•	6	4	•	4	0	•
98jf008	8	8	6	8	8	2	8	8	2	0	0
98jf009	8	4	4	6	5	2	8	3	4	2	2
98jf010	8	7	5	8	7	7	6	4	2	3	3
98jf011	6	8	6	6	8	6	6	8	6	0	0
98jf012	7	2	6	8	5	6	2	0	4	0	0
98jf013	8	8	7	8	8	6	8	8	8	0	0
98jf014	8	8	6	4	3	4	4	8	7	0	0
98jf016	6	2	0	8	4	0	7	4	6	0	1
98jf018	6	7	3	7	0	1	•	0	•	0	0
98jf019	8	2	1	7	1	0	6	0	0	0	0
98jf020	8	8	6	4	2	6	2	4	6	0	0
98jf022	8	6	5	6	5	2	8	5	2	2	3
98jf023	8	6	7	4	4	6	8	6	8	0	0
98jf024	3	4	0	5	3	0	4	4	1	0	0
98jf025	8	7	6	8	7	4	6	7	8	0	0
98jf026	8	8	8	8	8	8	8	8	8	8	6
98jf027	8	5	2	5	7	3	8	6	4	0	0
98jf029	7	2	3	6	6	0	7	3	3	0	0
98jf030	8	8	8	8	8	7	8	8	8	2	0
98jf031	8	7	3	8	6	3	8	8	8	0	1
98jf034	8	8	8	8	8	3	8	6	8	2	2
98jf035	6	6	7	8	6	7	7	5	6	3	2
98jf036	7	5	5	8	4	5	7	3	4	0	0
98jf039	6	6	7	7	7	8	8	8	8	0	0
98jf040	8	4	5	8	6	6	8	7	8	0	0
98jf041	6	4	1	8	5	0	8	5	0	2	0
98jf042	6	2	4	6	1	1	8	1	3	0	0

Subject ID	F/Up_Work	Pre_Private	Post_Private	F/Up_Private	Pre_Social	Post_Social	F/Up_Social	Pre_Home	Post_Home	F/Up_Home	Pre_Fam
98jf002	0	0	•	2	0	•	0	1	•	2	0
98jf003	0	0	0	0	0	0	0	7	0	0	0
98jf007	0	0	•	0	0	•	0	0	•	0	0
98jf008	0	2	1	0	1	2	0	2	1	1	3
98jf009	1	4	3	2	1	1	0	4	4	2	0
98jf010	1	5	3	3	0	2	1	3	3	3	4
98jf011	4	4	0	6	0	4	0	5	0	5	0
98jf012	0	3	2	3	0	0	0	3	4	3	0
98jf013	0	2	2	2	0	0	0	2	0	0	4
98jf014	0	1	0	0	0	0	0	4	0	0	2
98jf016	0	6	0	2	0	2	1	6	4	2	1
98jf018	0	0	0	0	0	0	0	0	0	0	0
98jf019	0	3	0	0	0	0	0	4	1	0	0
98jf020	0	0	0	0	0	0	0	0	0	0	0
98jf022	1	2	0	0	0	0	0	2	2	1	0
98jf023	0	0	0	0	0	0	0	2	2	2	0
98jf024	0	3	0	0	0	0	0	6	2	1	1
98jf025	0	3	4	6	1	4	0	1	2	2	2
98jf026	0	8	7	6	5	6	0	8	7	6	8
98jf027	0	0	0	0	0	0	0	0	0	0	0
98jf029	0	4	5	5	0	0	2	4	5	3	0
98jf030	0	8	0	0	6	0	0	8	2	0	0
98jf031	0	2	1	2	0	1	2	2	1	3	0
98jf034	4	0	2	0	0	0	0	0	0	0	0
98jf035	1	7	7	5	2	0	0	5	7	6	0
98jf036	0	0	0	0	0	0	0	0	0	0	0
98jf039	0	0	0	0	0	0	0	0	0	0	3
98jf040	0	3	0	2	0	3	2	2	1	0	1
98jf041	0	4	0	0	2	0	0	4	0	0	2
98jf042	0	2	3	1	0	0	0	3	3	0	3

Subject ID	Post_Fam	F/Up_Fam	Pre_Depr	Post_Depr	F/Up_Depr	Pre_Tot BAT	Post_Tot BAt	F/Up_Tot BAT	Pre_Tot SUDS	Post_SUDS	F/Up_Suds
98jf002	.	2	0	.	0	8	15	14	260	130	230
98jf003	0	0	0	0	0	2	.	.	70	.	.
98jf007	.	0	0	.	0	8	10	11	380	410	380
98jf008	0	0	1	0	0	1	1	1	100	70	75
98jf009	2	0	3	0	0	8	15	15	270	310	140
98jf010	3	2	4	1	0	8	15	13	225	636	120
98jf011	0	2	0	0	2	0	3	.	60	270	.
98jf012	0	0	0	0	0	6	10	8	110	60	25
98jf013	0	0	6	0	1	5	7	8	110	240	220
98jf014	0	0	0	0	0	10	6	.	200	60	.
98jf016	1	0	0	0	0	10	16	15	255	100	30
98jf018	0	0	0	0	0	0	4	12	100	160	150
98jf019	0	0	0	0	0	8	12	18	235	90	40
98jf020	0	0	0	0	0	2	.	.	30	.	.
98jf022	0	0	2	0	0	1	3	2	90	70	80
98jf023	0	0	1	0	2	7	4	8	150	120	170
98jf024	0	0	6	3	0	10	18	22	320	455	380
98jf025	2	0	3	0	1	6	10	16	90	130	320
98jf026	7	4	6	7	5	0	6	15	100	210	280
98jf027	0	0	0	0	0	1	8	14	90	343	50
98jf029	0	1	0	0	2	4	12	12	225	260	205
98jf030	0	0	2	4	0	.	.	1	.	.	100
98jf031	1	2	0	2	3	.	2	6	.	50	180
98jf034	0	0	2	2	4	.	11	11	.	90	10
98jf035	0	9	3	4	3	.	5	10	.	210	345
98jf036	0	0	0	0	0	8	14	.	315	285	.
98jf039	2	1	0	1	1	8	12	15	330	310	330
98jf040	0	0	1	0	0	1	3	6	90	180	200
98jf041	0	0	2	0	0	6	18	22	275	155	130
98jf042	3	2	6	2	1	.	.	10	.	.	340

Subject ID	Post_H/W_Tes	Prop_H/W_Tes	Post_H/W_Prior	Prop_H/W_Prior	pre_SODS_LastComp	post_SODS_LastComp	Prop_SODS_LastComp	pre_Highest_BAT_attempted	Subject ID
98jf002	2	3	1	7	80	25	50	4	98jf002
98jf003	3	2	0	0	70	.	.	1	98jf003
98jf007	2	3	0	0	100	90	80	4	98jf007
98jf008	2	1	0	0	100	70	75	1	98jf008
98jf009	3	4	0	0	90	50	20	4	98jf009
98jf010	5	4	0	0	75	95	20	4	98jf010
98jf011	0	1	0	0	60	90	.	1	98jf011
98jf012	5	3	7	7	30	20	80	3	98jf012
98jf013	2	3	10	6	50	60	70	3	98jf013
98jf014	1	3	0	2	100	20	.	5	98jf014
98jf016	4	5	0	0	100	50	0	6	98jf016
98jf018	0	3	0	1	100	30	10	0	98jf018
98jf019	5	6	1	1	50	40	10	4	98jf019
98jf020	0	1	0	1	30	.	.	1	98jf020
98jf022	3	1	2	0	90	20	80	1	98jf022
98jf023	3	2	2	0	20	40	40	4	98jf023
98jf024	3	5	0	0	100	85	60	5	98jf024
98jf025	0	4	1	5	40	50	100	3	98jf025
98jf026	4	0	1	2	100	50	30	1	98jf026
98jf027	4	6	1	0	90	99	40	1	98jf027
98jf029	1	2	1	1	50	80	60	3	98jf029
98jf030	0	1	0	0	.	.	100	.	98jf030
98jf031	2	3	1	0	.	50	60	.	98jf031
98jf034	0	0	0	0	.	10	0	.	98jf034
98jf035	1	1	1	1	.	90	90	.	98jf035
98jf036	3	2	1	0	85	75	.	4	98jf036
98jf039	3	1	3	0	80	40	30	4	98jf039
98jf040	1	2	0	0	90	90	60	1	98jf040
98jf041	1	1	0	0	95	25	30	3	98jf041
98jf042	4	2	0	0	.	.	100	.	98jf042

Subject ID	post_Highest BAT attempte	F-up_Highest BAt attempte	NART IQ	AGE	Total Time Taken
98jf002	8	7	124.68	39	46
98jf003	.	.	118.04	43	83
98jf007	5	6	123.02	29	44
98jf008	1	1	118.04	22	44
98jf009	8	8	115.55	39	130
98jf010	8	7	119.7	18	47
98jf011	3	.	119.7	41	53
98jf012	5	4	114.72	17	56
98jf013	4	4	122.19	41	46
98jf014	3	.	120.53	35	51
98jf016	8	8	118.87	20	58
98jf018	3	6	113.06	33	116
98jf019	6	9	126.34	32	46
98jf020	.	.	101.44	25	55
98jf022	2	1	123.85	45	56
98jf023	3	4	123.02	36	109
98jf024	9	11	118.04	23	136
98jf025	5	8	122.19	23	97
98jf026	3	8	116.38	38	50
98jf027	4	7	116.38	35	97
98jf029	6	6	123.85	20	49
98jf030	.	1	118.87	53	46
98jf031	1	3	108.91	26	66
98jf034	5	6	121.36	54	62
98jf035	3	5	122.19	51	54
98jf036	7	.	123.02	21	56
98jf039	6	8	123.02	36	47
98jf040	2	3	116.38	33	87
98jf041	9	11	118.87	29	72
98jf042	.	5	119.7	20	48

FM1subjclid	FM5min45_pts	FM6min45_pts	FM2min5_pts	FM2min10_pts	FM2min15_pts	FM2min20_pts	FM2min25_pts	FM2min30_pts	FM2min35_pts	FM2min40_pts	FM3min5_pts
98JF018	699	1653	383	1998	2003	2003	2003	2003	2003	2003	380
98JF014	1391	2005	207	448	1224	1627	2002	2002	2002	2002	604
98JF013	2008	2005	362	671	1210	1784	2005	2006	2006	2006	374
98JF019	2006	1284	544	1213	2004	2004	2004	2004	2004	2004	586
98JF024	2002	2002	220	1206	1206	1206	1206	1206	1206	1206	602
98JF023	1914	2004	746	2003	2092	2238	2238	2238	2238	2238	1047
98JF026	1225	1322	435	1492	2047	2572	3110	3176	3178	3178	393
98JF039	1223	2004	493	964	1560	2003	2003	2003	2003	2003	520
98JF007	1196	1203	438	1210	1210	1210	1210	1210	1210	1210	518
98JF029	1986	2002	201	348	607	1008	1293	1564	1826	2003	198
98JF002	1830	1735	268	863	1455	1455	1455	1455	1455	1455	288
98JF003	1005	1257	542	1229	1229	1229	1229	1229	1229	1229	1441
98JF041	2004	1270	342	1032	2002	2002	2002	2002	2002	2002	602
98JF040	1360	2001	76	197	349	638	1212	1985	1985	1985	203
98JF009	1473	1971	1155	1155	1155	1155	1155	1155	1155	1155	1695
98JF030	.	.	85	163	602	1460	2370	2370	2370	2370	603
98JF031	.	.	312	1203	1203	1203	1203	1203	1203	1203	536
98JF036	.	.	1036	2061	2061	2061	2061	2061	2061	2061	1383
98JF042	.	.	64	134	213	293	405	487	558	630	105
98JF034	.	.	146	505	1321	2039	2039	2039	2039	2039	1115
98JF035	.	.	420	1204	2005	2009	2013	2018	2018	2018	502
98JF011	.	.	85	168	227	370	641	790	910	948	165
98JF012	.	.	406	1204	2002	2002	2002	2002	2002	2002	262
98JF008	.	.	290	1206	2004	2004	2004	2004	2004	2004	446
98JF010	.	.	478	1202	1461	2002	2002	2002	2002	2002	508
98JF016	.	.	209	648	1240	2009	2009	2009	2009	2009	230
98JF025	.	.	512	2006	2006	2006	2006	2006	2006	2006	1018
98JF027	.	.	602	1455	1455	1455	1455	1455	1455	1455	582
98JF020	.	.	506	1209	1209	1209	1209	1209	1209	1209	462
98JF022	.	.	155	605	1204	2008	2008	2008	2008	2008	290

FM1subjctid	FM3min10_pts	FM3min15_pts	FM3min20_pts	FM3min25_pts	FM3min30_pts	FM3min35_pts	FM3min40_pts	FM4min5_pts	FM4min10_pts	FM4min15_pts	FM4min20_pts
98JF018	1140	1140	1140	1140	1140	1140	1140	220	605	919	1205
98JF014	1209	1649	1877	2005	2005	2005	2005	358	896	1546	2002
98JF013	836	1421	2006	2007	2008	2008	2008	885	2001	2001	2001
98JF019	1221	1221	1221	1221	1221	1221	1221	602	1278	2006	2006
98JF024	1224	1224	1224	1224	1224	1224	1224	.	.	.	.
98JF023	1047	1047	1047	1047	1047	1047	1047	.	.	.	.
98JF026	1042	2004	2004	2004	2004	2004	2004	.	.	.	.
98JF039	1214	2006	2006	2006	2008	2008	2008	.	.	.	.
98JF007	1206	1206	1206	1206	1206	1206	1206	.	.	.	.
98JF029	347	643	803	1128	1322	1658	1977	.	.	.	.
98JF002	784	1407	2005	2005	2005	2005	2005	252	742	1360	2005
98JF003	1441	1441	1441	1441	1441	1441	1441	891	891	891	891
98JF041	1455	2007	2007	2007	2004	2004	2004	.	.	.	.
98JF040	611	1181	1734	2004	2006	2006	2006	.	.	.	.
98JF009	1695	1695	1695	1695	1695	1695	1695	360	883	1506	2005
98JF030	695	1758	1758	1758	1758	1758	1758	.	.	.	.
98JF031	1207	1207	1207	1207	1207	1207	1207	.	.	.	.
98JF036	2061	2061	2061	2061	2061	2061	2061	.	.	.	.
98JF042	206	329	439	538	2007	2007	2007	.	.	.	.
98JF034	1115	1115	1115	1115	1115	1115	1115	.	.	.	.
98JF035	1213	1213	1213	1213	1213	1213	1213	.	.	.	.
98JF011	352	526	952	1353	1683	2003	2003	553	2005	2005	2005
98JF012	1203	1203	1203	1203	1203	1203	1203	1165	1165	1165	1165
98JF008	1215	2007	2007	2007	2007	2007	2007	1833	1833	1833	1833
98JF010	1208	1208	1208	1208	1208	1208	1208	601	1204	1815	1815
98JF016	933	1791	2009	2009	2009	2009	2009	590	1243	2006	2006
98JF025	1018	1018	1018	1018	1018	1018	1018	.	.	.	.
98JF027	582	582	582	582	582	582	582	.	.	.	.
98JF020	1214	1214	1214	1214	1214	1214	1214	227	647	1224	2006
98JF022	1205	1205	1205	1205	1205	1205	1205	468	1203	2002	2002

FM1subjctid	FM4min25_pts	FM4min30_pts	FM4min35_pts	FM4min40_pts	FM5min5_pts	FM5min10_pts	FM5min15_pts	FM5min20_pts	FM5min25_pts	FM5min30_pts	FM5min35_pts
98JF018	1262	1557	2003	2003	222	603	959	1266	1986	1986	1986
98JF014	2002	2002	2002	2002	314	816	1390	2002	2002	2002	2002
98JF013	2001	2001	2001	2001	747	1914	1914	1914	1914	1914	1914
98JF019	2006	2006	2006	2006	574	1223	1223	1223	1223	1223	1223
98JF024	.	.	.	.	.	.	.	.	.	.	.
98JF023	.	.	.	.	.	.	.	.	.	.	.
98JF026	.	.	.	.	.	.	.	.	.	.	.
98JF039	.	.	.	.	.	.	.	.	.	.	.
98JF007	.	.	.	.	230	1196	1196	1196	1196	1196	1196
98JF029	.	.	.	.	.	.	.	.	.	.	.
98JF002	2005	2005	2005	2005	207	605	1031	1830	1830	1830	1830
98JF003	891	891	891	891	1005	1005	1005	1005	1005	1005	1005
98JF041	.	.	.	.	.	.	.	.	.	.	.
98JF040	.	.	.	.	.	.	.	.	.	.	.
98JF009	2005	2005	2005	2005	434	1076	1636	2008	2008	2008	2008
98JF030	.	.	.	.	.	.	.	.	.	.	.
98JF031	.	.	.	.	.	.	.	.	.	.	.
98JF036	.	.	.	.	.	.	.	.	.	.	.
98JF042	.	.	.	.	.	.	.	.	.	.	.
98JF034	.	.	.	.	.	.	.	.	.	.	.
98JF035	.	.	.	.	.	.	.	.	.	.	.
98JF011	2005	2005	2005	2005	699	699	699	699	699	699	699
98JF012	1165	1165	1165	1165	678	2006	2006	2006	2006	2006	2006
98JF008	1833	1833	1833	1833	1473	1473	1473	1473	1473	1473	1473
98JF010	1815	1815	1815	1815	219	1391	1391	1391	1391	1391	1391
98JF016	2006	2006	2006	2006	517	1225	1225	1225	1225	1225	1225
98JF025	.	.	.	.	.	.	.	.	.	.	.
98JF027	.	.	.	.	.	.	.	.	.	.	.
98JF020	2006	2006	2006	2006	230	691	1360	1360	1360	1360	1360
98JF022	2002	2002	2002	2002	563	1232	2004	2004	2004	2004	2004

FM1subjctId	FM5min40_pts	FM6min5_pts	FM6min10_pts	FM6min15_pts	FM6min20_pts	FM6min25_pts	FM6min30_pt	FM6min35_pt	FM6min40_pt
98JF018	1986	208	621	1217	2002	2002	2002	2002	2002
98JF014	2002	226	631	1214	2002	2002	2002	2002	2002
98JF013	1914	1002	2004	2004	2004	2004	2004	2004	2004
98JF019	1223	572	1205	2004	2004	2004	2004	2004	2004
98JF024	.	.	.	.	.	.	.	.	
98JF023	.	.	.	.	.	.	.	.	
98JF026	.	.	.	.	.	.	.	.	
98JF039	.	.	.	.	.	.	.	.	
98JF007	1196	502	1203	1203	1203	1203	1203	1203	1203
98JF029	.	.	.	.	.	.	.	.	
98JF002	1830	382	1037	1735	1735	1735	1735	1735	1735
98JF003	1005	1257	1257	1257	1257	1257	1257	1257	1257
98JF041	.	.	.	.	.	.	.	.	
98JF040	.	.	.	.	.	.	.	.	
98JF009	2008	348	1091	1823	2005	2005	2005	2005	2005
98JF030	.	.	.	.	.	.	.	.	
98JF031	.	.	.	.	.	.	.	.	
98JF036	.	.	.	.	.	.	.	.	
98JF042	.	.	.	.	.	.	.	.	
98JF034	.	.	.	.	.	.	.	.	
98JF035	.	.	.	.	.	.	.	.	
98JF011	699	1653	1653	1653	1653	1653	1653	1653	1653
98JF012	2006	562	1284	1284	1284	1284	1284	1284	1284
98JF008	1473	1971	1971	1971	1971	1971	1971	1971	1971
98JF010	1391	213	1242	2005	2005	2005	2005	2005	2005
98JF016	1225	606	1322	1322	1322	1322	1322	1322	1322
98JF025	.	.	.	.	.	.	.	.	
98JF027	.	.	.	.	.	.	.	.	
98JF020	1360	310	1106	2001	2001	2001	2001	2001	2001
98JF022	2004	602	1270	1270	1270	1270	1270	1270	1270