

**COGNITIVE PROCESSES IN SPECIFIC PHOBIAS  
AND THEIR TREATMENT.**

**Susan Jane Thorpe  
Keble College**



**A thesis submitted in fulfilment of the  
requirements for the degree of Doctor of Philosophy  
at the University of Oxford.**

**Hilary Term 1994.**

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Specific phobias are the most common form of anxiety disorder. Two factors have influenced cognitively oriented research in specific phobias: (i) conditioning theory; (ii) the assumption that phobias are "irrational". Experimental investigation has largely focused on information processing paradigms, which have not advanced treatment. In other anxiety disorders, the cognitive approach, with its emphasis on cognitive products such as meaning and beliefs, has been at the forefront of therapeutic development. In this thesis, a series of experiments investigated the contribution of attention, memory and beliefs to the maintenance of specific phobias. These were hypothesised as contributing to the generic meaning of the phobic object, which is the level of meaning at which emotional change takes place. In the first experiment the content of phobic beliefs was examined and was found to form a logical framework for the maintenance of the phobia: phobics had a high level of belief that their phobic object would cause them physical harm or make them behave foolishly and that they would be unable to cope. As disgust has been raised as a possible factor in phobic acquisition and maintenance, cognitions and processes concerning disgust were examined in a separate series of experiments. Disgust beliefs were found to be present in phobics but did not contribute to an attentional bias and were not found to be closely linked to the phobic fear response. The third experiment examined attentional bias to threat words utilising a computer Stroop test in order to examine the merits of different hypotheses of attentional effects in spider phobia. Phobics were found to selectively attend to threat at the conscious, but not the pre-attentive level, but there was no evidence that threat information was subsequently suppressed (cognitive avoidance). The fourth experiment examined attentional bias to actual threat (a live Tarantula rather than word stimuli). Spider phobics showed prolonged attention to the threat stimulus. The results indicated that attention may be divided between threat and escape. The fifth and sixth experiments examined the effect of anxiety on memory in spider phobics for spider videos, first with a recognition test and second with a recall test. Spider phobics were not impaired in their memory for phobic stimuli: this is again consistent with the view that cognitive avoidance may not play a role in the maintenance of spider phobia. The seventh and final experiment was a treatment study. Spider phobics were given the Stroop test and questionnaires concerning beliefs, then given one session treatment for spider phobia. Compared to untreated spider phobic controls the treated phobics changed significantly in their negative beliefs about spiders after treatment, but were no different to the controls in their reaction time latencies to spider stimuli. It is the meaning that the threat object has for the phobic which causes them to attend to threat, rather than an automatic processing bias. It is the change in this negative meaning which is associated with a change in emotional response.

This thesis is dedicated to the memory

of my Mother and Father

Lily Jane Thorpe

and

Eric Thorpe

and of my brother

Ian Stuart Thorpe

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## CHAPTER 1

### SPECIFIC PHOBIAS: CLASSIFICATION, HISTORICAL BACKGROUND, PREVALENCE AND AETIOLOGICAL THEORIES.

#### Introduction: the importance of specific phobia.

Specific phobias have played a key role in the evolution of psychological theories of anxiety and its treatment. The beginnings of behaviour therapy were in the treatment of specific phobias (Jones, 1924; Wolpe, 1958) and subsequent developments in the treatment of phobias have effected theoretical and therapeutic formulations about emotional disorders in general and anxiety disorders in particular (Hawton, Šalkovskis, Kirk and Clark 1989).

Despite being the most prevalent anxiety disorder in the general population (Öst, 1988), and often being seen as objects of ridicule or sensationalism, phobias can be extremely disabling and as such are worthy of serious investigation. Future development of effective treatments for both phobias and other anxiety disorders would benefit from a thorough understanding of the mechanisms involved in the etiology and maintenance of phobias. While remaining aware of the wider issues involved in anxiety disorders in general, the research described here will concern itself exclusively with specific phobia, though it has some implications for the understanding of the more complex phobias and other anxiety disorders.

Specific phobias are usually defined as being a fear of a particular object or situation which significantly interferes with the sufferer's life and which is associated with avoidance of the phobic stimulus despite the phobic's understanding that their fear is unreasonable or out of proportion. In this first chapter the diagnostic criteria will be described. This will be followed by a historical perspective to do with specific phobias, their prevalence and natural

history and a description of the main theories which have been proposed to account for their origins and maintenance.

According to DSM-III-R criteria specific phobia is diagnosed on the basis of the discrete nature of the phobic object or situation.

### DSM-III-R

#### Simple Phobia

- A. A persistent fear of a circumscribed stimulus (object or situation) other than fear of having a panic attack (as in Panic Disorder) or of humiliation or embarrassment in certain social situations (as in Social Phobia).
- B. During some phase of the disturbance, exposure to the specific phobic stimulus (or stimuli) almost invariably provokes an immediate anxiety response.
- C. The object or situation is avoided, or endured with intense anxiety.
- D. The fear or avoidant behaviour significantly interferes with the person's normal routine or with usual social activities or relationships with others, or there is a marked distress about having the fear.
- E. The person recognizes that his or her fear is unreasonable.
- F. The phobic stimulus is unrelated to the obsessions of Obsessive Compulsive Disorder or the trauma of Post Traumatic Stress Disorder.

Based on recent research and field trials, major changes in this definition have been adopted for DSM-IV. The proposed changes are as follows.

Specific Phobia is defined as:

- A. Fear cued by the presence (or anticipation) of a specific object or situation (e.g. flying, heights, animals, receiving an injection, seeing blood).
- B. Exposure to the phobic stimulus almost invariably provokes an immediate anxiety response, which may take the form of an anxiety attack.
- C. The phobic stimulus is endured with marked distress.
- D. The person recognizes that the fear is excessive or unreasonable.
- E. The avoidance or anxious anticipation significantly interferes with the person's normal routine, or with usual social activities or relationships with others, or there is marked distress about having the phobia.
- F. The anxiety or phobic avoidance is not better accounted for by another mental disorder, such as Obsessive Compulsive Disorder (e.g., fear of contamination), Post Traumatic Stress Disorder (e.g., avoidance of stimuli associated with a severe stressor), Social Phobia (e.g., avoidance of social situations because of fear of embarrassment), Panic Disorder (e.g., fear of having unexpected panic attacks), or Agoraphobia Without History of Panic Disorder.

Specify Type:

Natural Environment Type (e.g., animals, insects, storms and water)  
Blood, Injection, Injury Type  
Situational Type (e.g., cars, planes, heights, elevators and tunnels/bridges)  
Other Type (e.g., phobic avoidance of situations that may lead to choking, vomiting or contracting an illness).

The emphasis has extended away from the object itself to include the anticipation of it and now includes the possibility of a panic attack response which was specifically excluded in DSM-III-R (a). The name is also formally changed from 'simple' to 'specific' phobia. Subtypes are also made explicit. The changes in diagnostic categorising have influenced the nature of research, indicating that more emphasis is to be placed on the mechanisms and maintenance of anticipatory anxiety as well as the possibility of similar processes existing in phobias to those found in certain types of panic disorder. Diagnostic criteria also influence epidemiological studies in terms of the qualitative and quantitative differences between having a fear and having a phobia.

### Historical Perspective

Early accounts of phobias are mainly to be found in medical writings from early Greek and Roman perspectives and eighteenth and nineteenth century writings. During the intervening thirteen centuries (fifth to seventeenth), psychological manifestations like theophobias and demonphobias were described by philosophers and theologians (as well as poets and playwrights) and as such were defined as out of the jurisdiction of science, being seen as manifestations of evil spirits and an imbalance in the hierarchical order of the universe. The occasional mentions of phobias during this period are confined to plague phobia (Oxenbridge, 1576-1642), syphilophobia (Daniel Tyrner, 1667-1741) and in a

parody of nosology by Benjamin Rush, who identified eighteen specific phobias (some satirical) and who mentions spider phobia for the first time:

'The insect phobia. This disease is peculiar to the female sex. A spider-a flea-or a musqueto, alighting upon a lady's neck has often produced an hysterical fit. . .' (Rush, 1798)

## Phobia

The word phobia was taken from the Greek word Φοβος meaning panic-fear, terror, flight (Liddell and Scott 1883). Phobos was a deity honoured by the Greeks as provoking fear and panic in their enemies. Until the middle of the nineteenth century the only use of the word had been for the symptom *hydrophobia*, a term for rabies coined by Celsus, and it was another 75 years before the word attached itself firmly to a set of diagnostic criteria.

Hippocrates noted two of the earliest clinical descriptions of men suffering from unreasonable and pronounced fear. The first, Nicanor, would be 'beset by terror' when he heard the sound of a flute at a banquet in the evening, though he could hear the sound with perfect equanimity during the day. The second, Damocles, was morbidly afraid of heights and 'could not go near a precipice, or over a bridge, or beside even the shallowest ditch; and yet he could walk in the ditch itself'. He also described a cat phobic. (Errera, 1962). Hippocrates put these symptoms along with other neurotic ones, under the heading of *melancholia* (suffering from an excess of black bile), one of the three major types of insanity. Temporary fears and terrors were assumed to be due to an overheating of the brain caused by a build-up of bile. Later physicians explained that 'melancholic humour, being cold, cools the brain and the heart, seat of courage, and hence fear develops' (Semelaigne, 1939) and well into the eighteenth century, phobic

reactions remained associated with melancholias. However, following on from Hippocrates, Caelius Aurelianus placed phobias in with the *manias* (that is, specifically to do with the mind):

'...For mania fills the mind now with anger, now with gaiety, now sadness, now with nullity, now with the dread of petty things. As some people have told; so that they are afraid of caves at one time, and chasms at another, lest they fall into them; or there may be other things which frighten them.'

Celsus was another early contributor to the field, who appears to have invented flooding as a therapeutic technique. Referring to a patient with hydrophobia, his term for rabies, he recommends the proper course of action is to

'throw the patient unawares into a water tank he has not seen before. If he cannot swim, let him sink under and drink, then lift him out; if he can swim, push him under at intervals so that he drinks his fill of water even against his will; for so his thirst and dread of water are removed at the same time' (trans. Grieve 1814).

After this there is little reference to such fears in medicine until the eighteenth century apart from those described above. Zilboorg (1941) suggests that this paucity of information is due to the changing role of the physician in the upheaval of changing social and cultural values. Outside the field of medicine, Descartes made a succinct analysis of idiosyncratic fear in *The Passions of the Soul*. He wrote:

'...there is such a tie between our soul and body that when we once have joined any corporal action with any thought, one of them never presents itself without the other - and that they are not always the same actions which are joined to the same thoughts...it is easy to conceive that the strange aversions of some, who cannot endure the smell of roses, the sight of a cat, or the like, come only from hence, that when they were but newly alive they were

displeased with some such objects, or else had a fellow-feeling of their mother's resentment who was so distasted when she was with child; for it is certain there is an affinity between the motions of the mother and the child in her womb, so that whatsoever is displeasing to one offends the other; and the smell of roses may have caused some great headache in the child when it was in the cradle; or a cat may have affrighted it and none took notice of it, nor the child so much as remembered it; though the idea of that aversion he then had to roses or a cat remain imprinted in his brain to his life's end'. (Descartes 1650 pp 107-108).

Some of this is suggestive of later theories to do with conditioning, modelling and the importance of the mind in relation to the body.

In literature, Shakespeare had described phobic behaviour in "The Merchant of Venice".

'Some men there are that love not a gaping pig;  
Some that are mad when they behold a cat . . .'

During the eighteenth and nineteenth century several attempts were made to understand and classify this 'mania without delirium' (Pinel, 1748-1825), 'partial insanity' or 'monomania' (Esquirol, 1772-1840), 'emotional delirium' (Morel, 1809-1873, himself a height phobic), and 'lucid insanity' (Trelat, 1795-1879). Etiological theories included a dysfunction in the eye muscle (Benedikt, 1870), a poor upbringing (Trelat), stomach ailments (Benedikt) and a 'morbid predisposition of the visceral ganglionic nervous system' (Morel). All agreed that hereditary factors were important (cited in Errera, 1962).

In 1872 Westphal published his classical monograph *Die Agoraphobie* which was an important step in the evolution of modern thinking about phobias. He made few pronouncements on their etiology beyond suggesting a cerebral origin and noting that often the thought of the feared situation was as frightening as being

in the situation itself, which presages contemporary thinking on the matter. He describes three male patients with the following symptoms:

...impossibility of walking through certain streets or squares, or possibility of so doing only with resultant dread of anxiety...

Some information based on individual cases was therefore available to the physician before Freud began to formulate his detailed theories of the acquisition of phobias, however, before going on to Freudian theories and beyond it would be useful to examine the prevalence and natural history of phobias in order to underline their importance in terms of number of sufferers and to place them in a societal context.

### Epidemiology

Epidemiological studies indicate that the prevalence of clinically defined phobias in the general population reaches 11% in the U.S.A. and 13% in West Germany (Argras, Sylvester and Oliveau, 1969; Robins, Helzer, Weissman, Orvaschel, Gruenberg, Burke and Regier, 1984; Wittchen 1986; Öst, 1987). Specific phobias form the largest part of this number and of these, 14% are animal phobias (Barlow 1988). Within the subgroup of intense fears as opposed to specific phobias, Agras et al. (1969) found differing prevalence rates per thousand of the general population, with intense fear of snakes being the most widespread (253 per 1000) followed by heights (120) and flying (109). The prevalence of clinical phobias was found to be different, with illness/injury phobia being most common (31 per 1000 of the general population) followed by storms (13 per 1000) animals (11), agoraphobia (6) death (5) crowds (4) and heights (4 per 1000 of the population).

Wittchen (1986) examined and compared the data collected in two epidemiological studies, the ECA (Epidemiological Catchment Area - in two sites, New Haven and St.Louis) and the MFS (Munich Follow-up). Both studies found that the highest prevalence rates were for simple phobia and agoraphobia, with markedly lower rates for panic disorders and obsessive compulsive disorders (social phobia did not figure in the MFS). These findings are shown in summary in table 1.1 below.

Table 1.1: Lifetime prevalence rates of DSM-III anxiety disorders in two ECA sites and the MFS.

	DIS/DSM-III disorders prevalence rates (%)			
	Specific phobia	Agora-phobia	OCD	Panic disorder
MFS	8.0	5.7	2.0	2.4
ECA New Haven	6.2	3.5	2.6	1.4
ECA St Louis	7.7	3.9	1.9	1.5
MFS Women	10.4	8.3	2.3	2.9
MFS Men	5.5	2.9	1.8	1.7

A study reported in 1987 using the Diagnostic Interview Schedule (DIS; Robins, Helzer, Croughan and Ratcliffe, 1981) by Von Korff, Shapiro, Burke, Teitlebaum, Skinner, German, Turner, Klein and Burns found that in a population of primary care patients, 7.8% had a phobia, 1.4% a panic disorder and 4.6% a generalized anxiety disorder.

There is evidence that simple phobia occurs more often in women than in men.

A community survey by Bourdon, Boyd, Rae and Burns (1988), of 18,572 adults (of whom 10,954 were women) revealed that women had significantly higher rates of agoraphobia and simple phobia than men but not of social phobia. The most common phobias were spiders, bugs, mice, snakes and heights. The largest gender differences were found in the item to do with going out of the house alone (in agoraphobia) and, in simple phobia, two items: fear of animals and of storms. Similarly, Cameron and Hill (1989) found that women are more likely to have an animal phobia or agoraphobia than men, but not social phobia or obsessive compulsive disorder. and Makaremi (1989), in a study of Iranian high school and college students, found the same significant effect of gender on phobias. Emerging from these figures is a clear indication that there is a preponderance of women suffering from anxiety disorders in general and simple phobias and agoraphobia in particular (Marks 1987). Chambless (1988) has suggested that two of the factors involved are female reproductive hormones and sociocultural factors such as sex-role stereotyping. Costello (1982) found that in a survey of the prevalence rates of fears and phobias amongst women, factors not associated with fears and phobias were social class, educational level completed, employment status or number of children at home. Liddell and Hart (1992) have shown that cultural changes, in the form of a wider range of threats towards women, has affected their perceptions of themselves and consequently of some items on the fear survey schedule. This may be taken as evidence of the importance of perception in the formulation of fear responses and of the relative unimportance of hormonal balance.

### Natural History

Öst (1987) is one of a number of researchers to examine the age of onset in a

variety of different types of specific phobia compared to social phobia or agoraphobia and has found that they are quite clearly differentiated. Age of onset is consistently the earliest in animal phobics, with a mean age of onset of 7 years, followed by blood phobics (mean age 9 years), and dental phobics (mean age 12 years). Claustrophobia was closer to agoraphobia (where age of onset is in the 20s) in onset age at 20 years. Öst follows Klein (1981) in suggesting that claustrophobia may be similar in function and description to agoraphobia. It is also useful to note that even within the subtype of simple phobia there are different ages of onset, with dental phobics having a later age of onset than animal phobics. These findings extend and confirm those of Marks and Gelder (1966) and Sheehan, Sheehan and Minichiello (1981)

Öst (1987) also gathered data on ways in which phobias may be acquired. The majority of patients reported conditioning experiences as the initial instigator of their fear responses, followed by modelling and information/instruction. However, this is based on verbal report many years after the event and may be unreliable. Marks (1987) has identified various developmental stages which when reached may make the individual vulnerable to the acquisition of particular fears: these include fear of heights, of novelty and of strangers.

It would appear that there are particular sensitive ages during which people are susceptible to the acquisition of a phobia; work with primates is consistent with this view and this is discussed in more detail later. Having now explored the prevalence and history of phobias it is time to consider more recent theoretical foundations.

### Aetiological Theories.

There have been many attempts in the last hundred years to explain why people become intensely fearful of a particular object or situation. These theories have invariably been intended to inform treatment but have only recently resulted in demonstrably effective therapies. Ideas from conditioning and cognitive theories have come together to produce effective and lasting treatments.

### The Psychoanalytic Theory

Freud attempted a systematic account of the development of specific phobias. According to Freud, phobias are a defense against the anxiety experienced when impulses formed by the id are being repressed, resulting in a displacement of the repressed feelings onto an object or situation with which it is symbolically connected. These objects or situations then become the phobic stimuli and the patient is able to avoid having to deal with the repressed conflicts by avoiding their symbolic correlates - closed spaces, cats, spiders and so on. The acquisition of a phobia is therefore seen as a displacement activity allowing avoidance of a real problem, often a childhood conflict. The most famous case quoted is that of a 5 year old boy, Little Hans, who was afraid to go out of the house in case a horse bit him, after an incident in which a horse and van fell down in the street in front of him. He subsequently elaborated this fear and became afraid of blinkers and muzzles on the horses (but not of vans). Although Freud never saw him, in his correspondence with Hans' father the explanation he proffered was that boy's fear resulted from the repression and subsequent projection of his aggressive impulses, which were to do with hostility towards his father and sadism towards his mother. The motivation for this repression was a fear of castration which Hans expressed overtly as a fear that his 'widdler' would be cut off by his

father. The blinkers and muzzles were seen as symbols for his father's eyeglasses and moustache.

Much more recently, Arieti (1979) has proposed a modified psychoanalytic theory of phobias based on interpersonal problems in childhood rather than the id. Children begin their lives in innocence and trust, believing that they will be protected from danger. They then come to realise that adults - usually parents - are not reliable. This mistrust becomes generalised and in order to be able to live with the terrible knowledge of insecurity they unconsciously transfer this fear of others onto impersonal objects or situations. The phobia then surfaces later in adulthood as a symptom substitution response to stress. There is little or no empirical evidence to support the psychoanalytic view and data on the age of onset of animal phobias also apparently contradicts it as according to Arieti, the age of onset of phobias should be in adulthood. Symptomatic treatment, as for example in cognitive behaviour therapy, is predicted to produce short-term relief followed by the appearance of different symptoms (symptom substitution), because the underlying conflict is unresolved. The data on this are unambiguous: i) Eysenck (1952) found that psychoanalytic treatment had the same success rate as spontaneous remission in simple phobias and ii) extensive research confirms the absence of symptom substitution. (Marks, 1987). Behaviour therapy in any case has been very successful in the treatment of phobias but when it began it was seen by the psychoanalytic community as being based on spurious pseudoscientific knowledge, exemplified by the use of the words 'stimulus' and 'response' as if they were indicative of the same rigour of thought as was the norm in experimental psychology. Breger and McGaugh stated that

"the use of the terms stimulus and response are only remotely

allegorical to the traditional use of these terms in psychology"  
(Breger and McGaugh, 1965, p340).

They also argued that the various competing theories on which this therapy was based were derived from laboratory studies of animals which are not transferable to the study of humans.

### Behavioural Theories

There are many different elements which make up the conditioning model. Modifications and additions to the theory by various theorists over the years have resulted in a comprehensive and multi-faceted theory incorporating behavioural, physiological, evolutionary and cognitive components. The later development of two process learning theory and the application of this theory to anxiety and avoidance behaviour was inspired by the work of Mowrer (1938,1947,1960) and Dollard and Miller (1950) who showed that behavioural theory could encompass broader issues than had previously been supposed and that learning theory could explain a wide range of phenomena (including cultural differences) hitherto seen as the preserve of psychoanalytic practitioners. Dollard and Miller (1950) did this by retaining psychodynamic concepts and translating them into the terminology of learning theory. This was not based on experimental observation but on the working out of a theoretical model of abnormal behaviour which lead to deductions of rational methods of treatment which was then applied to particular abnormal behaviours. Resulting advances in theory and application will be dealt with separately below.

### Classical Conditioning

Russian researchers, especially Pavlov, had an enormous influence on both the scientific and "common sense" understanding of fear. The principles of

conditioning were first described by Ivan Pavlov at the turn of the century. During a physiological study of the digestive system, a dog was given meat powder to make it salivate. After a short time the laboratory assistants noticed that the dog started to salivate on seeing the person who fed them, and then even earlier, when they heard the feeder's footsteps. Pavlov decided to study the phenomenon systematically. Over many trials a bell was rung behind the dog immediately before meat powder was placed in its mouth. The dog began to salivate at the sound of the bell alone, before the introduction of the meat powder.

Since the meat powder elicited an automatic salivatory response, without prior learning, the powder was called the unconditioned stimulus (UCS) and the response of salivation an unconditional response (UCR). After several pairings of the bell and powder the bell becomes the conditioned stimulus (CS), able to elicit the response of salivation, the conditioned response (CR) on its own. Pavlov and his group believed that any natural phenomenon could become a conditioned stimulus, in any of the sensory modalities. The Russian investigators also discovered that fear, along with other emotional responses, could be conditioned in a similar way. A red light systematically paired with an electric shock will result in an animal's conditioned fear response to the red light alone. This was reproduced by, among others, Fonberg (1956) who trained dogs to produce an avoidant response to noxious stimuli such as an electric shock or a strong puff of air in the ear. The dog was able to avoid this by a particular response - lifting its foreleg for example (which could also be seen as an exemplar of two-process theory this will be discussed below).

Pavlov's influence on western psychology was mainly through the work of Watson

and Rayner in the 1920s. The best known early conditioning experiment was the anecdotal description of the case of "Little Albert" (Watson and Rayner, 1920) which was an experiment inspired by Pavlov's discovery of conditioning principles. In their experiment, every time Albert reached for a white rat (the CS) in order to play with it, Watson made a loud noise (the UCS) with a steel bar behind his head, giving him "a great fright" (the UCR). After five of these experiences, Albert became disturbed (the CR) by the sight of the rat (the CS) even when the steel bar was not struck, so the fear associated with the loud noise became associated with the rat. The conditioning extended (*generalized*) to similar stimuli such as cotton wool and the experimenter's white hair.

Jones (1924), applied Watson's ideas to treatment of children's phobias, discovering that only two therapy methods were consistently effective; one was to pair the feared object with a pleasant response (eating), the other was to put the child in the feared situation with other children who were not fearful. These treatment techniques closely resemble those later adopted by Wolpe (reciprocal inhibition) and Bandura (participant modelling)

The phobic acquisition experiment of Watson and Rayner(1920) proved difficult to replicate. English (1929), Valentine (1930) and Bregman (1934) are commonly cited (Gray, 1971; Marks, 1969; Seligman, 1970,1971) as having failed to demonstrate fear CRs when using CSs other than a rat. Each of these studies suffers from a procedural defects and as such cannot be used alone to refute the theory. However, in Valentine's experiment, despite his being unable to induce fear of opera glasses in his one year old daughter, he did succeed in making her afraid of a 'woolly caterpillar' after only one pairing of it with an aversive stimulus (whistle). Valentine's idea of 'lurking fear in the background' elicited

by certain stimuli later gained credence when seen in the context of preparedness theory, discussed in full below. No further studies of this kind have been carried out due to their unethical nature.

In an applied field, conditioning concepts were later successfully used in work on enuresis which the Mowrers carried out in 1938. Regarding enuresis as a failure to respond to bladder distention by awakening, they associated waking and sphincter contraction with the onset of urination by utilizing an electrical 'bell and pad' device which rang at the first detection of damp. This was remarkably effective and made a significant contribution to the later development of treatment and formulations of behavioural theory (Hawton, Šalkovskis, Kirk and Clark, 1989).

Wolpe (1958), built on work reported by Metzner (reviewed in Metzner, 1961) who conducted experiments with cats to produce "experimental neuroses". Wolpe became interested in the production and extinction of conditioned fear. Metzner (1961) found that if an animal experienced a shock on approaching food, the fear could be subsequently elicited by situations similar to the one previously associated with the shock, such as being fed in the same box or entering the same box later. Basing his ideas on his research into the experimental induction and elimination of fear in cats, Wolpe (1961) proposed that since feeding was inhibited by the conditions surrounding the shock experience, then the conditioned fear and the feeding were mutually exclusive states or *reciprocally inhibiting*. Hence, anxiety could not simultaneously coexist with feeding behaviour, or relaxation, as such responses are antagonistic to anxiety. Following on from this, he demonstrated the use of feeding as an alleviator of anxiety by feeding his animals in graduatedly closer approximations to the situation in which

they had first been shocked, so that a graded, hierarchical exposure to both the anxiogenic stimuli and a stimulus inimical to anxiety - the reciprocal inhibitor - resulted in the alleviation of anxiety when the strength of the latter is greater than the former (Wolpe 1961). Wolpe also considered sexual responses, progressive muscular relaxation and assertive responses as possible effective reciprocal inhibitors.

The most widely adopted of these reciprocal inhibitors in humans was relaxation, initially using Jacobson's (1938) procedure, which Wolpe believed to have similar neurophysiological correlates to the effects of eating. Patients were taught relaxation then encouraged to advance very slowly through a hierarchy of feared situations (throughout the presentation of phobic stimuli) while remaining fully relaxed, in order to inhibit the fear response. The procedure became known as *systematic desensitization*. In his later work Wolpe used imaginal material for convenience but thought that *in vivo* exposure was more efficacious. As a result of experimental and treatment research (described below) it was shown that treatment did not work through reciprocal inhibition. The classical conditioning theory was extended by two process theory, (Rachman 1977) which proposed that phobias are the consequence of the contiguity of aversion responses and the phobic object, which fails to extinguish because avoidance of the object precludes exposure to it, and successful escape in any case shortens exposure time, resulting in turn in negative reinforcement of the avoidant behaviour associated with the termination of anxiety.

Paul (1966) had previously compared systematic desensitization, a placebo and insight therapy in an attempt to explore their relative effectiveness in the reduction of fear. He found that systematic desensitisation was superior to the

others in fear reduction and that results persisted in a two year follow-up study (Paul,1967) but that exposure was the crucial element rather than relaxation or other reciprocal inhibitors.

Subsequent research has confirmed the effectiveness of a form of treatment (Rachman and Wilson, 1980) combining hierarchy-driven exposure and avoidance-prevention and has also confirmed that the main component in its effectiveness is the element of exposure.

In an attempt to explain the mechanisms of systematic desensitization Watts (1979) examined the relationship between habituation (a gradual cessation of response to repeated exposure of the stimulus, usually applied to unconditioned responses) and extinction (a gradual cessation of conditioned response after repeated exposure without the reinforcing consequence), and proposed that it was the former concept which was the most likely process being utilised. The work of Gray (1975) is cited as evidence for this by Watts (1979). Gray's "behavioural inhibition" system is activated by novel stimuli eliciting an orienting response, and by stimuli previously associated with punishment and consequent anxiety. This system serves to inhibit ongoing behaviours and to increase autonomic arousal. Dual-process habituation theory (Groves and Thomson, 1970; Thomson, Groves, Teyler and Roemer, 1973) proposes that "observable response decrement is the summation of two inferred processes; habituation and sensitization. Response increment is equally the summation of the same two inferred processes." (Watts, 1979 p631) Sensitization refers to the process of increased response during exposure to an unconditioned stimulus. The processes differ in their effects on response. Habituation is purely decremental and is to do with a particular stimulus-response pattern, while sensitization responses get larger before

decaying, are to do with general responsiveness and are more transient in their effects. Sensitization and not habituation is also positively related to the stimulus intensity (Thompson *et.al*, 1973). Watts (1979) concludes that "relaxation and an incremental stimulus hierarchy may reduce sensitization rather than facilitate habituation"(p 627). This is an important distinction if long-term decremental response effects are being sought through treatment.

### Foundations of Two-process theory

Learning theorists elaborated on conditioning theory by asserting that the classically conditioned fear of an objectively harmless stimulus is the basis for an operant avoidance response. Thorndike (1935) had investigated the effect that consequences have on behaviour and proposed that behaviour followed by consequences satisfying to the organism will be repeated, while behaviour followed by unpleasant consequences will be discouraged. Thus the behaviour becomes the instrument which encourages or discourages its own repetition. Thorndike named this the 'Law of Effect'

B.F.Skinner took Thorndike's 'reinforcement' theories and extended the principle in terms of the effect that consequences have on the individual's behaviour rather than just on whether they appear to be rewarding or unpleasant. So, in 'operant' or 'Skinnerian' conditioning, if behaviour which is followed by a particular event is seen to increase in frequency, then the behaviour is said to be reinforced.

*Positive Reinforcement* describes the situation where desirable behaviour (e.g.working hard) occurs more often because of its positive consequence (e.g. praise, financial gain). *Negative Reinforcement* is described as the situation when the frequency of a behaviour is increased because of the omission of an anticipated aversive consequence. This differs from classical conditioning in its

emphasis on the shaping of behaviour by the manipulation of reinforcing consequences. The behaviour in operant conditioning is voluntary and its continuance depends on reward, while classical conditioning is to do with involuntary responses to a stimulus which is then associated with another stimulus.

Drawing on knowledge of both classical and operant conditioning Mowrer (1947) proposed a two factor-theory of phobic acquisition. He posited that phobias were acquired through two related sets of learning. First, via classical conditioning a person can begin to fear a neutral stimulus (the CS) if it is paired with an intrinsically painful or frightening event (the UCS). Second, via operant conditioning the person can learn to reduce the effect of this unpleasantness by escaping from or avoiding the conditioned stimulus, thus the response is maintained by its reinforcing consequences (negative reinforcement).

Evidence for the potential applications of two process theory came from the work of Solomon and Wynne (1954) who found that if stimuli had become classically conditioned through association with a highly aversive event, then any avoidant response to the conditioned stimuli was very resistant to extinction. Avoidance of harmless stimuli continued despite the cessation of conditioning experiences. Their experiments showed that an avoidance response that is acquired after a very strong initial aversive simulation can be very resistant to extinction for many hundreds of trials even though the unconditioned stimulus ceases. Solomon and Wynne (1954) related this to the fact that autonomic reactions have a longer latency than the avoidant responses that they trigger. If the avoidant response preempts the autonomic response and prevents the feeling of fear then no extinction of the fear can occur. This is also consistent with Mowrer's two factor

theory (1950) in which a fear which is classically conditioned is seen as a problem which is resolved when an instrumental response is deliberately or randomly discovered which reduces the fear. Gray (1971) expanded this by proposing that safety signals are themselves rewarding due to their association with the successful avoidance of punishment. Lawler (1965) showed that the reinforcing value of a safety signal appears to be independent of the degree of fear aroused by a warning signal so that animals continued to show avoidant behaviour long after the fear has subsided. Gray (1971) points out that this avoidance in itself serves to maintain any avoidance responses. Two process theory provides an explanation for the maintenance of fear responses and may in part explain their acquisition. However, there are other elements of possible importance in the acquisition of specific phobias and these will now be discussed.

#### Disease-avoidance

Watts was the first to suggest that another element in phobic responding may be 'disgust'. The importance of disgust may lie in its relevance to 'preparedness' as it relates to disease-avoidance, mediated by disgust reactions which in turn may lead to avoidance of the object which had previously elicited this response (Matchett and Davey 1991). Evidence for this has so far been based on normal, rather than phobic, subjects.

Up to the present there has been no thorough examination of the nature of the disgust reaction, it being assumed that disgust is universal and therefore generally understood by everyone. It has yet to be confirmed that certain clusters of characteristics form a disgust archetype or whether 'disgust' attaches itself to a variety of different objects. Darwin (1872) noted that disgust was evoked in the natives of Tierra del Fuego as well as in his compatriots by the same objects.

which were always food related. He further noted that the physical expression of disgust is characterised by movement around the mouth, as if wishful of expulsion of something nasty in the mouth, and that "extreme disgust is expressed by movements round the mouth identical with those preparatory to the act of vomiting".(p 257) Some disgust objects however appear to be culturally specific, as evidenced by the eating of grubs, locusts and so on in some cultures which is acceptable in some cultures but viewed with revulsion in others.

Rozin and Fallon (1987) have attempted to explain the phenomena of disgust in relation to contamination sensitivity and eating and define it as 'revulsion at the prospect of oral incorporation of offensive objects'. They note that almost all the objects of disgust are of animal origin. If this is the case it is difficult to see how animal fears could arise, given that they are not seen as potential food, unless the proximity of an animal to an edible object therefore renders it unfit for consumption because of its contamination by the animal.

Matchett and Davey (1991) have attempted to address the question of the relationship between phobias and the emotion of disgust on the assumption that disease and contamination fear are present in certain types of animal phobia. The conclusion drawn from this study is that normal (ie.non-phobic) people associate disgust with animals usually seen to be revulsive, or revulsive and predatory, and do not associate disgust with animals which are seen as primarily predatory or fear-evoking. A later study by Davey (1992) suggests that certain animals (e.g.rats) may be seen as disease carriers. It may be then that the emotion of disgust may contribute towards the acquisition of phobia and is an addition to the conditioning theories.

### Conditioning Theory: Constraints

One problem with conditioning theory has been its concentration on conditioned phenomena in the physiological and behavioural dimensions. According to Lang ((1971), "emotional behaviours are multiple system responses - verbal-cognitive, motor and physiological events - that interact through interoceptive (neural and hormonal) and exteroceptive channels of communication. All systems are controlled or influenced by brain mechanisms, but the level of the important centres of influence (cortical or subcortical, limbic or brainstem) are varied, and like the resulting behaviours, partially independent." This is in contrast to the two factor theory described above which places the emphasis on avoidance behaviour as the consequence of a fearful response, which has itself the consequence of fear reduction. Bandura (1971) endorsed the view that changes in each of the three subsystems are often reflected in the others, so that someone who is bitten by a dog "can *simultaneously* produce a dislike of dogs, endow a dog with fear-arousing properties, and establish dog-avoidance behaviour", but this is not always the case. However, according to Hodgson and Rachman (1974) there can be discordance in the subsystems and in the way they change and Lang (1971) points out that human speech is a far more refined and subtle measure of emotion than any physiological measure can be, highlighting a possible confound in the experimental data accrued by conditioning theorists who concentrate on the physiological response data and ignore self-reported emotion.

Another problem with the conditioning hypothesis for the acquisition of fear is that conditioning theory alone cannot account for the fact that not all people who have traumatic experiences subsequently become phobic (Di Nardo, Guzy, and Bak, 1988) and that not all phobics can remember an unpleasant early experience

with their phobic object. Di Nardo *et.al.* (1988) found that in a group of dog phobics, nearly two-thirds had experienced a conditioning event in which a dog featured and in over half of these incidents pain had been experienced. However, two-thirds of a non-phobic control group had undergone the same experience in the same proportion without subsequent phobic acquisition. Di Nardo *et.al.* (1988) noted that all of their dog phobics "believed that fear and physical harm were likely consequences of an encounter with a dog, while very few non-fearful subjects had such expectations...an exaggerated expectation of harm appears to be a factor in the maintenance of fear." (p 244). It could also be that the fear itself causes such illusory correlates between the stimuli and the likelihood of an aversive event, while also being the result of this bias.

More evidence against the conditioning theory has come from experiments failing to inculcate a fear in humans via the conditioning experience (English, 1929; Thorndike 1935; Davison, 1968b). Though a majority of phobic patients in a Swedish sample (approx 60%) attribute their phobia to a conditioning experience (Öst and Hugdahl, 1981; Öst,1985; Hugdahl and Öst,1985), only 50% of animal phobics in the survey attributed their phobia to a conditioning experience. Merckelbach, Arntz and de Jong (1991) found that 57% of spider phobics reported conditioning experiences, (though modelling was most often reported (71%)). Murray and Foote (1979) found little evidence of conditioning experiences in their 60 snake phobics and Kleinknecht (1982) found that a quarter of tarantula-phobic subjects attributed their fear to an unpleasant experience concerning a spider.

Rachman (1977) tried to reconcile the data by suggesting that there may be at least three pathways to fear. These are i) direct acquisition by conditioning

experience(s), ii) indirect\vicarious acquisition: direct or indirect observations of fearful people and iii) transmission of information likely to induce fear. So, conditioning processes may be involved in the aetiology of some phobias, but other processes are also involved in their development, including modelling, (see below) and cognitions (see below). Also, the interaction of the physiological, behavioural and cognitive components probably influence each other and will have differential effects.

In a further exploration of the debate about conditioning experiences as triggers for phobia, Barlow (1988) theorises that though some simple phobics experience alarm in response to a realistic threat to their safety which then becomes associated with the event, object or situation, a larger number suffer from a 'false alarm' which is itself so intense as to precipitate learning, and anxiety thereafter occurs when the unpredictable possibility of having another unpleasant false alarm becomes likely, or is perceived as such. Barlow states that the CSs and UCSs are likely to 'belong' together (for fuller discussion see below) in that they are not randomly paired, or that the association may alternatively arise with the possibility of entrapment should a false alarm occur. An actual 'true alarm' may not have to occur, only a false alarm which happens in the presence of a previously benign situation or object, and it is proposed that it is the *intensity* of the experience which is of paramount importance in the acquisition of fear responses.

The conditioning model of behaviour in its pure state has had increasing difficulty in dealing with the variety of empirical evidence available to theoreticians. Borkovec (1982), for instance, had stressed the importance of engagement with the stimulus, describing 'functional CS exposure' and suggesting that exposure

would take place only if attention was paid to the feared object in a way which enabled emotional processing to take place. Rachman (1981) proposed that attention had to be paid to the emotion experienced, as well as the phobic object or situation. Clearly, original conditioning theory itself had become inadequate to deal with the myriad permutations of anxiety response maintenance mechanisms and an addition to the theory of fear acquisition, derived from the evolutionary perspective was proposed. This is "preparedness."

### Preparedness

Seligman (1971), noting that phobias are highly resistant to extinction and are generally confined to relatively limited set of objects which seem to be nonarbitrary, proposed that they are instances of 'prepared' learning. Because of the exigencies of natural selection, organisms are evolutionarily prepared to associate selective events and are contraprepared or unprepared for other events. Thus, fears are prepared when they have had survival value (eg because the fear and associated avoidance has prevented harm) so a "preparedness" to acquire a fear of snakes should confer evolutionary advantage to the individual.

Seligman suggested that phobias are to do with this biologically prepared learning because the objects of phobic reactions are generally animals and situations which may have threatened humans, especially in the distant past. He went on to say that most attempts to induce fears in the laboratory use unprepared stimuli and as such cannot be a sound basis for theories of phobic acquisition and that in addition to this biological preparedness, the concept of *belongingness* should be added. This theory is based in part on the study of acquired food aversions in rats after a single conditioning event (Garcia and Koelling, 1966; Garcia, McGowan and Green, 1972) and from Seligman's own experience of aversion

conditioning following an unfortunate encounter with some Sauce Béarnaise (Seligman and Hager, 1972). Rats learned to avoid sweetened water (CS) when nausea was the consequence, but not when the consequence of drinking it was an electric shock to the foot. Garcia *et.al.*(1972) demonstrated belongingness in that the sickness was associated with interoceptive cues, and the act of ingestion, while exteroceptive cues (lights, tones) were associated with the shock. Seligman (1971) also suggested that such fears would be resistant to extinction and that they would not be available to consciousness. There is some doubt as to the validity of conclusions drawn by such studies as taste aversion is demonstrably not the same as fear, involving a different and highly specialised set of physiological responses.

Direct evidence for preparedness theory has come from conditioning studies in which different types of stimuli were used as the CS ( Öhman, Erixon and Löfberg, 1975; Öhman, 1979; Öhman, Dimberg and Öst, 1985). GSR (galvanic skin response) proved more difficult to extinguish after it had been paired with snakes, than after pairing with houses or faces. In a study by Hugdahl, Fredrikson and Öhman (1977), the subjects' level of physiological arousal was also found to be related to the extent to which fears can be conditioned, though this did not interact with the preparedness factors. People with high levels of arousal were more easily made afraid of fear-associated stimuli than were people with lower levels of arousal. These findings were interpreted as evidence that people are 'prepared' to fear certain stimuli, especially those who have a high level of arousal. The preparedness factor therefore works in both directions- both the stimuli and the response are prepared.

However, these studies have concentrated on the conditioning of a physiological

arousal response as measured by skin conductance, while Öhman *et.al.* (1985) used heart rate and finger pulse volume, none of which are necessarily correlates of the intensity of fear responses but which may relate to interest or excitement as well as to other emotions. They have also proved difficult to replicate. Furthermore, the acquisition of animal phobias tends to occur in early childhood while all experimental work has been carried out on adults, thus removing a vital component in acquisition theory. A further difficulty with preparedness theory comes from the field of genetics. A twin study by Skre, Onstad, Torgersen, Lygeren and Kringlen (1993) showed that there may be a genetic component in the aetiology of panic disorder, generalized anxiety disorder and post traumatic stress disorder, but not in simple and social phobia which they hypothesise as being mainly caused by environmental experiences.

The prediction made by Seligman that preparedness should facilitate acquisition of phobias has not been borne out by subsequent research (for review see McNally 1987). Given that the evidence for preparedness is confined to the resistance of particular fears to extinction, the relationship between preparedness of phobias and treatment outcome provides a test of the actual strength of this relationship.

A related proposition was put forward by Bennet-Levy and Marteau (1984). They examined the characteristics which are associated with humans and suggested that preparedness to fear certain animals could be a function of general fear-evoking properties and a discrepancy from the human form, so that 'ugly, slimy, speedy or sudden-moving animals are experienced as less approachable and more fear-provoking than animals without these qualities' (p40) and that the perception of harmful properties overrode even these concerns: rats were rated the most feared

stimuli because they were perceived as potentially harmful. This theme was extended by Öhman (1986) who suggested that reptiles were the initial predators of mammals and as such are the prototypic elicitors of fear. So, "a biologically controlled defence system can be postulated ..... activated by cues signalling the presence of predators" (p128). These include the position of the eyes with the ability to detect animals approaching rapidly, olfactory and auditory cues, and warnings from fellow members of the species. The response to these cues must of necessity be extremely fast and automatic. Both the perception of stimuli and responses to it are seen as evolved systems which work in tandem to protect the organism and promote genetic survival.

#### Modelling/Observational Conditioning

There has been a great deal of interest in the therapeutic effects of modelling on behaviour. Initially, Mary Cover Jones (1924) had pointed out the efficacy of exposing a fearful child to a feared stimulus in the presence of unafraid children. Much later, researchers such as Bandura and Rosenthal (1966) became interested in the vicarious conditioning of subjects to an apparently aversive stimulus. Subjects began to react emotionally to a harmless stimuli after they had watched others apparently being given an electric shock at the sound of a buzzer. In a later study, Bandura and Menlove (1968) were interested in the efficacy of reducing anxiety in children who were afraid of dogs by showing them a model fearlessly interacting with a dog. Initially fearful children showed more willingness to approach and handle a dog after exposure to this. Lazarus (1971) in his 'behaviour rehearsal' procedures, demonstrated exemplary ways of behaving in particular situations and then encouraged the patient to imitate the behaviour during the therapy session. This research led Bandura and others to

formulate social learning theory. Bandura theorised that modelling behaviour in this way transmits new patterns of coping behaviour, preventing or interrupting responses that are unnecessary and facilitating the expression of newly learned adaptive behaviour. A problem with researching the area of observational learning is that it is obviously not ethically justifiable to induce phobias in human infants. However, primate research has seemed to be marginally less problematic in this respect and a fruitful area of research into 'observational conditioning', has been the work carried out by Mineka and others on primates (Mineka, Davidson, Cook and Keir, 1984; Mineka and Cook, 1986; Tomarken, Mineka and Cook, 1989; Cook and Mineka; 1989). They showed that young monkeys acquired an "intense and persistent fear of snakes" on becoming afraid after seeing their parents behave fearfully towards real, toy and model snakes which were presented for 40 seconds, 6 times a session. 6 sessions were carried out over a period of three weeks. In conditioning terms, the fear (CR) becomes associated with the snakes (CS) because of the anxiety (UCR) induced by the sight of their fearful parents (UCS) towards the snakes. Mineka and Cook (1986) also explored the possibility of the transmission of immunizing experience and found that young monkeys who had previously seen adults interacting in a non-fearful way with snakes did not subsequently become afraid when subjected to observational conditioning. The prediction was that prior exposure to a non-fearful model can effectively immunize against subsequent observational conditioning. This response has obvious value for survival as has the belongingness evident between the elements in the conditioning experience which cuts down on the number of possible permutations to be learned. Evidence for this was obtained by Cook and Mineka (1989), in an effort to explore the non-

random distribution of fears, and following on from Seligman's (1971) and Öhman's (1986) work on preparedness and belongingness. They demonstrated that primates acquired a fear of fear-relevant objects (toy snakes and toy crocodiles) but not of fear-irrelevant objects (flowers and a toy rabbit) after observational conditioning experiences. Recent research by Masataka (1993) has indicated that a further element in observational conditioning of fear may be to do with the effects of experience of live, moving insects prior to being exposed to conditioning trials. Baby squirrel monkeys fed entirely upon fruit did not acquire fear of snakes, while those who had an addition of live insects to their diet, did acquire a fear of snakes during modelling trials.

There is also evidence from the Mineka group with regard to preparedness theory that, for high-fear humans, there is a tendency to make selective associations between fear-relevant stimuli and aversive outcomes (Tomarken *et al.* 1989). In this study, high-fear subjects overestimated the contingency between a shock and a fear relevant slide (snake or spider) and a second experiment indicated that this bias was due to the aversive nature of the shock rather than other features such as its attention capturing (or 'attentive') properties.

Due to the ethical problems of inducing fear in human subjects, this research in its particular form has not been carried out on humans. The relevance of primate research is two-fold: it has highlighted the familial element in fear acquisition, and has provided a possible reason for the low incidence of traumatic events in the acquisition of fear responses. If the traumatic event was observed as having happened to someone else, it would not be remembered as a personally relevant traumatic event and may not even be remembered at all.

## Conditioning and Cognitive processing

The history of conditioning theory therefore, as it is applied to the acquisition of fear, and particularly phobias, has been beset by contradictory evidence from many sources. Some researchers have argued that there is no such process in humans as classical conditioning (Brewer 1974). Davey (1983, 1989a, 1992) has pointed out that there has been an over-reliance on animal models and that there are "some important dynamic and procedural differences between classical conditioning in humans and animals. We can only begin to compare human and animal conditioning when we have developed a model of human conditioning based primarily on studies of humans" (1983). Developments in the understanding of animal conditioning have had an impact on the kinds of associations between stimulus and response that are formed by the animals during different types of conditioning experiences, and on the nature of the cognitions which mediate the CR. Rescorla (1967, 1968) had stressed the importance of the predictive significance of the CS in its announcement of the imminence of the UCS, that is, cognitive factors. Other researchers suggest a possible cognitive base to the conditioning process, that conditioning may actually be based on perceptions of causality.

In a study with humans, subjects who could verbalise the connection assumed between the CS and the UCS exhibited a differential conditioning response (Baer and Fuhrer, 1968, 1970) and the aversiveness of a UCS may be depleted by telling subjects that in future it will be less intense or less consistent. If they believe this, the UCS is rated as less unpleasant and a weaker response is elicited on future presentations of the stimuli (White and Davey, 1989). Similarly, if subjects are particularly afraid of either the UCS or the CS this may lead to the

attribution of aversive characteristics to the UCS which in turn leads to its heightened aversiveness and resistance to extinction (Russell and Davey,1991). Again, expectancy bias leads to the CS being evaluated as having predictive significance due to the generation of a covariation bias which influences the perception of the relationship between the CS and the UCS (Davey 1992b). These expectancies may be the result of evolutionary pressure in a phylogenetic (Seligman,1970; Öhman, Dimberg and Öst 1985) or ontogenetic ( Skinner 1971; Alloy and Tabachnik, 1984) sense. It may also indicate that the meaning of a stimulus is important in the forming of illusory correlates between the CS and the UCS.

Conditioning theory now incorporates many features including preparedness and belongingness, modelling, evaluation and cognition. It is placed in the context of the subsystems of physiology, behaviour and cognition. The emphasis in the study of the treatment of phobia has become increasingly focused on the cognitive element. Cognitions are conceptualized as being the products of particular cognitive processes (see chapter 2) which both encapsulate and mediate response mechanisms, which in turn are translated into patterns of thinking and meaning.

### The Cognitive Paradigm

Cognitive developments within conditioning theory invite a re-examination of Seligman's (1971) influential assertion that phobias are irrational and not subject to cognitive influences. This is especially relevant given the recent rapid development of cognitive and information processing approaches to the understanding and treatment of anxiety.

The cognitive theory of emotions is based on the idea that it is not things *per se* which evoke fear, but the appraisal of those things. Lazarus and his colleagues

(Coyne and Lazarus 1980; Folkman, Schaefer and Lazarus,1979; Lazarus 1966, 1981) have put forward the theory that two processes - cognitive appraisal and coping - are important in the mediation of stress. The amount of control a person may have is dependant on general beliefs they may hold to do with the amount of control he or she can exert over the outcome of important situations, and a specific appraisal of the amount of control he or she is able to exert over a particular, perhaps stressful, situation. Primary appraisals are to do with judgements about "whether an encounter is irrelevant, benign-positive or stressful" (Folkman and Lazarus, 1985) while secondary appraisal is to do with an evaluation of coping resources such as physical, social, material and psychological assets with respect to the demands of the situation. Coping refers to the cognitive and behavioural attempts made to manage a troubled interaction between the person and the environment and thereby reduce the level of stress (Folkman 1984). Emotions are seen as the products of people's appraisal of their interactions with the environment. In a similar vein, Bandura (1977a) theorised that the single result of all anxiety treatments is an increase in a sense of self-efficacy or competence in mastering a feared situation, though Borkovec (1978) has pointed out that self efficacy may be the result rather than the mediator of behavioural change.

There has been much clinical evidence for the beneficial effect on fear reduction of changing negative cognitions , beginning with Lang (1971) and Bandura (1971) (see above). Beck and Emery (1985) have suggested that such cognitions are often the cause of anxiety disorders and stated that "an anxiety disorder can be conceptualized metaphorically as a hypersensitive alarm system" (p31), and proposed that anxiety is precipitated by "the perserverative, involuntary intrusion

of automatic thoughts (in verbal or visual form) whose content involves possible physical or mental harm." Because some people are extremely sensitive to any stimuli that could possibly be interpreted as harmful, this leads to many "false alarms" which ensure a constant state of anxiety. Humans, having evolved an ingenious and sophisticated system of constant scanning of the environment, sometimes use the information thus gleaned in potentially self-harming ways. So depression is often the result of perceived loss, anger of perceived unfairness and anxiety of perceived threat. If processing of stimuli about the self, the world and the future (the "cognitive triad", Beck 1976) becomes faulty, automatic thoughts are triggered precipitously and lead to inappropriate behavioural, physiological, affective and cognitive responses. Anxiety patients are particularly sensitive to any signalling of potential harm and tend to discount any contrary signals. These disparate elements in the forming of anxious responding have been summarised by Beck thus:

$$\text{ANXIETY} = \frac{\text{Perceived prob. of danger} \quad \times \quad \text{Perceived awfulness}}{\text{Perceived ability to cope} \quad \times \quad \text{Perceived rescue factors}}$$

Some of the strongest evidence for the cognitive theory of anxiety emerged from the specific cognitive theory of panic attacks, (Clark, 1986; Clark, Šalkovskis, Gelder, Koehler, Martin, Anastasiades, Hackmann, Middleton, and Jeavons, 1988). The trigger stimulus, which may be internal (a slight feeling of breathlessness or faintness, thoughts or images), or external (a place where an attack has previously happened), activates a particular set of cognitions to do with the perceived probability of danger and awfulness. If these stimuli are perceived as

threatening, a state of apprehension follows which itself is associated with a range of bodily sensations. If these anxiety-induced sensations are open to catastrophic misinterpretation, anxiety increases, leading to an increase in bodily sensations and so on in a vicious circle, culminating in a full blown panic attack. A sense of an ability to cope or of an amount of help available reduces the amount of anxiety experienced.

Two behavioural strategies may be implicated in the maintenance of the panic response : hypervigilence and avoidance. First, hypervigilence (or hyperattention): patients scan their bodies specifically for threat. This leads to them noticing sensations of which they would otherwise be unaware (as indeed are most of the general population). Once noticed, these sensations are taken as further proof of some impending mental or medical catastrophe. Second, avoidance: Šalkovskis (1991) has noted that in addition, certain types of avoidance tend to maintain negative interpretations, so for example a patient preoccupied with the idea that he was suffering from heart disease avoided exercise (digging) or sex when he noticed a palpitation, and was therefore able to ascribe his continuing existence as contingent upon his taking these precautionary measures, rather than contingent upon his not having heart disease in the first place. Avoidance in this case was therefore reinforcing his negative interpretation of the palpitations as he took the lessening of anxiety following his avoidant strategy as proof that he was correct to stop exercising as this had prevented a heart attack. Similarly, spider phobics may believe that if they had not taken evasive action when confronted by a spider, they would have been attacked.

A main feature of the cognitive account of anxiety which distinguishes it from the

behavioural approach is to do with the pivotal role played by *beliefs* and by appraisal (Šalkovskis, 1991). Once anxious beliefs are formed they appear to be very strong and extremely difficult to shift. Other anxiety disorders (hypochondriasis and obsessive compulsive disorder for example) are prey to the escape/avoidance maintenance process. Phobic disorders in particular usually have very clear situational triggers and as such are particularly useful in the testing of hypotheses to do with specific beliefs and the processing of information, because of their circumscribed stimuli.

### Treatments

Treatments for specific phobias have been derived from the theories discussed above and can be grouped under the headings of psychoanalytic, behavioural and, most recently, cognitive-behavioural therapy. Drugs have not been found to be effective as treatment for specific phobias so this review will concentrate on psychological treatment. "No psychotropic drug has been demonstrated to be effective in the treatment of simple phobias" (Fyer, 1987,p.190)

### Psychoanalytic treatments

Psychoanalytic treatments of phobias in general try to uncover any repressed conflicts which are assumed to be the underlying cause of the severe anxiety and avoidance evinced by phobics. As the phobia is regarded as a *symptom* it is not dealt with directly and in fact is contraindicated because the phobia is protecting the individual from emotions that are too painful to confront. Techniques used to unearth the underlying cause and by doing so remove the phobia include free association, and examination of sexual conflicts or of a generalised fear of other people. Alexander and French (1946) indicated that it was important that

eventually the phobic object or situation was confronted directly and that Freud himself had recommended this course of action with regard to phobias. Wachtel (1977) has even recommended that techniques such as systematic desensitization be utilised.

### Behavioural Treatments.

Behavioural approaches are derived from work in conditioning theory, both classical and operant. Wolpe (1959) devised *systematic desensitisation* during which the phobic individual is asked to imagine a graduated series of increasingly frightening scenes while in a state of relaxation so that the relaxation inhibits anxiety rather than the other way round. This was based on the theory of reciprocal inhibition and required that anxiety remained low throughout the treatment in the presence of the threat stimuli. Approximately 50 variants and extensions of this type of behavioural method are described in the literature (Öst 1989). For 65-75% of agoraphobics and social phobics, and 75-80% of specific phobics, these treatments have led to a significant clinical improvement. An extremely influential series of studies (reviewed by Paul in 1966) showed the superiority of the behavioural treatment of systematic desensitisation over insight-oriented psychotherapy in the treatment of social anxiety. A follow up study (Paul 1967) showed the same pattern. Other authors (e.g Paul, 1966; Rachman, 1978) have shown that neither the hierarchical presentation of the stimuli nor the relaxation component are necessary for the treatment of fear reduction.

Rachman (1978) found that the omission of relaxation training did not prevent the reduction of fear and that there was evidence to show that though fear and relaxation are incompatible in many cases, this is not always so, and that muscle relaxation itself does not preclude the engendering of subjective anxiety. All

these techniques -desensitization, modelling, implosion and flooding, have in common a reliance upon *exposure* for their ameliorative effects. According to de Silva and Rachman (1981, p227) exposure is taken to mean "planned, sustained and repeated evocations" of either the fear-evoking stimulus itself or tangible representations of it". They also make a distinction between active (or "engaged") and passive exposure and state that the latter is less effective than the former and thus emphasise the importance of participant modelling.

*Implosive therapy* involves the imaginal presentation of highly anxiogenic cues along with psychodynamic, catastrophic cues. Levis and Hare (1977) describe four stages : i) the identification of cues which appear to be mediating phobic responses, ii) a period of neutral imagery to determine the client's imaginal ability, iii) the repeated description by the therapist of the aversive stimuli as vividly as possible while discouraging any avoidance of this on the client's part, and iv) The client is given "homework" scenes to practise before the next session.

In contrast to this, the technique of *flooding* does not involve the presentation of unrealistic cues but typically uses the presentation of realistic material. In the case of phobics, this often involves the confrontation by the phobic of his or her most feared situation. After prolonged exposure to the fear-evoking stimulus or situation levels drop or are extinguished. The therapist is required to withhold any comforting behaviour, though Foa, Blau, Prout and Latimer (1977) suggest that the presentation of terrifying scenes and the withholding of therapist support may not be necessary for flooding to succeed. One-session treatment incorporates this technique.

*Modelling*, another behavioural technique, involves repeated vicarious exposures to the threatening stimuli. The therapist demonstrates approach and contact with

the phobic object and encourages the client to do the same. Participant modelling uses graded hierarchies so that anxiety does not rise to a disabling extent in the treatment session, and uses a live (or filmed) presentation of the desired behaviour. With the covert modelling technique, the client is given verbal instructions to imagine someone interacting in the desired way with the feared object. Again, one session treatment utilises this technique. Behavioural treatments then, incorporate these techniques of exposure, modelling, and systematic desensitisation and have traditionally lasted over an agreed amount of time or number of sessions.

New developments have included the increasing use of cognitive change in therapy, based on the cognitive approaches described above. The culmination of the drawing together of these ideas about anxiety reduction has led to the creation of *cognitive behavioural therapy*. In the field of therapy for specific phobias, this has been further refined into one-session treatment for specific phobias (Öst, 1989; Öst, Šalkovskis and Hellström, 1991). This treatment consists of exposure *in vivo* combined with modelling and with the alteration of cognitions to do with both the phobic object, responses to it, and with the coping strategies of the phobic person (behavioural and cognitive) as they pertain to fear and avoidance. The purpose is to expose the patient to his or her feared object in a controlled way in a calm environment and enable him or her to stay in the situation until a belief in the non-occurrence of the feared consequence is assimilated. The meaning of the phobic object is thus changed and absorbed along with an emotional change from phobic fear to a more normal reaction. The patient must continue to carry out exposure in future situations to maintain the therapeutic effects of the session, and is given the tools to do this. A more

detailed description of the procedure can be found in chapter 9. In contrast to the ideas about the relative importance of active and passive exposure posited by de Silva and Rachman (1981), Arntz and Lavy (1993) have shown that elaboration (or engaged exposure) did not potentiate the effects of the exposure treatment during one-session treatment with spider phobics and it is suggested that the processing of information seems to occur spontaneously when the patient is undergoing the exposure treatment. One session treatment is not only an effective treatment: its brevity makes it a potentially important tool for research.

## CHAPTER 2

### INFORMATION PROCESSING THEORIES: COGNITIVE PROCESSES (MEMORY AND ATTENTION) AND COGNITIVE PRODUCTS

(BELIEFS).

#### Introduction

The behavioural theory of anxiety based on the conditioning model has been a continuing influence on information processing approaches to emotion and in particular on theories of acquisition and maintenance of anxiety disorders. On the overt level, conditioning terms such as 'stimulus' and 'response' have continued to be used, as well as the key concept of avoidance which has been taken directly from two process theory as 'cognitive avoidance'. Implicit in this is the assumption that behaviours are relatively fixed by conditioning and therefore relatively impervious to change except by active counterconditioning interventions. This has led to expectations about the automaticity and inevitability of stereotypic responses to stimuli and has had a profound effect on the kinds of experiments carried out, as well as on the hypotheses from which they are derived.

In contrast to this, the more specifically cognitive approach to clinical problems (Beck, 1976) is to attempt to change emotional responses by changing the meaning given to events. Specific beliefs are examined for distortions and those found to contribute to dysfunctional patterns of thought are replaced by others. Cognitive psychology contributed to the experimental methodology used to explore the processes which are presumed to be of importance in the initial formation of these cognitions but the emphasis of such research has tended to be on 'cold' cognitions and 'intellectual' beliefs rather than on 'hot' cognitions or

'emotional' beliefs (Teasdale 1993). The distinction is not unlike the one arising between knowledge and belief: one can believe in an idea without having any factual basis for it as is evident in the spheres of politics and religion. The opposite is also true: one can be in a danger situation (a car crash for instance) and know that the probability for this is very low. This can often result in a disbelief about the reality of the situation, even while it is happening. There can be belief without knowledge, and knowledge without belief and both of these states can have an impact on the meaning of a situation.

Exploration of emotion by cognitive psychologists has been very useful in furthering the understanding of cognitive processes at the level of propositional, specific, intellectual meaning. Later in this thesis it will be argued that although this research has been illuminating in the context of conditioning based theories, it has not really addressed the question of the processes involved in the formation of high-level, generic meaning (Teasdale 1993).

Before discussing these ideas and their implications, it is important to look at what has gone before, and contributed to their formulation, in terms of theories of cognition and emotion.

The previous chapter investigated the historical basis for the development of "cognitive theory" and "information processing theory". This chapter discusses the models of cognition which have arisen from this foundation and the relevance of cognitive theory to emotional disorders in general and phobias in particular. It then goes on to discuss information processing theory itself, as this has been the basis for much experimentation and is of particular relevance to the cognitive models of emotion discussed here. Next, it explores the history of the two main processes incorporated under the general heading of "information processing" in

relation to anxiety, and specifically in relation to phobias. These are the processes of memory and of attention. Finally, the importance of the products of these processes in the form of cognitions is discussed and their relationship to meaning.

#### Models of the relationship between emotion and cognition.

Although cognition and emotion were seen to be in some way connected by methodological behavioural theorists (although radical behaviourists considered cognitions as too ephemeral to merit debate), the exact nature of their interrelationship was unclear. Initially the debate concentrated on whether emotions preceded, or were preceded by, cognitions. The argument polarised with the idea on the one hand that emotional responses were dependant upon some kind of appraisal, and on the other that they came *before* appraisal and in some way directed it. The arguments can best be summarised by looking at the most influential adherents to each of the views.

1) Zajonc (1984) suggested that affect and cognition are likely to be in the control of separate neuroanatomical structures and therefore affective processes could be aroused independently of any cognitive input. In a paper on "the primacy of affect" he reiterated his position by stating that "affect and cognition are separate and partially independent systems and that although they ordinarily function conjointly, affect could be generated without a prior cognitive process. It could, therefore, at times precede cognition in a behavioral chain." (Zajonc, 1984, p117).

2) Beck (1976) and Lazarus (1981, 1984) rejected this view and suggested that cognitions were in fact the precursors of emotion but that this happened so rapidly that they remained unavailable to consciousness i.e. as a result of

automatic appraisal processes. Beck *et al.*(1976,1983), in a model derived from clinical observations rather than cognitive psychology, went further in proposing that it was the meaning of an event which mediated the emotional response and that this meaning was usually available to consciousness in the form of thoughts or images. An automatic thought, triggered by a stimulus, led to a particular emotion with which it was connected. A particular experience, often in childhood, leads to initially helpful but potentially dysfunctional assumptions which in turn is subject to activation by one or more critical incidents. This chain generates negative automatic thoughts sufficient to maintain or precipitate depression which in turn creates more negative automatic thoughts and so on. A self-perpetuating vicious circle is thus formed in people suffering from emotional problems. Schemas are a collection of assumptions: "functional structures of relatively enduring representations of prior knowledge and experience" (Beck and Clark, 1988,p24) and the possession of maladaptive schemas is suggested to lead to a cognitive vulnerability to depression or anxiety. Beck and Clark (1988) express the relation of schemas to anxiety thus:

'Cognitive structures guide the screening, encoding, organising, storing and retrieval of information. Stimuli consistent with existing schemas are elaborated and encoded, while inconsistent or irrelevant information is ignored or forgotten....the maladaptive schemas in the anxious patient involve perceived physical or psychological threat to one's personal domain as well as an exaggerated sense of vulnerability'. (pp.24-26)

Modes are the organising principles for schemas and each consists of groups of concepts and rules which are thematically linked. In anxiety disorders it is supposed that it is the danger mode which is in charge. The meaning of schemas

is seen here in terms of a person's underlying assumptions and beliefs. Often on closer examination this meaning appears to be confined to the consideration of a statement as 'irrational' is to be made rational through therapy. So, for example, the thought 'If I am not loved by others, I am not a worthwhile person' is an unrealistic schema which makes the person vulnerable to events (Beck, Epstein and Harrison, 1983).

3) In contrast to this, Bower's (1981) associative network theory, derived more directly from experimental cognitive psychology, suggests that it is the emotion which forms the *context* for cognition: a particular mood state facilitates the access of memories, concepts and an interpretative style previously associated with that state. Once in a mood, all the concepts and cognitions previously associated with that mood state are reactivated and access to them is facilitated. This then serves to maintain the mood. Teasdale (1993) proposes that this network theory makes negative thoughts both the consequences and antecedents of an emotional mood state.

4) Williams, Watts, Macleod and Mathews (1988) proposed an information processing model. They suggest that there are a number of operations performed in the brain which happen pre-attentively. The important processes in terms of the research to be described here are the 'sensory registration, semantic labelling, associative spread and disambiguation of a stimulus'. This is a pre-attentive stage of processing when there is a bombardment of sensory information upon the brain's receptors which needs to be filtered and made sense of. At this stage in the processing of information Williams *et.al.*(1988) proposed that all information is ambiguous. The ambiguity starts to narrow when the activation of all these meanings interacts with the activation of the context. Then

a dominant meaning emerges which leads to the rejection of the other possible interpretations. Williams *et al.* (1988) also hypothesise that a mechanism exists in pre-conscious process which judges the emotional valence of the situation. This has the effect of orienting the organism towards or away from the stimulus. Williams *et al.* (1988) also suggest that this in effect creates a processing priority and that it is at this, still pre-attentive stage, that anxious people orient their attention towards threatening stimuli while non-anxious people orient attention from threat. Once a negative item has been given priority in the processing hierarchy and has been allocated further processing resources, this will in turn increase the level to which it is subject to *priming*, the automatic process which takes place when a stimulus activates the various components which together form its internal representation. The consequence of the activation of these multiple components is that the stimulus (a word for example) becomes more accessible so that even if only a few features of the word are presented it readily springs to mind. This also has the effect of deflecting resources away from other tasks. These primed representations go on in their turn to affect the hierarchy of processing priorities in the future so that a negative pre-conscious attentional style is built up. This model differs from that of both Beck and Bower in its emphasis upon the relative containment of any effect of emotionally mediated bias on cognitive functioning, while Beck's and Bower's models suggest that the effects of emotion should pervade cognitive processing throughout the system, or at least throughout the jurisdiction of prevailing 'modes'. This model also predicts that if the encoding of information is avoided in some way (cognitive avoidance) this will result in weaker associations between internal representations and lead to a less efficient retrieval of memory. The cognitive avoidance of

information inconsistent with the fear response (in phobics, information which would disconfirm negative beliefs), being also inadequately encoded, will prevent the extinction of the fear response.

In this sense the theory owes more to two process methodological behavioural theory than to the cognitive theory of Beck and others. A great many experiments have been carried out in an attempt to further refine the information processing model and to show the effect of emotion on the processing of basic elements of meaning in the form, mostly, of single-word stimuli. These are discussed later.

5) A more recent development, moving away from the fundamentally behavioural theories of emotion towards a unified theory, has been the theory of interacting cognitive subsystems (Barnard and Teasdale, 1991; Teasdale, 1993). This is derived from both cognitive psychology and Beck's clinical-cognitive theories and is explained by Teasdale in the following fashion:

"ICS proposes nine qualitatively distinct types of information, or mental codes, each representing a different aspect of experience. Each type of information is processed by its own specialised processing subsystem. There are separate memory stores for each type of information, making nine distinct memory stores in all. Information processing involves the transfer of information between subsystems and its transformations from one mental code to another." (Teasdale, 1993 p344).

It is suggested that there will be a high level of interaction between the various systems and the senses and that it is the level of generic, rather than specific, meaning that is linked to emotion. Teasdale (1993) proposes that there are two levels of meaning, the *propositional* and the *implicational*. The propositional level is to do with specific meaning which can be grasped easily due to the

relatively direct relationship between language and concept. An example of a sentence of this kind is "Paul has curly hair". Teasdale (1993) states that meaning at this level is 'represented in semantic networks, such as Bower's theory of mood and memory' and that they consist of 'specific constructs and the relationship between them' (p 345). The *implicational* level is more 'generic, holistic,' and is 'difficult to convey adequately because it does not map directly onto language' (ibid). This generic level 'encodes recurring very high order regularities across all other information codes' (ibid). Emotions are hypothesised to be linked to this level of meaning. Three important features of this are i) a high level of extrapolation, ii) a connection to non-verbal features of communication such as facial expression or intonation, and iii) the underlying driving concept which comes from the coming together of knowledge from all possible sources, or schema, into an implicative meaning. Teasdale (1993) gives as an example, the concept of 'brokenness' which is implied in the following two sentences : "John knocked the glass off the table. Mary went into the kitchen to fetch a broom". With this theory there is a move away from those derived from behavioural theory and towards a less serial type of processing paradigm in which meaning is an emergent property. Teasdale has attempted to unify the cognitive theory of emotion with the theory of cognitive therapy and although there is as yet little empirical evidence to support his theory it is certainly a very interesting and thought-provoking one.

#### Emotion, conditioning and cognition

In order to understand the models described above it is useful to have some integrated knowledge of the most relevant theories of emotion, as well as behavioural conditioning theory described earlier. Peter Lang was influential in

introducing cognitive concepts into the behavioural study of emotion with the three system construct of fear (Lang 1970, 1977, 1979, 1984). He proposed that there are three separate response systems involved in anxiety and that these systems are the behavioural, the physiological, and the verbal or cognitive. It is perhaps from this point that the cognitive began to be equated with the semantic. Starting off from this point, Foa and Kozak (1986) proposed that emotions are encoded in networks in memory that include information about stimulus features, the individual's responses (including verbal, physiological and behavioural responses) and information about the meaning of the stimulus and response features. Meaning changes in this context as a result of a modification of the threat elements that are connected to the stimulus and response elements in the structure. Meaning also is mostly confined to do with the estimation of harm. When the emotion experienced is fear, the network serves as a template for escape and avoidance reactions and the information includes knowledge of the dangerousness of the stimuli or responses as well as physiological activity to do with escape. This idea is clearly in the conditioning tradition. They also concur with Lang (1971) in suggesting that emotions are evoked when a 'good match' is found for incoming information amongst existing memory structures. Emotion is therefore automatically called up each time there is this congruence between internal representations and external events. This suggests a certain amount of rigidity in behavioural and emotional responses where often in reality people have an extremely wide and flexible range of reactions to events which appears to depend more on the meaning these events have for them at that particular time than to fixed, overhead processes of the type typified by conditioning theory. There may be a constant reinvention of a wide range of responses. (Šalkovskis,

1991).

The idea of "fear structures", consisting of these three main components which are related to each other has been influential in the study of phobias over the last decade. It has also provided a framework for theorists who have refined and extended ideas about cognitive processes in other anxiety disorders. Of particular interest here is the theoretical model of Williams *et.al.*(1988) and the studies derived from it. These experiments are examined in more detail below and are mainly to do with the particular cognitive processes of interest to experimental clinical psychologists, that is : attention and memory and their relationship to emotional states. The information accrued through the study of these has attempted to inform therapeutic processes by clarifying the various pathways to anxiety responses while remaining rooted in two process theory. This approach has led to the creation of a number of experimental paradigms to do with the impact of propositional meaning on attentional and memory processes, which in turn shape the information in the fear network.

Williams *et.al.*(1988), following on from Foa and Kozak (1986) have suggested that avoidance is an important feature in the maintenance of fear, that avoidance can be cognitive as well as behavioural and that this has implications for the functioning of the fear network because of the defects in the priming and elaboration of information which leads to an imperfectly realised internal representation. Again, meaning here seems to be to do with having a clear representation of the 'real world', specifically, a vision of a stimulus which is not distorted. This relates closely to Borkovec's idea of 'functional CS exposure' (1982) which proposes that exposure only happens if attention is paid to the feared object in a way which enables emotional processing to take place.

Similarly, according to Watts (1979), the focusing of attention should enable anxious individuals to form a 'clear model of the stimulus' aiding 'long-term response decrement' (p.634). Williams *et.al.* (1988) further refine this and place importance on priming. The more a stimulus is primed, the greater the tendency to orient towards the primed stimulus which has the effect of moving resources away from other stimuli and allows more elaboration of the primed stimuli to take place. Subsequent retrieval of the stimuli is made more likely by this process.

Attention to anxiety responses has been differentiated from attention to anxiety-inducing stimuli. Focusing on anxious response processes leads to an increase in those responses, while focusing on stimuli produces a decrease in anxious responding, according to Hinde (1966). This is based again on conditioning theory and has produced some very useful insights about the processing of propositional stimuli. The encoding and retrieval processes in memory are therefore important for both the understanding and treatment of anxiety disorders and depression, as are the processes involved in the modulation of attention. Attention may be the selector of memories, and memory the pointer of attention. This in turn has an impact on the storing of propositions.

It would be useful at this point to outline the main components of the information processing paradigm as later in this thesis some of its experimental designs will be adapted and utilised. The information processing system to be examined here emphasises attention, encoding and memory retrieval, requiring a study of attentional processes, memory processes and the products of these processes in the form of reactions and cognitive appraisals or beliefs. In order to clarify these processes there follows a very brief history of the information

processing theory of attention and memory along with a sketch of the major experimental designs derived from it.

### Information processing.

Despite the upsurge of interest in cognitive processes as they relate to behaviour, the driving theoretical force behind the theory of emotional disorders has tended to remain fundamentally rooted in assumptions derived from the behavioural hypothesis, with avoidance given a primary position in theories of the maintenance of phobias because of the way it prevents the extinction of unwanted responses. The terminology has changed to make it more in line with information processing terminology, but the fundamental concepts remain closely linked to conditioning theory. This is evident in the work of various research groups (Foa *et.al.*1986, Watts,1986, Watts *et.al.*1986) who further suggest that a cognitive form of avoidance is particularly relevant to this maintenance mechanism. Attention is seen as an index of the intensity of fear and the contents of memory as an index of the impact of avoidance on cognitive representations of the threat object. Later in this thesis it will be argued as an alternative that it might be more fruitful to adopt a theory more directly based on implicational cognition (i.e.meaning) rather than on a reinterpretation of behavioural avoidance in terms of cognitive processes and the modification of propositions, though there is an important place for such theorising in the understanding of the basic elements which lead to the emergence of meaning. The information processing model, based on ideas of the brain as a super-computer as envisaged by experimental cognitive and neurocognitive psychologists, has begun to influence ideas about the processing of information in abnormal, anxious and depressed states. This has been largely due to the

development of computers which has had a huge impact on how psychological processes are viewed and examined and has led to the formulation of the "computer analogy". Computers accept information, code and transform it in a various ways, send the information on through a series of stages and retrieve information. All this is accomplished by a simple binary system able to handle complexities through the sheer number of its actions, much as neurones are supposed to behave in the brain. The computer model has been widely adopted throughout psychology. There are problems with this : computers have also been seen as logical and immovable, operating at a low level without the elements of consciousness or meaning.

Attention and memory are conceptualised as the basic modules of the system which take in and process the information through a series of stages. This has led to areas of enquiry concerning the nature of the information being taken in from the environment, the stages through which it passes, the transformations carried out upon it, and the relationship of these to the final output in the form of behavioural, physiological and cognitive responses. The information processing system is envisaged as the system by which people make sense of incoming information and transform it into output. Two main strands to the 'input' process have been considered in the attempt to understand phobic anxiety: attention, (memory encoding and retrieval, including priming and elaboration), and appraisal (meaning). It is important to distinguish between the *processes* and *products* of these interdependent systems. The processes (attention and memory) are involved in the generation of the end products (cognitions, beliefs, meaning and associated behaviour) which while clearly theoretically distinguishable appear to interact in complex and poorly understood ways. Information processing

research has tended to focus on the two broad categories of attention and memory, while, apart from directly clinical work, research into the products of these processes to do with cognitions, beliefs and meaning has been relatively neglected by experimental cognitive psychologists.

The understanding of phobias has benefited from the clarification of these processes, as well as other anxiety disorders which have been conceptualised as being the result of a distorted processing style or strategic or automatic cognitive avoidance. It was thought (Watts,1979) that if a clear picture of the threat object could be formed, anxiety should reduce due to habituation effects. So the successful completion of priming and elaboration processes should reduce cognitive avoidance, which is seen as a negative reinforcement of inadequate processing. A detailed understanding of the processing abnormalities and cognitive content of these disorders has been seen as essential in their treatment. Phobic disorders are particularly useful in this context in exploratory terms because they usually have very clear situational triggers and are available to test various theoretical hypotheses due to the discrete, and often concrete, nature of this stimulus. This means that it is easier to conduct experiments on specific phobias than it is on , for instance, generalised anxiety disorder. Any set of fixed beliefs or avoidant behaviours arising from such phobic fears therefore are of particular interest for both their high degree of specificity and for what they illuminate about the nature of anxious processing.

Measurement of the dimensions and content of the cognitive constructions found in emotional disorders has depended largely on introspective information-gathering techniques such as the reporting of thoughts while in an anxious state (Beck, Laude and Bohnert 1974) or the measuring of exaggerated estimates of

subjective risk in anxiety states (Butler and Mathews 1983). Mathews and MacLeod (1986) describe other measures derived from information processing methods in cognitive psychology. These methods were presumed to be more objective (and therefore more useful) than self-report measures in that they do not rely on introspection but instead utilise information gathered from the way emotional material impacts on the fundamental cognitive processes of attention and memory. This allows inferences to be made about these processes. A problem which has emerged about this type of research is concerns the relevance of the processes measured and the nature of the inferences drawn. It may be that rather than directly tapping into the effects of the information processing of threat stimuli, other unanticipated processes are being measured.

These objective measures can be divided into two main areas to do with i) attentional bias, (i.e. reaction time experiments, dichotic listening tasks and Stroop tasks) and to do with ii) memory bias (i.e. recognition and recall tests).

Thus, information processing theories of anxiety can be seen as based on conditioning theory with its emphasis on the importance of avoidance as maintaining and reinforcing fear responses. It includes the key concept of cognitive avoidance, and has also incorporated ideas from cognitive psychology such as priming and elaboration. The focus of research has continued to be on the exact relationship between a stimulus and a response and what is the consequence if the response is an avoidant one – even when this response is at an almost neuronal level. There is therefore an uneasy alliance between traditional behavioural theory on the one hand, and cognitive methodology on the other. A brief discussion of the experimental evidence for information processing theory follows with regard to memory and attention.

## Memory and Emotion

Foa and Kozak (1986), based on Lang (1970, 1977, 1979), have proposed that fear structures have an affect on attentional strategies and this can lead to cognitive as well as behavioural avoidance. According to this theory, fear is seen as arising from a network in memory which includes information on the stimuli situation, information on verbal, physiological and behavioural responses, as well as the individual's interpretation of the meaning of the stimulus and response elements in the structure. Foa and Kozak (1986) envisage this fear structure as a "program to escape danger" and suggest that it must involve information about the dangerousness of the stimuli and of responses, as well as information about the physiological arousal necessary to activate the escape sequence. According to this view a fear structure must contain propositional meaning in order to discriminate threat situations from non-threat. This meaning is to do with the amount of probable harm arising from an encounter with the feared stimulus. The persistence of such fears may result from their internal cohesion and from impairments in the fear processing mechanisms (Foa and Kozak, 1985)

Hyperattentiveness may lead to a fear network being activated in inappropriate ways resulting in unnecessary avoidance behaviour, with an effect of reinforcing the individual's interpretation of events. In order to reduce anxiety it is therefore necessary to attenuate the connection between the meaning and the stimulus. It is important for the treatment of emotional disorders that these structures are more clearly understood in order to facilitate the emergence of better and more focused treatments. Although people are often aware of the meanings associated with their feared stimuli and fear responses, they may not be able to utilise this knowledge in their dealings with their phobic object. Their having factually

precise information does not result in unassisted symptom reduction or remission. In order to fully understand the structures it has been seen as necessary to assess the elements of these which are not brought to light by introspection and to this end physiological responses, facial expressions, gesticulations, bodily movements and so on have all been recorded and subjected to analysis (Foa and Kozak, 1986). One of the problems with this approach is that it is difficult to be certain of the meaning of, for example, a fluctuation in the galvanic skin response. In an earlier, unpublished experiment, the present author found a relationship between GSR and an incongruous event, but the effect could just as easily have been ascribed to fear or enjoyment as to incongruity. Two other ways of examining information not available to direct self-report are to look at attentive bias, which will be discussed in more detail subsequently, and to study memory recall and recognition bias.

#### Memory and Emotion: Research studies

Most of the literature on memory functioning in individuals with emotional disturbance has concentrated on depression (Teasdale and Russell, 1983; Teasdale and Fogarty, 1979), although there has recently been an increase in research into memory in anxiety disorders. A detailed review of the work on mood and memory can be found in Williams, Watts, MacLeod and Mathews (1988) who note that "not all moods appear to be as potent as depression in acting as a 'context'" (p79) and that research has looked at the 'state' rather than 'trait' effects of mood on memory. Dagleish and Watts (1990) also note that clinical observations suggest that depressed patients suffer from the spontaneous intrusive recall of negative thoughts which are limited in range and extremely emotive, rather than suffering from the increased likelihood of their recalling negative

material if they attempt to do so. Mischel (1979), and Alloy and Abramson (1988) also make the point that depressed people may be more realistic in their view of the world. This may have implications for the kinds of information stored and retrieved in the memory process also but is not the view shared by most clinical psychologists, or indeed most people.

Research into the effects of has involved three types of investigation: into mood in depressed patients, mood in sub-clinical depressed subjects and induced mood in normal subjects. Breslow, Kocsis and Belkin (1981) found that depressed people were no better at remembering negative material than were non-depressed people, but were worse at remembering positive material presented in a word-list experiment. Zuroff, Colussy and Wielgus (1983), (cited in Williams *et al.* 1988) asked high and low scorers on the Beck Depression Inventory to judge how accurate words from a list were as self-describers and found that when asked to recall the words one hour, two days and seven days later, the depressed group recalled more negative items, (but also more negative intrusions). Zuroff *et al.* (1983) also tested recognition memory after the final recall test using signal detection methodology. They found that although the depressed subjects recognised more negative items they also gave more false positives, showing a relative laxity in response criteria, but no difference from controls in the discriminability of old from new negative items. This may indicate that increased recall of negative material in other studies may be due to response biases. Zuroff *et al.* (1983) also found that a similar negative bias was shown by a group of low scorers who had been depressed in the past, so there may be a general trait in depressed people towards a mood biased memory, independent of their particular current state.

Mogg *et al.* (1987) came to a similar conclusion to Foa and Kozak (1986) in outlining a general multi-stage process which reconciles the automatic orienting response to threat with a seeming absence of memory bias. They hypothesised that anxious individuals are biased towards threat information at an early stage in the process leading to a heightened detection capability and speed of recognition. Once the stimulus is found to be potentially dangerous it may then be suppressed or avoided in some way, leading to a less efficient recall/recognition strategy. The motivation for this they ascribe to a possible reduction in the experience of feelings of anxiety. A potential consequence of this inhibition in relation to the full processing of stimuli may be a poorer memory for such stimuli. (Williams *et.al.*,1988). Other studies using agoraphobics (Nunn,Stephenson and Whalen 1984) and panic patients (McNally, Foa and Donnell,1989; Norton, Schaefer, Cox, Dorward and Wozney,1988) have shown evidence of such memory bias.

McNally *et al.*(1989) suggested that the priority processing of anxiety-related stimuli during the process of encoding should lead to a more robust memory trace for anxiety words with a consequent enhancement of memory retrieval. In their study, subjects showed better recall for fear-relevant stimuli which they had processed using a self-referent encoding task. Conversely, Mogg, Mathews, and Weinman (1987), using a similar self-referent processing strategy found that anxious subjects showed poorer recognition and a trend towards poorer recall of threatening words, so the evidence for the effect of anxiety on memory has been more ambiguous. Mogg *et.al.*(1987) found no evidence of memory bias towards threatening words in patients diagnosed as suffering from generalised anxiety disorder. Their results indicate a poorer memory for threatening words in

anxious patients, leading to a reformulation of the schema theory and including some inhibitory process in anxiety which interferes with memory. As anxious people have been found to respond in a way which suggests hypervigilance to threatening stimuli (see Stroop discussion below) these results would suggest that in anxiety at least, an initial orientation to threat may be connected with impaired memory functions to do with the threatening material, perhaps as a function of the cognitive correlate of behavioural avoidance, which inhibits memory. Mogg *et al.* (1987) suggest that this 'vigilance-avoidance pattern' (p 97) may maintain the disorder by the combination of heightened awareness for threat cues and a subsequent effort to reduce the anxiety caused by that awareness by repressing the memory of it. This is consistent with conditioning theories of panic and phobias. They also go on to state that cognitive bias is present in both depression and anxiety but that the nature of the bias may be 'fundamentally different' (p97) in these emotional disorders.

Although some studies have found recall biases in anxiety, others have failed to find any evidence for recall bias among anxious people, making it difficult to fully endorse any theorising based on results only intermittently positive. There have been no studies of both anxious and depressed patients, which also limits the conclusions to be drawn and the research has generally been concentrated on memory for word lists rather than on more complex implicational stimuli. The advantage of this is that the meaning of individual words is relatively stable and contained (much in the same way as they are in a dictionary, though many words still have multiple meanings even at this level) while a few words strung together in a sentence can be interpreted in a multitude of different ways, even if the phrase is not idiomatic, and are not merely the summation in meaning terms -

of their constituent parts. Similarly, real life events in the environment are also subject to huge variation in interpretative style.

However, although there are advantages to using semantic rather than real life stimuli, one of the problems may still be that even at the level of individual words these contain different meanings for each individual and may be set into the relevant cognitive framework in unique and idiosyncratic ways. Another possible disadvantage is that priming and elaboration effects to which semantic stimuli are said to be subject, are not necessarily relevant to pictorial or real-life stimuli. Williams *et.al.*(1988) have stated that their "model is based largely on studies with word stimuli" (p 178) and raise the question of its generalisability, so it is not yet known if the theory can be extended to include other kinds of stimuli. For example, threatening situations often require that escape strategies are constructed or visualised while threat words do not require this. Avoidance may in fact be safety-seeking (Clark, 1986; Šalkovskis, 1991).

One of the ways of examining this is through the memory process in relation to specific phobic disorders. Specific phobias are useful in the exploration of these ideas because of their relatively restricted concordance between the word and the object (although it is acknowledged that the meaning of a phobic object will differ widely between phobics) and because a phobic object can be used as stimuli itself which is observable and concrete, rather than having to rely on verbal representations.

### Memory and Phobia

Little research so far has concentrated on memory and phobia, and even less using real rather than verbal stimuli. Spider phobics have been reported as to having a poorer recognition memory for large spiders than do normal controls

(Watts, Trezise and Sharrock 1986) and for spider words (Dalglish and Watts 1990; Watts and Dalglish 1991), though this is not consistently the case (Watts and Coyle, 1992). In the first experiment (Watts *et.al.*, 1986), spider phobics were shown freeze dried spiders mounted in lifelike positions which were immediately re-presented again along with a similar spider : phobics were asked to choose which one they had seen before. Spider phobics accrued marginally but not significantly -higher scores than controls. In a *post hoc* analysis it was found that phobics were significantly better than controls at recognising small spiders but were significantly worse at recognising large spiders suggesting that anxiety levels, low in the presence of small dead spiders, had been elevated sufficiently in the presence of large dead spiders to interfere in the recognition task by leading to an avoidant strategy. A further experiment was designed to test the effect of arousal on memory by using an immediate v delayed testing design. This showed that delayed recognition was poorer than immediate recognition for both controls and phobics. The theoretical stance that an initial orienting response and subsequent recognition of threat leads to avoidant behaviour, would seem to be consistent with these results. In terms of priming and elaboration, it would seem to indicate a failure in the operation of both of these process once anxiety had been elevated.

In the experiments with spider words as stimuli, Watts and Dalglish (1991) found a similar effect for spider-relevant words. Spider phobics showed less free recall of spider words than of control words and were impaired in recall compared to control subjects, but only when their state anxiety levels were elevated by their being in the presence of a live spider, resulting in more spider-related intrusions. This may indicate that attention is being divided. Watts has recently been

reported (Dalglish and Watts, 1990) as having shown that memory is biased in different directions depending on the type of words used. Recall for words relating to the anxiety response ("scared" ) is enhanced, while recall for words describing the phobic stimuli ("hairy") is impaired. Further experiments by Watts and Coyle (1992 and 1993) only serve to confuse the issue, as their results are in conflict with both this earlier finding and with each other. These are described in full in chapters 7 and 8.

Experimentation on the effect of phobic anxiety on memory has so far concentrated on using semantic or quiescent (dead) stimuli. Given that spider phobics seem particularly afraid of the unpredictability of the movement and direction that spiders take, and that one of the characteristics most noted by both non phobics and spider phobics in relation to spiders is "creeping/crawling" (Davey,1992; see also chapter 4), the logical step is to use real spiders moving in real settings to test whether any cognitive avoidance (as evinced by impaired recognition and recall memory) comes into play when the element of movement is added, enabling further conclusions to be drawn about the relationship between danger and cognitions and to bring the experimental situation closer to that experienced in real life. The use of real life stimuli is also presumed to be more meaningful to the phobic. As fear and vigilance are part of a highly evolved survival mechanism it does not seem to make sense for an individual to be hyperattentive to a moving threat and then to suppress the information, unless the information so suppressed is only to do with the features and characteristics of the threat object rather than the movement, and it is this which is of paramount importance rather than extraneous information about colour and shape. This would lead to a heightened attentional bias for movement and

direction along with a heightened response detection and a decrease in stimulus feature detection, if the above theorising is taken to its logical conclusion. If the situation is sufficiently meaningful, then this may override these other considerations. At this point it is therefore crucial that the nature of attentional processes be examined. Attention is the other process said to be involved in the functioning of fear networks.

### Attention

"The act of becoming conscious depends upon a definite psychic function attention - being brought to bear. This seems to be available only in a determinate quantity"

(Freud, 1900,p.529)

"The doctrine of attention is the nerve of the whole psychological system, and that as men shall judge of it, so shall they be judged before the general tribunal of psychology"

(Edward Titchener,1908)

Cognitive psychology has generally conceptualized consciousness as a linear, serial process which mediates the chaotic complexity of multiple events in the perceptual environment by simultaneous or parallel processing (Cherry,1953; Broadbent, 1958; Treisman 1964). Broadbent's single channel filter theory (1958) tried to explain how the brain copes with a superfluity of perceptual data by drawing an analogy with electronic communication theory, proposing that the brain is a single processing channel, switching between input channels at a rate of twice a second. To accept input is to pay attention to it while other information is held in short term memory for a few seconds, creating a "bottleneck". Treisman (1964) modified this by suggesting that the analysis of unattended information is attenuated and that the location of the bottleneck is more flexible. Stimulus analysis travels systematically through a hierarchy

starting with physical cues, and in the case of words, continuing with syllabic pattern, specific words, grammatical structure and meaning. If there is insufficient capacity to analyze this successfully then the tests at the top of the hierarchy are omitted.

Deutsch and Deutsch (1963) concurred with the bottleneck concept but placed it much nearer the response end of the process, arguing that all incoming stimuli are subject to the full range of analyses with one input determining the response on the basis of its particular relevance or urgency.

The screening process therefore involves a series of filters that analyze information for sensory and semantic properties (Broadbent, 1971; Shallice, 1978). Posner (1973) postulated that this screening probably involved comparison of input data with data in the long term memory store whose contents have been supplied by past experiences. This would also help direct attention towards particular stimuli (Mathews and MacLeod, 1986; MacLeod and Mathews, 1988) When attention becomes focused in this way the neglected information continues to have an influence on the processing despite its being stuck in the bottleneck (Corteen and Wood, 1972). This has been demonstrated by experiments with dichotic listening, especially with shadowing, which consists of two simultaneous auditory messages being relayed in stereo by means of headphones to subjects who are asked to attend to only one channel. They are facilitated in this focusing by a request to shadow the message, that is, repeat it aloud as it is being presented. If any attention is given to the ignored channel disruption of the shadowing task follows. Awareness of the contents of this channel is usually confined to its acoustic properties (Cherry, 1953), though a particularly salient word such as one's name may enter awareness (Moray, 1959)

as may 'emotional' words and contextually probable words (Treisman, 1969) indicating that semantic processing outside awareness contributes to the selective attention filter process. Emotionally salient words such as sexually explicit and other 'taboo' words have also been found to disrupt the shadowing process without the subjects' conscious awareness of their presence (Lewis 1970; Treisman, Squire and Green, 1974) and despite their being unable to recognise these words after the end of the test. So, this type of task allows indirect measurement of the ability of identified stimuli to "capture" attention.

Mathews and MacLeod (1986) showed that threat cues are processed differently by anxious and non-anxious individuals leading to a slowing down of a reaction time task. Thorpe (1990) found that simple phobics made significantly more errors in the shadowing task when words to do with their phobia were presented in the unattended channel, though none could remember hearing any of the phobic words. This was borne out by the results of a subsequent recognition test. Increasingly the theory has become more refined and more able to deal with the nuances and subtleties of the processing system in the brain, much in the same way - to continue Broadbent's analogy - as the electronic communications system has expanded in its capabilities with the coming of fibre optics, the silicon chip and parallel distributed processing.

The Stroop test (Stroop 1935) involves subjects saying aloud the colour of the ink in which a series of words are written. Usually, subjects find it difficult to inhibit the impulse to read the word itself. The original experiment concerned the interference effect (measured by reading time) of incompatible ink colours. Subsequent research has used emotional words and personally relevant words and assessed their 'attentive' properties (Bower, 1981). Designed to test the

distraction value of verbal stimuli and therefore to examine the workings of attentional strategies, it gained great popularity in the seventies and eighties . Initially confined to cards, with words being written in different coloured inks, it has now been developed as a computer task which, with its ease of administration and its ability to incorporate elements of pre attentive bias and strategic deployment of attention, have made it a popular tool in the field of research into attentional processes in psychological disorders. This is discussed in more detail later.

The visual dot probe has been used as an alternative paradigm in the exploration of the deployment of attention in generalised anxiety and in panic disorder. Increasing refinement in understanding of the workings of attention as a parallel processing capability have further undermined the credibility of strictly sequential and hierarchical models. Logan (1980) envisaged the stroop effect as a gathering of evidence which, once enough evidence has been accumulated, results in reaching a decision/response threshold. Evidence from each dimension has a different weight leading to its being processed at a different rate. Two rates are important in this process: automatic/stable and strategic/attentional/flexible. If all the evidence from all the dimensions is consistent then the threshold is reduced and response time reduced.

Parallel distributed processing incorporates many of the features of Logan's model without the pitfalls . Cohen, Dunbar and McClelland (1986) suggest that processing occurs through activation moving along many different pathways at the same time, with strength rather than speed being the determining factor. Attention serves to fine-tune this operation, along with other sources of information, in tandem with other non-linear processing units. A top-down

approach complementing this is the schema theory as envisaged initially by Neisser (1967) in which information is selected to match a template. Foa and Kozak (1986) envisage the template as a network in memory structures, as previously described, in a redefining of Bower's (1981) network model.

Examination of attentional processes in anxiety disorders of particular relevance to this review are these visual dot probe and Stroop experiments, both of which measure the distractibility capability of threatening or valent stimuli, and both of which are used as experimental paradigms later on in this thesis. A more detailed discussion of these now follows.

### The Visual Dot Probe Experiments

Macleod, Mathews and Tata (1986), in an attempt to get rid of the element of response bias from the exploration of the processing of threatening information, developed the dot probe experimental methodology. This entailed a subject making a neutral response (button press) to a neutral stimulus (dot on screen) which appeared in place of a previously presented word, either threatening or non threatening. Subjects had to read aloud the top word of each pair presented so distracting themselves from the other. Dot probe detection latencies were used to examine the effect of the verbal stimuli on subsequent response to the dot. Clinically anxious subjects were oriented towards threat words, as evidenced by their reduced detection latencies, while normal controls shifted attention away from threat, thus further confirming the possible existence of encoding bias/template construction.

Mathews, May, Mogg and Eysenck (1990) investigated attentional bias using a task involving the search for a particular target among distracters. The rationale for this was that attentional bias for threat could be due more to an inability to

focus or to avoid distraction. Anxious subjects were slower at finding the target when any distraction material was used, and both anxious and recovered anxious subjects were slower when threatening words were used as a distracter. Mathews *et al.*(1990) suggest that a tendency to favour threat cues during perceptual processing may be an enduring rather than ephemeral characteristic of people vulnerable to anxiety reactions, in other words, that particular people habitually prioritise the processing of negative elements in the environment to the detriment of other elements and that this is a stable characteristic which in itself makes them vulnerable to fear and anxiety. This has many implications for the treatment and understanding of anxiety disorders and is an argument for the 'anxious personality' type.

#### The Stroop Test.

Macleod (1991) has undertaken a comprehensive review of the Stroop task and its variations. This review will therefore confine itself to those experiments of particular relevance to anxiety disorders in general and phobic disorders in particular. Klein (1964) found that the more meaningful or "attentive" the word the more interference it caused. Word frequency was also found to be important (Scheibe, Shaver and Carrier 1967; Effler 1977a, 1980, 1981). Ray (1979) showed that students in the run up to examinations were retarded in their response to words relating to exams compared to neutral words, and that those scoring high on the state anxiety scale showed the most marked effect, indicating that the personal relevance of the stimulus was also a factor in response style. Warren (1974) had also made the point that the Stroop effect could be due to the semantic relatedness of stimuli used.

Incorporating these findings, Watts, McKenna, Sharrock and Trezise (1986)

carried out a Stroop experiment on spider phobics requiring them to colour name spider words. Spider phobics were significantly retarded at naming colours when words were to do with spiders, but no different from controls in the general threat or conflicting-colour conditions. It is important to note the introduction of an emotional control in this experiment, ensuring that any differences obtained between groups would not be due to the emotional content of the words alone, that results could differentiate between a general response to emotionally salient stimuli and a particular response to stimuli that are personally meaningful. Martin, Williams and Clark (1991) confirmed this finding with a Stroop experiment involving generalised anxiety disorder patients who were slower than non anxious controls at colour naming both positive and threat words. An important development in the use of the Stroop in the exploration of attention came when it became possible to administer the test via a computer, and further, that stimuli, now presented individually, could be masked, thus allowing an investigation of possible pre-attentive bias in emotional processing of anxiogenic information, that is, information which encourages or causes an anxiety response. MacLeod and Rutherford (1992) again using students high in state anxiety (about to embark on exams), divided subjects into groups depending on their having high trait and low trait anxiety. Words used in the Stroop were in four categories: exam related threat, exam related non-threat, non exam related threat and non exam related non threat. State anxiety in both groups was heightened for one, pre exam session. Results showed an interactive influence of trait and state anxiety on response times. High trait anxiety subjects in high state anxiety condition showed increasing selective interference to all threat words (both exam related and non exam related) in the masked presentation while the low trait

anxiety subjects showed decreased interference to all threat words. The conclusion drawn is that high trait anxiety subjects automatically and selectively process threat material when state anxiety is elevated, while low trait anxiety subjects automatically avoid such stimuli. Again, this could be taken as evidence for a particular personality type who may be especially vulnerable to anxiety due to processing biases.

In the unmasked presentation condition in this experiment, with high state anxiety subjects, all subjects were retarded in response to colour naming the non exam related threat words but were faster in response to exam related words. The explanation offered is that an increase in state anxiety led to a strategic deployment of attention away from the source of the anxiety. This is somewhat at odds with previous Stroop results culled from clinical populations and has yet to be replicated.

MacLeod and Hagan (1992) have used the Stroop as a predictor of response to stressful life events and have found that the initial pattern of automatic selective processing as measured by Stroop retardation was consistently the best predictor of subsequent distress in response to adverse medical information.

Mathews and Klug (1993), in a further refinement of the Stroop, found that neither the valence nor the general emotionality (either positive or negative) of words used was a reliable indicator of interference, while words related to a particular individual's anxiety disorder, either positive or negative (positive words were 'fearless', 'relaxed', 'safe' and so on) produced a significant interference in Stroop performance. (This was a card rather than computer-generated Stroop.) It would appear then that for attention to be diverted away from the task, stimuli presented have to be personally relevant to an individual's concerns, and can be

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either positively or negatively charged.

Macleod (1987) has said that the future refinement of clinical treatments may depend on an 'ability to identify the precise nature of the actual processing biases which underlie any particular disorder' (Macleod, 1987, p181). He saw in the Stroop just such a sensitive measure. Foa and McNally (1986) and Watts *et al.*(1986) reported that behaviour therapy can eliminate attentional bias in obsessive-compulsive disorder and spider phobia respectively. In both cases, behaviour therapy was spread over a number of sessions, and in the latter case, in a subsequent avoidance test there was no significant improvement. Unfortunately Watts *et al.*(1986) have used an unconventional statistical analysis which nullifies their findings. Lavy, van den Hout and Arntz (1993) used one session treatment for spider phobia (Öst 1989) with an elaboration condition (where patients were encouraged to notice spider feature details) to prevent cognitive avoidance. Before treatment, spider phobics, but not controls, showed increased response latencies to spider words compared to control words-both negative and neutral. After one session treatment the decrease in the difference between response to spider words and negative/neutral in the phobic group, as measured by an interference index, was significantly greater than in the non phobic group. In this study elaboration made no difference to the outcome and the authors conclude that there is no evidence to suggest that elaboration enhances the disintegration of the fear network though they also point out that preventing elaboration in the spider phobics undergoing treatment was extremely difficult and not very successful. This study did not use matched untreated phobics as control subjects and this causes large baseline differences in many of the initial measures taken which invalidate the findings. This is discussed in more

detail in chapter 9. It is difficult to assess how far the process of verbal elaboration matches the process of the elaboration of internal representations as envisaged by Williams *et.al.*(1988).

It would appear that these results do not really support the hypothesis that treatment, leading to the cessation of fear, may reduce attentional bias, as measured by the Stroop, towards spider words. Given the previous report of Mathews and Klug (1993), the expectation would be that personally relevant words, whether positive or negative, would still show an interference effect and this in itself would negate any diagnostic usefulness the Stroop might have. It may be that it is not so much the anxiety associated with the words but their preoccupying position in consciousness which causes the effect.

It seems clear that there is conflicting evidence to do with the cognitive processes of attention and memory in the context of anxiety and that the evidence for priming and elaboration effects is ambiguous. In order to clarify this it may be of use to examine the product of these processes not only in terms of reaction time to visual stimuli, but in terms of meaning.. The third area of exploration is therefore that of cognitions or beliefs, envisaged as both the product of these processes and, it will be argued, the context in which they work. Williams *et.al.*(1988) are mainly concerned with the processes to do with primary appraisal of threat which is to do with the matching of incoming information with relevant internal representations at an automatic, pre-attentive level. Secondary appraisal is to do with coping skills, resources and meaningfulness and this has no place in the experiments described above to do with attention and memory except on the low level of personal relevance. These terms are discussed in more detail below. Conscious cognitions may be of importance in the organising of information as

well as being formed by it. It is to these that this thesis will now turn in an attempt to explain their content and possible role.

### Cognitions: Beliefs and Meaning

Cognitions are conceptualised here as a result of the interaction of information processing and memory. They can be best described as the products of the cognitive processes discussed above as well as being interactive in their processing. Cognitions may take the form of ideas about the world, which are often held in the face of seemingly contradictory information (especially in the case of phobias) but are also often found on close examination to be part of a logical framework of beliefs. DSM III-R criteria for specific phobia includes a recognition on the part of the sufferer that her or his fear is 'excessive or unreasonable' but the content of such unreasonable fears has not so far been known with any accuracy or certainty.

Recent theorising by Teasdale (1993) has pointed out that there seems to be a confusion between two types of cognition. Experimentation of the kind described above has generally been to do with cognitions operating at the specific, propositional level while it is hypothesised that it is cognitions operating at the generic, implicational level which interact with emotions in a way which allows change to occur. Šalkovskis (1991) has emphasised the importance of this kind of appraisal and suggests that meanings are reinvented with each new contact with a stimulus, rather than being a fixed entity. He reports such findings in the successful treatment of panic patients (Šalkovskis, 1991).

Historically, approaches to the problem of cognition and emotion were to do with appraisal and began with the work of Schacter and Singer (1962; Schacter, 1964) who suggested that individuals may examine the context in which arousal occurs

before attributing an emotion to it, so that two elements are involved in the experience of emotion : the perception of physiological arousal and the label which is given to it. A churning stomach or a rapid pulse are not responses specific to a particular emotion but are only associated with one when the source of such physiological arousal is appraised, as such symptoms could be to do with the excitement of sexual attraction, fear in a dangerous situation or anger in a provoking one. Their experiment has been criticised on methodological grounds and reviews (Manstead and Wagner, 1981; Reizenstein, 1983) of subsequent studies have shown that it is difficult to prove that this theory holds good in ambiguous situations, and that unexplained arousal is often perceived as unpleasant even when the context would seem to be cuing a pleasant response. Marshall and Zimbardo (1978) for instance found that inexplicable arousal is perceived as negative whatever the environmental circumstance. This finding is of particular relevance in the field of anxiety research.

Carrying on from Schacter, Lazarus (1966; Lazarus, Kanner and Folkman, 1980) hypothesised that environmental change is appraised by the individual and that its possible effect on them is assessed. *Primary appraisal* is an evaluation of the event with regard to its irrelevance to well-being, as benign-positive , or as stressful, while *secondary appraisal* is an evaluation of the personal and environmental resources available to deal with the situation. Both of these may be modified by the process of constant *reappraisal* of success in coping and of the continuing impact of the event on the individual. Barlow (1988) points out that one of the problems with this is that it is often difficult to come up with a rational or even conscious response to an emotional event and that the explanation often given that the process is unconscious, is an unsatisfactory one.

However, as has been discussed above, information may be processed out of awareness (MacLeod *et.al.* 1986) so this objection may not overly impinge upon appraisal theory. A more cogent criticism may be that it is too narrow in its definition.

Beck (1976) and Beck and Emery, 1985) amplified these ideas with regard to anxiety responses. Emotions are innate and adapted for survival in an environment which has changed so radically as to be unrecognisable to primitive man: threats which were once physical and life-threatening are now largely confined to the psychological (except during war and tempest) though the sympathetic nervous system becomes aroused in the same way whatever the cause. Beck suggests that anxiety resides in the distorted processing of information due to negative cognitive schema which trigger thoughts automatically. Schemas are structures which are made up from propositional information like rules or assumptions, and play a role in organising the infinite input of novel information. When a schema is activated it influences the selection of information about a stimuli to be attended to, as well as the recall of information from a store in memory. It is interesting to note here their use of the word 'propositional' in relation to information.

Following on from Beck, research into cognitions (or 'beliefs' or 'cognitive products') in anxiety disorders has concentrated on estimates of perceived risk (Butler and Mathews 1983). Beck, Laude and Bohnert (1974) observed that anxious patients could identify cognitions associated with their anxiety and that common themes were disease, death, failure and social rejection. Finlay-Jones and Brown (1981) found that danger cognitions about anticipated life events were associated with anxiety while Butler *et al.* (1983) found that anxious people are

more likely than controls to interpret ambiguous events as threatening. However, actual cognitions were not made explicit in a systematic way until 1984 when the Agoraphobic Cognitions Questionnaire (Chambless, Caputo, Bright and Gallagher 1984) revealed a variety of beliefs about fear of fear in panic and agoraphobia. It reports a variety of cognitions to do with the possible catastrophic results of feelings of anxiety ('I am going to pass out', 'I am going to go crazy', 'I am going to act foolish' and so on.)

Subsequently, cognitions to do with potential or actual harm have been examined as the precursors in panic (Clark 1986), and beliefs in the likelihood of the sudden onset of a heart attack or other events leading to a premature death have been found to lead to the catastrophising of innocuous physical symptoms. Cognitions have become increasingly associated with beliefs in this context and have come to be regarded as indices of the incidence of particular beliefs.

Catastrophic thoughts are not confined to panic and complex anxiety disorders and phobias but are also evident in situation phobias (Marshall, Bristol and Barbaree 1992). Acrophobics were asked to rate 100 general rational and non-rational statements along with 10 statements relating to height. They also completed negative thinking questionnaires which showed that negative thinking is of a catastrophising nature and it was found that the best predictor of behavioural avoidance was the degree of catastrophic thinking evinced by the subjects. There is some evidence therefore that cognitions are present and important in anxiety disorders, though the actual content is less well delineated. The position with regard to animal phobias is more obscure. Traditional accounts of the aetiology of animal phobias have concentrated on the amount of expectation of physical harm suffered by phobics. This is partly because a

number of animal phobics referred for treatment have traced the onset of their fear back to an actual physical attack (Marks, 1987; McNally and Steketee, 1985). Other, more common phobias (snake and spider in particular) have been explained by Seligman (1971) as being 'prepared' in an evolutionary sense in that animals potentially harmful to prehistoric man may in some way trigger fear responses in some individuals. This has also contributed to the previously held belief in the non-cognitive nature of animal phobias, as has Öhman's (1986) suggestion that the fear may originate in the predatory defense system which facilitates animals in escaping from predators. A combination of both factors seems likely, where animal physical characteristics call forth a range of escape responses and this leads to the formation of particular cognitions. So, these evolutionary ideas can be taken as a possible explanation for the supposed irrationality of fixed beliefs while also suggesting the type of beliefs to be expected in phobic consciousness. The emphasis on such physicality and harm has led to an empirical concentration on the cognitions to do with harm-potential and with behavioural and physiological responses. These seem to be the natural outcome of evolved predispositions, but another line of enquiry to do with coping or with contamination fear should also be followed in line with the theoretical stances outlined above. The physical nature of animal phobias has led to a concentration on physical harm to the detriment of more esoteric concerns and in order to redress the balance of enquiry, it may be useful to divide cognitions in animal phobics in relation to their phobic object into cognitions to do with primary appraisal (beliefs about properties which the object/environment may be thought to have), secondary appraisal (beliefs about coping), and beliefs about future harm (however imminent that future may be). In this way the meaning

that a particular phobic object has for a phobic may become clearer and hence changeable.

A further development of the importance of meaning in the processing of information has been mentioned earlier on in this thesis and has come from the work of Barnard and Teasdale (Barnard and Teasdale, 1991; Teasdale, 1993) in which it is proposed that there are two levels of meaning, the propositional and the implicational (or specific and generic). At the first level there is a close relationship with language and concept where at the second this becomes much more diffuse and operates at a "very high level of abstraction" (Teasdale, 1993, p345). It is this implicational level which is conceived as being "directly linked to emotion" (ibid). There is as yet no empirical evidence for this theory though this thesis does attempt to examine the content of cognition in a way which may illuminate it to a small extent.

Phobias then are conceptualised here as being possibly linked to attentional and memory biases due to priming and elaboration processes which facilitate the accessibility and retrieval of phobic stimuli, having the effect of super-sensitivity towards any stimulus which shares some features of the threat object. It may be the meaning derived from the organisation of data at this level which directs and serves to maintain the anxiety behaviour and this in turn could help to maintain the phobia and may interact with the functioning of basic perceptual processes. This meaning is available to conscious enquiry in the form of beliefs about the threat object, and the persons responses to it. In order to facilitate understanding of the relative importance of these processes and their hypothesised products in the maintenance and treatment of specific phobia it is therefore important to examine the meaning a phobic object or situation has for a phobic person. The

first task here is to elicit the actual phobic beliefs and compare them to those of non phobics in an attempt to pin-point the differences and allow an estimation of their contributory importance to anxiety. This will be followed by an exploration of the processes of attention and memory and finally by an examination of the importance of beliefs, attentional processes and memory processes in phobias as shown by their separate roles in the extinction of phobic responding. This thesis intends to explore the possibility that a change in the emotional, or generic, meaning of a phobic object and phobic responding, is the most useful way of reducing anxiety responses in phobia.

## CHAPTER 3:

### QUESTIONNAIRE STUDIES OF THE NATURE AND SPECIFICITY OF PHOBIC BELIEFS.

#### Introduction

The importance of beliefs in the perpetuation of anxiety is in their contribution towards the overall meaning that a situation may have for an anxious individual. Beliefs here are conceived as being separate from knowledge, though interacting with it in complex and inextricable ways. The point has been made that it is common for beliefs to exist without knowledge, and knowledge to exist without beliefs although more often they coincide in relation to normal responses to the world. It is proposed here that it is belief which contributes to the individual's emotional responses to the environment. In effect, the distinction made here between belief and knowledge is equivalent to the distinction made by Teasdale (1993) between implicational and propositional meaning.

Teasdale (1993) has suggested that *generic* rather than *specific* meaning is important in the production of emotion. He makes the distinction that high-level (generic, implicational) meaning cannot be conveyed by single sentences but relies upon other processes for its effect: in effect, the meaning of a phrase is greater than the sum of its visible parts. These ideas are similar to ideas of 'hot' and 'cold' or 'emotional' and 'intellectual' cognitions but go further in proposing that only one type of meaning (generic or implicational) affects emotional learning. This has implications for the understanding and treatment of anxiety disorders and for future experimental designs and hypotheses.

It has been stated in the previous chapter that cognitions (beliefs) are conceptualised as being the products of cognitive processes which may then go

on to inform those processes in turn. Williams *et.al.*(1988) have stressed the importance of imagery and of emotional processing in anxiety responses, but their exploration of cognitions is mostly to do with the kinds of processes explored by experimental cognitive psychologists rather than to do with meaning. Before examining the processes involved in the processing of emotional information it would be useful to have a clear idea of the meaning that a threat object has for a fearful person: to establish whether these are entirely different from the kinds of ideas that non-phobic people may have or whether they are only different in intensity.

Research into the role of conscious cognitive factors in the maintenance of anxiety responses has generally been focused on beliefs to do with the risk perceived as associated with the situation. Evidence for this is in the over-prediction of the frequency of the incidence of aversive events by more generally anxious individuals. In specific phobias it has tended to be accepted that these beliefs are non-cognitive and irrational and often the cited evidence for this (from phobics and non phobics alike) is the fact that slugs, mice, rats, spiders and other common phobic objects cannot inflict harm in humans, except in exceptional circumstances, and it is not therefore rational to be afraid of them on those grounds. A case has been made recently for the role of disgust in this, suggesting that the perceived possible harm may come from contamination or infection but this is dealt with in detail elsewhere ( see chapter 4 ).

Seligman (1971) has also been influential in the perpetuation of the idea that phobias are 'non-cognitive' with his idea that phobias are prepared in an evolutionary sense, are biological and as such outwith the realms of conscious control or knowledge. This has been discussed in detail in chapter 1 but it is

useful in this context to note that Seligman has actually stated that phobic fear 'is by definition not readily inhibited by rational means' and that 'prepared conditioning is not readily modified by information' (Seligman 1971, p316). The logical conclusion to this is therefore that it is counterconditioning procedures which will provide the most effective treatment for phobias and that cognitive approaches will not be useful in their amelioration, though research into other anxiety disorders has provided evidence of the efficacy of cognitive approaches with notable successes in the treatment of anxiety (Beck, Emery and Greenberg, 1985) and panic (Clark, 1986).

The investigation of cognitions linking specific stimuli with fear and avoidance in anxiety disorders has been mostly confined to panic disorder, as discussed in chapter 1, or agoraphobia, (Chambless *et al.*, 1984) (see chapter 2). The relationship between perceived risk and anxious responding in Generalised Anxiety Disorder has also been investigated (Butler and Mathews 1983). Work in these areas has shown that far from being irrational, there is a logical relationship between stimulus and response, given the presence in the respondent of some fixed, conscious and idiosyncratic beliefs to do with the stimulus, his or her discomfiture in its presence, and a belief in the efficacy of escape. It is likely that it is the appraisal of an event (both primary and secondary, as conceptualised by Lazarus, 1966, and discussed elsewhere) which provides a context for its meaning and in anxious people this meaning very often has a negative tone and is to do with the over-prediction of harmful consequences. Much has been made of the therapeutic value in panic disorder of disconfirming these negative beliefs ( Clark, 1986; Ehlers, Margraf, Roth, Taylor and Birbaumer, 1988; Barlow, 1988) and in showing that it is fear of fear, or, more

properly, fear of the consequences of fear, which operates to maintain anxiety. Having established the presence of cognitive elements in other anxiety disorders, including complex phobias, it seems sensible to return to the purportedly 'non cognitive' nature of specific phobias.

Rachman (1988) examined the relationship between predicted and actual fear experiences in phobic subjects repeatedly confronting aversive events. Claustrophobic volunteers were asked to enter a small enclosed space several times. Their anxiety levels were obtained on each occasion, particularly levels immediately before entry. Anxious subjects consistently overpredicted the fear associated with their phobic situation, and these overpredictions were particularly likely to follow underpredictions. Reductions in fear were most likely to follow overpredictions, but there was evidence of an inherent bias towards the overprediction of subsequent anxiety and pain (i.e., the belief that the next time will be worse). Avoidance behaviour may follow from this overpredictive tendency, based on the collation of material from past experience which then becomes part of a system of beliefs, or meaningful cognitions, which in turn lead to concomitant avoidant and fearful behaviours. In order to understand these cognitions more fully it is necessary to investigate them in more detail than predictions of risk can illuminate. Hitherto, assessment of cognitions in specific phobia has come from three main sources;

i) the work by Watts and Sharrock (1984) on cohesion of constructs in spider phobia and the construction of a questionnaire incorporating measures of vigilance, preoccupation, avoidance-coping, factual knowledge and cognitive-behavioural items. Cognitions listed in the questionnaire do not access specific subjective beliefs about the nature of the specific object, or subjective beliefs

about the probable consequences to the phobic person of interaction with the phobic object. They are a measure of phobic intensity as a corollary of metacognitive constructs rather than an exploration of the underlying cognitions from which these are derived.

ii) Work carried out by two groups on the aetiology and maintenance of animal phobia. McNally and Steketee (1985) looked at a variety of animal phobics (10 snake, 4 cat, 4 bird, 2 dog, 2 spider) and examined the incidence of distressing stimulus characteristics (movement: 77%, physical appearance: 64%, sound: 27% and touch: 23%) and feared consequences (panic: 91%, physical attack: 41%, insanity: 18%, injury while fleeing: 14% and heart attack: 9% of subjects). The second group worked with dog phobics and also confirmed that an exaggerated expectation of harm is a factor in the maintenance of fear responses (Di Nardo, Guzy and Bak, 1988; Di Nardo, Guzy, Jenkins, Bak, Tomasi and Copland, 1988).

Of the cognitions to do with potential actual harm, the most prevalent appears to be to do with fear of panic responses (though these may differ from the panic responses of panic patients, for whom panic means death, losing control and so on), followed by fear of actual physical harm, though the secondary hidden cognitions to do with the causal beliefs of this remain mysterious.

iii) Work by Öst (1988) and Öst, Šalkovskis and Hellstrom (1991) on one session treatment of spider phobia which challenges the beliefs held by individual spider phobics, once they have been garnered. Šalkovskis (1991) has emphasised the importance of 'safety seeking behaviours' which the anxious person believes have saved him or her from disaster, and has pointed out that the content of these cognitions provide a logical context for anxiety responses.

There is evidence of a strong cognitive component in phobic responding to do with possible consequences of contact with the phobic object, but there is little knowledge of the beliefs from which the metacognition of, for instance, 'I will lose control' is derived: what are the misconstrued cues and what is the nature of the misconception? There has been no systematic exploration of cognitions in phobics to do with the perceived harmful characteristics of the phobic stimulus, the subjective experience of physiological arousal or the belief in the efficacy or otherwise of coping strategies. The Watts and Sharrock (1984) questionnaire concentrates on the operational and behavioural side of phobic responding, McNally and Steketee (1985) concentrate on cognitions derived from underlying beliefs rather than at the specific beliefs themselves as does the Di Nardo (1988) experiment and Öst *et al.* (1988) concentrate on methodological issues and only make mention of the need to bring out and examine catastrophic thoughts without giving specific examples other than 'I will lose control'. It is therefore necessary to explore the explicit cognitive correlates of these implicit underlying beliefs, including superstitious or catastrophic beliefs, their cognitive subtexts and the meaning that these have for the individuals as made manifest by the amount of anxiety experienced as a consequence of having these beliefs.

The hypothesis is that conscious cognitions to do with the phobic object, stimuli, response and so on will be present, specific and identifiable in phobics and that these cognitions will be meaningful at the propositional level and this will provide a logical framework for phobic beliefs in a similar way to that in which cognitions in panic disorder contribute to the continuance of panic attacks. The implicational meaning of a phobic object will be an emergent property arising from these propositions. If a bird phobic believes that terrible harm will follow

from the sighting of a bird, whether it is in the form of having eyes pecked out or of having physiological discomfort it is reasonable that birds should become objects of avoidance. Similarly, it is reasonable that the same bird phobic should believe that it was his or her safety seeking action which prevented them from being harmed by the bird. Ultimately, the meaning of a bird for a bird phobic is very different to the meaning a bird has for a non phobic, or to an ornithologist.

Following on from the hypothesis is the prediction that beliefs will not change in phobics following exposure in an experimental setting because of the lack of emotional encoding of *meaningful* information about the phobic object. Similarly, beliefs will not change if no new information about the individuals response to that object is learned because it is the cognitions themselves which are serving to maintain the phobia rather than conditioning experiences.

In order to test this hypothesis a questionnaire to do with specific phobic cognitions was constructed and administered to a variety of phobics in order to identify specific phobic beliefs. Once initial data from this was analysed it was felt that it would be useful as a next step to administer the questionnaire, now made spider-specific, to non phobics, other specific phobics and to spider phobics in order to check for any general bias in beliefs about spiders in these two control populations, especially with regard to the other phobic control group and to check whether these were different in nature and intensity to those beliefs held by spider phobics. As the question has arisen as to the role of disgust cognitions in phobic thinking, and as the initial results appeared to show that this is a component in phobic responding, it was decided to deal with the bulk of the information concerning the disgust aspects more fully in chapter 4.

To explore the possibility that phobic beliefs would be resistant to change before and after exposure alone, the main set of questionnaires were administered to all groups immediately before and after engaging in experimental work involving concentrated interaction with spider words, pictures, videos and a real spider.

## Method

### Experiment one

#### Overview

Subjects were solicited by poster and by word of mouth. Having expressed their willingness to participate in the study they were sent a batch of questionnaires which were intended to elicit information about demographic factors, anxiety, phobic severity, history of phobia, beliefs about their phobic objects and disgust and anxiety ratings for a variety of items. They returned these in a stamped addressed envelope.

#### Subjects

The subjects were 25 volunteers from a variety of backgrounds and occupations, ranging in age from 18 to 42 with a mean age of 23.6 years. 17 were female, 8 male. All fulfilled the criteria for phobia as defined by achieving a score of 14 points on the Watts and Sharrock (1984) spider phobia questionnaire and 10 points on an amended general version for other phobias (Thorpe 1989). The mean of scores for the spider phobics was 22, and for other phobics was 16. Types of phobia were as follows: 6 spiders, 4 heights, 2 patterns (leaf patterns and networks), 2 snakes, and one each of; blood/injury, vomit, dentists, dogs, cats, slugs, maggots, birds, rodents, buttons and claustrophobia. 15 could

remember an early traumatic experience to which they attributed the phobia, 10 could not. 17 had family members who were phobic, 8 did not. 12 used distraction and 13 escape as a broad coping strategy and 10 felt their phobias had been worse in the past while 15 felt it had remained constant.

### Assessment

Newly constructed or amended questionnaires were piloted on a range of subjects, both phobic and non phobic, in order to evaluate any specific difficulties and to explore the possibility that there may be ceiling effects. All such questionnaires can be seen in the appendix. The questionnaires used were as follows:

Questionnaire 1. This was a descriptive questionnaire consisting of a series of 14 questions to do with demographics, descriptions of phobic incidents, coping strategies and descriptions of phobic objects.

Questionnaire 2. This was initially based on the Chambless Agoraphobic Cognitions Questionnaire. It contained a confidence rating as to how subjects felt they would be able to tolerate being in the same room as the object of their phobias right now at this moment. They were asked to circle a number between 0 and 100. This was followed by 31 statements. Subjects had to rate how much they believed each statement to be true on a scale of 0 (I do not believe this thought at all) to 100 (I am completely convinced this thought is true) while imagining that their phobic object is in the room with them. Further information about its construction can be found in the appendix.

Questionnaire 3. Matchett and Davey (1991) Fear of Animals Questionnaire, validated as corresponding to clinical measures of animal phobia. This is a list

of animals which fall into three categories. (i)"High fear/high predatory": animals which were rated as highly likely to attack and harm human beings and were also highly fear-evoking, (shark, tiger, lion, bear, snake).

(ii)"High fear/Low predatory": animals rated low on tendency to attack human beings but which were still rated high in fear evocation (rat, eagle, spider, cockroach, maggot,snake). (iii)"High Revulsion":animals that were rated as evoking high revulsion responses (maggot, cockroach, slug, rat, snake, spider, snail). The fear ratings of animals in each category were combined to give a single fear score for each of the categories of animals. This questionnaire was validated to some extent by correlation of the scores of the three categories with scores on the animal subscale of the FSS (Matsheyy and Davey 1991). As it is more a descriptive than a strictly diagnostic questionnaire and it was being used to attempt a replication of the findings of Matchett and Davey, its use was felt to be justified.

Questionnaire 4. Disgust and contamination sensitivity. This variable was measured by the only previously existing measure of disgust sensitivity, that of Rozin, Fallon and Mandell (1984) as constructed for their study of family resemblances in attitudes to food. This was amended by Matchett and Davey (1991) in order to remove americanisms and consists of a series of 24 questions all involving some sort of contamination of normal food. Subjects rated on a 9 point scale how much they would like to eat each of the items. An overall measure of disgust sensitivity was obtained by summing the scores. Although not statistically validated by its authors, the questionnaire is descriptive rather than diagnostic, and was used by Matchett and Davey, hence its use here is felt to be justified.

Questionnaire 5. Beck Depression Inventory (1961). This questionnaire is widely used as an instrument for detecting depression in normal populations (Steer, Beck and Garrison, 1986) and for assessing the intensity of depression in psychiatrically diagnosed patients (Piotrowski, Sherry and Keller, 1985). The BDI was derived from clinical observations about the attitudes and symptoms displayed frequently by depressed psychiatric patients and infrequently by nondepressed psychiatric patients (Beck *et.al.* 1961). A comprehensive psychometric review was carried out by Beck, Steer and Garbin (1988) and they found that the mean coefficient alpha was 0.87, indicating a high internal consistency. With respect to test-retest reliability, the BDI's correlations are greater than 0.60. They report that the construct validity is strong, that it differentiates psychiatric and non psychiatric patients, as well as appearing to differentiate subtypes of depression and that it also distinguishes between major depressive and generalised anxiety disorders.

Questionnaire 6. Spielberger STAIy-2 (State-Trait Anxiety Index) self evaluation questionnaire. (Spielberger 1983). The construction of this questionnaire began in 1964 with the goal of developing a single set of items that could be administered with different instructions to provide an objective measure of state and trait anxiety. Initial construction and validation of this questionnaire was extremely rigorous (for detailed description see Spielberger and Gorusch 1966) and has since been used extensively as an anxiety measure. The internal consistency for the most recent version, used here, is a Cronbach-Alpha coefficient of .92 for the state anxiety scale, and .90 for the trait anxiety scale. The median correlation between these two forms of the index is .65.

Questionnaire 7. A visual analogue pertaining to phobic avoidance. This is a purely descriptive questionnaire. Subjects were asked to rate on a scale of 0 to

8: (i) how much they would avoid their phobic object because of fear or other unpleasant feelings; (ii) how much fear or other unpleasant feelings they would experience if in the proximity of their phobic object; (iii) how much the problem upsets them and/or interferes with normal activities.

Questionnaire 8. The fear survey schedule (FSS). This was used to measure fear responses to various categories of objects (Wolpe and Lang, 1964). This is a 73 item scale divided into 6 categories of anxiety provoking stimuli: i) Animals, ii) Social and interpersonal, iii) Tissue damage, illness, death and their associations, iv) Noises, v) Other classical phobias, and vi) Miscellaneous. The research reported here is concerned with the animal subscale. Scores on this category have been validated against various behavioural measures of avoidance (Kamil, 1970; Fazio, 1969).

Questionnaire 9. The Watts and Sharrock Spider Phobia Questionnaire (1984). This was used in its original form of 43 forced choice questions to do exclusively with spiders, as well as in an amended form of 30 forced choice questions which could be applied to other phobias. The questionnaire was originally developed from interviews with spider phobics which generated items, and was intended to examine cognitive and behavioural responses to spiders rather than stimulus factors. The validity of this questionnaire was measured by correlating the scores obtained in its three subscales (vigilance, preoccupation and avoidance-coping) with measures of behavioural avoidance and subjective anxiety. Preoccupation and avoidance were highly correlated with subjective anxiety. The questionnaire was found to distinguish between spider phobics and non spider phobics but was not compared to an earlier, validated measure of spider phobia constructed by Klorman, Weerts, Hastings, Melamed and Lang (1974). However, since much of

the research here is based on subsequent experiments by Watts and his colleagues, all of which used the measure (see reference section) it is necessary to employ the same measurement of phobic intensity.

## Results

### Experiment 1 : Overview

All respondents were specific phobics. Cognitions were divided into three broad categories : disgust cognitions, harm cognitions and coping cognitions. Belief ratings ranged from 0 to 100 in steps of 10. There was a broad range of responses to the questions, reflecting different patterns of response to different types of phobias and this range along with the means for each category are shown below in table 3:3. The questionnaire was initially composed of both positive and negative statements but for ease of comparison comprehension and analysis they have all been converted to negative. The higher the score, the more they are convinced of the negative outcome of an encounter with their phobic object.

A correlational study was carried out comparing three measures of phobic intensity (fear, interference and general avoidance) and the three categories of cognitions described above. Cognitions to do with inability to cope with the phobic object or situation were highly correlated with all the intensity measures while cognitions to do with harm correlated only with fear. Disgust cognitions did not correlate with any of the measures of phobic intensity. Table 3:4 shows these results in full.

Table 3:3 Means of belief ratings for mixed phobics.

	minimum	maximum	std deviation	mean
Disgust cognitions	4.29	74.29	22.33	36.80 <sup>a</sup>
Harm cognitions	7.69	75.38	17.73	35.02 <sup>a</sup>
Coping cognitions	35.45	100.00	17.21	66.84 <sup>b</sup>

<sup>a</sup>=no different to each other, <sup>b</sup>=different to both other scores.

Table 3:4. Correlation of cognitions and phobic intensity in a mixed group of phobics, n = 25. Probability in brackets.

	Fear	Interference	General Avoidance
Disgust cognitions	0.33443 (0.1023)	0.20987 (0.3140)	0.24014 (0.2476)
Harm cognitions	0.65481 (0.0004)	0.24370 (0.2404)	0.25703 (0.2148)
Coping cognitions	0.55226 (0.0042)	0.51899 (0.0079)	0.71260 (0.0001)

Results more specifically to do with disgust are explored in chapter 4.

## Experiment Two

### Overview

Subjects were solicited by poster, by word of mouth and by personal interview. On returning a spider phobia questionnaire in order to ascertain their suitability, they were invited to participate in an experimental session during which they filled in more questionnaires and participated in experiments to do with spiders.

### Subjects

Subjects were volunteers from a variety of sources including students, members of the public and members of the Welsh National Opera Orchestra. The total number of subjects was 75, of whom 21 were non phobics, 20 were phobic

controls and 34 were spider phobics. All the phobics fulfilled DSM-III R criteria for simple phobia and in addition scored above the cut-off point in the Watts and Sharrock (1984) Spider Phobia Questionnaire and the amended General Phobia Questionnaire. The groups did not differ in measures of trait anxiety or depression, nor were they different in a variety of demographic features. There was no difference in sex ratio between the groups (CHI-SQUARE [2df] = 1.743,  $p=0.418$ ). Groups did differ on a variety of measures to do with spiders, as would be expected. Subject characteristics are shown in table 3:1 below. Details are set out below in table 3:2 showing that spider phobic were different from the other two groups, who were similar to each other.

### Materials

#### Assessment

Questionnaires are the same as for the previous experiment with the exception of numbers 3 (The Matchett and Davey Fear of animals questionnaire) and 8 (The FSS, Wolpe and Lang 1964) which were excluded. Two additional questionnaires were:

- i) Spielberger STAI y-1 self evaluation questionnaire, pertaining to present state of anxiety. This questionnaire is widely used as an aid to the quantifying of trait anxiety by clinicians and was described in detail along with its partner (trait anxiety) earlier.
- ii) Visual analogue containing seven items to do with: a) general anxiety level, b) desire to escape c) to what extent spiders were found to be disgusting, d) coping with anxiety about spiders, e) coping with the situation, f) feeling anxious about spiders, and g) approaching and dealing with a spider. This is purely descriptive and can be found in its administered form in the appendix.

Table 3:1 Means of subject characteristics.

Group:	Non Phobic	Phobic controls	Spider phobics
n	21	20	34
Sex ratio (f:m)	18:3	15:5	30:4
Age (years)	25.4	24.1	26.3
Age of onset	.	9	3.8
WQS	5 <sup>a</sup>	6.05 <sup>a</sup>	22.50 <sup>b</sup>
Spielberger Trait anxiety	35.86	36.70	40.85
Rozin & Fallon	131.26	130.15	116.29
BDI	4.00	5.65	6.97

<sup>b</sup> =  $p < 0.0001$ . <sup>a</sup> = do not differ.

Table 3:2 Means of subject characteristics concerning spiders. (VA refers to visual analogue items, see below)

	Non Phobic	Phobic Controls	Spider Phobics	F <sub>(2,64)</sub> Values
Avoidance	1.00	1.22	6.00	78.28 <sup>***</sup>
Fear	1.20	1.00	5.18	58.40 <sup>***</sup>
Interference	0.33	0.61	3.65	35.07 <sup>***</sup>
Spielberger	28.47	33.00	41.74	6.57 <sup>*</sup>
General anxiety	6.00	15.56	50.00	24.85 <sup>***</sup>
Desire to escape	3.33	8.33	24.71	6.10 <sup>*</sup>
Find spiders disgusting	12.00	12.22	66.47	46.38 <sup>***</sup>
Coping:anxiety re spiders	6.67	11.11	60.88	47.48 <sup>***</sup>
Coping:situation	5.33	7.78	33.82	13.37 <sup>***</sup>
Anxiety about spiders	12.67	12.22	67.35	53.42 <sup>***</sup>
Approach and deal with spiders	18.00	16.67	78.53	69.20 <sup>***</sup>

<sup>\*</sup> =  $p < 0.01$ . <sup>\*\*\*</sup> =  $p < 0.0001$ .

## Procedure

Subjects were seated in a soundproofed room and given the questionnaires. They then participated in experiments to do with cognitive processing of spider-related material. This entailed doing a computer based stroop task, reacting to a light in the presence of a live spider, and looking at videos and pictures of spiders. A variety of anxiety ratings were also taken after each experiment. All the questionnaires were re-administered at the end of the experimental session. The session lasted approximately three hours.

## Results

### Experiment 2: Overview

Following on from previous information gathered from the earlier questionnaire, spider phobics, other phobics and controls filled in questionnaires to do with beliefs specific to spiders immediately before and after participating in experiments involving exposure to spiders. Again, the questionnaire was initially composed of both positive and negative statements but for ease of comparison comprehension and analysis they have all been converted to negative.

Spider phobics as predicted were found to differ in strength of belief in almost all items from both the other groups, who were not different to each other.

Spider phobics did not change in the strength of their beliefs after exposure to spiders, with the exception of one item to do with the disgustingness of spiders and one item to do with the likelihood of a hysterical reaction to spiders.

Individual spider phobics also have a high level of belief in the possibility that the spider will cause them harm in some way.

## Results

The data was analysed using a one way analysis of variance with three groups (spider phobics, other phobics and non-phobic controls). Planned comparisons were carried out using a Bonferroni corrected T test.

As well as conscious cognitions, measures of avoidance, anxiety and disgust were analysed. Spider phobics differed from other phobics and non phobics in all responses except for trait anxiety, disgust (as measured by the Rozin and Fallon scale), depression (as measured by the BDI), 3 pre exposure belief scores and 4 post exposure belief scores. The 3 pre exposure beliefs on which spider phobics did not differ from other groups were:

"If confronted by a spider I would...not be excited..have a heart attack...lose control of my bladder or bowels".

Of the 4 post exposure beliefs on which spider phobics did not differ from the other groups,3 were the same as the pre exposure beliefs reported, and the belief which had changed and was no longer different was:

"If confronted by a spider I would become infected".

A complete listing of category means is shown in table 3:5. In every case where there was a significant main effect, it was accounted for by the spider phobics being different from the two other groups, who were not different to each other. A comparison of within-subject change over the course of the experiment within groups was calculated using a two way analysis of variance with one between group factor of group (control, other phobic or spider phobic) and one within group factor (repetition over time). There were no significant changes in cognitions after exposure with the exception of one in the non-phobic control group only and one item which changed in the spider phobia group only. In the

control and other phobic groups, the belief rating which changed significantly was belief number 4 (I would not be interested) ( $F_{1,66}=9.40$ ,  $p<0.01$ ), indicating that they had become more interested during course of the experiments. In the spider phobia group, the item which changed significantly was belief number 7 (I would feel disgusted) with a mean increase of 17.06 ( $F_{1,66}=6.55$ ,  $p<0.025$ ) indicating a strengthening of belief conviction.

Table 3:5 Mean of belief conviction scores in each category before and after exposure.

	Cognitions	Before	After
Controls	Disgust	6.76	6.00
	Harm	1.90	1.13
	Coping	28.97	22.61
Other phobics	Disgust	5.35	4.42
	Harm	2.92	2.08
	Coping	28.41	27.05
Spider phobics	Disgust	34.16	35.08
	Harm	32.22	29.16
	Coping	78.53	77.99

This change was not due to a significant change in anxiety in the spider phobia group, whose state anxiety rating at the end of the exposure period was no different to their state anxiety at the beginning, despite fluctuations throughout the period ( $F = 1.09$ ).

A correlational study was carried out using the same measures as in the first study, comparing three measures of phobic intensity (fear, interference and general avoidance) and the three categories of cognitions. Results are shown in table 3:6 below.

Table 3:6 Correlation of cognitions and measures of phobic intensity in controls, other phobics and spider phobics. Probability in brackets.

Group	Types of cognition	Fear	Interference	General avoidance
Controls	Disgust	0.86298 (0.0001)	0.65297 (0.0083)	0.70169 (0.0036)
	Harm	0.87411 (0.0001)	0.52215 (0.0459)	0.53020 (0.0420)
	Coping	0.75921 (0.001)	0.68426 (0.0049)	0.77042 (0.0008)
Other phobics	Disgust	0.45523 (0.0437)	0.48290 (0.0310)	0.52647 (0.0171)
	Harm	0.77851 (0.0001)	0.38764 (0.0913)	0.72730 (0.0003)
	Coping	0.73139 (0.0002)	0.65724 (0.0016)	0.79595 (0.0001)
Spider phobics	Disgust	0.06563 (0.7123)	0.44318 (0.0087)	0.36202 (0.0354)
	Harm	0.63417 (0.0001)	0.57805 (0.0003)	0.64330 (0.0001)
	Coping	0.57770 (0.0003)	0.50431 (0.0024)	0.61934 (0.0001)

Individual phobic's scores in relation to cognitions to do with harm were examined. All phobics who scored 40 and upwards on the belief questionnaire for these items were noted and the results shown in table 3:7. It is evident that phobics have a high level of beliefs about the actual harm which spiders may inflict upon them either physically, psychologically or socially.

Table 3:7. Number of phobics scoring more than 40% belief conviction on statements to do with possible personal physical harm caused by a spider.

Cognitions to do with harm	Number of phobics scoring over 40% on belief scale.
I would make a fool of myself	21
I would come to physical harm	8
I would go mad	11
I would feel faint	9
I would lose control of myself	17
I would be paralysed	12
I would be hysterical	19
I would have a heart attack	4
I would lose control of my bladder/bowels	1
I would be unable to escape	13
I would act foolish	20
I would scream	23
I would feel trapped	20

### Discussion.

Phobics have a range of negative beliefs about their phobic object which are identifiable and which together form a logical framework for phobic fear responses. These beliefs form an important part of the meaning which the phobic object has for the phobic person. The point has been made that a bird, for example, has a different meaning for a bird phobic than it does for an ornithologist. This meaning is not only to do with the possible harm the bird could inflict but involves beliefs about the phobic's ability to cope (with the bird and with themselves), subjective negative evaluations of the appearance of the bird and beliefs about the efficacy of avoidance of contact with the bird, or escape from it if such contact is unavoidable. The meaning also has emotional

content which may cause the different beliefs to cohere. The basis for this proposal lies in the finding here that negative cognitions to with harm and coping are highly correlated to feelings of fear and avoidance. This meaning may not be evident to the non-phobic observer. Šalkovskis has put it thus :

'The rationality or irrationality of a person's beliefs to the *outside observer* is not the key issue. The degree of anxiety is proportional to the immediate personal and idiosyncratic appraisal of threat; in the case of panic attacks, the *catastrophic* nature of the misinterpretations generates spectacular levels of anxiety incomprehensible to the observer who does not share the patient's assumptions (and bodily sensations). (Šalkovskis, 1991 p13)

The results from the studies described here are evidence for the importance of such assumptions in the maintenance of phobias. It is clear from the results of the first questionnaire study that phobic fear intensity is related to strength of negative belief conviction to do with harm and with coping and this in itself is an indication of the importance of cognitions.

Cognitions were divided into three categories: harm, coping and disgust, and these were looked at in relation to measures of phobic fear, interference in daily life, and avoidance. The intensity of fear experienced by the phobic is related to the strength of negative beliefs to do with harm and with coping, while interference and general avoidance were related only to the strength of negative beliefs to do with coping. Disgust appeared to be related neither to phobic fear nor to interference, nor was it related to the amount of *avoidance* of their phobic object estimated by phobics. Avoidance would seem logical if revulsion does in fact lead to avoidant behaviour as suggested by Matchett and Davey (1991).

In an identical correlational analysis carried out with the results of the second study using negative belief scores and measures of phobic intensity of non phobics, other phobics and spider phobics a different pattern emerged. All

beliefs in all groups were correlated to some degree except for the cognitions specifically to with harm in relation to interference in the other phobic control group, and, in the spider phobic group, the disgust cognitions in reaction to fear. This issue of the role of disgust in phobias is discussed in detail in the chapter devoted to disgust (chapter 4). These findings clearly indicate the importance of negative cognitions in phobia, and of positive cognitions in non-phobia, as evidenced by the high correlation between cognitions and phobic intensity measures in the non phobic and phobic controls showing that these subjects' lack of fear of spiders is related to their lack of negative beliefs about them.

The results of the second, main questionnaire study confirm the importance of the beliefs held by spider phobics in relation to spiders. There was a marked and significant difference between the spider phobics on the one hand and the other phobics and non phobics on the other with regard to the strength of negative belief conviction. This would suggest that spider phobics endow spiders with more meaning than do non spider phobics.

In the main questionnaire study spider phobics were shown to be very different in the intensity of their beliefs about spiders, which is unsurprising in itself. What is perhaps surprising is the relatively high endorsement of beliefs such as "I would feel nauseous", "I would lose control of myself", "I would be paralysed", "I would not eat food it had been near" amongst others. Irrational ideas such as these are of the type expressed by panic patients, thus providing further evidence for the fact that spider phobics are as afraid of their own responses as they are of anything nasty brought about through the mediation of the spider. This is in line with results shown by McNally and Steketee (1985) who found that phobics feared the panic brought about by an encounter with their phobic object. The

spider phobics in the present study showed a high level of belief in the amount of harm which the spider could inflict on them either directly or indirectly. Given these beliefs it is logical that fear and avoidance of the belief-provoking object should seem sensible to the phobic holding them, despite the low endorsement of belief in the phobic object's ability to inflict actual physical harm (e.g., item 6: I would come to physical harm, which had a mean of under 20, both pre and post exposure). From this stems the confusion felt by phobics who know that they will not actually be physically harmed but who are disproportionately afraid of something nameless and dreadful happening. It is clear from the results that it is, again, fear of fear and of acting in an unreasonable or a hysterical way, based on past experience, and the over prediction of future discomfort which serves to maintain their avoidance behaviour and thus their phobia. It is these underlying beliefs which remain obdurate in their refusal to disperse, even after exposure to spiders on the unprecedented level (for the participating spider phobics), as reported here.

Beliefs remained very consistent across the period of exposure to spiders. The only shift in the spider phobics was in the increase of feelings of disgust to do with spiders. This was in spite of their having spent up to three hours in the presence of spider stimuli, including a live Tarantula, without having had hysterics, making a fool of themselves and so on. However, anxiety levels were consistently high, significantly higher than in the other groups throughout the exposure period, and this is likely to have impeded any possible disconfirmation of negative beliefs about spiders. An alternative view is that it may have interfered with the efficient encoding of information, as the discomfort experienced bolstered negative thoughts and may have resulted in cognitive

avoidance.

As a final check, an examination of the strength of belief in individual phobic's specific harm cognitions revealed that a surprisingly high number of phobics were at least 40% sure (and often much more convinced in terms of belief rating) that an encounter with their phobic object would make them scream, hysterical, that they would come to physical harm and so on. This is convincing evidence for the presence of a meaningful set of beliefs which make the possession of a phobia logical and, in terms of causality, explicable.

On the evidence of the two studies reported here it would seem that far from being 'non-cognitive' (Seligman, 1971), phobics have a complex construction of beliefs to do with their phobic object which is different from that of non-phobics. The second study further illustrated that the beliefs of spider phobics are highly specific, and are exclusive to them: other animal phobics do not share any of the distorted beliefs about spiders, but have the same kind of distortions about their own phobic objects. It is a criticism of this study that it did not collect comparable data re the beliefs of the phobic controls with regard to their phobic object. Future studies could rectify this, but the pressure of experimental time made this difficult. Another criticism is to do with the inclusion of two items which were ambiguous and therefore were not useful. These items were number 10 ('I would be excited') and number 4 ('I would be interested').

Previous research into the cognitive basis of anxiety has concentrated on the prediction (or over-prediction) of risk by anxious people and the hypothesis that this is part of the pattern of phobic thinking would appear to be born out by the results of this study. However, this in itself is not an adequate account of phobic cognitions as is clear from this study that there is also a connection between

phobic intensity and perceived ability to cope, a line of thinking more akin to self-efficacy theory as propounded by Bandura (1977).

It would appear that phobic thoughts then are composed of a variety of beliefs which together contribute to the meaning the phobic object has for the phobic. These beliefs are to do with the amount of perceived harm emanating from the phobic object itself (possible physical harm or contamination), the amount of harm experienced by the phobic (going mad, having hysterics, paralysis, syncope) combined with a feeling of helplessness (not able to cope, feeling trapped, unable to escape), and that these are all closely related to levels of emotional intensity and are important in the maintenance of the phobia. The content of the thoughts which together form fixed beliefs and form a basis for behavioural strategies has previously been under-explored and as such has remained somewhat mysterious. Watts and Sharrock (1984), in constructing their spider phobia questionnaire, carried out exhaustive research into behaviour to do mainly with coping, vigilance and preoccupation. This, along with the Chambless *et al.*(1984) agoraphobia questionnaire formed the basis of the present questionnaire which concentrates on the more introspective components of spider fear and includes catastrophic thoughts. It is also different from Watts and Sharrock (1984) in its lack of a forced choice decision, allowing more subtle shadings of results to be seen. The question remains as to why otherwise normal and rational people should have extremely irrational ideas about things which other people see as harmless or even endearing. Psychoanalysts would suggest that it is to do with some repressed instinct or hidden childhood memory, behaviourists that it is a learned response and as such unavailable to conscious scrutiny. Later in this thesis, theories to do with the possible distortions of information entering the cognitive

system will be discussed and examined in the context of cognitive experiments. There is some current speculation that deficits in the cognitive processing system are such that they engender strange ideas of the type noted here. This will also be examined. An alternative explanation, and the one proposed here, is that these ideas are based on a high level construction of information which is an emergent property of underlying systemic functioning: what Teasdale (1993) describes as the 'generic, holistic' level.

Beliefs are the result of many disparate elements. Processes contributing towards their genesis are purportedly to do with attention and memory as well as personality and physiology. It is the purpose of this research to explore these underlying processes in order to be able to understand more fully the emergent cognitions. The ultimate goal is to be able to change their more malign aspects and thus ameliorate the effects of phobic disorders. It is proposed throughout that it is only at the level of belief or meaning that this is possible.

The emotion of disgust has been proposed as being important in the formation of phobic responding. If this is the case its exploration may contribute important insights into the nature of meaning with regard to fear-objects. The next task therefore is to explore the nature of disgust in more detail as a possible contributor to the meaning of a phobic object, and to examine its role in the acquisition and maintenance of phobias.

## CHAPTER 4:

### THE MEANING OF DISGUST : ITS ROLE IN THE ACQUISITION AND MAINTENANCE OF SPECIFIC PHOBIA.

#### Introduction

Until recently phobias have been seen as exclusively associated with the emotion of anxiety as opposed to other emotional responses. However, two research groups have recently suggested an additional association between *disgust* and animal fears and phobias. Watts (1986) was the first to suggest that spider phobics had an element of disgust in their response to spiders, "and that it is the element of disgust in (spider phobics) which interferes with the recall of spider words" in a recall task (Watts 1986, p299), while Matchett and Davey (1991) have made a more specifically causal link by suggesting that some animals may become objects of phobic avoidance by nature of their having revulsive properties to do with disease avoidance/contamination fear. The suggestion is that there may be cognitive avoidance of disgust stimuli going on at the automatic processing level which interferes with the priming and elaboration of stimuli perceived to be disgusting. This helps to perpetuate the phobic response by the process of negative reinforcement. In this chapter this idea will be scrutinised and assessed with regard to its relevance to clinical phobia.

Darwin (1872) was the first to express scientific interest in disgust. He noted that there were characteristic facial expressions for the whole range of emotions and that an apparently universal expression of disgust was characterised by movements round the mouth as if expelling food, or in extreme cases, vomiting. Disgust, "in its simplest sense, means something offensive to the taste" (Darwin 1872, p256). Angyal (1941) defined disgust as the emotion associated with the

avoidance of incorporation of a particular substance, usually identified as waste products of the body (human or non-human). Rozin and Fallon (1987) studied disgust and put it in the context of contamination sensitivity. They describe the response as primarily a food-rejection response consisting of nausea, a characteristic facial expression, *a distancing of the self from the offensive object* (avoidance), a sensitivity to both contamination from the object and the prospect of its oral ingestion, and a characteristic feeling-state (revulsion). Earlier (Rozin, Fallon and Mandell, 1984) a positive correlation was found amongst family members in their resemblance in attitudes to food, especially sensitivity to cleanliness and contamination of foods. This was amplified in a later paper which looked at how contamination perception is affected by the laws of contagion and of similarity (Rozin, Millman and Nemeroff, 1986). Contagion is seen as a permanent transfer of properties from one, usually animate, object to another object by brief contact. From there the law holds that "once in contact, always in contact" (Frazer, 1890). Rozin *et al.* (1986) show that in their study, drinks that have been in brief contact with a sterilized dead cockroach become undesirable and that laundered shirts previously worn by a disliked person are less acceptable than those previously worn by a neutral or liked person. There is no record of their having attempted to remove the disgust reaction so induced. The relevance of this to phobic fear lies in the suggestion that phobics may themselves feel contaminated by the presence, or potential touch, of their phobic object and this may generalise to other objects which have been in contact with it.

The second 'law' of interest to Rozin and colleagues is the one which Frazer (1890) describes as 'similarity', which holds that "the image equals the object" and

that anything happening to one object is seen as having happened to other, similar objects. Rozin *et al.*(1986) showed that people reject acceptable foods if they are presented in a form resembling something unacceptable. They cite the example of their subjects being unwilling to eat fudge when presented in the shape of dog faeces and conclude that these laws of sympathetic magic correspond closely to the two basic laws of association, (contiguity and association) and that the emotion of disgust may be particularly susceptible to this. Disgust may be an emergent property of these general laws and may in this way contribute to the overall meaning of a fear object leading to the avoidance of it by a fearful person.

It has been shown, in illustration of this point, that aversive conditioning is particularly effective, fast acting and long-lasting when the unconditioned response is nausea (Garcia and Koellig, 1966; Garcia, Rusiniak and Brett, 1977). Several researchers have previously proposed that taste aversions may be of relevance in the acquisition of phobias (e.g.Seligman, 1971; Rachman,1978). Wolves and Coyotes, for example, have taken extreme avoidant action of lambs when those lambs have been associated with previous sickness. A more prosaic comparison to do with similarity can be drawn between the attitude of phobics to things resembling their phobic objects: phobics are often afraid of pictorial representations of their phobic object. The bird phobic in the initial questionnaire study (reported in chapter 3) described being unable to pick up a book with a picture of a bird on the cover and one of the spider phobics had to hit and squash tomato-top leaves before being able to pick them up for disposal. In these cases the fear had transferred itself onto objects which had become associated with the phobic objects themselves and provocative of the same kind

of avoidant response. although these responses are different to those elicited by a real life bird or spider, suggesting a certain flexibility in the behavioural repertoire of phobics which is not accounted for by conditioning theory. Nevertheless, to return to taste aversion, it remains difficult to see how this translates to phobia. Following an unpleasant experience after a party, people often describe an aversion to a particular flavour of alcohol. However, few would then describe these people as phobic of, for example, whisky, the next time they come into contact with it. It may be that the link is between taste aversion and *avoidance* behaviour, rather than fear, which is known to be a component in the behaviour of spider phobics in relation to spiders and has been seen as a part of the maintenance of phobic responses.

It is notable that the concept of avoidance emerges from these diverse approaches. One-trial conditioning of food aversions and contamination fears seem to have a powerful effect on attitudes to objects, leading to avoidance of them, though this may not be directly to do with fear. It is therefore important to consider whether disgust may play a role in maintaining the avoidant behaviour of phobics, and hence contributing to its maintenance (as discussed in chapter 2) and whether the fear of contamination is sufficiently important to be taken into account in treatment.

Consistent with Watts'(1986) idea that disgust plays a role in the maintenance of avoidant behaviour in phobias, Matchett and Davey (1991), found that measures of disgust and contamination sensitivity were highly correlated with scores on the animal subscale of the Fear Survey Schedule (Wolpe and Lang 1964). In addition, disgust and contamination sensitivity correlated with fear of animals normally considered to be fear-relevant (as defined by Bennett-Levy and

Marteau, 1984), but mostly not physically harmful (camel, rat, eagle, spider, snake, cockroach, maggot, snake) but did not correlate with animals considered to be physically harmful, attacking or predatory (shark, tiger, lion, bear, snake, jellyfish, wolf). However, these results were obtained from non-phobic subjects. Davey (1992a) has suggested ways in which animals might acquire disgust-eliciting characteristics for particular humans. They may be seen as spreaders of disease (rats), by being contingently associated with contamination or dirt (either temporally or spatially, like spiders or cockroaches) or by possessing features normally associated with the disgust reaction (by resembling mucus for example, like slugs, or things often erroneously perceived as slimy, like snakes). All these together may go some way to explaining how certain animals may become disgust - provoking, though familial and cultural influences will determine the likelihood of its transmission to individuals. These characteristics may also be more to do with "preparedness" (see chapters 2 and 3) than with a conditioned response.

Davey (1992c), in support of this theory of fear/disgust acquisition, has shown that fear of animals in a fear-relevant category covaried with feelings of disgust and a tendency to associate the animal with dirt and disease. There is also the suggestion (Davey, 1992) that to believe "that our ancestors has been subject to predatory pressure from slugs and caterpillars would seem to be stretching the evolutionary predator-defence model beyond the limits of its credibility." (p313). (Though our ancestors were not all hominids.)

Davey (ibid) also states in furtherance of his views that movement cues are not an important element in spider fear, showing that only 22.6% of subjects indicated that sudden movement was the most frightening feature of spiders. Out of the 5 most reported characteristics, 3 (sudden movements 22.6%, speediness

16.9% and crawliness 13.2%) are specifically to do with movement, 1 (hairiness) is a purely physical characteristic and the most frequent feature reported (legginess 28.3%) is highly ambiguous and has strong associations with movement. He also cites as evidence for the primacy of disgust, that if movement was indeed a particularly salient feature of spiders for those who fear them, then they should have rated the characteristic of 'sudden movement' more highly than those who are not fearful of spiders, and that this was not so in his fearful (but not phobic) sample. However, 'sudden movement' *per se* of spiders may be particularly relevant to fearful people but is an obvious characteristic even to those who are not, so the conclusion drawn by Davey seems a little too broad. It is also perhaps too optimistic to suggest that 'legginess' is only to do with physical characteristics and have nothing to do with movement.

In summary, there is some evidence from research into taste aversion and contamination that is consistent with the view that the disgust reaction can be acquired very easily, is associated primarily with food but is also associated with objects previously in contact with disgust-inducing stimuli which have transferred their properties to these objects. It may also be associated with contamination fear through familial or cultural transmission. Disgust may lead to avoidant behaviour, taste aversion definitely does. Rozin and Fallon (1987) suggest that there is a substantial overlap between people's perception of disgusting and dangerous objects. They also suggest that objects evoking disgust are either animals, parts of animals, the bodily products of animals (faeces, urine, mucus) or objects that have been in contact with these, which resemble them or which are associated with spoilage and decay. Watts (1986) and more recently, Davey (1991), has seen the area of disgust as potentially accounting for some aspects of

the acquisition and maintenance of some animal phobias. Set against this are the findings reported in chapter 3 which show that disgust does not appear to be related to phobic intensity, although exposure appears to increase disgust feelings towards spiders by spider phobics. However, given the ideas of Watts and Davey propounded above and given that all previous experimental work carried out has been on non-phobic subjects and confined to questionnaires, the aim of the present study is to attempt to clear up the ambiguities by answering certain key questions:

i) Is there a specific link between disgust and phobias as opposed to that shown between disgust and non-phobic fears?

ii) If disgust is related to the fear of particular types of animals and results in the avoidance of them and disgust sensitivity is a vulnerability factor in phobics, then disgust-related concepts should be differently processed by those suffering from phobia due to deficits in the encoding of information. This might be expected to be manifested as longer reaction time latencies in phobics to disgust words than to neutral or non-disgusting emotional words in a reaction time task.

iii) Do phobics feel more disgusted by their phobic object than non-phobics feel for objects they identify as the most personally repulsive? If Davey is correct then disgust should emerge as higher in phobic than in non-phobics and it would be reasonable to suppose that if phobics are equally disgusted by both their phobic object and by objects which they are *not* phobic of, then disgust is unlikely to be a sufficient explanation for the acquisition and maintenance of even those phobias which seem to be founded on disgust (e.g. vomit, slugs). It is already clear that the disgust response is not a necessary component for the

diagnosis of clinical phobia.

In order to examine the above the following hypotheses were formulated:

Hypothesis 1: that disgust is a factor in spider phobia. Leading on from this is the prediction that i) the intensity of disgust experience will be associated with the intensity of phobic avoidance, ii) that the amounts of disgust and fear elicited by the phobic object will be closely associated, iii) that the phobic object will provoke more disgust than non-phobic objects, and iv) that cognitions specifically to do with the disgustingness of phobic objects will form an important part of phobic thinking.

Hypothesis 2: that disgust words, being revulsive, are connected with an avoidant information processing strategy. The prediction following from this is that disgust words will produce longer latencies in a colour naming task due to the aversive properties of the word and its consequent effect on processing, possibly leading to deficits in the priming and elaboration of internal representations to do with the disgust word.

Hypothesis 3: that disgust plays a part in the acquisition and maintenance of phobias.

The questionnaire study looked at disgust sensitivity as measured by the Rozin, Fallon and Mandell (1984) disgust questionnaire in order to see if it was predictive of intensity of animal phobia, as measured by (i) the Watts Spider Phobia Questionnaire (1984), (ii) the amended general phobia questionnaire, (iii) visual analogues to do with avoidance, anxiety and spider-specific disgust both in the presence and absence of a live spider. Spider phobics were also asked to note down up to five words describing a spider.

The second experiment examined whether or not spider phobics find:

- a)spiders more disgusting than non-phobics,
- b)spiders more disgusting than other generally accepted disgust objects,
- c)spiders as disgusting as they are fear-invoking.
- d)other fear- and disgust-invoking animals more aversive than non-phobics.

This was achieved by asking phobics to look at two series of first; neutral, disgusting and spider pictures and second; spider pictures alone, asking for estimates of disgust in the first series, and disgust and fear in the second.

The third experiment was designed to test the amount of avoidant properties of disgust words (as shown by a processing bias) and whether there was any similarity in this respect between spider and disgust words. This was tested using a Stroop task with disgust words and neutral and emotional control words.

Finally, the fourth, questionnaire study in this exploration of disgust dealt with the phenomenology of disgust by asking a wide range of people to fill in two, 43-item questionnaires to do with the two objects which personally elicited most disgust. Two objects were identified in each case because pilot work indicated that the range of objects might otherwise be confined to just one or two universally-acknowledged disgusting items (faeces, vomit). Questions to be answered were to do with the physiological, behavioural and cognitive responses to the disgust object, as well as its objective physical characteristics. It was hoped that this might clarify the relationship between disgust and phobias further by providing evidence that phobics are more disgusted by their phobic object (if that object is also their most disgusting object) than are non-phobics by their most disgusting object. If this is the case then disgust is an important consideration in phobias. If it is not the case, then disgust is either not an important element in phobias, or the disgust that phobics feel for their phobic object is different to the

more conventional meaning of the word and as such is not the same as the emotion of disgust examined here and proposed by Davey as being a factor in the acquisition and maintenance of phobias.

### Methods

The studies which make up this chapter are as follows: i) Questionnaire study on the links between disgust and fear; 2) Questionnaire study on the salient features of spiders for spider phobics; 3) Picture experiment comparing the disgust provoked by spiders with that provoked by a variety of other categories as judged by spider phobics and controls; 4) Picture experiment comparing the disgust and the fear provoked by spiders in spider phobics and controls; 5) Stroop test including disgust and control words; 6) Questionnaire on the relative role of fear, avoidance and disgust items in the disgust response. Methods for each will be listed in this order below.

#### 1) Links between disgust and fear

##### Subjects

Subjects are identical to those characterised in chapter 3, experiments 1 and 2.

##### Assessment

Questionnaires are the same as those in chapter 3, experiments 1 and 2.

##### Procedure

i) 25 mixed phobics were contacted by post, filled in the questionnaires and returned them for analysis. ii) 3 groups consisting of spider phobics, other phobics and non phobics filled in questionnaires while participating in experiments to do with spiders.

### Results : Cognitive Links between phobias and disgust

A correlational analysis was carried out across measures from all sections of the FSS questionnaire using scores obtained from a mixed group of 25 phobics. Initial overall analyses showed that Trait anxiety was not related to overall Fear Survey Schedule score but was significantly related to the social subscale. ( $r=0.4852$ ,  $p>0.02$ ).

Table 4.1 shows the correlation between disgust sensitivity, trait anxiety, phobic severity and animal, social, tissue damage, noises, phobias and miscellaneous subscales of the FSS as reported by Matchett and Davey (1991) using non phobic subjects and the same measures obtained in the present experiment using phobic subjects.

It should be noted that the disgust questionnaire scores run counter to the norm so that negative correlations are in fact positive, and vice versa.

On this evidence there would seem to be little justification for positing disgust sensitivity as a vulnerability factor in phobias. That is, the amount of disgust sensitivity appears not to be predictive of the presence of animal phobias in actual animal phobics, only in those deemed fearful of animals.

Matchett and Davey (1991) found correlations at the  $p<0.001$  level between disgust sensitivity and the HFLP and HREV categories in a normal population. If disgust sensitivity is, as proposed by them, a factor in the phobic experience, then similar or stronger correlations should be present when phobics with a wide range of disgust embedded in their responses to their phobic objects are analyzed. The range is important so that a global sense of disgust is explored rather than one overriding element which may skew the results.

A correlational analysis was carried out between disgust sensitivity and the three

categories of animals (HFHP, HFLP, HREV ie:high fear high predatory, high fear low predatory and high revulsion). A further analysis was carried out dividing the group into the subgroups disgust-involved and disgust-not-involved in order to test whether the disgust sensitivity scores of particular types of phobics would be predictive of fear for a particular set of animals. When phobics were subdivided and analyzed separately according to whether disgust was present or absent as an element in their phobic response (disgust-involved or disgust-not-involved), there was a change in the pattern of results showing a split in the subgroups, though this did not achieve significance. The trend was towards the disgust-not-involved group having an inverse correlation between scores for strength of disgust, and fear scores, while the disgust-involved group followed the same pattern as the Matchett and Davey results. Table 4.2 shows these results in full. Again, it should be noted that the disgust questionnaire scores run counter to the norm so that negative correlations are in fact positive, and vice versa.

T Tests were carried out to examine the contention that this difference is due to some divergence between the groups. No differences were found between the groups to account for this: scores on the animal subscale of the FSS, disgust sensitivity, phobia-specific fear and interference ratings were all similar, though the phobia-specific avoidance rating was a non-significant trend ( $T_{16,7} = -2.03663$ ,  $p = 0.0534$ ), indicating that those in the disgust-involved group are likely to be marginally more avoidant of their phobia than those in the disgust-not-involved group. On this evidence there is no link between fear and disgust in phobics.

Table 4.1: Correlations between disgust sensitivity score, trait anxiety and factors of the fear survey schedule in non-phobics (Matchett and Davey) and phobics.

	Factors of the FSS					
	Animal	Social	Illness death	Noises	Classical phobias	Misc.
Disgust sensitivity (normals)	-0.3171***	-0.1966	-0.3253***	-0.207	-0.1686	-0.0897
Trait anxiety (normals)	0.1692	0.4986***	0.1634	0.1467	0.2228*	0.3931**
Disgust sensitivity (phobics)	-0.3117	-0.4926*	-0.4224*	-0.3508	-0.1227	-0.5162
Trait anxiety (phobics)	-0.0713	0.4852*	0.1743	0.2263	0.2318	0.3978**

\*P < 0.05; \*\*P = 0.052. \*\*\*P < 0.001.

Table 4.2: Correlations between disgust sensitivity and the mean fear scores for groups of animals rated as HIGH FEAR/HIGH PREDATORY, HIGHFEAR/LOW PREDATORY and HIGH REVULSION

Disgust sensitivity	HFHP	HFLP	HREV
Matchett and Davey (normals)	-0.1124	-0.2937**	-0.2824**
All phobics	-0.13911	-0.15124	-0.14070
Phobics (DNI)	0.19180	0.48861	0.37987
Phobics (DI)	-0.28162	-0.21588	-0.30353

(DNI = disgust not involved, DI = disgust involved)

### Disgust-related cognitions

An exploration of cognitions to do with various aspects of phobic responding yielded differences in the strength of beliefs held by both groups. The

questionnaire was initially composed of both positive and negative statements but for ease of comprehension and analysis they have been converted to negative statements. In all cases where there is a significant difference the means shifted in one direction with disgust-involved phobics scoring consistently higher than the others. T Tests were performed on all ratings. Significant differences were found in responses to seven of the statements. No other differences were found. Results of these seven items are shown separately below in table 4.3.

Table 4.3: Means of belief ratings in phobics where disgust is either involved or not involved in response to their phobic object

If confronted by my phobic object I would:	feel disgusted	not try to deal with it	not slowly lose my fear	find it repulsive	not cope with it	feel unclean	not eat food it had been near
Disgust not involved	12.50	13.75	56.25	32.50	26.25	2.50	23.75
Disgust involved	62.94	47.06	82.35	81.18	59.41	30.00	72.94
T values (16,7)	-3.2412	-2.2451	-2.1242	-3.4626	-2.3805	-2.1670	-3.1800
P	0.0036	0.0347	0.0446	0.0021	0.0260	0.0408	0.0042

The two items uncontaminated by direct disgust elements are "not try to deal with it " and "not slowly lose my fear".

## 2) Salient spider characteristics

### Subjects

Subjects are the spider phobics involved in experiments to do with spiders.

Subject characteristics can be found in the previous chapter, experiment 2.

### Procedure

Spider phobics participating in a series of experiments were asked to write down 'no less than five words describing your phobic object/situation', as part of a

demographic questionnaire. Spider phobic's words were collated in order to compare them with words collected by Davey (1992).

Results

Spider Attributes

40 spider phobics were asked to write down up to 5 words describing a spider. The words were collated and mentions of each word totalled. The hierarchy of results is shown in table 4.5.

Table 4.4: Spider attributes: number of times word appears in total.

Words noted	Total number of times noted
legs	23
hairy	21
creepy	21
black	20
fast	14
big bodied	14
ugly	12
disgusting	12
eyes	7
scuttling	7
menacing	6
crawling	5
evil	4
agile	3
fangs	3
sudden	3
horrible	2
invasive	2
dirty	2
lurk	1

### 3) Picture Experiment 1

#### Design

After participating in experiments to do with spiders and completing state anxiety questionnaires and visual analogues, three groups of subjects – spider phobics, other specific phobics and non-phobic controls - were shown 40 pictures including spiders, owls, carnivorous plants, slugs, centipedes and human disease. Spiders were divided into two subsections (revolting or nice) on the basis of pilot work. Subjects were asked to rate how disgusting they felt the pictures to be, on a scale of 0 to 10. They then filled in the two questionnaires again.

#### Subjects

Subjects are the same as in the previous chapter, experiment 2.

#### Assessment

Questionnaires: Spielberger STAI y-1 self evaluation questionnaire.

Visual analogue pertaining to phobic avoidance (see chapter 2 and appendix).

#### Stimuli

40 colour pictures were divided in the following way:

- 10 carnivorous plants
- 5 'aesthetically pleasing' spiders
- 5 'revolting' spiders
- 5 owls
- 5 slugs
- 5 centipedes
- 5 human (diseased).

Specific groups were chosen after pilot work suggested the need for control stimuli which were generally viewed as disgusting or were not at all associated with disgust. The division of spiders into 'nice' and 'nasty' was carried out by asking non spider phobics to put pictures into categories to do with the aesthetics of the spider pictures. The rationale was to test whether spider phobics were

susceptible to the same kinds of aesthetic judgements with regard to spiders which may then affect their fear or disgust reactions.

Pictures were taken from a variety of sources, were all in colour and were mounted on pastel A4 card before being placed in the transparent plastic leaves of a presentation folder. All were photographs in natural settings, except for the human pictures which were obtained from a book of diagnostic picture tests for use in clinical medicine, and were consequently confined to particular anatomical areas. Picture groups were selected on the basis of their being neutral controls (plants and owls) spider relevant (nice or nasty spiders in order to check for particular disgust-evoking characteristics) or disgust relevant (slugs, centipedes and human).

### Procedure

Subjects were given questionnaires and seated at a small table. The experimenter sat on the opposite side of the table and gave the following instructions.

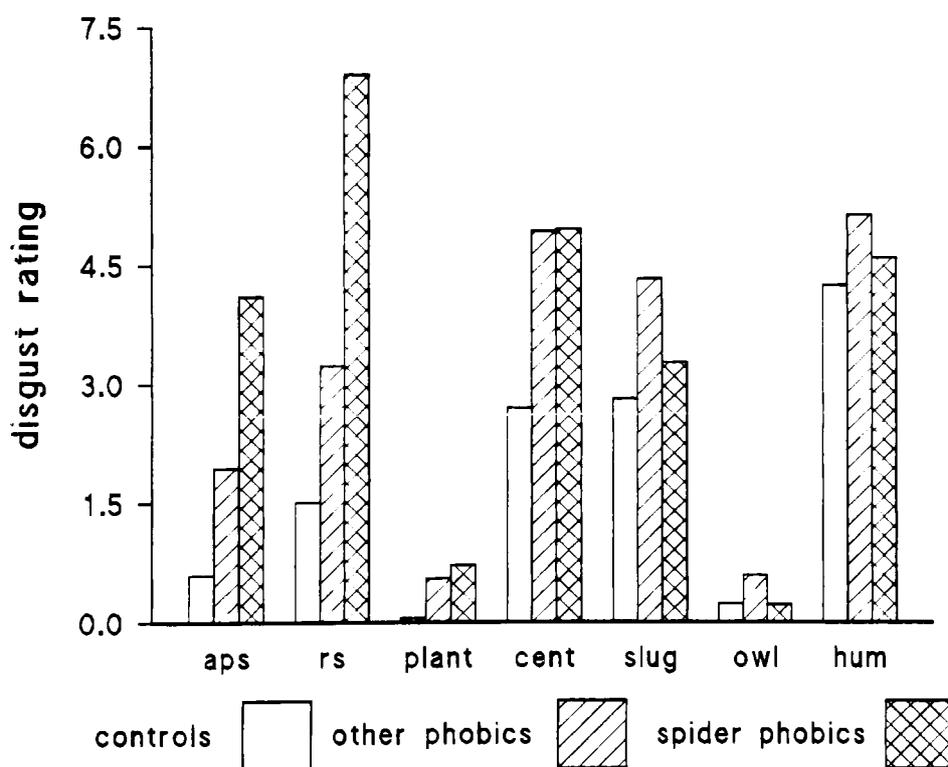
"I am going to show you some pictures. As we go through them I want you to tell me how disgusting you judge them to be on a scale of 0 to 10, where 0 is not at all disgusting and 10 is extremely disgusting. Do not think too hard about your answer : it is your immediate response which I want. Please tell me when you are ready to begin."

The subjects were shown the pictures by the experimenter who turned the page as soon as a response had been uttered and the number noted down.

### Results : Picture Data : Disgust in a variety of objects

Measures of disgust taken from spider phobics, other phobics and non phobic controls with regard to spiders, carnivorous plants, centipedes, slugs, owls and human diseases were compared. A one way analysis of variance was carried out on the data. Spider phobics found spiders ( both revolting and more aesthetically

pleasing ) significantly more disgusting than did the other two groups ( $F_{2,66} = 19.51, p < 0.0001$ ;  $F_{2,66} = 30.45, p < 0.0001$ ). Controls found centipedes significantly less disgusting than did spider phobics or other phobics ( $F_{2,66} = 3.91, p < 0.025$ ). There were no other differences between the groups. This is confirmation that spider phobics do indeed find spiders more disgusting than do non phobics. The result to do with the centipedes may indicate that for phobics in general, the 'legginess' of an animal may be disquieting in itself. Means of each of the categories can be found in graph form in figure 4.1. It is evident from looking at this graph that spider phobics found the aesthetically pleasing spiders less disgusting than centipedes and human disease, and found slugs only marginally less disgusting than the aesthetically pleasing spiders.



aps=aesthetically pleasing spider; rs=revolting spider; plant=carnivorous plant; cent=centipede; slug=slug; owl=owl; hum=human disease.

Figure 4:1 Mean disgust scores for all categories of pictures.

#### 4) Picture Experiment 2

##### Design

Three groups of volunteers comprising spider phobics, other specific phobics and non-phobic controls were shown 20 pictures of individual spiders after filling in questionnaires to do with state anxiety and spider fear/avoidance. They were asked first to evaluate how disgusting the spider was and subsequently to evaluate the degree to which the spider frightened them. They then filled in the two questionnaires again.

##### Subjects

Subjects were the same as in the previous chapter, experiment 2.

##### Assessment

Questionnaires: Questionnaires: Spielberger STAI y-1 self evaluation questionnaire.

Visual analogue pertaining to phobic avoidance (see chapter 2 and appendix)

##### Stimuli

20 colour pictures of spiders cut from "SPIDERS An illustrated guide" by Rod Preston-Mafham. Pictures were mounted on A4 paper and put in individual transparent leaves in a plastic wallet. All were taken in the wild in a natural setting and were of a variety of spiders.

##### Procedure

Subjects were seated at a small table across from the experimenter. They were given these instructions:

"Look at the following pictures of spiders. As we go through them please rate on a scale of 0 to 10 how disgusting you judge the spiders to be. 0 is not at all disgusted and 10 is the most disgusted you have ever felt."

The experimenter opened the folder and flipped quickly through the pictures, holding them up at an angle which would render them clearly visible to the subject. The subject gave an immediate response in the form of a number from zero to ten, as instructed, which was noted down. When all pictures had been seen they were given the next instruction:

"You are on a country walk when you come across a spider. It is about a metre away from you. Look at the pictures again and as we go through them tell me how frightened you would be if you saw the spider in that situation. Use a scale of 0 to 10, where 0 is not at all frightened and 10 is the most frightened you have ever been."

The experimenter repeated the procedure with the subject again giving an immediate verbal rating and the experimenter noting down the number.

At the end of this, questionnaires to do with state anxiety and phobic avoidance were administered.

### Results : Picture data:spiders, disgust and fear

#### Correlations between fear and disgust

Mean scores were obtained for fear and disgust ratings of twenty spider pictures. These were subjected to a two way analysis of variance with one between group factor (control, other phobic or spider phobic) and one within group factor (type of picture). There was a significant group difference ( $F_{2,66}=46.78, p>0.0001$ ). However, the difference in ratio of fear to disgust was not significant ( $F<1$ ) suggesting that in general spiders do evoke disgust and fear in spider phobics but that it is the fear evoked which is important in defining their phobic status. Figure 4:2 shows these scores in graph form.

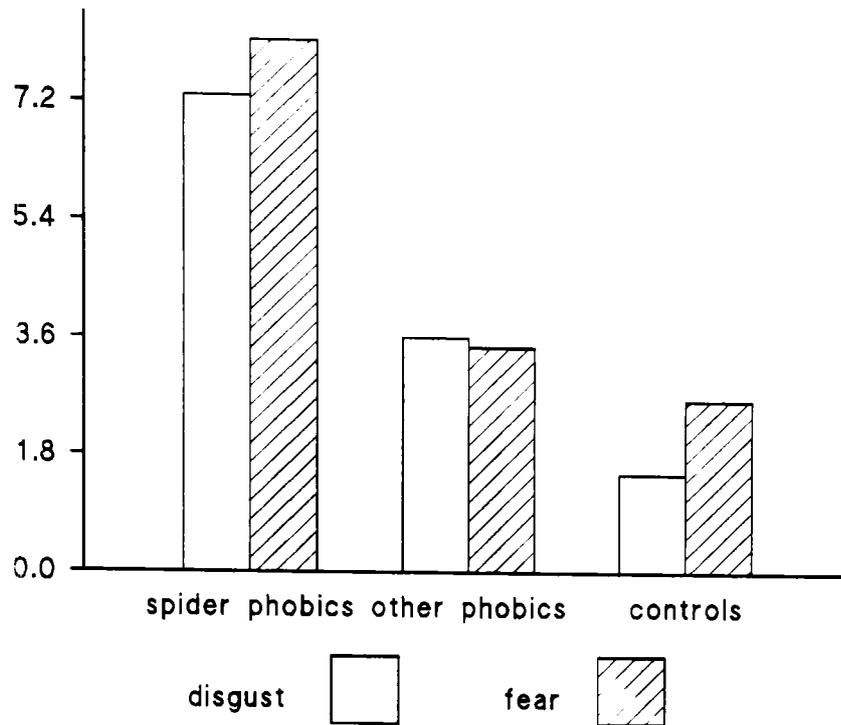


Figure 4:2 Mean disgust and fear ratings to spider pictures.

A correlational analysis was carried out between fear and disgust scores. Table 4.5 shows these results.

Table 4.5: Correlations: Fear ratings and disgust ratings of spider pictures.

	Spider phobics	Other phobics	Controls
Correlation between	0.7296	0.6396	0.6394
fear and disgust	$p < 0.0001$	$p < 0.01$	$p < 0.025$

### 5) Stroop

As the next chapter is devoted in its entirety to a Stroop experiment, it was thought that it would be appropriate if the method for the present Stroop experiment was situated there. It is the same experiment to be discussed in the results section here, but the emphasis in this chapter is on the disgust words, whereas the interest in the next chapter is focussed on the spider words.

### Results : Disgust Stroop

Three groups of subjects (control, phobic controls, spider phobics) were presented with four categories of words (spider, emotional, disgust and neutral) under both masked and unmasked conditions. Spider words were analyzed separately and the results discussed in chapter 5. The groups did not differ in the way they processed the varying wordtypes (disgust, emotional and neutral) nor was there any significant difference in latencies across the different wordtypes.

An initial examination of the results show an apparent baseline difference in the reaction times of the groups. In order to ensure that this did not confound any possible results, an analysis of covariance was carried out using the neutral words as the covariate. The wordtype by group effect remained non significant.

Colour naming latencies. For every subject the trimmed means of colour naming latencies were extracted for each experimental condition and for all groups. This data is summarized in table 4.6.

An analysis of variance was carried out using one between group factor (absence of phobia / presence of non-spider phobia / presence of spider phobia) and two within group factors: Masking Mode (masked v unmasked) and Wordtype (disgust, emotional or neutral).

There was no overall main effect of group ( $F_{2,72} = 1.87, p > 0.1$ ). There was no wordtype main effect ( $F < 1$ ). There was a no significant wordtype x group interaction ( $F_{4,144} = 1.62, p > 0.1$ ).

Table 4.6: Trimmed Mean colour naming latencies in milliseconds. (Standard deviations in parentheses)

	Non phobics	Phobic controls	Spider Phobics
<i>Masked</i>			
Disgust	628(63)	572(68)	596(61)
Emotional	619(61)	591(87)	593(59)
Neutral	620(64)	576(74)	595(54)
<i>Unmasked</i>			
Disgust	696(82)	645(107)	674(84)
Emotional	685(84)	651(97)	664(93)
Neutral	687(93)	647(99)	676(79)

As expected the mask x unmasked main effect was significant ( $F_{1,72}=176.49$ ,  $p<0.0001$ ). There was no masking x group interaction ( $F<1$ ) or wordtype x masking ( $F<1$ ).

There was no effect in the higher order interaction of wordtype x masking x group ( $F<1$ ). As the reported wordtype x group interaction is not modified by masking, the data for both masked and unmasked latencies was combined and the means are shown in table 4.7 below and in graph form in Figure 4.3.

Table 4.7: Combined Trimmed Mean colour naming latencies in milliseconds

Wordtype	Non Phobics	Phobic controls	Spider phobics
Disgust	662	609	635
Emotional	652	621	629
Neutral	653	611	636

These results indicate that phobic status is unrelated to the processing of disgust information.

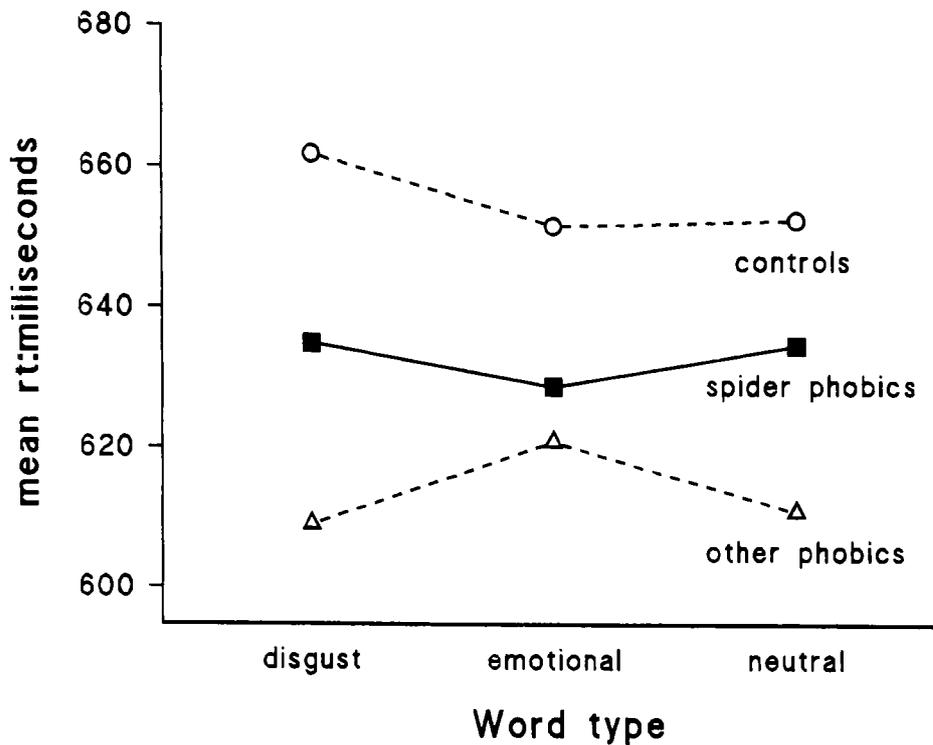


Figure 4:3. Combined trimmed mean colour naming latencies.

#### 6) The role of disgust in phobic responding

##### Subjects

Subjects were drawn from a wide range of sources and numbered 143, each filling in two questionnaires to do with disgust. The questionnaires were filled in anonymously. Of those filling in the questionnaires, 60 were non phobic and 83 were phobic, dividing into the following categories of phobia: 4 faeces, 5 blood, 9 small animals, 6 invertebrates, 37 spiders, 6 insects, 1 rotting meat, 1 vomit, 1 injections and 13 heights.

##### Assessment

The 2 questionnaires were identical and consisted of 45 items to do with the demographics of disgust, including attributes to do with the objects physical appearance as well as the responses (physiological, emotional, cognitive) it

provoked. Subjects circled one of five possible answers ranging from 'never' to 'always'. All subjects filled in two questionnaires in order to extend the range a little, as it was felt that peoples most disgusting objects would be confined to one or two item (faeces and vomit) which would not provide a good experimental range. Subjects were asked to circle one of five possible answers, from 'never' to 'always'. (Please see appendix).

### Procedure

450 sets of questionnaires were sent to subjects via the college mailing system. Response rate was about 10% and replies were anonymous. 70 sets were administered to participants at the end of a series of experiments to do with spiders and others were sent to phobics participating in previous pilot studies.

### Results

As a final check on the possible relationship between disgust and phobias it was decided to compare the scores of a mixed group of phobics with non phobics on a variety of disgust, avoidance, or fear related items. If disgust is important in the etiology of some phobias than phobics should endorse ideas about the disgusting nature of their phobia more highly than non phobics do about an object disgusting to them. The scores of phobics and non phobics on a variety of items to do with the object they considered most disgusting were collected and the means computed. Individual items were then compared in order to see whether there were differences between the phobics and non-phobics in the relative importance given to disgust or to fear associated ideas. 73% of the phobics (excluding the height phobics) chose their phobic object as their most disgusting object, and 18% chose another in the same category the second time.

The results of the first questionnaires are shown in table 4.8, which shows all the items on which the phobics differ significantly from the non-phobics. P=phobics and C=controls. Where the phobics are significantly higher or lower than the controls the phrase is noted and the direction is shown by > (higher) or by < (lower). On all the other items phobics did not differ from non-phobics. Items have been divided into categories of fear-relevant, disgust relevant and avoidance relevant for ease of comprehension.

Table 4:8. Significant differences between phobics and non-phobics with regard to disgusting objects.

<u>Fear</u>	
I am afraid	P > C
I become paralysed	P > C
I start to sweat	P > C
I tremble	P > C
It can move fast	P > C
<u>Disgust/contamination</u>	
My skin crawls	P > C
I close off my nostrils	P < C
I feel nauseous	P < C <sub>a</sub>
I think it is slimy	P < C
I think it smells unpleasant	P < C
I hold my breath	P < C <sub>a</sub>
My nose wrinkles	P < C
My stomach heaves	P < C
<u>Avoidance</u>	
I leave quickly	P > C
I would get help to remove it	P > C
I will avoid places I think it can be found	P > C <sub>a</sub>

p < 0.01 except where <sub>a</sub> = p < 0.05.

Phobics are more likely than controls to rate fear or avoidance items higher in relation to their phobic/disgusting object

Phobics were *not* more likely to associate their phobic object with disgusting items than controls, but in many cases were significantly *less* likely to do so.

When phobics chose their second item of disgustingness, the pattern of responding followed that of the non-phobics.

### Discussion

The results of the questionnaires and experimental studies reported here do not support the view that disgust is implicated in the acquisition and maintenance of phobias. Disgust may be a part of the generic meaning of certain kinds of threat objects, but this does not imply that it has a causal role in the fear response.

The first question asked was whether there was a specific link between disgust and phobias in the same way that there is a link between disgust and non-phobic fears as found by Matchett and Davey (1991). In the phobic group in the very first questionnaire study, the trend of relatedness between disgust sensitivity and fear of animals was similar to that reported by Matchett and Davey, but failed to reach significance. Even in a group especially chosen (*post hoc*) as having phobias specifically to do with disgust, there was no significant correlation found between disgust sensitivity and fear scores for animals in the high revulsion category. This group did differ from the disgust-not-involved group in their belief ratings of some cognitions: five of these beliefs were specifically to do with disgust and as such unsurprising. The interesting finding was that two cognitions 'I would (not) slowly lose my fear' and 'I would (not) cope with it' were endorsed more heavily by the disgust-related phobics than the non-disgust-related group of

phobics, which can be interpreted in a variety of ways: i) they felt no actual fear in the first place but some other emotion; ii) they do not have to 'cope' with their disgusting objects because of the nature of most of those objects (slow moving, static, vegetative and so on) except insofar as they may have to remove it; or, iii) disgust reactions really are more resistant to extinction than fear responses. Certainly in research in nausea acquisition (Garcia *et al.*, 1972) and in personal experience in treating spider phobia, disgust reactions are extremely obdurate, but even if they remain, a phobic can still be cured of the phobia (see chapter 9). Phobia, is by its very definition, based on a fear reaction and once this is removed from a person's behavioural and cognitive repertoire, they cease to be phobic. However, there are insufficient numbers in this study to be able to draw any but the most tentative conclusions. A further experiment is needed to clarify this point, involving a proper set of 'disgust phobics'

With regard to the salience of spider features, the relative importance given to disgust and fear-relevant features and in response to Davey (1992), the attempt made to determine actual spider phobic ideas about spider attributes without prompting resulted in 'legs', 'hairy', 'creepy', 'black' and 'fast' being the most common reported. Davey (1992) suggests that the word 'legs' (or, in his study, 'legginess') is only to do with physical characteristics and has nothing to do with movement. The view proposed here is that legs are inextricably connected with the idea of movement and that the meaning of 'legs' for spider phobics may in any case be different from the meaning this word has for non spider phobics. Disgust is an element in a spider phobic's concept of what a spider *is* ('disgusting' and 'ugly' were the seventh and eighth most frequently reported adjective on the list) but it seems that for spider phobics the most obvious and

compelling characteristics spiders possess are to do with movement and texture rather than characteristics more commonly associated with disgust like bodily secretions or waste.

The second question to be answered concerns general disgust sensitivity as a factor in spider phobia. If disgust is related to fear of particular types of animals, resulting in avoidant reactions, then there may be an attentional bias in the processing of disgust-specific stimuli. Accordingly, a Stroop test using disgust words, neutral control words and emotional control words was given to non-phobics, a mixture of phobics and specifically spider phobics. There was no effect at all of disgust words in the colour naming task in any of the groups, though according to Davey's (1992) hypothesis spider phobics should have a more keen disgust-sensitive set of responses which would have an impact on the priming and elaboration of disgust-related information processing and should theoretically retard response. The fact that spider words were also used in the Stroop task (reported separately) which might have been expected to prime disgust reactions (or activate disgust nodes), points to the fact that attention remained resolutely on the colour-naming task while the disgust words were presented. The hypothesis that disgust may lead to avoidance does not seem to have had a powerful enough affect to effect reaction times. This could be due to the fact of the stimuli being semantic however, and further research on these factors may be appropriate. Semantic stimuli alone are not necessarily the best indices of emotional salience, being shorn of a meaningful context.

The third question still to be answered is whether spider phobics are more disgusted by spiders than non-phobics are by objects which they identify as the most personally repulsive. Supplementary questions to this are a) Do spider

phobics find spiders more disgusting than non phobics and other phobics, and b) do spider phobics find spiders more disgusting than other objects, also generally considered repulsive. On the basis of the data culled from the first picture experiment it can be stated that spider phobics do indeed find spiders more disgusting than non phobics and other phobics, whether the spiders are classed as revolting or not. In this experiment also it was shown that spider phobics find the 'revolting' spiders more disgusting than other objects. However, they found the centipedes and human pictures at least as disgusting as the more 'aesthetically pleasing' spider, so perhaps judgement of disgust is based on aesthetics rather than contamination fear after all, (although the aesthetic judgement itself could be based on more primitive emotions, including, of course, contamination fear). An interesting addition to these findings is that spider phobics and other phobics were alike in their assessment of the disgust quotient to be allotted to centipedes, and were both different in this respect to the non phobics. This may be taken as more evidence for the importance of the unpredictability of movement in the formation of phobic constructs or may be an indication of the lowly place of 'legginess' in the aesthetic hierarchy. It may also indicate a commonality in phobic concepts, but much more research is needed before such statements can be supported.

The results of the second picture experiment show that there is a strong connection between the reaction of disgust to a picture of a spider, and the amount of fear that picture evokes. This is true for spider phobics in every case, but is less consistent in other phobics and less again in non phobics. This may be an artefact of the limited range of responses in the control groups but the main finding to do with the spider phobics seems very clear.

The link between fear and disgust of spiders by spider phobics as explored by the picture experiments can be summed up thus: i) Spider phobics are more disgusted by spiders than they are by other objects, but only if these spiders are generally considered revolting. As shown by the graph, they are no more revolted by 'aesthetically pleasing' spiders than they are by centipedes or the human pictures. ii) Spider phobics are more disgusted by spiders than are non spider phobics, and this appears to be correlated to how much fear they feel on looking at pictures of spiders. The lack of strength in the connection in the control groups could be due to their narrower range of response to the pictures compared to the spider phobia group but in any case the main finding with regard to the spider phobics is very robust. Fear may be mediating the disgust reaction rather than both fear and disgust being equally involved.

In answer to the last main question posed, the results of the questionnaire to do with disgust objects clarify further the relationship between phobia and disgust. It is clear that the majority of phobics find their phobic object disgusting. The vast majority of phobics chose their phobic object as their most disgusting object. When asked to quantify the characteristics of this disgust they place more importance on the fear and avoidance characteristics and less importance on the characteristics to do specifically with disgust, than do non-phobics. The phobic disgust response seems to be different to the non-phobic disgust response, so the conclusion is that the important features of phobic objects are not those conventionally considered disgusting. This is born out by the second questionnaire which shows that phobics respond in 'normal' ways to disgusting objects when those objects are not their phobic objects.

It would appear therefore that there is no evidence for any causal link between

disgust and phobia. As has been previously stated, measures of phobic disgust do not correlate with measures of phobic intensity (as measured by the Watts and Sharrock (1984) spider phobia questionnaire) in phobics, though there appears to be a closer connection between fear and disgust in non phobics. This could again be due to the more limited range of ratings or could be an indication that, as Matchett and Davey (1991) suggest, in the normal population, many common animal fears are related to the food-rejection/disease avoidance response of disgust. Spider phobics do not show the same relationship and consequently do not appear to conform to this set of precepts, interesting though they may be. Disgust may be a part of the generic meaning of a particular threat object but does not appear to be implicated in the acquisition or maintenance of phobias. Davey (personal communication) makes a case for a historical base for this aetiological theory with spiders being seen as plague carriers and contaminators. It is difficult to find in literature any mention of either this fact or indeed of spider phobia itself. Hillyard (1994) mentions an epidemic of Tarantism which occurred in Italy in 1370 and lasted for around 300 years. Relief from the spider bites was sought through dancing in order to flush the venom out of the body (hence the Tarantella). Pepys mentioned this in his diary (1662) but Dr Thomas Cornelius, a neopolitan physician, believed it to be an excuse for wanton behaviour (cited in Hillyard, 1994). This is still done with spiders as venomous however, not as diseased or contaminating. Spiders are also eaten in South East Asia, parts of China, and Venezuela which seems to suggest that they are not the victims of a 'prepared' (in the evolutionary sense, Seligman 1971) disgust reaction. Cats seem to have been singled out as fear-inducers, (see chapter 1) perhaps because of their association with witchcraft, but not spiders, which have been

held up as positive examples (Penelope, Arachne, Robert the Bruce) and have often been used as symbols of good luck and used to ward off evil. It is unusual to find spider phobia in history, with the possible exception of the unfortunate Miss Muffet, force-fed spiders by her father for medicinal reasons, and famous as one of the first reported spider phobics.

## CHAPTER 5:

### ATTENTIONAL BIAS AND THE STROOP TEST.

#### Introduction

The two previous chapters have examined the hypothesis that phobics have beliefs about their phobic objects which differ in kind and intensity to those of non phobics. The results found are consistent with such a view. The next task is to examine the information processes which lead to the formation of these idiosyncratic beliefs, and may be in turn be affected by them. These processes are attention and memory. Memory is examined in chapters 7 and 8, attention is the subject of this chapter and the next.

Beck (1976) proposed that negative thinking styles may contribute to the onset and maintenance of both depressive and anxiety disorders (Beck, Rush, Shaw and Emery, 1979; Beck and Clark, 1988). Beck's model places importance on the structures within memory, built up over the individual's lifetime and incorporating past experiences. These structures, or schemata, serve as a kind of prismatic sieve directing sensory input in particular ways and organising it to fit in with existing structures.

Beck suggests that the threat or danger schemata will therefore be sensitive to particular sensory data which are congruent with the schema characteristics. That is, if someone is anxious about a particular situation or object, than they will notice more incidents concerning these situations or objects. Anxiety will therefore be increased because more threat has been detected. In most instances it is hypothesised that this attention to threat is an automatic process and that selection does not necessarily depend on any consciously mediated processing strategy.

Information processing theories suggest that threat stimuli will be processed in a different way to non-threat material at a pre-conscious, automatic level. This process is succinctly described by Williams *et al.*(1988). They suggest that there are a number of operations performed in the brain which happen before incoming information reaches the conscious level and that these include 'sensory registration, semantic labelling, associative spread and disambiguation of a stimulus'. At this stage in the process 'all meanings of an item are activated' (Williams *et al.*1988, p171). When the activation of all these meanings interacts with the activation of the context meaning, the ambiguity starts to cohere. A predominant meaning emerges which leads to the rejection of the other possible interpretations. Williams *et al.* (1988) also propose that a decision mechanism exists in pre-conscious which judges the emotional importance of the situation. This results in orientation towards or away from the stimulus. Williams *et al.*(1988) also suggest that this in effect creates a hierarchy of processing priorities and that it is at this, still pre-attentive stage, that anxious people orient their attention towards threatening stimuli while non-anxious people orient attention from threat. Once a negative item has been given priority in the processing hierarchy and has been allocated further processing resources, this will in turn increase the level to which it is subject to *priming*. The processing of such a stimulus involves the automatic activation of the components involved in the representation of the stimulus, making it more accessible so that it is more likely to be produced, (or detected by one of the sensory modalities) even when only a very few of its features are present. These primed representations go on in their turn to affect the hierarchy of processing priorities in the future so that a negative pre-conscious attentional style is built up. That is, anxious people will

be biased automatically to selectively attend to threat stimuli. They also suggest that the visual dot probe experiment, on which the reaction time experiment (chapter 6) is based, is an elegant assessment of this theory in relation to the differential allocation of attentional bias in anxious and non-anxious people. Macleod *et al.* (1986) found that anxious people in their study oriented towards threat, while non-anxious people oriented away from threat towards non-threat. Williams *et al.* (1988) have suggested that two processes are involved in this perceptual memory bias in anxiety. The first is to do with the automatic process of *priming*, and the second to do with the strategic process of *elaboration*. These terms were introduced in this context by Graf and Mandler (1984) (cited in Williams *et al.* 1988) who distinguished between integration (priming) and elaboration by proposing that priming is an automatic process which strengthens the organisation of the internal representation of a stimulus, such as a word, resulting in its being more available to future access. This makes it recognisable from only some of its features. Elaboration is conceived as a more strategic process which strengthens the connections between these internal representations, creating new connections and reactivating old ones. The effect of this is that information so elaborated will be more retrievable because of the multiplicity of new and regenerated connections between the internal representations. The amount to which these processes are carried out on any given stimulus depend on the pre-attentive processing described earlier. This can be measured by accessing the residual information in the memory store (see chapters 7 and 8). Empirical evidence for this theory has come from a variety of areas. Research in clinical populations of patients who show elevated levels of state and trait anxiety has shown that there appears to be a processing bias which seems to

result in the selective encoding of anxiety-relevant and personally relevant stimuli. (Mathews and Macleod, 1985, 1986; Macleod, Mathews and Tata, 1986; Watts, McKenna, Sharrock and Trezise, 1986; Broadbent and Broadbent, 1988; Ehlers, Margraf, Davies and Roth, 1988; Mogg, Mathews and Weinam, 1989; Macleod and Mathews, 1991; MacLeod and Hagan, 1992; MacLeod and Rutherford, 1992). Many experimental designs have been used to illustrate the attentional processing bias by using threat stimuli as distracters from a central task. The consistent finding has been that people suffering from anxiety show increased disruption in the allotted task if the distracting stimuli are threat related.

Work on the distracting nature of emotionally salient stimuli initially focused on the area of dichotic listening experiments, where material presented in one auditory channel was found to interfere with a task allocated to the other. This happened under some circumstances (Cherry, 1953; Moray 1959; Lewis 1970; Treisman, Squire and Green, 1974; Thorpe 1990), particularly if the words were personally relevant. This type of result is taken as an indication that attention has been captured and an illustration of this is a study by Parkinson and Rachman (1981). Using an auditory recognition task, they found that mothers whose children were about to undergo surgery recognised more stress-related words while being auditorially distracted than did controls, suggesting that personally relevant words are attention catching.

The next methodology used to test the amount of interference evident in the processing of particular types of information was the Stroop (see chapter 2 for a more complete history). Stimuli were again semantic, albeit visually rather than aurally presented. The Stroop experiments have provided evidence that

threatening words are processed differently to neutral words by anxious people as shown by their differing reaction time latencies to a colour naming task when the distracter is a threat or a neutral word. In the one of the original Stroop colour naming tasks (Stroop, 1935), subjects were presented with the names of colours words written in inks of conflicting colours and were required to name the colour of the ink in which the word was written, aloud and as quickly as possible. Words written in conflicting colour inks interfered with the naming task (i.e. the word 'red' written in green ink). It has since been found that other classes of words have a similar, if lesser, effect.

The issue of personal relevance in attentional bias was raised by Klinger, Barker and Maxeiner (1981) who found that on a dichotic listening task, college students were more likely to listen to material related to their current concerns. The Stroop test was adapted as a test of this by using words that were personally relevant as stimuli. In one of the first uses of the Stroop to detect attentional bias to personally relevant stimuli in an area relevant to clinical work, Mathews and Macleod (1985) showed that subjects worried about their health or about social concerns were retarded in the naming of colour words when the stimuli used concerned social threat, but only the health-anxious people showed attentional bias to physical threat words.

This raised the question of whether anxious people were responding specifically to the threat, or were responding to the emotional content of the word. In an attempt to answer this question, Watts, McKenna, Sharrock and Trezise (1986) devised a Stroop test using a set of highly emotive words as an emotional control for their spider Stroop. The emotional control words were also used as a control for the semantic relatedness of the spider words. The inclusion of an emotional

control is an aid to distinguishing between the deployment of attention towards emotional or towards threat-specific items. In their study, spider phobics were reported as having shown retardation in the naming of spider words compared to neutral or emotional words (Watts *et al.* 1986). Desensitisation treatment was reported to reduce the amount of interference of spider words in treated spider phobics compared with a control group, tested over a similar period, who had not been treated. Watts *et al.* (1986) suggest that this provides evidence for saying that the Stroop can provide a 'sensitive measure of individual differences in the emotional salience of words' (p 105). A problem with this is that treatment took place over a number of weeks and the change in the Stroop effect could be due to a lessening of preoccupying thoughts about spiders rather than the removal of the threat-specific automatic processing of spider stimuli.

In order to examine this issue of personal relevance and preoccupation still further, Martin, Williams and Clark (1992) examined the Stroop effect in relation to the patient or non-patient status of their subjects. They found no difference between the colour-naming times of threat words of high and of low anxious 'normal' (non clinical) people. Their high and low anxious subjects had equivalent state and trait anxiety scores to those participating in trials utilising anxious patients and non-anxious controls which had been successful in showing the bias (Ehlers *et al.* 1988; Broadbent and Broadbent, 1988; Mogg *et al.* 1990). Martin *et al.* (1992) concluded that it may be something to do with the patient or non patient status of their subjects (none of their subjects in the first experiment were patients) which was affecting their results. In a second experiment they compared generalised anxiety disorder patients with equally anxious non-patient subjects and found that the GAD patients were significantly retarded in the

colour naming task of threat words compared to non threat words, where non-patients were retarded in the naming of non-threat words compared to threat words. The patients were significantly slower overall in their response time to all stimuli. They explain this finding by saying that the patients may be more disturbed by being in an anxious state than the non-patients, and consequently perceive threat as more dangerous and themselves as more vulnerable to it. It would in effect, have more meaning for the patients. A further study by Martin *et.al.*(1992) compared the reaction time latencies of GAD patients with non-anxious, non-patient controls to threat, positive and neutral words. Anxious patients were significantly retarded in the colour naming task when the words were threat or positive emotional, compared with neutral words and compared with the non -anxious controls. Martin *et.al.*(1992) suggest that this provides evidence for the importance of the emotional valence of a word in the allocation of attention to it, and that it may be the emotional content of threat words which cause the retardation effect rather than the threat content.

A further question arose as to whether this attentional bias was an automatic process which took place before the words entered consciousness, or whether the effect was due to a strategic deployment of attention mediated by a conscious process. In order to examine this a computer-generated version of the Stroop was devised by McLeod and Rutherford (1992). They presented words subliminally by showing words on the computer screen for a very short time before covering them with a pattern, thus effectively rendering them unavailable to consciousness. They also allowed an equal number of words to remain uncovered, allowing them to go through the processes into consciousness.

The computer Stroop was used with a non-clinical group of subjects who showed

different patterns of disruption in the two presentation modes (MacLeod and Rutherford, 1992). In their study, anxiety affected the processing of non-consciously perceived stimuli but not of consciously perceived stimuli. There is a suggestion that awareness somehow modified the processing of unmasked stimuli. There was also a different pattern of results from those in the high and low trait anxiety groups, with only the former becoming increasingly retarded in the task as their state anxiety was became elevated. In another study (MacLeod and Hagan, 1992), the interference evident in the naming task to threat words in the masked condition was predictive of amount of anxiety (both state and trait) experienced by women given a negative result regarding their cervical pathology. This was not true of the unmasked condition. So anxiety was associated with selective retardation on the colour naming task when the words were not in the conscious domain and were to do with threat, in a non-clinical population.

In order to examine the automatic and strategic attentional bias specific to threat in a clinical population it was decided to construct a computer Stroop test for spider phobics which included spider words, neutral words and an emotional control words. All of these were presented in a masked (subliminal) and an unmasked (available to consciousness) condition in order to differentiate between an automatic or strategic allocation of attention towards threat. If there is any pre-attentive bias towards threat in anxious people this has implications for the kind of treatment which should be developed.

As the question has been raised as to the possible confound of status on attentional tasks (Martin, Williams and Clark, 1992), another control group was added, that of phobic controls. No one has yet compared the functioning of different groups of phobics. The use of phobics has an advantage in that phobic

stimuli are particularly homogeneous and have a direct connection with actual objects in the world. The Watts *et al.* (1986) Stroop experiment reported evidence for selective processing in the interference effects from spider words, but this was using a card version of the Stroop, which has now been superseded and which may have suffered from the effect of semantic relatedness between consecutive words, as well as possible demand characteristics effects (Orne, 1961). It was also unable to test the theory that attentional bias operates at a pre-conscious level. This is important if, as Williams *et al.* (1988) suggest, as soon as a stimulus is identified as threatening it is cognitively avoided, which ultimately reinforces the fear by a process of negative reinforcement (discussed in detail in chapter 2). If this is an automatic process unavailable to consciousness, the logical conclusion is that only stringent counterconditioning schedules of reinforcement could change the behaviour and reduce anxiety.

Macleod *et al.* (1986) proposed that this automatic bias in anxious people towards threat-related information has an ecological validity in that it facilitates the perception of possibly dangerous situations in the environment against which they are trying to protect themselves. Macleod and Rutherford (1992) further suggested that this bias is an automatic process in people with high trait anxiety, which gets more pronounced when their levels of state anxiety rise.

The alternative explanation proposed here is that the anxious person will orient towards threat as a strategy in order to prepare for flight. In this case, personally meaningful stimuli will draw the attention when presented within conscious awareness, but as the process is not automatic, this effect will not be found in stimuli presented outside awareness.

The key questions to be asked then are: i) Is there evidence of a pre-attentive

bias to anxiety-generating words which inhibits the processing of threat stimuli in spider phobics? ii) Is there evidence of the consciously mediated strategic deployment of attention which inhibits the processing of threat stimuli in spider phobics? iii) Does the amount of interference relate to the intensity of phobic experience of anxiety? and iv) Is this interference due to the emotional content of the word or is it specific to threat?

The experiment was designed to answer these questions by using the Stroop colour naming task using both masked and unmasked words (that is, unavailable and available to consciousness) with groups of spider phobics, other phobics and non-phobic controls. Other phobics were separated from the non-phobic controls in order to check for a phobic status effect as hypothesised above, and to check that any specific effects were indeed peculiar to spider phobics. Words used were in four groups :spider-relevant, neutral, disgust and emotional (both positive and negative) in keeping with the Watts *et al.*(1986) paper and in order to ensure that any retardation in response could not be accounted for by the emotional content of spider words alone. Any effect found should therefore be threat-specific. If such specificity effects are found then it will be determined by the presentation mode (masked or masked) whether these effects are automatic or strategic.

## METHOD

### Design

Volunteers were divided on the basis of their being spider phobic, phobic (but not of spiders) or not at all phobic. All subjects were tested once, after filling in a consent form and questionnaires to do with spiders and general demographic factors. The test consisted of 480 presentations, on a computer screen, of a word

from one of four groups (spider, disgust, emotional, neutral), in one of five colours and in either a masked or unmasked presentation mode. Latency to naming the colour of the word was recorded on each presentation. The experimenter recorded the actual colour named by the subject so that any effect of the speed/accuracy trade-off could be negated: the computer was programmed to ignore errors in its computations. The word remained on screen until the subject's response was detected by the microphone.

After the experiment, on a separate occasion, subjects rated each of the stimulus words which had been used in the experiment for emotionality.

### Subjects

Subjects were volunteers from a variety of sources including students, members of the public and members of the Welsh National Opera Orchestra. The total number of subjects was 75, of whom 21 were non phobics, 20 were phobic controls and 34 were spider phobics. All the phobics fulfilled DSM-III R criteria for simple phobia and in addition scored above the cut-off point in the Watts and Sharrock (1984) Spider Phobia Questionnaire or the amended General Phobia Questionnaire. The groups did not differ in measures of trait anxiety or depression, nor were they different in a variety of demographic features. Subject characteristics are shown in detail in table 5:1 below

There was no difference in sex ratio between the groups ( CHI-SQUARE [2 df] = 1.743,  $p=0.418$ ).

Table 5:1 Means of subject characteristics.

Group:	Non Phobic	Phobic controls	Spider phobics
n	21	20	34
Sex ratio (f:m)	18:3	15:5	30:4
Age (years)	25.4	24.1	26.3
Age of onset		10.4yrs n = 16	7.86yrs n = 14
WQS	5 <sup>a</sup>	6.05 <sup>a</sup>	22.50 <sup>b</sup>
Spielberger Trait anxiety	35.86	36.70	40.85
Rozin & Fallon Disgust sensitivity	131.26	130.15	116.29
BDI	4.00	5.65	6.97

<sup>b</sup> =  $p < 0.0001$ . <sup>a</sup> = do not differ.

## Materials

### Assessment

Questionnaires were exactly as described in chapter 3. Questionnaires filled in immediately before and after the present experiment were as follows:

- i) The Spielberger STAI y-1 self evaluation questionnaire, pertaining to present state of anxiety.
- ii) A visual analogue containing seven items to do with: a) general anxiety level, b) desire to escape) c) to what extent spiders were found to be disgusting, d) coping with anxiety about spiders, e) coping with the situation, f) feeling anxious about spiders, and g) approaching and dealing with a spider.

### Emotionality Ratings

On a separate occasion subjects were given a list of all the words used in the Stroop task and asked to:

rate the following words on how "emotional" you judge them to be. "Emotional" may be taken as meaning the emotional impact of the word / the ease of arousing an emotion to the word.(An emotion may be either "positive" e.g. happiness or "negative" e.g.anger.) A word with no emotional impact (i.e. one which doesn't arouse an emotion) will score 0 whereas a word with strong emotional impact (i.e. one which easily arouses an emotion) will score 10.

The range of the scale was 1 to 10, from "not at all emotional" to "extremely emotional".

### Practise Cards

These were pieces of black card measuring 22 x 30 cm with the names of colours (red, blue, green, pink and yellow) written in the centre of the card in five colours of ink (red, blue, green, pink and yellow) not matching the word, as in the original Stroop (Stroop 1935).

### Stimulus Items

The words used as experimental stimuli were drawn from four classes of words: spider, disgust, emotional and neutral. The emotional and neutral words served as controls for the targeted spider and disgust words to negate the possibility that any difference found could be due to the emotive nature of the target words rather than to the threat or disgust elements possibly inherent in them. All groups were matched on average length and frequency with all other groups. The full set of stimulus materials are presented in table 5:2 below.

### Presentation Hardware

Stimuli were presented by a Viglen computer (Vig II) on a high resolution Viglen colour monitor in letters 0.5cm high. Colour naming responses were detected by a custom-built voice activated relay, through a Maplin unidirectional Dynamic microphone (used on the high-impedance setting) and connected to the

microcomputer. A button to enable the subject to control the start of response blocks was also connected to the computer.

Table 5:2 Stimulus Items

Spider	Disgust	Emotional	Neutral
Spider	Vomit	Harmony	Sponge
Tarantula	Disgusting	Ecstatic	Rectangular
Web	Pus	Fatal	Wrap
Scuttling	Diseased	Wounded	Woven
Cobweb	Decay	Painful	Windy
Lurking	Faeces	Joyous	Seating

### Presentation Software

The experimental software was designed to control stimuli presentation, to record colour naming latencies, to record errors and to perform simple statistics on the data (excluding error responses).

On each colour naming trial the word was presented in the centre of the screen as soon as the start button was pressed by the subject. In the masked presentation mode the words were initially presented unmasked for one frame count (16.6 milliseconds) before being masked by a random pattern. This mask remained on screen until the subjects' verbal response was detected. In both presentation modes the word remained on screen until the subjects' response was detected, after which the screen was blanked and another word presented immediately. The software created the masking patterns by using a random string of pieces of graphic characters which it then arranged to look like rotated or reversed letter fragments, as conventionally used in masking procedures (cf Macleod and Rutherford 1992, Holender 1986, Marcel 1983).

The software recorded the colour naming latency for each presentation, that is, the interval between the appearance of the stimulus word and the detection of a vocal response. The software also controlled the balancing, ensuring that each word appeared twice in each of the conditions and all of the colours, totalling 480 separate presentations, divided into 40 groups of 12. The number of words in each group is 12, but due to the difficulty of finding 12 equally evocative words in the spider group, 6 words used twice in each mode was found to be the most useful solution. Each of the 24 words appeared 10 times in masked presentation mode and 10 times in unmasked presentation mode. On each of these 10 occasions, in each exposure condition, the stimulus word was presented twice in one of each of the five colours: red, blue, green, pink or yellow. The order was fully randomised.

The experimenter recorded the actual colour spoken aloud by the subject via the computer keyboard. Any colour that did not match up with its computer-generated counterpart was listed as an error by the programme and was not used in subsequent calculations of the means by the programme but merely listed as an error total for each group and condition.

### Procedure

After the diagnostic and descriptive characteristics of the subject were determined, subjects completed a series of questionnaires (listed in chapter 3), then filled in the Spielberger State Anxiety questionnaire and the visual analogue described above. They were then seated in front of the computer, 50cm away from the screen and 10cm away from the voice-key microphone. The control button was on the table to their right. Dynamic range of the subjects' voice was tested and the voice key adjusted to the correct level. Subjects were given a

standard set of instructions. They were told to speak the colour of the ink in which the word was written as quickly as possible and that after every 12 presentations there would be a break and that it would be up to them to restart the trial by pressing the button. They were given a practise run using the practise cards and then asked to read the instructions on the screen. When they were confident that they understood the task, the experiment began, with the experimenter pressing the appropriate key corresponding to the spoken colour word once the subject had responded aloud. This carried on in groups of 12 presentations until 480 words had flashed onto the screen. Subjects then completed the state version of the STAI and the visual analogues.

### Treatment of Data

Two subjects with extreme scores outlying the means by more than 2 standard deviations were excluded from the analysis. Data means were trimmed to 2 standard deviations in accordance with convention (Macleod *et.al.*, 1992, Watts *et.al.*, 1986)

SAS and BMDP statistical packages were used to analyse the data.

## Results

### Overview

Three groups of subjects (control, phobic controls, spider phobics) were presented with four categories of words (spider, emotional, disgust and neutral) under both masked and unmasked conditions. Disgust words were analyzed separately and the results discussed in chapter 4. The groups differed in the way they processed the varying word types but the pattern of this difference did not depend on whether the words were presented in the masked or unmasked condition. The

final analyses, in order to remain comparable with previous research carried out previously by Watts *et.al.*(1986), concentrated on the results from words in the unmasked condition.

An initial examination of the means show an apparent baseline difference in the reaction times of the groups. In order to ensure that any results obtained were not due to this baseline difference, an analysis of covariance was carried out using the neutral words as the covariate. The wordtype by group effect remained significant after the removal of baseline differences though phobic controls and spider phobics appeared to be reacting in different directions with the phobic controls having *shorter* latencies and spider phobics having *longer* latencies to spider words than to emotional or neutral control words. The possibility that the effect may have been due to differing emotional impact of the words was considered. In order to examine this possibility the emotionality ratings for all the words and all groups were compared. There were no differences in emotionality ratings for neutral or emotional control words between all groups, ruling out the possibility that phobic controls were reacting differently to the emotional words due to a group difference in their perceived emotionality. As expected, spider phobics rated spider words as significantly more emotional than did non phobics and phobic controls.

The question remained as to whether spider phobics were responding to the emotional content of the word rather than the threat content. In order to test this the emotionality ratings of spider phobics for spider words, and of phobic controls for emotional words, were compared and found not to be different, enabling an analysis of covariance to be carried out using emotional words as the covariate and comparing response latencies for spider words alone. The effect

was robust, with spider phobics being significantly different from the other two groups.

Colour naming latencies.

For every subject the trimmed means of colour naming latencies were extracted for each experimental condition and for all groups. This data is summarized in table 5:3 and Figures 5:1 and 5:2.

Table 5:3 Trimmed Mean colour naming latencies in milliseconds (standard deviations in parentheses)

	Non phobics	Phobic controls	Spider Phobics
<i>Masked</i>			
Spider	623(60)	577(75)	598(53)
Emotional	619(61)	591(87)	593(59)
Neutral	620(64)	576(74)	597(54)
<i>Unmasked</i>			
Spider	687(72)	636(92)	694(103)
Emotional	685(84)	651(97)	664(93)
Neutral	687(93)	647(99)	676(79)

An analysis of variance was carried out using one between group factor (absence of phobia / presence of non-spider phobia / presence of spider phobia) and two within group factors: Masking Mode(masked v unmasked) and Wordtype (spider, emotional or neutral)

There was no overall main effect of group ( $F_{2,72} = 1.78, p > 0.1$ ). There was no wordtype main effect ( $F < 1$ ). There was a significant wordtype x group interaction ( $F_{4,144} = 2.49, p < .05$ ).

As expected the mask x unmasked main effect was significant ( $F_{1,72} = 157.42, p < 0.0001$ ). There was no masking x group interaction ( $F_{2,72} = 1.32, p > 0.2$ ) or wordtype x masking ( $F < 1$ ).

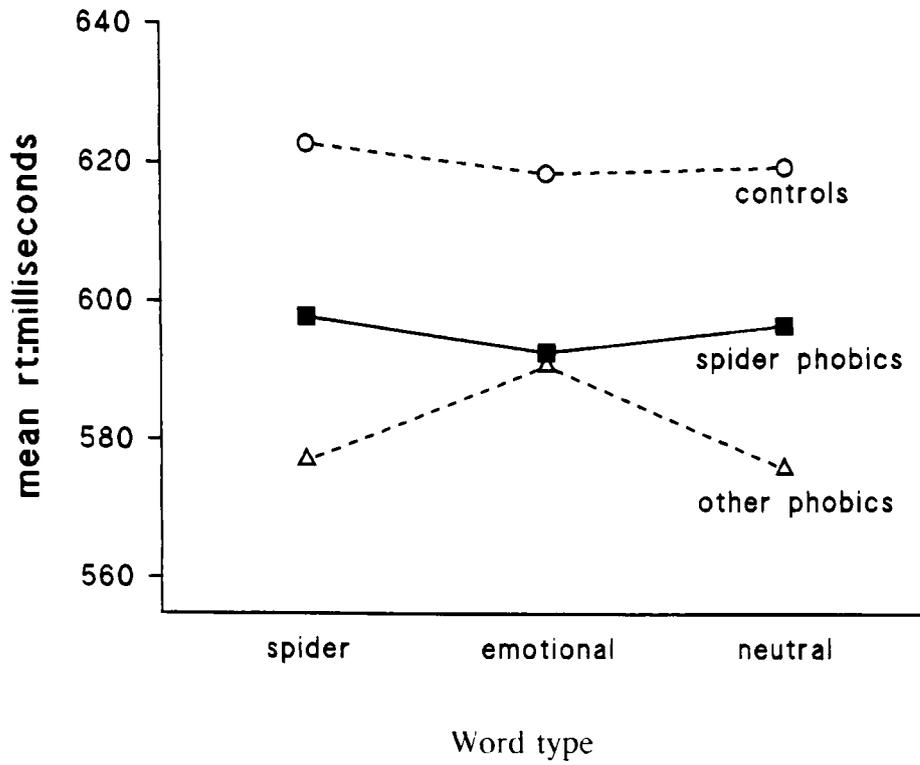


Figure 5:1. Trimmed mean colour naming latencies to masked stimuli

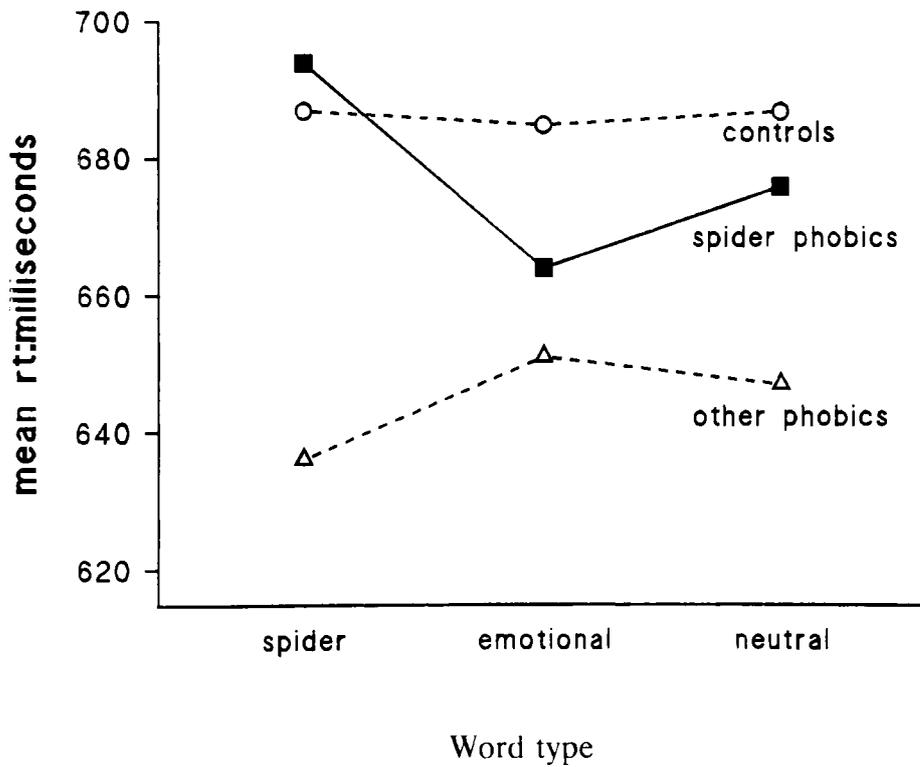


Figure 5:2 Trimmed mean colour naming latencies to unmasked stimuli

It is clear from the data that, although not significantly so, the overall means of each group are somewhat different from each other. In order to ensure that any differences obtained were not due to the baseline variation, an analysis of covariance was carried out using the neutral wordtype scores as the covariates. This corresponds to using an interference index subtracting scores of neutral reaction times from those of spider and emotional words. In the covariance analysis the wordtype x group interaction remained significant, ( $F_{2,72}=4.57$ ,  $p<0.02$ ). Tables 5:5, 5:6, and 5:7 show adjusted cell means using neutral words as covariates in full (combined, masked and unmasked conditions) and Figure 5:4 shows this effect of covariance adjusted means and indicates an opposite pattern of results in the spider phobic and phobic control groups.

Table 5:5 Adjusted cell means using neutral words as covariates.  
Masked and unmasked combined.

Wordtype	Non phobic	Phobic controls	Spider phobic
Spider	639	625	645
Emotional	636	640	627

Table 5:6 Adjusted cell means using neutral words as covariates.  
Masked condition.

Wordtype	Non phobics	Phobic controls	Spider phobics
Spider	635	624	630
Emotional	630	639	625

Table 5:7 Adjusted cell means using neutral words as covariates.  
Unmasked condition.

Wordtype	Non phobic	Phobic controls	Spider phobics
Spider	644	626	660
Emotional	643	641	630

There was no effect in the higher order interaction of wordtype x masking x group ( $F < 1$ ). As the reported wordtype x group interaction is not modified by masking, the data for both masked and unmasked latencies was combined and the means are shown in table 5:4 below and in graph form in Figure 5:3

Table 5:4 Combined Trimmed Mean colour naming latencies in milliseconds

Wordtype	Non Phobics	Phobic controls	Spider phobics
Spider	655	606	646
Emotional	652	621	629
Neutral	653	611	635

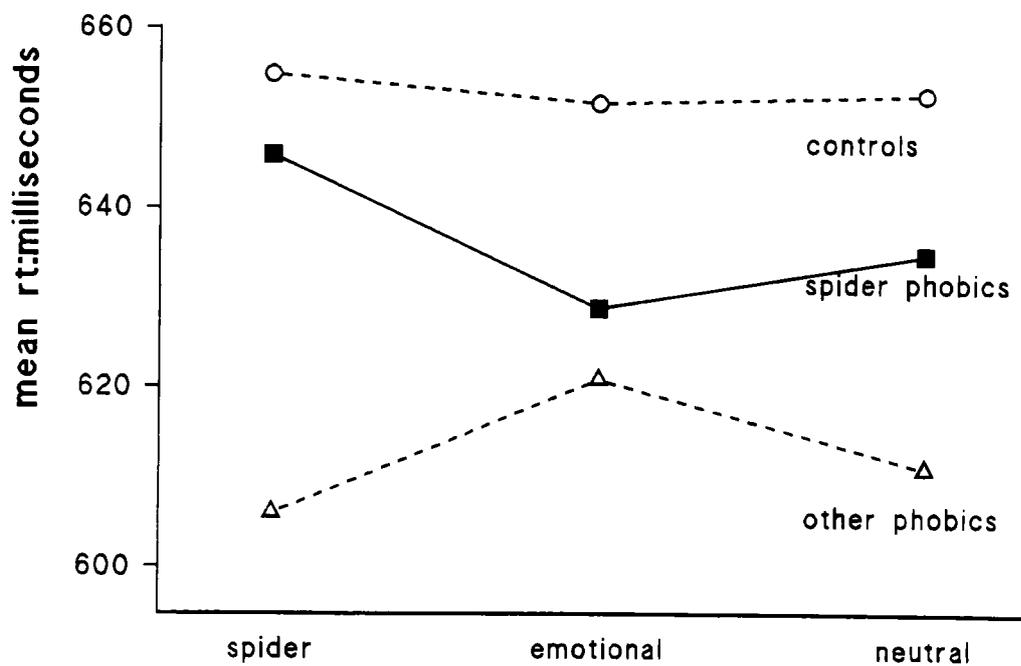


Figure 5:3 Combined trimmed mean colour naming latencies

Multiple comparisons were carried out using Bonferroni corrected T-tests. On spider words, spider phobics showed significant interference of spider words relative to other phobics ( $p < 0.05$ ) but not to controls. None of the other comparisons were significant.

Emotionality ratings. A possible explanation for the finding that phobic controls and spider phobics have an opposite pattern of response to spider and emotional stimuli is that the groups may have different responses to the emotionality element in the stimuli, that the spider phobics retardation is due to the emotional content of words to do with spiders and that the retardation of response to

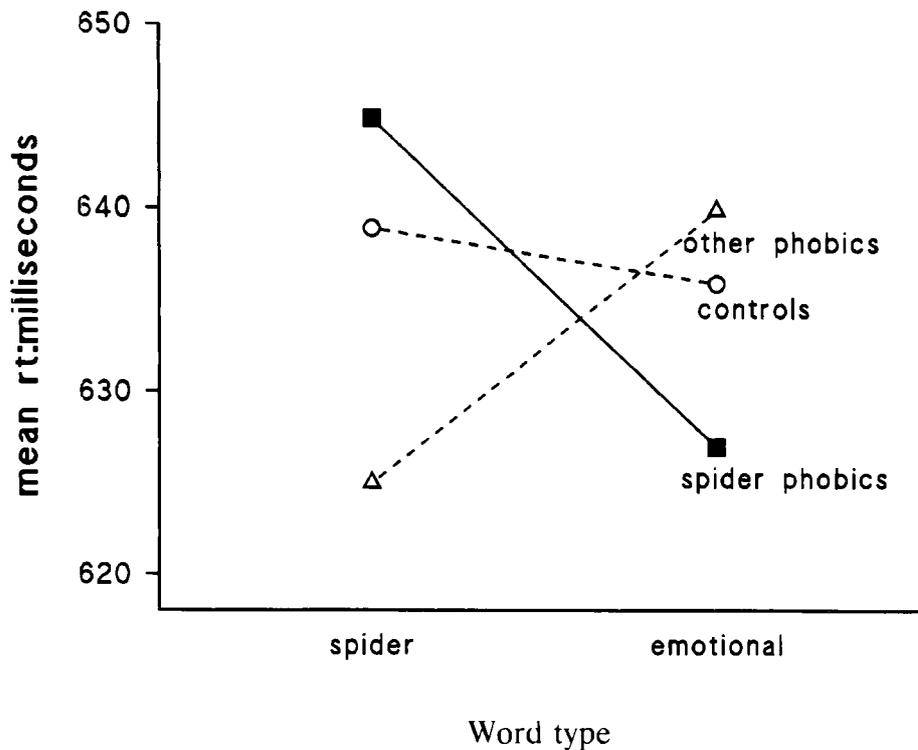


Figure 5:4 Combined adjusted cell means using neutral words as covariates

emotional words in the phobic control group may be due to these particular words being more emotionally salient, (evinced by having a higher emotionality rating) in that group specifically. This has been found to have an effect in previous work (Watts, McKenna, Sharrock and Trezise, 1986; Martin, Williams and Clark, 1991). In order to examine this possibility, subjects in the experiment were asked to give ratings of all words. Emotionality ratings for all words by all groups were analyzed. There was a significant difference in the emotionality

ratings of spider words ( $F_{2,34} = 17.6, p < 0.00001$ ) but not in the ratings of emotional control words ( $F = 1.57, p > 0.2$ ) or of neutral control words ( $F < 1$ ). Means of emotionality ratings for each group of words are shown in table 5:8 below.

Table 5:8 Means of emotionality ratings for all groups of words by all subject-groups.

Type of word	Non phobics	Phobic controls	Spider phobics
Spider	2.03 <sup>a</sup>	2.45 <sup>a</sup>	6.11 <sup>b</sup>
Emotional	5.81	5.98	4.67
Neutral	0.40	0.55	0.54

To examine interference effects which are specific to threat as opposed to emotionality it was decided to examine the emotionality scores of emotional words in phobic controls as compared to the emotionality scores of the spider words in the spider phobics. No difference was found ( $F_{13,9} = 1.25, p > .75$ ). This allows the use of emotional word latencies as covariates for an analysis of the spider words alone in an attempt to discover whether spider phobics are different in their response to spider words from the other two groups when neutral word scores (to reduce baseline difference) and emotional word scores (to remove all emotionality effects) are used as covariates. This is the equivalent of carrying out an analysis of the effect of spider words while removing the interference effects of neutral and emotional words.

The final analysis therefore was an analysis of covariance of response latencies to unmasked spider words alone, using response latencies to unmasked emotional

words as the covariate. The main effect of group was found to be robust ( $F_{2,71}=4.97$ ,  $p<0.01$ ). Multiple comparisons show that this effect is due to the spider phobics responding differently to spider words than non phobics or phobic controls. This does not depend on the emotional content of the word. Table 5:9 shows these means in full.

Table 5:9 Adjusted group means for unmasked spider words using unmasked emotional words as covariates.

Wordtype	Non phobics	Phobic controls	Spider phobics
Spider	671 <sub>a</sub>	648 <sub>a</sub>	696 <sub>b</sub>

### Anxiety and response interference

#### State anxiety scores

In order to examine the differences in state anxiety in case of any connection between anxiety and response rate to the stimulus, both between and within the groups a two way analysis of variance was carried out on Spielberger state anxiety score data obtained immediately before and immediately after the Stroop test. The analysis of variance used one between group factor of group (spider phobic or non spider phobic) and one within group factor of time (before and after the trial). Means for all groups are shown in Figure 5:5.

There was an significant overall effect of group ( $F_{2,72}=9.34$ ,  $p<0.001$ ). The overall effect of time was not significant ( $F_{1,72}=2.61$ ,  $p<0.1109$ ). The higher order interaction of group x time was also not significant ( $F<1$ ). These results show that spider phobics were significantly more anxious than the control groups

both before and after the test, but that they were not significantly more anxious after the trial than before it. Controls and other phobics showed no difference in anxiety levels after the trial than before it.

A correlational analysis was carried out between response times to all word types and anxiety measures taken before and after the Stroop. There were no correlations between any of the anxiety measures ( including those specifically to do with spiders and the change in anxiety over the period of the Stroop) and any of the response latencies to the words in either the masked or unmasked presentation condition.

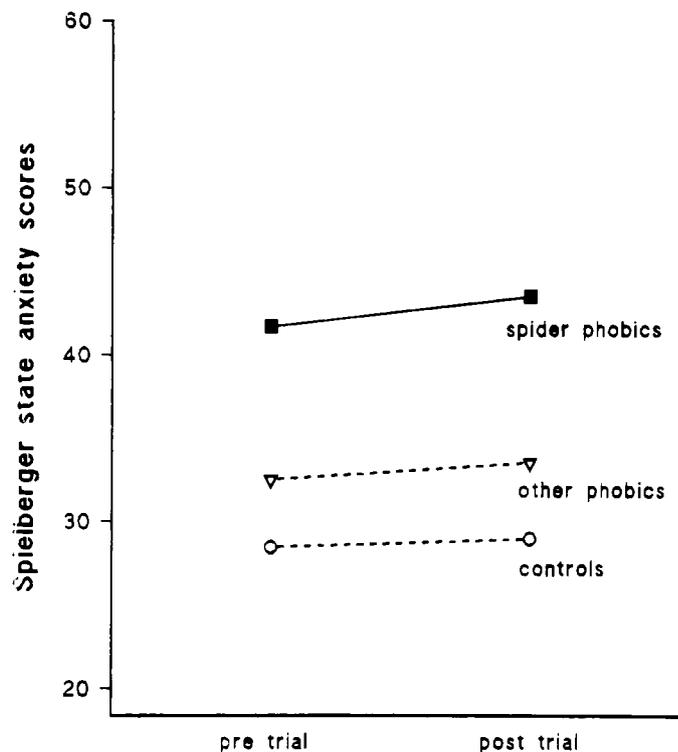


Figure 5:5 State anxiety scores pre and post trial.

## Discussion

This study was designed to examine the hypothesis that anxious people selectively allocate attention to threat stimuli and do not automatically attend to threat presented below the threshold of consciousness. It was hypothesised that anxious people will orient attention towards personally meaningful threat in order to prepare for flight. The specific questions asked were i) whether there was any evidence for a pre-attentive bias to threat in spider phobics, 2) whether there was any evidence for a strategic deployment of attention to threat in spider phobics, 3) whether the amount of interference related to the intensity of phobic experience and 4) whether the interference could be attributed to the emotional content of the word rather to threat specificity. The results in summary are as follows: There is no evidence for a pre-attentive bias towards threat; there is some evidence for a strategic deployment of attention towards threat; there is no evidence that the amount of interference in processing as measured by the Stroop is related to the intensity of phobic fear experienced; the interference is specifically to do with threat as opposed to emotionality.

It has been proposed that anxious individuals have a general and automatic processing bias towards threat information (Williams *et.al.*, 1988; Mogg *et.al.*, 1987). Williams *et.al.* (1988) suggest the possibility that in "some types of emotional disturbance (e.g.spider phobi) there may be strong tendencies to direct processing resources *away* from valent (phobic) material at the elaboration stage." An alternative view proposed here is that in the real world an anxious individual may strategically orient towards threat stimuli which have been perceived as personally meaningful in order to prepare escape plans and that this is not to do with the general emotional content of the stimuli but is specifically to do with the

perception of danger. This may manifest itself as longer reaction time latencies to threat stimuli when that is available to consciousness, but will not be apparent when stimuli are presented outside consciousness. The results of the present experiment go some way to confirming the importance of the strategic processing of threat information but do not confirm the importance of automaticity, providing support for the present hypothesis that attentional bias is a strategic process only applied to stimuli which are consciously meaningful to the individual. An initial examination of the data revealed that there was a significant interaction between the wordtypes and the groups when the scores from the masked and unmasked conditions were combined. An examination of the raw data revealed that this was likely to be coming from the spider phobics' response to spider words and the other phobics' response to emotional control words. It was also apparent that the three groups (controls, other phobics and spider phobics) were quite different in their trimmed mean response latencies to neutral words (when scores of masked and unmasked stimuli are combined), with controls being slower, and other phobics faster than spider phobics to name the colour when the wordtype was neutral. This was a pattern throughout the results in all the wordtype groups.

The extent to which an interference effect was found is ambiguous because relative to neutral words, only the other phobics are different to spider phobics in response times to spider words, while controls are not. However, the final analysis suggests that when emotionality is controlled for, spider phobics are showing interference relative to both other groups. A precise interpretation of these findings is therefore not possible. It has to be concluded that the threat-specific interference effect is a very fragile one and may not even be present.

Consideration of the two different classes of control words used (neutral and emotional) would suggest that a small amount of threat-specific interference may be present.

Because of this discrepancy in the reaction time latencies to neutral words, it was necessary to control for the effect of baseline differences by using the scores obtained from the neutral words as covariates. When this was done the interaction between wordtype and group remained significant, and it became evident that the effect was coming from two sources: i) Spider phobics were significantly retarded in their response times to spider words compared to emotional words and ii) the other phobic control group was significantly retarded in their response times to emotional words compared to spider words. This provides strong support for the importance of having control groups of matching phobic status.

There was a significant effect of masking or unmasking of stimuli though this did not interact with the group or wordtype condition. All groups were significantly faster to respond to the stimulus, whatever the word type, when it was presented in the masked condition. An examination of the raw data indicated that the retardation of spider word stimuli in spider phobics was arising from the unmasked condition indicating that attention was being strategically deployed towards threat rather than being an automatic process.

The question still remained as to whether this effect could be due to the emotionality of the spider words for the spider subjects, or whether the attention was specifically threat directed. As there appears to be an interaction between the spider phobics' response to spider words, and the other phobics' response to emotional words, this may indicate that it is the emotionality of the spider words

which is affecting their processing. In order to examine this possibility, the emotionality rating for all the words by all the groups were analysed. The only significant difference was in the spider phobics emotionality ratings of spider words, which were significantly higher than the emotionality rating of spider words obtained from the other two groups. There were no other differences. In order to examine the threat-specificity effects of spider words for spider phobics it was decided to compare the emotionality scores of the other phobic controls for emotional words with the emotionality scores of the spider phobics for spider words. As the differences were due to scores arising from the unmasked condition, and in keeping with previous experimentation (Watts *et.al.* 1986) scores used in this analysis were from the unmasked condition. No difference was found between the emotionality of spider words for spider phobics, or of emotional words for other phobics. This allowed the use of emotional word type latencies to be used as covariates for an analysis of the spider words alone, removing all the effects of emotionality. This analysis revealed the effect of spider words was robust and that with all the baseline differences removed, including that of emotionality, spider phobics were still significantly retarded in their response time latencies to spider words compared to other phobics and non phobic controls.

These results provide support for a spider Stroop effect in spider phobia. Combined with other evidence cited in the introductory section they suggest that the Stroop can measure differences not only in the emotional salience of words but in the particular relevance of these words to the individual's attentional bias towards threat. The question remained as to whether this interference was related to state anxiety and phobic intensity. A correlational analysis revealed

that there was no predictive relationship between any of the anxiety measures and any of the response latencies. This would seem to undermine the value of the Stroop as a diagnostic tool.

The differences in response style between the two control groups suggest that future experimental design should be aware of the possible effects of including controls of an equivalent clinical status to the experimental group. Other phobics were included in this study to check on the possibility that specific phobics may have a different response style generally to particular word sets. The inclusion of a phobic control group might also clarify the effects of threat specificity: it may be that anyone who has a phobia will respond to threatening stimuli seen as being to do with aspects of phobias which are more broadly salient such as uncontrollability, unpredictability and so on, though words of general relevance to do with phobic *responses* and which may have been expected to effect the phobic control group were excluded for clarity. There is also the question of phobic status: phobic objects may have a different meaning for people who perceive themselves as phobic, as opposed to fearful, and this has implications for the kind of processing which may go on.

It is difficult to explain why the phobic controls should have been so much faster to respond to spider words than either of the other two groups and relatively slow to respond to emotional words, unless they had been in some way sensitised to spider stimuli by the filling in of questionnaires to do with spiders immediately prior to participating in the Stroop task, but this is not an adequate explanation as the non-phobic controls underwent exactly the same induction and they were sluggish in their response to all categories of words. Nor is it due to a difference in the experience of anxiety, as the control groups did not differ in this respect

either before or after the experiment suggesting that speed of response is not dependant on state anxiety levels.

This could be due to a particularly idiosyncratic set of phobic controls though it is difficult to reason why the spider phobics should be faster to respond to emotional words than to neutral words which would normally be interpreted as being due to an increase in processing time re the neutral words. There is no obvious reason why in this case the neutral words should be more attention catching than the emotional words. This perhaps needs further investigation with the focus of the experiment being on a wide range of phobics.

One of the problems with interpreting the results of the Stroop is that it is difficult to know whether any bias is due to preoccupation with the phobic object rather than anxiety. If a bias exists then according to the theory discussed in the introduction, the amount of interference may relate to the amount of emotion experienced. Results from this study show that there is no correlation between state anxiety before and after the Stroop test, and response latencies in any of the groups. Neither is there a correlation between change in state anxiety and response latencies, which would suggest that any interference may be due to preoccupation with spiders rather than to spider-specific anxiety.

In summary, there is no evidence of a pre-attentive bias to anxiety generating words. There is evidence that a strategic deployment of attention operates in spider phobics towards their threat stimuli but the amount of this interference does not appear to relate to the amount of anxiety experienced, indicating that the amount of interference evident in the processing of information does not depend on the amount of emotion experienced. As there appears to be no pre-attentive, non-conscious bias in the Stroop test towards threat stimuli in spider

phobics, the problem of how to test pre-attentive bias towards real stimuli seems unnecessary and should therefore not be the focus of an experimental design. The problem with most of the tests to do with attentional processing is that of them make use of linguistic stimuli. Von Streblow, Hoffman and Kasielke (1985) and Achille, Stewart, Dubois-Nguyen, Peterson and Pihl (1991) have used pictorial stimuli and there has been some doubt expressed as to the various semantic pathways through which information can travel (Glaser and Glaser, 1989) making the Stroop less clear cut. Lavey and her colleagues in Maastricht are presently reporting data on selective attention as evidenced by pictorial and linguistic Stroop tasks, but this has not yet been published. The question remains as to the ecological validity of such an experimental paradigm. The cues for which a specific phobic is vigilant are nearly always exteroceptive and non-linguistic, with the possible exception of claustrophobic cues, and are very often ambulant as well, so although pictures may go some way in the furtherance of relevance, it still remains to examine the effect of real-life stimuli on the attentional biases. The next chapter describes such an experiment.

## CHAPTER 6:

### ALLOCATION OF ATTENTION TO A REAL PHOBIC STIMULUS

#### Introduction

Data from the Stroop experiment reported in the previous chapter are generally consistent with the hypothesis that phobics may show attentional bias to specific threat-relevant stimuli compared to controls and that this bias is unlikely to be due to the emotional valence of the stimuli. Also, the bias may be confined to the strategic allocation of resources towards threat because there was no evidence found for a pre-attentive bias. In other studies it has been found that responses of anxious people in reaction time tasks are facilitated when attention is directly focused on threatening information or stimuli (Macleod, Mathews and Tata, 1986), and are retarded when the threatening information is used as a distracter, as in the Stroop task used in the previous chapter. This may be adaptive in that it alerts the individual to threat in the environment and hence optimises his or her chances of escape/avoidance and hence survival. Such a bias may evoke a flexible response strategy in the anxious person. The suggestion has been made that the interference effects evident in the Stroop indicate that an initial allocation of attention to threat results in an immediate suppression of threat information (cognitive avoidance) (Watts *et.al.*1986). This finding may be interpreted in a different way. It could be that rather than avoiding the processing of threat information, anxious people are diverting resources towards possible escape strategies resulting in a division of attention between the threat object and safety-seeking.

The results reported in the previous chapter on the Stroop experiment confirm that threat information is distracting, at least with regard to the conscious

processing of such material, but this finding does not necessarily indicate that attention to real as opposed to semantic stimuli is similarly affected, so the ecological validity of semantic tasks with regard to phobias has yet to be proven. Nor does it illuminate the question of the relationship between attentional bias and avoidance.

In order to explore this relationship it would be necessary to provide both the threatening and escape/avoidance stimuli simultaneously but separately, to check for the differential effects of vigilance and safety seeking. The use of semantic stimuli, though universal in fields of cognitive psychological research, is problematic for many reasons but the most obvious of these is that language, even at the level of feature detection and word recognition is as yet imperfectly understood by cognitive psychologists. Many models of linguistic processing and lexical access have been proposed (e.g. Morton, 1978; Johnston and McClelland, 1980) indicating that the internal lexicon is much more complex than would appear at first sight, and the meaning of words may be contained in memory in many more ways than are known so far. Another point against the exclusive use of words as experimental stimuli is that humans developed language only 30,000 years ago and consequently words may have an entirely different effect on physiological and attentional processes to that of real stimuli in the environment, however evocative of emotion those words may be. Reading about something is a different experience to living it, as is apparent from the popularity of horror and adventure books through which the reader experiences fear and violence vicariously and presumably with pleasure. The mechanisms of this are not yet understood. Words and concepts are at one remove from physical things in the real world, and it is likely that they will affect the individual in different

ways also. On the face of it, reading the word 'spider' is quite different to finding one in your bath. The meaning of spider in a real-life context may be different to the meaning of the word 'spider' or even of a picture. Semantic stimuli may also be pre-phobic: reading the word may be similar to being *warned* that there is a spider in the vicinity and may alert a phobic to this possibility, resulting in a division of attention. Situations *in vivo* are more likely to call forth a flexible set of responses from the fearful person which may include safety-seeking behaviour and coping behaviour : responses not necessarily present in lexical tasks. A response style which can change according to context must be more useful than a stereotyped conditioned response unavailable to change except through the application of extensive counterconditioning measures. It is for this reason that it is important to try to approximate reality during experiments with phobic individuals.

The previous chapter has explored phobics' attentional biases towards personally relevant verbal stimuli and has attempted to give the theoretical basis of attentional processing as envisaged by Williams *et al.*(1988). This chapter will attempt to explore attentional biases using real stimuli and will also address the question to do with the hypothesised causal relationship between attentional bias and avoidance. The theoretical basis for this lies in network models of emotion as described in detail in chapters 2 and 3 above. According to Bower's (1991) network model, anxious people should not only show recall biases in memory towards mood congruent material but should also be biased towards the encoding of such material which he suggests may lead in turn to its being more likely to become 'attentive'. This has been discussed in detail in chapter 2 with regard to the aural dimension (as explored by dichotic listening tasks) and the visual (as

explored by the Stroop task and the visual dot probe experiment). Because of the difficulty already noted in manipulating live stimuli, studies of attention have not previously used actual phobic stimuli with phobic individuals. This means that a new type of experiment is required to investigate attention to real (as opposed to semantic or abstract) stimuli. The experimental paradigm to be utilised here is the visual dot probe adapted to enable the use of live stimuli, something not previously attempted in research on phobias due to the reason discussed above and to its being likely to raise phobic anxiety to an unmanageable level.

In an attempt to clarify the issue of the existence of cognitive bias in anxiety and to measure the distribution of visual attention directly without recourse to the Stroop, Macleod, Mathews and Tata (1986) utilised an experimental paradigm described as the dot-probe. It is a variant of this task and that used by Beck, Stanley, Averill, Baldwin and Deagle III (1992) which will be adapted for use with live stimuli.

In the MacLeod *et.al.*(1986) study, two words, one threat one neutral, were presented simultaneously, one above the other, on a computer screen. The upper of the pair was to be read aloud by the subject. In some trials, immediately after the end of this display a dot appeared in the location of one of the two words and subjects were asked to press a button as soon as they saw it in order to establish the direction of their attention. In the anxious subjects, but not the controls, reaction time was faster to the dot when it appeared in place of the previously-read word and when the dot replaced a threat-word rather than a neutral word. In this case there is no question of a division of attention due to the simultaneity of time and place of the probe and the target word. Controls

appeared to be shifting attention *away* from the threat word. Macleod *et al.* (1986) interpret this as supporting the theory that there exists an 'anxiety-related encoding bias' which may serve to maintain emotional disorders. It may be that a threat-sensitive mechanism exists which allocates attention to all possibly threatening stimuli in the environment. This has obvious significance for those suffering from anxiety - as Sophocles put it, "for those who are afraid, everything rustles". For the non-anxious controls the opposite was true with attention apparently being diverted away from threat.

Two studies carried out by Mathews, May, Mogg and Eysenck (1990) with anxious patients and recovered anxious patients using letters and then words as distracters from a target found that anxious subjects (currently and recovered) were slower than controls to react to the target when words of any type were used as distracters. A similar study was carried out with panic disorder patients (Beck, Stanley, Averill, Baldwin, Deagle III, 1992) though in this case the dot probe was presented simultaneously with a pair of words, ( rather than 25msec after the word pair offset as in the McLeod *et.al.*1986 study) one of which was read aloud : the dot probe was adjacent to one of the pair and appeared on 50% of the total trials. Subjects were required to detect its presence while reading the top word of the pair. In this case the results showed that the panic patients were slower than controls to detect the probe when the stimuli were physical-panic related and positive-emotional while there was a similar trend for social threat stimuli. The attentive properties of threat words for anxious subjects led to a division of attention and a consequent retardation of response to the dot, confirming the conclusions reached by Macleod *et.al.*(1986) and providing further evidence for attentional bias in anxious people.

Pictorial stimuli have also been used to test attentional bias, but very rarely. Von Streblo, Hoffman and Kasielke (1985) presented a series of slides to phobic subjects, each of which consisted of a central target picture flanked by two others. Phobics had to decide if the central picture belonged to a particular class of objects and their response time was measured. Response time was slower if the two accompanying pictures were threat related rather than neutral, indicating that attention had been captured by threat. When the central picture was threat related and the flanking pictures neutral, reaction time was faster than when all the pictures were neutral, again suggesting that there was orientation towards threat by the phobics. Unfortunately there are methodological problems with this study, including lack of subject diagnosis, lack of information about the presentation method of the (monochrome) slides and exactly how the response times were measured. A replication study carried out by Lavy, van den Hout and Arntz (1993) does not suffer from these shortcomings but found no evidence for the distraction effect of threatening flankers. They did confirm that attentional bias was evident towards the central picture when it was threat relevant and the flankers were neutral. After treatment, the threat relevant flanking slides did seem to be distracting the attention away from the central target slide while the initial effect of attention to a threatening central picture was lessened, as evidenced by slower reaction times. Lavy *et al.* (1993) suggests that this may be due to their being primed for threatening material or to the initial concentration of phobics, before treatment, on the target in order to ignore anything nasty in their peripheral vision.

The advantage of the visual dot probe and of this design lies in the neutral nature of the required response (pressing a button) which enables direct measurement

of how attention is distributed without the possible interference of response bias (i.e., individual differences in the way in which anxious people respond to threat as opposed to the way in which they perceive it). It is also particularly relevant to use concrete visual stimuli given the visual vigilance usually exercised by spider phobics when in the presence of a spider outside the laboratory setting. It has been suggested that response and stimulus features may elicit different results and that there may be desynchrony between fear and avoidance reactions (Hodgson and Rachman, 1974). If this is the case, the present study's concentration of attention on *stimuli* rather than *response* features (exteroceptive rather than interoceptive cues) is particularly useful in determining the direction of attention, whether it be towards or away from threat, or away from threat and toward escape, when that threat is embodied rather than semantic.

Previous findings from studies using verbal or pictorial stimuli do not allow us to draw unequivocal conclusions about reactions to phobic stimuli. The dot probe paradigm can, however, be adapted for use with actual phobic stimuli thus allowing more direct generalisation to the phobic situation. Another rationale for this approach is its ecological validity in terms of meaningful real-life fear responses, and the fact that phobics, given the discrete nature of their phobic object, are ideal subjects with whom to explore this particular problem. It would also be useful to know whether attention to threatening stimuli necessitates distraction from any reciprocally inhibitory material (for instance that denoting neutrality or salvation) being simultaneously presented. Questions to be answered include one about the presence of any response retardation in reaction time to a threat-free simultaneous location, indicating a link between avoidance and attentional biases as discussed above. The present experiment is based on

the dot-probe paradigm, but extends it into space and concreteness by using a spider as a stimuli in place of a threat word, an equivalent but spiderless space in place of a neutral word, and a light as the dot-probe in an attempt to answer the question previously posed. It was constructed in order to test the hypothesis that spider phobics attend to a threatening stimulus, and that they would be more attentive to a stimulus placed near a means of escape than to a stimulus in a neutral area because attention towards threat and towards escape would not in this case be divided but be directed towards one location, resulting in shorter reaction times to the light on these occasions. It is proposed that it may be the coping strategy (in this case the awareness of escape possibilities) which is impeding the absorption of new disconfirmatory information in phobics, rather than cognitive avoidance.

So there are three possible strategies of response in cognitive terms, though only two in behavioural terms. These are: the vigilance to threat strategy (attention to the spider), the avoidance strategy (attention to the spiderless space) and the escape strategy (attention to the door). In this experiment a real living stimulus was used as most research in this area has previously used semantic (words) or quiescent (dead) stimuli, and it is not clear whether these stimuli access the same processes as do *in vivo* situational stimuli or are as meaningful in emotional and implicational terms.

## METHOD

### Design

Subjects were seated in a chair equidistant from two free-standing shelves on the near corner of which was a small light. The lights came on singly in a random pattern and the task was to press a button as soon as a light came on at either side. In the first phase of the experiment the shelves were empty. In the second phase, on the basis of random allocation, subjects were allocated to one of three conditions:(i) no spider (ii) spider by the wall (iii) spider by the door. After the lights had appeared 15 times on each shelf the session ended. After a short break the next trial began.

### Subjects

Subjects were volunteers. The total number of subjects was 70, of whom 16 were non phobics, 12 were small animal phobic controls, 8 were situation phobic controls and 34 were spider phobics of whom 4 failed to complete the conditions and 2 turned away from the spider. These were excluded leaving 28 spider phobics in the analysis. All the phobics fulfilled DSM-III R criteria for simple phobia and in addition scored above the cut-off point in the Watts and Sharrock (1984) Spider Phobia Questionnaire and the amended General Phobia Questionnaire. The groups did not differ in measures of trait anxiety or depression, nor were they different in a variety of demographic features. As the small animal phobics and situation phobics were similar in all measures it was decided to combine groups to form a single phobic control group. Subject characteristics are shown in detail in table 6:1 below

There was no difference in sex ratio :(CHI-SQUARE [1 df]=0.658,p=0.417).

There was no difference in handedness :(CHI-SQUARE [1 df]=0.339,p=0.560).

Table 6:1 Means of subject characteristics.

Group:	Control	Spider phobic
n	35	28
Sex ratio (f:m)	27:8	24:4
Age (years)	24.38	23.85
Age of onset	.	7.86yrs
WQS	6.03	21.30
Spielberger Trait anxiety	35.69	40.33
Rozin & Fallon	131.25	119.66
BDI	4.66	6.63
Handedness Ratio R:L	30:5	21:6

### Materials

#### Assessment

Questionnaires are exactly as for the Stroop experiment described in the previous chapter.

#### Presentation Hardware

A BBC Model B computer with Zenith monitor connected to a disc drive, a response button and to two light-emitting diodes (LEDs). These were Red High Intensity with a 35° viewing angle, 30 mcd and 635 nanometres. The LEDs were mounted in the centre of pieces of black card measuring 6 x 7.5 cm and attached to the near corner of the shelf by black insulating tape.

#### Presentation Software

The presentation software was designed to control the lighting up of the LEDs, to record the response latencies of each presentation, to work out the mean reaction times to both LEDs separately and to work out the trimmed mean

reaction times based on one, two and three standard deviations. Lights were presented 30 times with a delay of between 3 and 30 seconds. The programme did this by pointing to one of the following time-spans and acting upon it: 3, 6, 9, 12, 15, 18, 21, 24, 27 and 30 seconds. The computer controlled the random allocation of distribution between the two locations, within the constraints of there always being an equal division of presentations with 15 in each location. The software recorded latency response for each presentation, that is, the interval between the light coming on and the button being pressed.

#### Stimulus Item

This was a live Zebra Tarantula measuring 8cm from spinnerets to fangs and having a 10cm leg span when standing at rest. It was placed in a transparent plastic box measuring 20x30x12cm with the lid firmly closed. The spider was brown in colour and liberally sprinkled with fine orange hairs.

#### Procedure

Subjects initially completed the Spielberger State Anxiety Index and the Visual Analogues, after having participated in the Stroop Experiment as described in Chapter 5. They were then seated in a chair, given the response button and the task was explained to them in the following manner:

'The two black cards on the corner of the shelves which you see in front of you have small lights in the middle. Your task is to press the button as soon as you see a light coming on in either location. This will last about 10 minutes.'

It was confirmed that subjects understood the task. The experimenter then counted down to the start of the experiment from the doorway, from where she could reach the computer controls. She immediately egressed on completion of countdown and watched the computer. On completion of the task, after 30

presentations lasting in total an average of 10 minutes, the experimenter re-entered and told the subject that they could have a short break. The task was set up again on the computer. The key experimental conditions were as follows:

- A: Spider by door (right hand)
- B: Spider in corner (left hand)
- C: Spider absent

The experiment always began with condition C in order to establish any natural individual biases towards the light positions. On the basis of random allocation in groups of four, subjects were allocated to one of four conditions. Half of the subjects then went on to repeat this condition C in order to examine the possibility of practise or fatigue effects (CC) and then went on to complete the next two conditions in the same way as the other half: condition A followed by condition B (AB), or condition B followed by condition A (BA). The four experimental conditions were therefore as follows: CAB CBA CCAB CCBA. Figure 6:1 shows the design in diagrammatic form. The main comparison was intended to be between CA, CB and CC.

Subjects were randomly assigned to each experimental condition by sampling without replacement in groups of four. Table 6:2 shows the distribution.

Table 6:2 Distribution of subjects to experimental condition.

	CAB	CBA	CCAB	CCBA
Control	9	9	9	8
Spider phobic	7	6	7	8

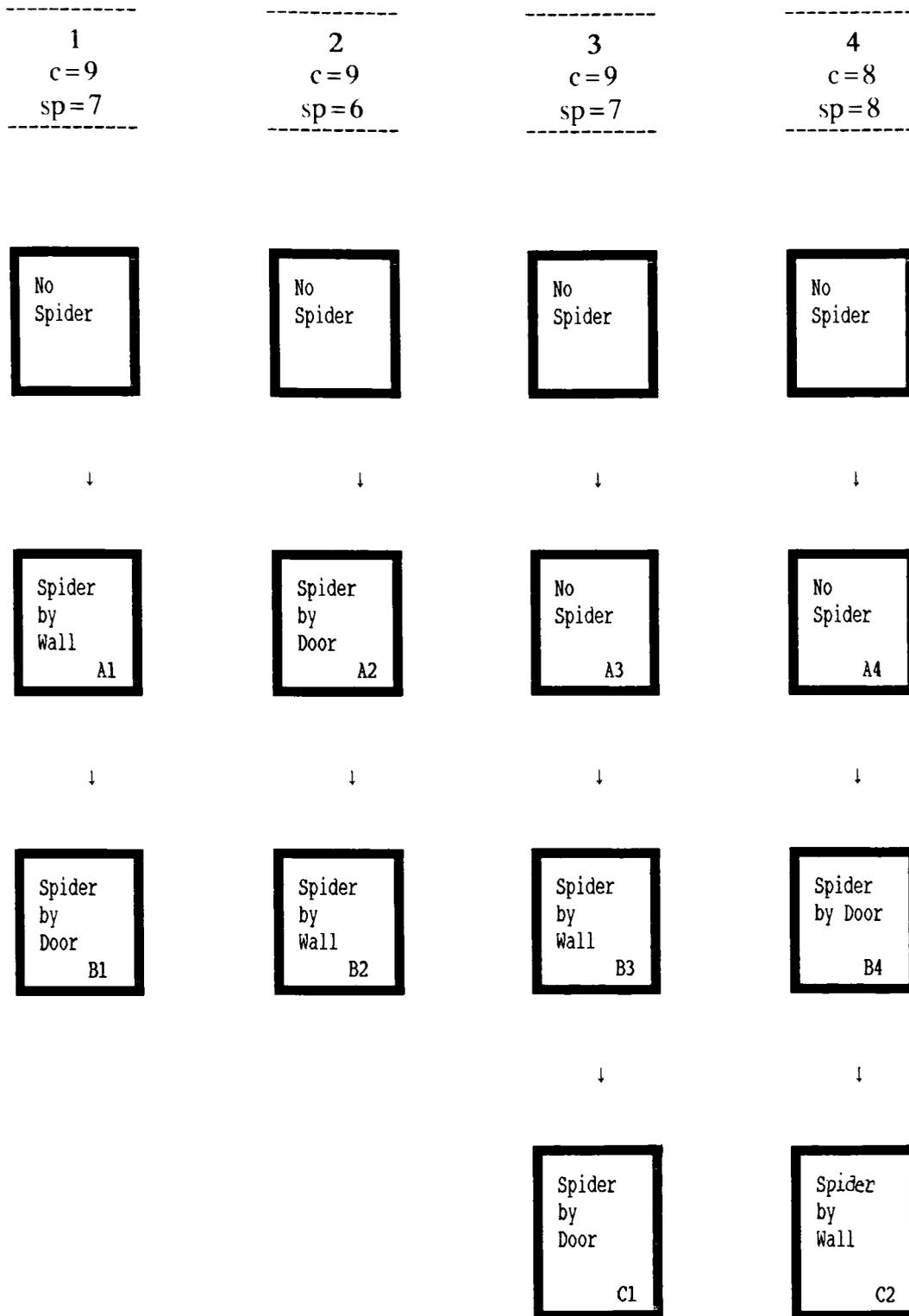


Figure 6:1 Diagram of experimental design.  
(c = controls, sp = spider phobics)

Subjects were told, before the Tarantula appeared, that it was large but that it could not escape from the box. Subjects all agreed that this would be acceptable. After the subjects had completed the task in all their assigned conditions, the Tarantula was removed and the subjects given questionnaires as described in the assessment section above.

### Statistical methods

As in the visual dot probe experiment (Macleod *et.al.*, 1986) means were trimmed to 2 standard deviations to remove outliers. This also prevented possible confounds due to single lapses of concentration.

It was found that the two control groups did not differ in any way from each other in their reaction times so in order to facilitate data analysis their scores were conflated into a single control group.

## RESULTS

### Overview

In this experiment, response latencies of two groups of subjects (controls and spider phobics) were obtained to a light coming on in one of two possible positions (by the door or by the wall).

The primary analysis compared the first (post baseline) results in a between-group comparison with the spider by the door, by the wall or absent. This showed that i) spider phobics but not controls were faster to respond to the light when it was next to the spider than when it was on the opposite side of the room to the spider, and ii) Spider phobics were slower in all responses when the spider was present than when it was absent.

The second analysis compared the scores obtained when the spider was first

present in all groups, so for half the subjects this was a second trial and for half a third trial. This again showed that spider phobics but not controls were faster to respond to the light when it was next to the spider than when it was on the opposite side of the room. though the pattern of response was slightly different. The third analysis compared the scores obtained when subjects had already been exposed to the spider once in one position, and now were exposed to the spider on the other side of the room. For half the subjects this was the third trial and for half the fourth trial. This again showed that spider phobics but not controls were faster to respond to the light when it was next to the spider than when it was on the opposite side of the room.

#### Manipulation check

#### State anxiety scores

In order to examine the differences in state anxiety both between and within the groups a two way analysis of variance was carried out on Spielberger state anxiety score data obtained immediately before and immediately after the reaction time test. The analysis of variance used one between group factor of group (spider phobic or non spider phobic) and one within group factor of time (before and after the trial).

There was an significant overall effect of group ( $F_{1,60}=40.13$ ,  $p<0.00001$ ). The overall effect of time was also significant ( $F_{1,60}=8.02$ ,  $p<0.01$ ). The higher order interaction of group x time was also significant ( $F_{1,60}=27.92$ ,  $p<0.00001$ ). These results show that spider phobics were significantly more anxious than the control group both before and after the test, that they became significantly more anxious after the trial than before it, while controls were significantly less anxious after the trial than before it. See figure 6:2.

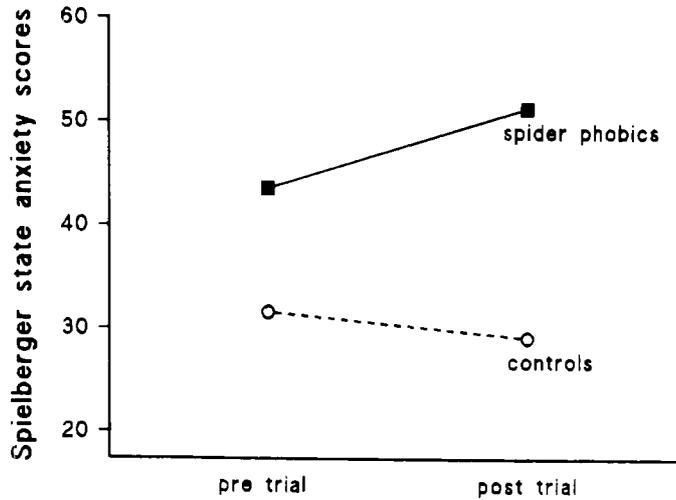


Figure 6:2 State anxiety scores pre and post trial

First analysis. Baseline Scores : no spider present.

This analysis was carried out to assess whether there were any pre-existing reaction time differences between the groups.

For all subjects the trimmed mean reaction times for the left (by the wall) or the right (by the door) were collected for the initial condition, where no spider was present on either side.

The mean reaction time latencies found in initial testing where no spider was present for either group are shown in Table 6:3 and figure 6:3. An analysis of variance was carried out using one between group factor (spider phobic or non spider phobic) and one within group factor : location of target (by wall or by door).

There was an overall effect of group ( $F_{1,54} = 10.42, p < 0.01$ ) The main overall effect of location of target was also significant ( $F_{1,54} = 7.22, p = 0.01$ ) but the higher order interaction of location of target x group was not significant

( $F_{1,54}=3.52, p>0.05$ ).

These results indicate that the spider phobics were faster than the controls to respond to the light even when the spider was not present, and that for both groups, reaction times to the target was faster when it was by the wall (on the left) than when it was by the door (on the right).

Table 6:3. Trimmed mean reaction times in milliseconds. Initial test: no spider present. (Standard deviations in brackets.)

	Door	Wall
Controls	635 (245)	524 (167)
Spider Phobics	459 (79)	438 (100)

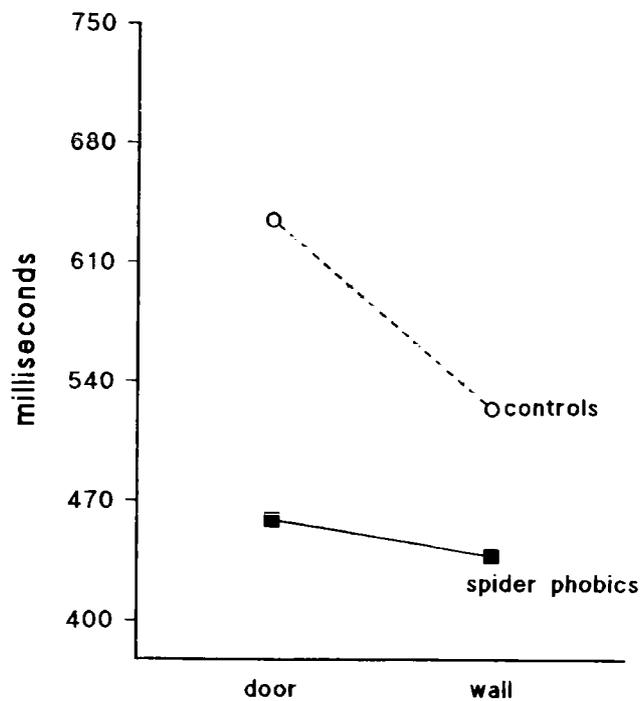


Figure 6:3 Trimmed mean reaction time latencies : no spider present.

Second analysis: spider present(wall or door) v spider absent.

Scores were obtained from the second trial (A1 A2 A3 A4 in diagram) during which half the participants again had no spider present while the other half had

a spider present in the room either on the shelf by the wall or by the door.

The mean reaction time scores for controls and spider phobics for each condition is shown in table 6:4 and in graph form in figure 6:4. First period scores were used as covariates in the analysis. Covariance adjusted means are shown in table 6:5 and in graph form in figure 6:5.

Table 6:4. Mean reaction times in milliseconds.

Group	No Spider		Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall	Door	Wall
Control	578	502	673	589	777	594
Spider phobic	531	469	450	783	681	508

Table 6:5. Adjusted cell means:baseline scores used as covariates.

Group	No Spider		Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall	Door	Wall
Control	551	491	646	601	616	599
Spider phobic	560	503	516	850	702	557

An analysis of covariance was carried out using two between group factors :group (spider phobic or non spider phobic) and condition ( no spider, spider by wall, spider by door) and one within group factor : location of target (by wall or by door).

There was no main effect of group ( $F_{1,55} = 1.11, p > 0.2$ ). There was a significant effect of condition ( $F_{2,55} = 4.49, p < 0.02$ ). The group x condition interaction failed to reach significance ( $F < 1$ ).

The main effect of location of target was not significant ( $F < 1$ ), nor was location of target x group ( $F_{1,55} = 2.29, p = 0.1362$ ).

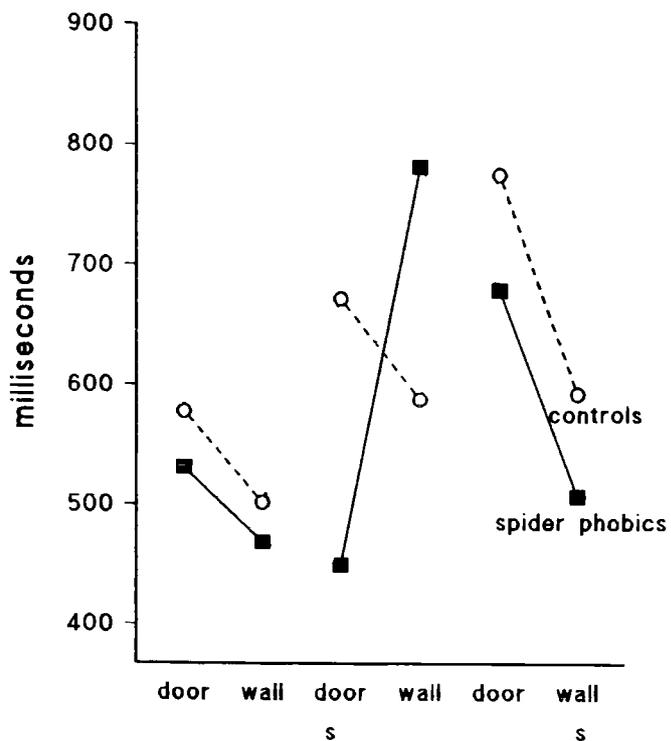


Figure 6:4 Second analysis:spider present (wall or door)v spider absent  
( 's' indicates position of spider)

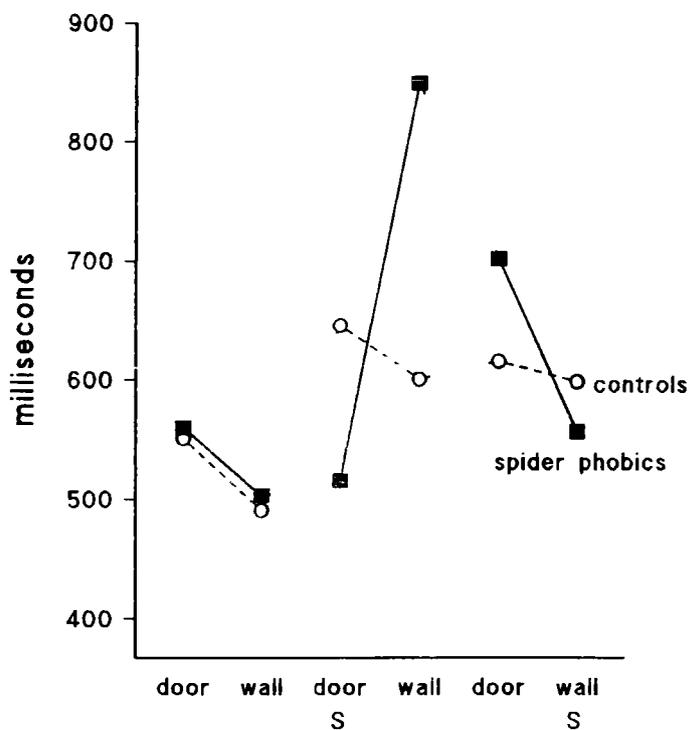


Figure 6:5 Second analysis: covariance adjusted means

The higher order interaction of location of target x condition was significant at the ( $F_{2,55} = 3.77$ ,  $p = 0.05$ ) level. The higher order interaction of location of target x group x condition ( $F_{2,55} = 3.18$ ,  $p < 0.05$ ) also reached significance. This indicates that the groups are reacting differently to each other when the spider and target are in particular conjunctions, but not in others. Comparing this to the graph, the indication is that spider phobics but not controls react more quickly when the spider and target are in the same place than when they are in opposite locations and that the difference in speed is most marked when the spider is located by the door. Multiple comparisons were carried out using Bonferroni corrected T-tests. The only significant difference between spider phobics and controls was found with regard to reaction time latencies to the wall when the spider was by the door ( $p < 0.02$ ). Spider phobics were significantly slower than controls to respond to the light when it was by the wall and the spider was by the door. No other significant differences were found.

Third analysis: all subjects first encounter with spider (spider by wall or spider by door).

In order to attempt a clarification of the data it was decided to examine scores for all subjects obtained when the spider was first present in the laboratory for each subject : for half of the subjects this was the second trial, and for the remainder it was the third. (A1 A2 B3 B4 in the diagram).

An analysis of covariance was therefore carried out using two between group factors: group (spider phobic or non spider phobic) and condition ( spider by wall, spider by door) and one within group factor: location of target (by wall or by door). Baseline scores were again used as covariates.

Means are shown in table 6:6 and figure 6:6 and covariate adjusted means in table 6:7 and figure 6:7.

Table 6:6 Mean reaction time in milliseconds: all subjects' first presentation of spider.

Group	Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall
Control	670	554	647	541
Spider phobic	440	633	821	508

Table 6:7 Adjusted cell means using baseline scores as covariates.

Group	Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall
Control	633	543	584	551
Spider phobic	482	675	838	482

There was no main effect of group ( $F_{1,57} = 1.53, p > 0.2$ ). There was no significant effect of condition ( $F < 1$ ).

The group x condition interaction failed to reach significance ( $F_{1,57} = 1.63, p > 0.2$ ).

The main effect of location of target was not significant ( $F_{1,57} = 2.15, p > 0.1$ ), nor was location of target x group ( $F < 1$ ). The higher order interaction of location of target x condition was significant at the ( $F_{1,57} = 6.56, p < 0.02$ ) level. The higher order interaction of location of target x group x condition ( $F_{1,57} = 9.21, p < 0.01$ ) also reached significance. This is again indicative of the fact that groups appear to be reacting differently to each other when the spider and target are in particular conjunctions, but not in others. Spider phobics but not controls are relatively fast to respond to the light when the spider and the target are in the same place. In order to explore this further, multiple comparisons on covariance adjusted scores were carried out using Bonferroni corrected T-tests. No significant differences were found between the groups.

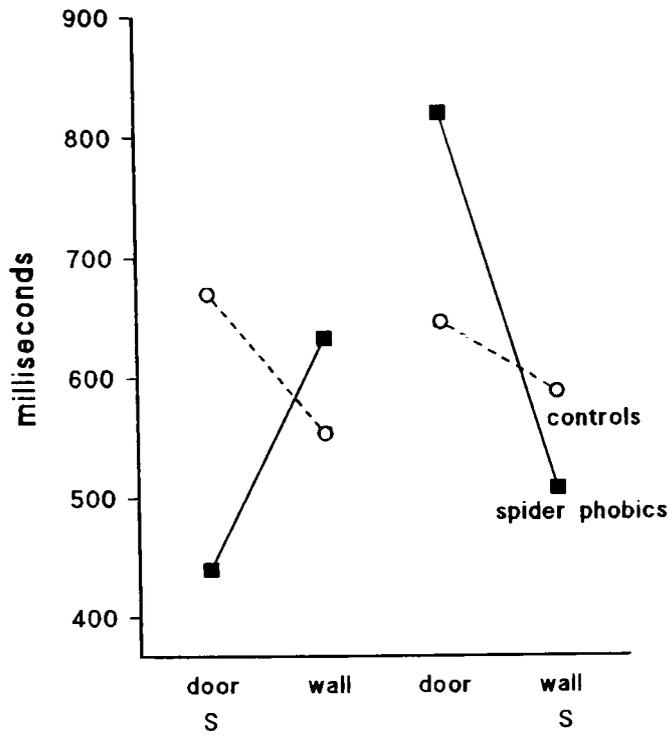


Figure 6:6 All subjects: first encounter with spider  
(‘s’ indicates position of spider)

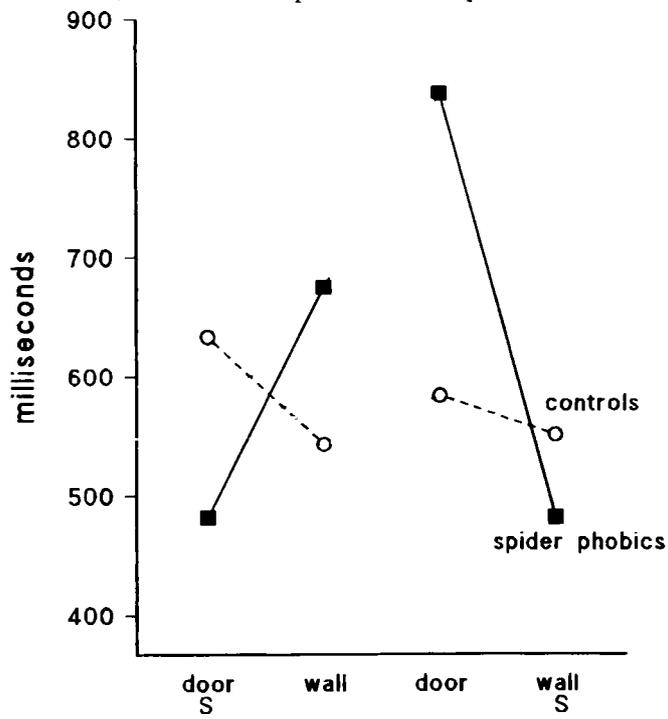


Figure 6:7 All subjects: covariate adjusted means of first encounter with spider.

Fourth analysis : All subjects' second encounter with spider: spider by door or spider by wall.

As the pattern of results was slightly different with regard to retardation of response in spider phobics when target was on the opposite side to spider stimulus, it was felt necessary to examine the final set of results obtained from subjects in order to have as full a picture as possible of the underlying trends. Reaction time scores for response to the second presentation of the spider were collected. (B1 B2 C1 C2 in the diagram) Again, baseline scores were used as covariates in the analysis and means and adjusted means obtained for response latencies are shown in full in tables 6:8 and 6:9 and in graph form in figures 6:8 and 6:9.

An analysis of variance was therefore carried out using two between group factors:group (spider phobic or non spider phobic) and condition ( spider by wall, spider by door)and one within group factor: location of target (by wall or by door).

Table 6:8 Mean reaction time in milliseconds:all subjects' second presentation of spider.

Group	Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall
Control	548	558	681	535
Spider phobic	546	674	804	436

Table 6:9 Adjusted cell means using baseline scores as covariates.

Group	Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall
Control	490	567	647	524
Spider phobic	561	704	842	473

There was no main effect of group ( $F_{1,57}=2.93$ ,  $p>0.1$ ). There was no significant effect of condition ( $F<1$ ).

The group x condition interaction failed to reach significance ( $F<1$ ).

The main effect of location of target was not significant ( $F_{1,57}=2.34$ ,  $p>0.1$ ), nor was location of target x group ( $F<1$ ). The higher order interaction of location of target x condition was significant at the ( $F_{1,57}=10.04$ ,  $p<0.01$ ) level. The higher order interaction of location of target x group x condition ( $F_{1,57}=2.46$ ,  $p>0.1$ ) failed to reach significance.

This pattern of response coincides more clearly with the results obtained in the previous analysis, than with the initial pattern. Spider phobics -but not controls- were relatively fast to respond to the target when it was next to the spider. This difference was again most marked when the spider was by the wall.

Again, in order to explore this further, multiple comparisons were carried out on covariance adjusted means using Bonferroni corrected T-tests. No significant differences were found between the groups.

#### Correlations: anxiety and reaction time.

These results could be due to elevated anxiety levels, given that previous studies as reported have shown a general slowing down of response rates due to anxiety. In order to explore any more specific relationship between anxiety and reaction time to a real phobic object, state anxiety scores and reaction time scores were subjected to correlational analysis. Tables 6:10 and 6:11 show the correlation between state anxiety (first in controls then in spider phobics) before and after the reaction time tests and reaction times to the light in both positions with the spider either next to the light or on the other side from the light

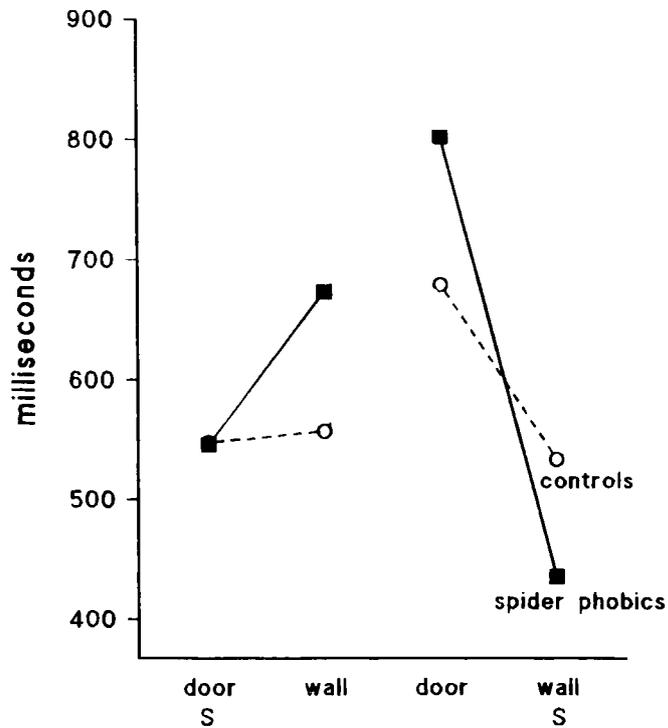


Figure 6:8 All subjects: second encounter with spider  
(‘s’ indicates position of spider)

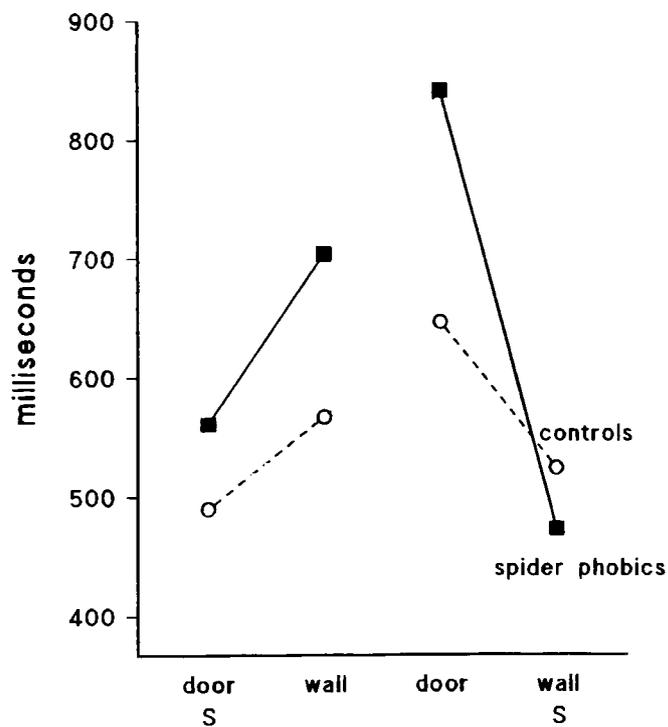


Figure 6:9 All subjects: covariate adjusted means of second encounter with spider.

Table 6:10 Controls. Correlation between state anxiety and RT.

	Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall
Pre Stais	0.12199	-0.03457	0.01629	-0.00698
Post Stais	0.22832	0.00806	0.09452	0.07005

Table 6:11 Spider Phobics. Correlation between state anxiety and RT.

Group	Spider by Door		Spider by Wall	
	Door	Wall	Door	Wall
Pre Stais	0.46374 p 0.0148	0.26667	0.18740	0.50158 p 0.0077
Post Stais	0.36128	0.44586 p 0.0198	0.40875 p 0.0343	0.26168

In order to ensure that these results were not the result of natural baseline attentional biases, a correlation analysis was also carried out between anxiety scores obtained before and after the tests and reaction times to the lights before the introduction of the stimulus. The pattern in this case was different, as shown below in tables 6:12 and 6:13.

Table 6:12 Controls. Correlation between state anxiety and RT. No spider present

	Door	Wall
Pre Stais	-0.05550	0.00260
Post Stais	0.04933	0.13833

Table 6:13 Spider Phobics. Correlation between state anxiety and RT. No spider present

	Door	Wall
Pre Stais	0.13995	-0.20798
Post Stais	0.08075	-0.36366

## Discussion

The data support the hypothesis that anxious people allocate attention to threat. The principal, and most robust finding in this study was that spider phobics demonstrated selective attention effects with threat stimuli as shown by their being significantly faster to respond when a target stimulus was presented immediately adjacent to a real spider compared to when the target stimulus was on the opposite side of the room to the spider. Controls showed no such bias. This suggests that the spider phobics' attention was more focussed on the phobic stimulus than was the attention of the controls, and that their attention was focussed on the spider to the detriment of attentional focus on the neutral space. In the first trial also their attention was significantly more focused on the spider when it was beside the door, as manifested by slower reaction times to the spiderless target when it was by the wall rather than the door. It may be that this is tentative confirmation of the proposal that phobics, rather than cognitively avoiding threat, are actively engaged in safety-seeking behaviour. These findings provide evidence that results obtained from semantic and pictorial stimuli in previous experiments are also applicable to real-life stimuli as they are consistent with results obtained by Macleod *et.al.* (1986), Beck *et.al.* (1992) and Lavy *et.al.* (1993).

An unusual finding is to do with the relative, baseline speed of response. Anxiety has been shown to inhibit responses, resulting in longer detection latencies for all types of targets (Martin, Williams and Clark, 1991). This experiment using real life stimuli has found something quite different: spider phobics were significantly faster than controls to respond to the neutral targets, resulting in a baseline difference. It is difficult to explain why this should have been the case. The

difference may lie in the amount actual perceived danger which alerts rather than dampens attentional vigilance and compensates for the presumed impairment of performance necessitated by a significantly higher anxiety rating. This may point out a fundamental difference in the nature of response to real life stimuli as opposed to semantic or imaginary stimuli, or may be peculiar to the particular responses evoked by a spider. The usefulness of fast reaction to a physical hazard ( spider, snake and so on) in the environment is more obvious than to a more abstract threat, where an avoidant response may be more appropriate. Further work using different kinds of phobic stimuli is needed before that can be confirmed. The second somewhat finding was that both groups were quicker, from the first, to respond to the light when it was by the wall (on the left) than when it was by the door (on the right). There is no adequate explanation for this. There was no difference in the ratio of handedness in the groups so the result cannot be due to that.

In all the conditions when the spider was somewhere in the room and baseline differences were taken into account, spider phobics were significantly faster to respond to the light when it was next to the spider than when it was on the opposite side of the room to the spider. Controls showed no bias in this respect. This is in line with results obtained in the visual dot probe experiments by Macleod *et al.* (1986) and Beck *et al.*(1992) where anxious subjects allocated attention to threat stimuli resulting in faster response times to the dot in the Macleod *et.al.*(1986) experiment when the dot was adjacent to the threat and in slower response in the Beck *et.al.*(1992) experiment where the target was *adjacent* to the threat (and thus serving as a distracter) rather than replaced by it and had to be searched for simultaneously. However, Lavy *et.al.*(1993) found

no evidence for the distraction effect of threatening pictorial stimuli but suggest that this may be to do with the angle of vision at which these pictorial distracters were presented. The present experiment is a construction in real time, with real stimuli, of both the Beck experiment (though actually preceding it in conception) as the light (dot) was presented simultaneously adjacent to either the threat (spider) or the non threat (empty shelf) stimulus, and of the Macleod *et.al.*(1986) experiment. Though a major theoretical difference between this experiment and the others reported here is that the position of the spider is constant within each presentation and as such is entirely predictable. In order to test for scanning vigilance it may be possible in the future to set up an experiment using pictorial stimuli set apart from one another (unlike the Lavy *et.al.* (1993) experiment), though this would be less useful in terms of real-life functioning.

In the first analysis in the presence of the spider, spider phobics were fastest at responding to the light when it was next to the *door* and to the spider, while they were next fast to respond when the light was by the *wall* and the spider. Next in the speed hierarchy is their response to the light when it was by the door and the spider was by the wall. Spider phobics were slowest at responding to the light when it was by the wall and the spider was by the door. Although not a significant difference, this could indicate attention being divided between the door and the spider, thus entailing slower reaction times to the wall location when the two attentive stimuli of 'spider' (threat) and 'door' (escape) were in conjunction. This is a convincing support for the hypothesis that spider phobics attend to a threatening stimulus and that they are more attentive to a stimulus placed near a means of escape. The strategies of vigilance to threat and of escape seem to be working simultaneously here.

However, the subsequent analyses show a different pattern of results. In the second encounter with the spider, the spider phobics responded relatively more slowly to the light when it was by the door and the spider was by the wall. This was also found in the third presentation involving the spider. It is difficult to account for this though it may be due to an order effect. It would have been useful to ask the subjects if they had been aware of any possible reason for this, but that may possibly have introduced a confound into this particular experiment due to the nature of the design. The experiment was constructed so as to have the experimenter having minimal contact with the subjects throughout. It may be that the sink began to lure attention away from the door once subjects knew the format of the task or that fluctuations in state anxiety could account for some of this anomaly.

State anxiety could have been measured between each trial period which may have been illuminating as it may have fluctuated in relation to the spider's position. As shown in the results, there was a marked and significant shift in state anxiety before and after the complete trial in both groups, with controls becoming less anxious and spider phobics becoming more anxious. In order to remove the possible effects of order, a similar experiment using only the neutral and one situational presentation might be useful, along with the exclusion of the sink from sightlines.

Another possible confound is that although spider phobics found the Tarantula highly aversive, in debriefing sessions afterwards a proportion of them stated that they had not found the spider as aversive as they would have found a large house spider. The explanation they gave was that the Tarantula had appeared more mammalian and less frightening than would a more common one. This may not

truly be the case though, and it was not in any event a majority view.

The results show that spider phobics are initially vigilant to threat and escape, as evidenced by the distraction apparent in their slowed response times to the neutral target position. Subsequent testings show a slightly different pattern with an apparent shift away from escape-seeking, perhaps due to an order effect. The overall finding is that spider phobics are significantly faster at detecting a target when it is next to a threat object than when it is not, and that controls, perceiving no threat, are not.

The correlational analysis was undertaken to try to illuminate any connection between anxiety and the allocation of attention. The results do show a significant connection between *initial* state anxiety of the spider phobics and their response times to the target when it was by the spider. The more anxious they were initially, the slower their response time. Post trial spider phobic state anxiety scores showed a significant connection to response times to the target when it was away from the spider. This indicates that the higher the anxiety the slower the response times to the non-threatening location, further indicating that attention was being directed away from this and towards the spider in direct relation to the amount of anxiety experienced.

Despite the questions generated by the two subsequent analyses, it is clear that attention of the spider phobics was always drawn to the spider, in whatever positional permutation it lay in relation to the target light. The controls, who might have been expected to be drawn towards looking at such a novel stimulus during a particularly tedious task, did not appear to do so. This is in keeping with data obtained by the dot probe experiments previously reported where anxious or panic patients appeared to be attending to threat stimuli to the

detriment of responding to a dot in the Beck *et al.*(1992) experiment, but not in keeping with the finding by Macleod *et.al.*(1986) that non-anxious subjects avoided the threatening stimuli. There was no evidence to suggest that this happened in the present experiment although it could be argued that the Tarantula is not threatening to the control group in the universal way that some semantic stimuli are threatening, and as such cannot be used as a real comparison.

It may also have been useful to ask subjects to write down a full description of the spider immediately after the end of the task in order to check for any possible cognitive avoidance in the phobics, which would have manifested itself as a relative paucity of information about the physical attributes of the spider. This could be incorporated into future experiments as could an attempt to explain the initial reaction times to the light before the introduction of the spider. As has been stated, anxiety generally interferes with a person's ability to respond, and anxious people are usually slower to respond than non-anxious (McLeod *et.al.*1986; Beck *et.al.*1992). In this case however, as noted above, the spider phobics, who were much more anxious than the controls and who may have been expected to have been distracted by thoughts of possible future unpleasantness, were actually faster to respond by a considerable and significant margin. This is consistent with results obtained in the Stroop experiment previously reported, where the spider phobics were quicker to respond to all semantic stimuli than were controls, (although the other phobic controls were fastest of all). It is not therefore to do with the concrete nature of the stimuli alone, although in a real-life situation it seems sensible that phobics, being ever vigilant for possible harm, should respond with more alacrity to a signal, due to a general heightening of

arousal. It has a certain ecological validity but is inconsistent with findings in other anxiety research. However, as it is usually words/semantic stimuli that are used to explore attentional processes, it may be that they have a different effect on response times, perhaps taking up more processing space in the minds of the anxious due to a richer and more elaborate set of connotative connections or to a greater depth of ambiguity.

In summary : the results reported here confirm that anxious individuals orient towards threat. The initial confrontation with the spider resulted in significantly slower reaction times by the spider phobics to the target when it was non-threatening and away from the door (escape), indicating that attention was allocated towards the spider and the door (threat and escape). There is no evidence to suggest that unalloyed avoidance (no threat and wall) had any attentional allure for spider phobics. This shifted over time. Attention was still allocated to threat (spider) but moved away from escape (door). This shift appears to be related to changes in state anxiety.

The results seem to indicate that spider phobics' attention is divided between the threat and safety and that this is the kind of flexible response to a situation which is necessary in the real world. Again, it is the meaning and context in which the threat resides that is important in the formulation of real-life behavioural and cognitive responses. If this is the case, and cognitive avoidance does not operate at this level, then a phobic's memory for their phobic object, when that object is in a meaningful situation which requires action, should not be subject to deficits. It is this idea which is explored in the following two chapters.

## CHAPTER 7:

### RECOGNITION MEMORY FOR SPIDER INFORMATION.

#### Introduction

In 1906, Jung noted that when subjects were asked to associate to a word, certain items produced very long latencies. Jung supposed this to be due to their reluctance to reveal words linked to anxiety-laden complexes, leading to repression of associated memories. Levinger and Clark (1960) found that in a free recall test, subjects were poorer at remembering emotionally laden associate words as compared to neutral. This was interpreted as evidence for Freud's repression theories but could equally well be interpreted as consistent with later theories of the relationship between arousal and memory. Eysenck and Wilson (1973) proposed an alternative explanation based on research carried out by Kleinsmith and Kaplan (1963) who discovered that emotional words were poorly recalled initially but better recalled after a delay. This effect has been replicated with positive-emotion as well as negative-emotion words, leading to the conclusion that repression is not involved. Much of the subsequent research on the effect of arousal on memory is contradictory. Studies have been carried out in eyewitness testimony, state dependent learning and, of particular relevance to the present study, research into the connection between memory, anxiety and attention.

The experiments reported here have provided evidence for the importance of belief and meaning in the maintenance of anxiety, in particular the maintenance of phobic responses. It has been found that phobics have a unique and idiosyncratic set of beliefs about their phobic objects which provides a logical

framework for their phobia and from which the overall implicational meaning of their phobic object emerges. It is at the level of generic or implicational meaning that emotion is hypothesised to be linked to meaning, and it is at this level that therapeutic emotional change may take place.

Evidence has also been found to support the theory that phobics allocate attention to threat and that this is a strategic, rather than automatic process. This has been taken as further evidence for the importance of context and meaning: phobics attend to threat under specific circumstances which call forth thoughts of escape and do not necessarily do so when this is not required, when they are presented with semantic stimuli for example. There is also the point that phobics may not take much notice of a spider's colouring when they are afraid it will attack them, or cause them to have hysterics and so on.

The question of cognitive avoidance has been raised. This has not been supported by the results of the studies reported here. As a final check it was decided to present phobics with stimuli which was as close as possible to the stimuli they would encounter *in vivo*. If cognitive avoidance does exist and leads to the suppression of threat stimuli, then this should lead to a deficit of such stimuli in memory. The alternative proposed here is that attention to threat stimuli may be divided between the stimuli itself and a search for safety. If there is no need to seek safety if for example the stimuli is verbal or pictorial (and as such is more like a warning about the imminence of threat than about the presence of threat itself) then phobics will store as much information in their memories as non phobics. It is of personal relevance to them and may be important in the forming of escape strategies. It is suggested that in order to optimise chances of survival, it makes sense for a phobic to have as much

information about danger as possible. Cognitive avoidance in this context does not seem sensible.

According to cognitive theories of emotional disorders, anxiety is the consequence of the activation of particular schema to do with the possibility of subjective danger in the environment. It is necessary for the huge amount of incoming sensory data to be arranged in some way that enables easy access when needed. In primitive man this information would presumably have been ordered in such a way as to potentiate ideas of imminent physical harm from predators or from the elements in a hierarchical way which heightened survival chances in potentially dangerous situations. Williams *et al.*(1988) have hypothesised that a hierarchy also operates at the initial stages of information processing, resulting in an automatic bias towards threat stimuli in anxious people. They also suggest that the encoding of information involves the processes of priming and elaboration (see chapter 2 and 5). Priming is an automatic process while elaboration is strategic. This has implications for the retrieval of information as well as its encoding, as words can be retrieved in a seemingly effortless, automatic way, or can be found after an exhaustive search through the memory structure. They also suggest that this bias may be found in only one of the processes and that it is this dissociation between the two processes which characterises depression or anxiety, and that the two disorders may differ in which process (priming or elaboration) affected:

'anxiety preferentially affects the passive, automatic aspect of encoding and retrieval, whereas depression preferentially affects the more active, effortful aspects of encoding and retrieval. In the terms used by Graf and Mandler (1984), anxiety makes certain items more *accessible*, while depression makes certain items more *retrievable*.'(Williams *et al.*1988, pp173-174).

Anxiety affects priming while depression affects elaboration. Williams *et*

*al.*(1988) propose that it is the lack of allocation of resources during the priming process which results in links not being made. hence spider phobics do not have the mnemonic cues to aid remembering. They also make the point that even within the range of anxiety disorders there may be differences in avoidant processing strategies between agoraphobics, who know that a particular situation will cause them anxiety, and spider phobics, who will unexpectedly come across a spider and cannot avoid it.

Foa and Kozak (1986) have suggested that emotions are the result of the activation of a network in memory structure which includes information about stimuli and responses along with the meaning that these may have for the individual. Again, it follows that memory structures should be weighted differently in anxious people, with more meaning attached to particular stimuli and responses, and more attention paid to that meaning.

The case for a specific state-dependent effect in memory has been discussed at length, and inconclusively, with regard to non-anxious individuals. It has been shown to be unreliable as a phenomenon and has been abandoned to a large extent by researchers in cognitive psychology (for review see Eich, 1980). In anxiety research attempts are still being made to understand the effects of mood on memory. In depression research the general finding has been that depressive subjects, compared with non-depressive subjects, tend to recall negative stimuli more readily and are quicker to retrieve unpleasant than pleasant memories (see Williams *et.al.*1988 for review of this).

However, as has been indicated, the case for an effect of anxiety on memory is more ambiguous and problematic. Many studies have looked at recall and recognition tasks, where subjects are typically required to listen to a tape made

up of separate words and then asked to write down what they can remember (recall) or to mark on a list the items they can remember (recognition). The results obtained from such experiments range from: i) those in favour of a memory bias for threat words (McNally, Foa and Donnell, 1989; Watts and Coyle, 1992) ii) those showing a *poorer* memory for threatening material (Foa, McNally and Murdock, 1989; Mogg, Mathews and Weinman, 1987; Watts and Dalgleish, experiment 1, 1991) iii) those showing mixed results depending on the context of the task : i.e. better recall in the presence of a live spider but not in the presence of a dead spider (Watts and Dalgleish, experiment 2, 1991) and iv) those showing no memory bias (Mathews, Mogg, May and Eysenck, 1989).

In summary, it has been shown (Breslow, Kocsis and Belkin, 1981; Zuroff, Colussy and Wielgus, 1983; Teasdale and Russell, 1983; Watts, Trezise and Sharrock, 1986; Dalgleish and Watts, 1990; Watts and Dalgleish, 1991) that personally salient and arousing material can be more available to access than neutral stimuli and that this bias will be particularly powerful in people suffering from an emotional disorder. Depressed people can readily access negative material and anxious people can readily access threat material under some conditions, but the evidence for memory bias in anxiety is not so compelling. The ability of an anxious person to fully elaborate threatening stimuli may be of therapeutic importance in decreasing anxiety to do with that stimuli, although the evidence for this is slim (Lavey *et al.* 1993).

#### Memory in spider phobics

In an experiment to test phobics' processing of threatening stimuli, recognition memory for spider stimuli was found to be poorer in spider phobics than in control subjects, but only, in a *post hoc* analysis, for "big spiders" (Watts, Trezise

and Sharrock,1986). The main analysis indicated that spider phobics were not significantly better at recognising spiders. In the *post hoc* division of the stimuli into 3 pairs of large spiders and 9 pairs of small spiders, it was found that in fact for small spiders, recognition memory was significantly better in spider phobics than in controls, while spider phobics were significantly worse at recognising large spiders. Spiders were presented on card, freeze-dried into life-like positions, (subjects were aware that spiders were dead) then immediately re-presented in pairs. Subjects made a forced-choice decision. as to which was the spider they had previously seen. In a second experiment Watts *et al.*(1986) found that elaboration (that is, describing features of the spider aloud) made no difference to recognition accuracy in a forced choice design , though there was a non-significant trend for phobics to be less accurate at recognition of big spiders on immediate testing. They also found an inverse correlation between intensity of fear and recognition scores in the elaborated processing condition but not in the ordinary processing condition. Thus the evidence that spider phobics have a poorer recognition memory for spiders than do non-phobics is sparse. Watts *et al.*(1986) nevertheless interpreted their results as suggesting that phobics' level of arousal interfered with elaborated processing. The only condition which reduced phobics recognition scores was the elaborated processing condition and this is seen by Watts *et.al.*(1986) as consistent with the dual process habituation theory (Watts 1979), showing that processing at lower levels of stimulus intensity, being stimulus specific, would benefit from more focusing of attention. That is, if anxiety were to be reduced in the presence of the spider and attention then focused upon it, memory for spiders should improve.

But dead spiders may not be as salient as real spiders and obviously do not

possess volition, which is arguably the characteristic of which spider phobics are most afraid. The overriding emotion produced by the presentation of obviously dead stimuli may be disgust (Watts, 1986) which may have some specific associations with avoidance behaviour. However life-like the pose of the dead spiders, they are unlikely to elicit an identical reaction to that of spiders known to be alive. Bennet-Levy and Marteau,(1984) have shown that in the case of fear of certain animals (e.g. cockroaches, snakes, lizards, spiders, grasshoppers, rats.) it is sudden movement which is most fear-inducing. One possibility is that in the Watts *et.al.* (1986) experiment, phobics may have been processing less efficiently because of the element of disgust with regard to the dead spiders (though no such processing bias was found in the Stroop experiment reported in chapter 4), where a moving spider may have elicited more vigilance-inducing fear and may have been more meaningful.

Watts and Dalgleish (1991) investigated both mood congruent encoding and retrieval effects. In their first experiment half of the subjects were exposed to a live spider and the other half asked to relax. No evidence was found for mood congruent effects. Their second experiment exposed spider phobics and controls to either a live or to a dead spider which remained in the room with them during the experiment (covered up). Recall and recognition of spider related words was impaired in spider phobics in the live spider condition compared to controls, but facilitated in the dead spider condition. It may be that a small increase in anxiety enhances performance while a large increase inhibits it, as it does in many other areas of life (exams, musical performance, public speaking and so on). Anxious people may be using the vigilance-avoidance pattern of information processing, as discussed elsewhere. An alternative explanation is that in the presence of a

live spider, spider phobics divide their attention between the spider and safety seeking. They may not be aware of its features but will be very conscious of its position in relation to themselves and in relation to an escape route. The experiment reported in chapter 6 provides some support for this view.

In a later study (Watts and Coyle 1992), subjects were asked to recognise words in the categories 'spider' and 'baby', which had been previously presented in a recall task. Controls had a higher hit rate than spider phobics overall, but there was a non-significant trend towards a higher hit-rate in spider phobics for spider words, and in controls for baby words. Words to do with the stimulus (cobweb, rattle) were more likely to be recognised than words to do with the response (shudder, maternal).

Testing spider phobics' recognition memory for large spiders, incorporating the key element of movement, would allow a closer match to actual phobic responding and thus lead to a better understanding of the processing of spider features by spider phobics. This is what was done in the present experiment. Based on Watts *et al.*(1986), it was hypothesised that spider phobics would show no difference in recognition memory for phobic stimuli which includes the element of movement as this is an extremely salient feature for spider phobics and may form a large part of the overall meaning which spiders have for spider phobics. In chapter 3 it was shown that movement characteristics form a large part of the perceived features of spiders on the part of spider phobics. Any possible effects of cognitive avoidance would be neutralised by the addition of movement. If cognitive avoidance does exist in anxiety as hypothesised by Foa and Kozak (1986), then phobics should show a spider-related memory deficit. Williams *et.al.*(1988) hypothesise that in spider phobics, there may be an

allocation of resources *away* from the threat stimulus resulting in insufficient links to be made and a consequent paucity of mnemonic cues, resulting in a poorer memory. The proposal here is that any effects of an suppression of spider information, if such exists, should be cancelled out by a heightened awareness of spider movement factors at a post-attentive, conscious level. (Although of course if such information is screened out automatically, it may never reach the conscious level).

Watts *et al.*(1986) report that Spider phobics while undergoing treatment are often heard to remark spontaneously that they have "never really looked at a spider until now" Watts *et al.*(1986, p254). The suggestion is that this ought to "affect the quality of cognitive representations of phobic stimuli" (*ibid*) in the associative network (Bower, 1981) resulting in poorer recognition memory for still spiders. However, very few people have really looked at spiders, and spider phobics are more vigilant, more aware of unexpected movement and more sensitive to the sudden appearance of things which share spider features than are non spider phobics. It may be that this set of characteristics associated with spiders is more available to memory processes than the more static feature characteristics discussed so far. They are also more aware of the likelihood of seeing spiders in certain situations, in particular places, and during specific months. There is also evidence form the work on cognitions here that phobics attach more meaning to their phobic objects. Taking all this information into account the prediction here is that a recognition memory task involving the element of movement and context will reveal that spider phobics are no different to non phobics and phobic controls in their recognition memory for large spiders.

## Method

### Design

Subjects were divided on the basis of their being spider phobic, non-phobic or specific-phobic (but not of spiders). They filled in questionnaires to do with state anxiety and avoidance ratings after which the task was explained to them.

All watched 3 short film clips, each of a different spider. During the subsequent recognition test, 3 clips of each of the 3 spiders were shown and subjects required to recognise which of these they had previously seen. The whole sequence was repeated twice making 3 times in all, with 3 different sets of spiders, subjects being asked to recognise 9 clips out of a total of 27.

### Subjects

Subjects were volunteers from a variety of sources including students, members of the public and members of the Welsh National Opera Orchestra. The total number of subjects was 66, of whom 15 were non phobics, 20 were phobic controls and 31 were spider phobics. All the phobics fulfilled DSM-III R criteria for simple phobia and in addition scored above the cut-off point in the Watts and Sharrock (1984) Spider Phobia Questionnaire or the amended General Phobia Questionnaire (as described in chapter 3). The groups did not differ in measures of trait anxiety or depression, nor were they different in a variety of demographic features. Subject characteristics are shown in detail in table 7.1 below

There was no difference in sex ratio between the groups ( CHI-SQUARE [2 df] = 1.743,  $p = 0.418$ ). None of the other comparisons approached significance except where indicated.

Table 7.1 Means of subject characteristics.

Group:	Non Phobic	Phobic controls	Spider phobics
n	15	20	31
Sex ratio (f:m)	12:3	15:5	27:4
Age (years)	26.28	24.1	23.81
Age of onset	.	9	4.09
WQS	5.6 <sup>a</sup>	6.05 <sup>a</sup>	21.68 <sup>b</sup>
Spielberger Trait anxiety	34.33	36.70	40.56
Rozin & Fallon	131.26	130.15	115.06
BDI	4.00	5.65	6.87

<sup>b</sup> =  $p < 0.0001$ . <sup>a</sup> = do not differ.

### Materials

#### Assessment

Questionnaires are exactly as described in chapter 5.

#### Stimulus Items

A video of a variety of spiders (spiders were provided by the department of Zoology) of three hours duration was edited by the experimenter. Spiders include a Zebra Tarantula, a red-kneed Tarantula and a variety of other spiders varying in shape form and size. Clips also differed in form, in that in some clips the spider was static, in some it was extremely active and in yet others it was being handled or crawling over everyday items of furniture.

3 clips of 4 seconds each of 3 different spiders were first put on to tape with a gap of 3 seconds of blank screen between each. There followed a gap of 20 seconds after which the same three clips were repeated in random order dispersed amongst a further 6 clips composed of 2 each of all 3 initial spiders in different positions or engaged in different activities. After this sequence a there

was a 30 second blank screen before the whole sequence was repeated with 3 novel spiders. After the process had been completed again, the screen was blanked for 30 seconds before the sequence was repeated for the third and final time, making a total of 9 clips to be recognised from 27 clips, made up of 3 presentations each of 9 different spiders.

### Presentation Hardware

A Grundig combined VCR and television unit.

### Procedure

Subjects were seated 80cm away from the tv screen. The experimenter sat beside them with the remote control and read out the instructions as follows:

" You will see 3 very short clips of film of spiders. I want you to look closely at them and try to remember everything you can. You will then see 9 short clips. If you think you have not seen them before I want you to say "no", if you think you've seen them say "yes". The backgrounds and the spiders will be the same in a lot of the clips so it is the precise piece of film I want you to remember, not just the spider or the background."

Subjects were asked if they were clear about what was expected of them. If they did not, further explanation was given until the experimenter was confident that the task was understood. The video begun. After the first three clips had been shown the subject was reminded that s/he was to verbally indicate whether or not s/he saw the exact clips again in the following series. The 9 clips - in which were embedded the initial 3 - were shown, with the subject saying either "yes" or "no" depending on whether they recognised the clip or not. Their replies were noted. After the first set had ended, subjects were told that they would now see a different 3 clips and that the procedure was exactly the same. They went through the process two more times in the same way until they had been required to recognise a total of 9 clips out of 27.

Subjects were then given visual analogue scales to complete, as well as a Spielberger State Anxiety Index.

### Treatment of Data

In line with the Watts, Trezise and Sharrock (1986) experiment, signal detection methodology was to be used in analysing the data so 'hits' (H) and 'false positives' (F) were collected. Sensitivity was calculated as a measure of the discrepancy between the hit rate and the false positive rate using the formula

$$d' = z(H) - z(F).$$

(z was computed by consultation of appropriate table from Macmillan and Creelman's (1991) Detection Theory: A User's Guide.)

When observers cannot discriminate at all,  $H=F$  and  $d'=0$ . Perfect accuracy implies an infinite  $d'$ . The largest possible *finite* value of  $d'$  depends on the number of decimal places to which H and F are carried. When  $H=.99$  and  $f=.01$ ,  $d'=4.65$ . This is considered an effective ceiling. Correct performance on 75% of trials corresponds to a  $d'$  of 1.35, 69% to  $d' 1.0$  and so on.

The basic bias measure  $c$  (for "criterion") was calculated by using the formula

$$c = -0.5[z(H) + z(F)]$$

and the resulting transformations used to calculate  $\log \beta$  by using the equation

$$cd'$$

So, the criterion location relative to the zero bias point,  $c$  is multiplied by  $d'$  to obtain the likelihood ratio measure  $\log \beta$ .

## Recognition Results

### Overview

Scores obtained from spider phobics, other phobics and non phobics were compared using signal detection analyses in order to examine whether spider phobics were different to the other two groups in their ability to recognise previously encountered moving spider stimuli. Results show that spider phobics are no different from normal controls and phobic controls in their ability to recognise live spiders on video during a recognition memory task.

### Manipulation check

#### State anxiety scores

The difference in state anxiety scores between the groups was examined in order to explore the possibility that anxiety may effects recognition accuracy. A two way analysis of variance was carried out on Spielberger state anxiety score data obtained immediately before and immediately after the recognition test. The analysis of variance used one between group factor of group (spider phobic or non spider phobic) and one within group factor of time (before and after the trial).

There was a significant overall effect of group ( $F_{2,63}=26.67$ ,  $p<0.00001$ ). The overall effect of time was not significant ( $F<1$ ). The higher order interaction of group x time was also not significant ( $F<1$ ). These results show that spider phobics were significantly more anxious than the control group both before and after the recognition task, but that they were not significantly more anxious after the trial than before it, while controls and other phobics showed no difference in anxiety from each other or before and after the trial.

### Recognition Memory Scores

Recognition memory scores -hits and false positives- obtained by spider phobics, phobic controls and non phobic controls were compared. Means for all groups are shown in table 7:1 along with standard deviations and state anxiety scores. A one way analysis of variance was carried out with one between group factor (control, phobic control or spider phobic). There was no effect of group ( $F < 1$ ). A further analysis was carried out using false positives as the within group factor. Again, there was no effect of group ( $F_{2,63} = 1.17, p > .1$ ). These results indicate that there are no differences in the three groups' ability to discriminate between spiders in a recognition task.

Table 7:1 Mean scores, hits and false positives and state anxiety scores

Group	Hits	False positives	State anxiety
Non phobics	6.80 (1.21)	2.07 (1.71)	27.28 (7.87)
Phobic controls	7.15 (1.04)	3.60 (3.47)	31.40 (9.94)
Spider phobics	6.81 (1.19)	3.13 (3.10)	51.13 (14.54)

### Signal Detection

In order to ensure that there was no difference between groups in response bias and criterion, data was converted to  $d'$  and  $\log\beta$ . This is to ensure against the possibility that one of the groups may have a different set of response characteristics, with  $d'$  measuring true perceptual sensitivity and  $\log\beta$  measuring bias or criteria the threshold set by the individual for decision as to whether

something is perceived or not.

Means of  $d'$  and  $\log\beta$  scores for each group are given in table 7:3.

Table 7:2 Means of  $d'$  and  $\log\beta$  scores for each group

Group	Mean $d'$ Scores	Mean $\log\beta$ Scores
Non phobics	2.40	0.09
Phobic controls	2.16	0.05
Spider phobics	1.98	0.06

A one way analysis of variance was carried out on  $d'$  scores. There was no significant effect ( $F < 1$ ), indicating that spider phobics were no different from the other two groups in their hit/false positive ratio. As a check on criterion bias  $c$  was computed and a one way analysis of variance carried out. Again, there was no significant effect of group. As a final check to ensure that there was no difference in criterion and bias sensitivity, and in keeping with Watts' (1986) analyses  $\log \beta$  was subjected to an analysis of variance. Again, there was absolutely no difference between groups ( $F < 1$ ).

This analysis indicates that spider phobics are as accurate as non spider phobics in recognising spider stimuli, when that stimuli approximates real life more nearly, even when their anxiety levels are very much higher. Anxiety levels in phobics did not correlate with recognition accuracy.

### Discussion

The results from the present study do support the hypothesis that in a recognition task using moving spiders, spider phobics would be no different from non phobic or other phobic controls in their accuracy. Spider phobics were as good as other phobics and non phobic controls in recognising brief video clips of spiders. They were no different to controls in their sensitivity to the video stimuli or in their

decision criteria.

Previous work to do with memory has indicated that spider phobics may have a poorer recognition memory for large spiders but a better recognition memory for small spiders (Watts, Trezise and Sharrock 1986). The present results do not support this finding, nor do they support the results in a study by Watts and Coyle (1992) which indicated that spider phobics were marginally (but not significantly) better at recognising spider words than were controls. Watts' and Coyle's (1992) contention that spider phobics are significantly better at recognising stimulus words than response words was not addressed here.

Watts (1986) has suggested that some of the resultant inaccuracy for recognition of large spiders in his study may have been to do with the disgust elicited in spider phobics by the sight of large dead spiders, which is presumably less in the case of small dead spiders. Disgust has been shown in chapter 4 not to be of particular attentional significance in spider phobics' processing of information but may be a consequence of the phobia. Phobic disgust in any event does not appear to consist of the same elements as more conventional disgust, being more to do with fear of harm than with the fear of contamination .

The present experiment attempted to remove any remaining elements of doubt by using live, moving, spiders, albeit at one remove from reality on video. Movement is an extremely salient part of spider-experience both in phobics and in non-phobics. Words to do with movement are among the most reported spider characteristics (see chapter 4). This type of stimulus material may also be closer in meaning to real-life stimuli than semantic stimuli can be. Semantic stimuli may be pre-phobic in their effect. They may work in the same way that a verbal warning of a dangerous situation does in making phobics aware that there may

be imminent danger. This is different to being in a dangerous situation.

The spider phobics participating in the present experiment found it very aversive. Many had difficulty in looking at the screen and could only glance at it momentarily before covering their eyes again. In spite of this handicap they were as accurate in recognising the clips as were the more complaisant control groups. This suggests that if the element of movement is included spider phobics have the potential to be more accurate at recognition tasks than non spider phobics. A way of clarifying this might be to test the recognition memory of treated spider phobics.

There are some differences between the methods used in this study and those used in previous studies which might account for the different results. Because of the distinctiveness of the stimuli it was necessary to show three clips initially followed by nine clips in which the three were embedded. As each clip was matched with two others showing the same spider in a slightly different context there was a large amount of detail available to aid the memory. This may have resulted in multiple cues. Spider phobics may have a more elaborate internal representation of spiders than non-phobics, including information about response and stimulus characteristics. Visual, quasi-realistic stimuli may also activate related schema more easily than semantic stimuli as they are closer to the kinds of danger phobics encounter in life. As many of the memory cues as possible were identical in each of the three clips from which the choice had to be made, but there may still have been a facilitation effect of realistic stimuli during the task in a way which is not possible with single word stimuli. Similarly, various techniques to aid the memory could have been used here, such as visual imagery, which are not available for use with lists of words. The task itself is one which

is common in daily life (when trying to remember where one has put something for example), where remembering a list words is not, except under exam conditions.

Another difference between the study reported here and other studies lies in the time span, with subjects in the present study required to recognise stimuli as soon as the three clips had been shown, while they were watching the nine possible choices shown immediately after the three target clips. This is different from previous work in which there has usually been a filler task following initial stimuli presentation.

Because of the nature of most emotional disorders, (that is, to do with thoughts and interoceptive cues) experimental emphasis has been on words as being the hinges of these thoughts. Phobias are unique in providing a concrete set of stimuli with which to work. These can be assessed independently and objectively and can provide comparisons untainted by the ambiguity inherent in semantic stimuli. They are also more meaningful in that they contain much more information, from a variety of sources, than single words can ever do. Cognitive avoidance is presumed to operate in circumstances where anxious people wish to allay anxiety by methods such as distraction. In phobics this does not seem to be the case, although it would take a further study to disentangle the elements of avoidance and vigilance mentioned here as possible elements of the phobic response to a life-like stimulus. Williams *et al.*(1988) have suggested that cognitive avoidance may be an inappropriate concept to apply to animal phobia, but if it is,as they suggest, an immediate suppression of information following on from the automatic attention response by anxious people to threat stimuli, it is difficult to see how this could be an effect specific to one subclass in anxiety

disorders. If this is the case, then what they are suggesting is that any avoidance may depend on the *appraisal* of the context or meaning of the situation.

In this instance the results suggest that phobics are neither impaired nor facilitated in memory recognition performances with regard to stimuli relating to their phobic object. The implication is that spider phobics do not avoid processing information about their phobic object, and that their internal representations of spiders are as rich in meaning (as found in chapter 3 and 4) and escape features (chapter 6) as in information about their physical construction. In order to explore this further, and in order to explore spider phobic's memory for spiders in more detail with regard to the relative importance of spider features, movement and meaning it was felt that a memory recall task which was set in the meaningful context of real-life situations might highlight any differences not detected by the experiment under discussion. Such a test is the subject of the next chapter.

## CHAPTER 8:

### A TEST OF THE FREE RECALL OF SPIDER INFORMATION

#### Introduction

The findings of the previous chapter support the hypothesis that spider phobics are no different to non phobics in their ability to remember spider information. There is no evidence to suggest that phobics suffer from deficit of information about their phobic object which reinforces their fear responses due to their perceiving threat when there is none. The evidence from chapters 3 and 4 seems to suggest that for a phobic, their phobic object is rich in high-level, generic meaning and it is this which is implicated in the maintenance of their phobia. In this thesis it is hypothesised that it is the meaning of an event in context which elicits anxiety responses rather than its imperfect internal cognitive representations (Teasdale and Russell, 1983). This meaning is an emergent property of a variety of mental processes including memory, and it is this which is the subject of the study reported here.

The previous chapters have provided some support for the idea that an attentional bias towards threat exists in spider phobics, as well as a more elaborate set of beliefs concerning spiders than may be found in non-phobics. The previous chapter explored the recognition memory of phobics for phobic stimuli including the element of movement. The experiment under discussion here will attempt to discover if this is also true of spider phobics when they are asked to recall spider information without cues.

The history of recall memory experimentation is slightly different to that of recognition memory so there follows a discussion of the principal experiments carried out to do with this subject, along with its rationale in terms of a

theoretical framework.

A study by Eysenck, MacLeod and Mathews,(1987) showed that subjects high in trait anxiety show a significantly greater bias towards the recall of the negative spelling of one of a homophone pair (eg.dye,die) than do low trait anxiety subjects, suggesting that people store incoming words with regard to their semantic content (as proposed by Light and Carter-Sobell,1970) and to personal salience. Memory bias has been found in a variety of clinically anxious patients including agoraphobics (Nunn, Stephenson and Whalan, 1984) and panic patients (McNally, Foa and Donnell, 1989; Norton, Schaefer, Cox, Dorward and Wozney, 1988). Other studies have failed to find evidence (Mathews and MacLeod, 1985; Mathews, Mogg, May and Eysenck,1989; Mogg, Mathews and Weiman, 1989). Watts, Trezise and Sharrock (1986) have hypothesised that this memory bias is due to a relative lack of focused attention and that this is evident in spider phobics (who often claim during treatment that they have never really looked at a spider before, as discussed in the previous chapter) who tend to have less elaboration of phobic information and, consequently, a paucity of cognitive representations to do with spiders. This is also hypothesised to effect the quality of phobic cognitions, due to less elaboration of spider knowledge (Watts and Sharrock, 1985) which would effect the depth of semantic processing in the associative network and lead to a lessening of recall ability. Methods used to explore these issues have been mostly to do with looking at lists of words, or being presented with them aurally, and being subsequently asked to recall as many as possible, often with an intervening distracter task.

Possible problems with this paradigm include the ambiguous relationship between semantic and real-life stimuli; the impossibility of screening subjects for

idiosyncratic word-usage; some people may be more practised at remembering lists than others and it is difficult to gauge the extent to which semantic stimuli are appropriate in representing the essentially physical stimuli which are the concern of small-animal phobics.

Watts and Dalglish (1991), in an experiment designed to test recall memory for spider words in spider phobics, found that spider phobics were better at recalling control words than spider words. However, they also found that the same effect occurred in controls. Watts *et.al.* argue that control subjects could recall more spider words than could spider phobics, but only when in the presence of a live spider, that is, when the spider phobics' state anxiety was high. Unfortunately, the way the statistical analysis was carried out makes it difficult to support such a conclusion. They suggest that it is not clear whether the anxiety needs to be aroused specifically by the spider or whether other anxiogenic material could result in a similar bias. Spider phobics recall was accompanied by a high rate of spider-related intrusions, which Watts and Dalglish suggest is due to a failure to encode the exact words used which results in the use of a category-based method of recall. They propose that this may provide evidence of cognitive avoidance where it was shown that words to do with objects causing the anxiety and words to do with the response to the objects are less well recalled and better recalled respectively than control words. One of the problems with such an experiment is to do with the possible complicated interaction of the spider words, with the actual object in the room. It seems likely that, rather than suppressing spider words, the attention of phobics could have been drawn away from the words and towards the live spider which is clearly more threatening than the words.

In a second study (Watts and Coyle 1992) a different pattern of results emerged

when subjects were asked to recall spider and baby words. In this case the two categories of words were further divided into the sub-categories of 'stimulus' and 'response' words, in order to try to discriminate between phobic responding to these two features of the "emotion prototype" (Lang 1984). Stimulus words were such as 'jaws', 'cobweb', 'smile', 'gurgle' and response words were such as 'scared', 'shock', 'comfort', 'cooing'. Spider phobics in this study were no different from controls in their recall of spider words, but significantly worse in their ability to recall baby words. Stimulus words were better recalled than response words and this was more evident in the spider words. Watts and Coyle suggest that this may be due to a general impairment in recall, perhaps due to anxiety, which shows a bias towards the recall of spider words. They propose that anxiety was impairing their performance overall. However, it is difficult to see why the earlier results have not been replicated; this failure to replicate casts further doubt on the Watts and Dalgleish study. In a yet further experiment (Watts and Coyle 1993) spider phobics were found to not differ at all from controls in the recall of spider words. There was some evidence (an almost significant trend) that spider phobics were relatively impaired in the recall of words relating to the anxiety response compared to words relating to spider features. Again, statistical difficulties introduce an element of ambiguity in such an interpretation.

These studies have been interpreted by Watts as evidence for a specific and automatic repression of information. For example Watts and Coyle (1993) suggest that there exists "a cognitive mechanism whose purpose is mood repair" (p373). Further experimental studies are required to clarify these apparently contradictory findings.

In a prose recall task, Rusted and Dighton (1991), found that spider phobics were

more likely than non-phobics to recall spider-related information embedded in a meaningful text. This may be because of the relevance of the ideas expressed to actual experiences with which the spider phobics would be familiar ("something wispy (sic) brushed against Pete's face", "something ran over his finger") and points to a difficulty with research so far: testing recall for single words may be different from testing recall of concepts, or different from recall of real spider features. Rusted's and Dighton's test places the spider information in a meaningful context for the phobics.

Movement, as a feature inextricably entwined with the concept of "spider", is extremely salient and not captured by single words, though the prose passage does suggest movement effectively. Nevertheless, as spider phobics often report fear of the unpredictability of movement as one of the most threatening cognitions, and this information appears to be more highly elaborated than other spider features by the very nature of its salience *in vivo*, incorporating movement as an element in the recall task may possibly elicit another pattern of results. The experiment described in the previous chapter showed that recognition memory for spiders is not impaired in spider phobics. Such a finding is consistent with the view that cognitive avoidance may not be a feature of spider phobia. However, it could still be argued that spider phobics avoid details other than movement because they were attending to relevant detail and avoiding irrelevant detail.

Consequently, the present experiment is designed to test this possibility by examining the different spider characteristics (i.e. movement, features) remembered by phobics. If cognitive avoidance does exist in spider phobics then it will prevent their efficient recall of features to do with static qualities like

shape and colour, information which has no survival value for phobics (unless they are aware of the markings of very venomous spiders). The suggestion here is that the meaning of the spider for the spider phobic is to do with all the information available, including information to do with movement, background, features, emotional responses and so on, and that if this is the case then spider phobics should not suffer from memory deficiencies with regard to spiders or at least if they do, this should only be with regard to features like colour or shape. As cognitive effects of anxiety are shown most clearly when state anxiety is elevated (MacLeod and Mathews, 1989; Watts and Dalgleish, 1991) the stimuli used were of sufficient salience to elicit usefully elevated anxiety responses from phobic subjects. The hypothesis is therefore that spider phobics will be no different from non phobics in their recall of spider information.

## Method

### Design

Subjects were divided into three groups: non phobics, specific phobics (not spiders) and spider phobics.

All watched 14 short clips of film of spiders. After each clip the film was stopped while subjects wrote down everything they could remember about the clip they had just seen. Once they had finished writing, the film was restarted and the next clip shown.

### Subjects

Subjects were exactly as described in chapter 7.

## Materials

### Assessment

Questionnaires were exactly as described in chapter 5.

### Stimulus Items

A video of a variety of spiders (spiders were provided by the department of Zoology) of three hours duration was edited by the experimenter. Spiders include a Zebra Tarantula, a red-kneed Tarantula and a variety of other spiders (mostly tarantula but with one more common house spider with striped legs) varying in shape form and size. Clips also systematically differed in form, in that in some clips the spider was static, in some it was extremely active and in yet others it was being handled, crawling over everyday items of furniture, still, in a box with soil or climbing up curtains. 14 clips of 10 seconds each were edited onto another tape, each clip being followed by a blank screen.

### Presentation Hardware

A Grundig combined VCR and television unit with a 14" screen.

### Procedure

Subjects were seated 80cm away from the tv screen. The experimenter sat beside them with the remote control and read out the instructions as follows:

'You will see fourteen short clips of film. After every one I will stop the film while you write down everything you can remember about the clip you have just seen. For instance, the background, colour, movement, texture, size and so on, in short sentences or single words.'

The trial began, with the experimenter stopping the film after every clip and only continuing when told to do so by the subject.

After 14 clips had been seen, subjects were given visual analogue scales to complete, as well as a Spielberger State Anxiety Index.

### Treatment of Data

#### Recall data scores

Data from each category was collected by allocating one mark for each piece of detail recorded under each of the following headings

Name Movement Background Appearance Evaluation

and means obtained for each group.

#### Protocol for marking data

Markers were given the following instructions:

"Read through the following descriptions. As you go through them give one mark for each mention of a particular feature under one of the following headings:

Name / Movement / Background / Appearance / Evaluation

Name: if 'spider' or 'tarantula' is written down give one mark.

Movement: give one mark for each adjective and noun to do with movement eg: 'crawling fast' would be given two marks while 'scuttling' or 'still' would be given one mark.

Background: give one mark for each adjective and noun to do with the physical environment. eg 'table' or 'chair' would be given one mark each, while 'orange chair' would be given two marks.

Appearance: give one mark for each adjective and noun to do with the physical appearance of the spider itself.

Evaluation: give one mark for each value-judgement. eg 'ugly' or 'evil'."

## Recall Results

### Overview

A previous study (Watts and Dagleish 1991) has shown that in a free recall memory test using spider words, spider phobics recall fewer words than do normal controls, though only in the context of a live spider. The present experiment using moving visual stimuli found that spider phobics were no different to other phobics and normal controls in their ability to recall both appearance and movement information about spiders on film. They were no more likely to make evaluative comments despite a difference in state anxiety.

### Recall scores:reliability of markers.

An independent marker was given a marking protocol and the written descriptions of 12 subjects chosen at random. Mean scores for each category (name,appearance, movement,background and evaluation) were collected and were compared with those of the main marker. Concordance rate was very high, with no differences being found between markers in any category.

Name	: p < 0.9081
Appearance	: p < 0.9498
Movement	: p < 0.9790
Background	: p < 0.9796
Evaluation	: p < 0.9369

### Recall data scores

Data from each category was collected by allocating one mark for each piece of detail recorded under each of the following headings

Name / Movement / Background / Appearance / Evaluation

and means obtained for each group. Means are shown in Table 8:1 along with concomitant state anxiety scores and standard deviations. One way ANOVAS were carried out and all F values were less than one ( $F < 1$ ). There were no significant differences between groups in their recall of the number of features in any of the descriptive categories. In order to check that there was no difference in the total number of features recalled, a one way ANOVA was computed with the scores in each of the categories totalled. There was no difference between the groups ( $F < 1$ ).

Table 8:1 Mean scores for recall in each category and state anxiety. Standard deviations in brackets.

Group	Name	Movmnt	Backgnd	Appear	Eval	Anxiety
Non phobic	10.60 (4.95)	16.53 (8.93)	21.67 (7.02)	29.33 (14.09)	1.40 (2.61)	26.87 <sup>a</sup> (6.7)
Phobic cont.	9.55 (5.60)	17.15 (10.80)	22.25 (12.10)	33.05 (14.28)	1.95 (2.50)	30.30 <sup>a</sup> (10.8)
Spider phobic	11.00 (6.59)	18.43 (8.29)	21.70 (9.62)	33.83 (13.82)	2.73 (5.20)	49.15 <sup>b</sup> (15.3)

<sup>a</sup>= not different to each other, <sup>b</sup>= different to others  $p < 0.0001$ .

A post hoc analysis of the data obtained from the most frightening spider video clip (as ascertained in de-briefing afterwards) was carried out. A one way ANOVA was computed. There was no significant between the groups in the amount of detail remembered. ( $F < 1$ ).

State anxiety scores

In order to examine the differences in state anxiety in case of any connection between anxiety and recall accuracy, both between and within the groups a two

way analysis of variance was carried out on Spielberger state anxiety score data obtained immediately before and immediately after the recall experiment. The analysis of variance used one between group factor of group (spider phobic or non spider phobic) and one within group factor of time (before and after the trial).

There was a significant overall effect of group ( $F_{2,63}=24.64$ ,  $p<0.00001$ ). The overall effect of time was significant ( $F_{1,63}=4.9$ ,  $p<0.05$ ). The higher order interaction of group x time was not significant ( $F=1.19$ ). These results show that spider phobics were made significantly more anxious overall than the control group and other phobic group both before and after the recall task, and significantly less anxious after the trial than before it, while controls and other phobics showed no difference in anxiety from each other either before or after the trial or over time. Lack of result again cannot therefore be attributed to insufficient generation of anxiety by the situation with regard to the spider phobics.

### Discussion

This study was designed to extend the finding of the previous experiment on recognition memory. The use of free recall allows the evaluation of memory effects for different categories of information (i.e. movement and appearance). In particular, it addresses the possible differential roles in memory of cognitive avoidance and of vigilance in relation to a highly threatening object and of the implications this has for the importance of meaning in the response to threat. Previous research, as noted in detail in the introduction, has found that in free recall tests subjects are poorer at recalling emotionally pertinent material than

personally irrelevant material. This has been hypothesised as being to do with cognitive avoidance resulting in a failure of focused attention, and consequent impoverishment of feature encoding and paucity of imagery. This is conceptualised as having to do with cognitive avoidance, as described by Foa and Kozak (1986).

The results of the experiment described here do not support this. They do not support the findings of Watts and Dalglish (1991) and Watts and Coyle (1992) who looked at recall memory for spider words in spider phobics. In the first of these experiments, spider phobics showed significantly less free recall for spider words than for control words. In the second, spider phobics were shown to be poorer at recalling spider words than were control subjects. This is not supported by the findings reported in the present study and neither is the finding of Rusted and Dighton (1991), who showed evidence for enhanced recall of spider related material by spider phobics in a prose recall task. They suggested this was an indication of a strategic attentional bias and of the influence of "cognitive preoccupation" on text processing. The evidence described here supports neither the cognitive avoidance nor the cognitive preoccupation hypothesis.

There are many possible reasons for the discrepancy between previous and present results and an attempt will be made to highlight these here. The recognition experiment in chapter 7 was not concerned with semantic stimuli but with the video images of real movement by a real spider. This type of stimulus is probably as close as it is possible to get in a laboratory memory task to a lifelike situation, given ethical and humane constraints. Real spiders *in vivo* could not be used, though this was considered. Getting them to perform the same sequence of events on demand over a period of weeks was, of course, impossible.

The possibility of using similar spiders running around in a transparent bowl was considered, but as it was movement in a naturalistic setting which was the object of study this idea was discarded. Another difference between this study and the others described is in the immediacy of the recall required. In the Watts and Dalgleish (1991) experiment subjects were required to do a filler task for twenty minutes in the first and two minutes in the second experiment. In the Rusted and Dighton (1991), subjects were given a four minute distraction task before writing down what they could remember, then another four minute distraction before writing from the perspective of a burglar. In the study under discussion subjects were asked to write down what they had seen as soon as the film stopped. This demand for immediate recall may call upon different strategies than a more delayed recall test, though this is unlikely and there is no theoretical basis for this assertion. Subjects were also able to write for as long as they felt was necessary instead of within a time limit. Neither were they in the presence of a live spider as in the Watts and Coyle experiments (1992, 1993). They *had* been in the presence of a Tarantula in the twenty minutes before commencement of the experiment, for the duration of the reaction time experiment described in chapter 6, but this was removed before the experiment began.

As has been stated, in the second paper by Watts and Coyle (1993) a pattern of results emerged which was different from the Watts and Coyle (1992) results. Phobics were better than controls at recalling words to do with their phobia both in the stimulus and response categories. The present experiment did not look at responses but did address the question as to the relative ability of phobics to recall movement and feature words compared with non spider phobics. According to the cognitive avoidance hypothesis, the processing of threat stimuli

and a consequent suppression of anxiogenic material would lead to a deficit in memory with regard to spider features. Here it was proposed that vigilance to spider movement, seen as more meaningful, might enhance recall of spider movements or position. Again, spider phobics were no different from controls and other phobics in the number of items recalled in either of these categories. On this evidence, neither cognitive avoidance or preoccupation seems to be shaping the memory efficiency of phobics.

So, results are not consistent with a hypothesis that phobic anxiety leads to a bias towards recall of phobic words as suggested by Watts and Coyle (1993). Differences in the design and the stimuli may account for this apparent contradiction but it is clear that further research using realistic, if not real, stimuli would be useful in resolving some of the discrepancies. For instance, it may have been useful to ask participants in the reaction time experiment (see chapter 6) to write down everything they could remember about the Tarantula which had been in the room with them for a total of 20 minutes. As was shown in the results of that experiment, attention was being directed towards the spider by the spider phobics but it is not known whether they attended to the spider features in any detail. This may have been useful in determining whether cognitive avoidance come into play after an initial hyperattentive phase, as suggested by Foa and Kozak (1986).

As reported in the previous recognition experiment, nearly all the spider phobics proclaimed themselves revolted by the pictures and some only looked at the screen for an extremely short time. It is remarkable under these circumstances that they were able to remember as much detail as the control groups who gazed unflinchingly at the scenes for the full ten seconds. This may be because spiders

are extremely meaningful for phobics and that this provides an emotional imperative which drives the information into memory configurations which are easily accessible subsequently. Further evidence for this is that spider phobic state anxiety levels, though significantly higher than that of the control groups did not seem to be inhibiting memory processing as might have been expected. It is known that anxiety can be either facilitative or debilitating in concordance with the amount of anxiety aroused and the personal relevance of the task. Mogg Mathews and Weinman (1987) have also suggested that biases operate differently depending on the level of processing so that anxious subjects may show attentional vigilance initially but may inhibit further processing through a cognitive avoidance strategy. The present finding is not consistent with a theory of cognitive avoidance in phobics. This may be to do with the nature of the stimuli in phobic disorders : it may be useful to avoid a negative thought where it is not useful to ignore a marauding spider if physical damage or personal invasion is believed to be the consequence.

In summary, the results suggest that cognitive avoidance of real life stimuli in phobics is unlikely to have ecological validity, but further research is needed before any unequivocal statement can be made about free recall in phobias. Neither is there any evidence whatsoever for a processing bias of any inhibitory kind to do with memory storage and retrieval in spider phobics.

The results are unequivocal: spider phobics are no different from other phobics or non phobics in their ability to recall details about a spider when that spider is seen in a situation which is meaningful and threat-relevant.

## CHAPTER 9:

### THE EFFECT OF ONE-SESSION TREATMENT ON ATTENTIONAL BIASES AND BELIEFS.

#### Introduction

The primary aim of most research into the processes which may be involved in the maintenance of phobias is to improve treatment. Studying the effects of treatment on such processes has two main aims (i) to distinguish between passive consequences of the disorder as opposed to factors actively involved in its maintenance by looking at automatic and strategic attentional mechanisms and (ii) to identify those factors most closely associated with change in order to help re-focus treatment strategies. This thesis has proposed that it is the meaning of a situation or stimulus which will be of prime importance in the changing of emotional status and that meaning is an emergent property of the strategic processing of information. A test of this would be to examine belief change in relation to behavioural improvement and a reduction in intensity of measures of fear and avoidance.

Despite the large amount of research carried out in recent years on the effect of attentional bias and memory processes in anxiety disorders, little is known of the changes in these processes and their products (beliefs) after successful elimination of the anxiety by treatment. Such work as has been carried out has been unable - with a few notable exceptions - to distinguish between a lessening of fear responses *per se* as opposed to a lessening of a general preoccupation with the phobic object. A recently recovered phobic patient may still be preoccupied with their phobic object or situation, but the meaning attached to it will have changed and the anxiety which previously accompanied thoughts about the phobic object,

or confrontations with it, will have ceased. If this is the case it may not be possible to use tests of attentional bias as diagnostic aids as was initially and optimistically proposed by a variety of clinical researchers. It was thought that this might be a useful area of research and processing bias was found in a number of anxiety disorders (Williams, Watts, MacLeod and Mathews, 1988). These include panic disorder (McNally, Riemann and Kim, 1990), generalised anxiety disorder (Butler and Mathews, 1983; Mathews and MacLeod, 1988; MacLeod, Mathews and Tata, 1986), obsessive-compulsive disorder (Foa and McNally, 1986) post-traumatic stress disorder (McNally, Kaspi, Riemann and Zeitlin, 1990), social phobia (Hope, Rapee, Heimberg and Dombeck, 1990; Stopa and Clark, 1993) and spider phobia (Watts, McKenna, Sharrock and Trezise, 1986; Lavy, van den Hout and Arntz, 1993).

Phobic beliefs about their phobic object have often been explored during treatment but research in this area has been mainly confined to the thoughts associated with impending harm in panic and agoraphobia (Clark, 1986; Chambless, Caputo, Bright and Gallagher, 1984; Butler and Mathews, 1983) though a paper by McNally and Steketee (1985) looks at cognitions in a variety of animal phobics (see chapter 3 for detailed discussion) Treatment studies by Foa and McNally (1986), Watts *et.al.*(1986) and Lavy *et.al.*(1993) attempted to show that attentional bias can be altered by treatment. However, in Foa's and Watts' studies the effect of therapy on the attentional biases (as measured by the Stroop) may have been confounded by a number of factors, including a mixture of imaginal flooding and *in vivo* exposure over a period of weeks, along with between-session work carried out by the patient alone and a general lessening of preoccupation and personal relevance. In the Lavy *et.al.* (1993) study, the control

group used was non-phobic and therefore did not have an attentional bias to be changed in the first place. It is difficult in these instances to separate the effects of treatment specifically to do with the fear, to do with the gradual attenuation of preoccupation, and to do with personal salience. As the feared stimuli lose importance, mood also improves due to a variety of factors perhaps including heightening of self esteem and a lessening of anxiety, so pinpointing the fulcrum of change in either beliefs or attentional processing becomes more difficult over time.

Lavy *et.al.* (1993) attempted to deal with this difficulty by using one-session treatment as devised by Öst (1989) but they did not use spider phobics as a control group. They suggest that it is exposure which is the crucial component in the reduction of attentional bias as it facilitates the gathering of corrective information. They also cite Foa and Kozak's (1986) theory of emotions as networks in memory structures which include information about the exteroceptive and interoceptive cues as well as their meaning for the individual and say that these serve to trigger the escape/avoidance behaviours which in turn maintain fear. The processing of information inimical to these structures helps both in their deconstruction and in the creation of new structures which do not have the same links with fear. During exposure, the fear network is totally activated and incompatible information is processed to its fullest extent. Watts, Trezise and Sharrock (1986) have suggested that cognitive avoidance interferes with this processing of incompatible information but Lavy *et.al.*'s (1993) are inconsistent with this, and the experiments described here have been unable to confirm this also. If exposure does activate the fear network in this way, negative beliefs should show an immediate shift towards the positive.

Lavy *et.al.*(1993) gave 36 spider phobics and 30 non-phobic controls a Stroop test both before and after a two hour period during which the spider phobics were given one-session treatment for their phobia. In one of the phobic groups cognitive avoidance was discouraged by asking the subject to talk about the spider as much as possible focusing on real, non-evaluative information (elaboration), while the other group was not asked to do this. There were no differences in treatment outcome though those in the elaboration group remembered significantly more spider details than did those in the non elaboration group, suggesting that it is not the focusing of attention *per se* which aids recovery but the emotional processing and a consequent change in its meaning.

On the Stroop task in Lavy's *et.al.*(1993) experiment, before treatment spider phobics but not controls showed significantly more interference in response to spider words compared to neutral and general negative words. After treatment this interference effect decreased significantly in the phobic group. There was no difference in the interference effects of spider words between the elaboration and non-elaboration groups.

This study, while very interesting, has some methodological problems. First, the control group, having no fear of spiders, could not show any change. Any change noted in spider phobics could be attributed to test-retest effects as the population was different in this vital way. Second, the phobics filled in questionnaires to do with spiders before the Stroop test and were aware of the nature of the experiment. They were also about to undergo treatment for their spider phobia and as such might be expected to be particularly preoccupied by thoughts of spiders, almost to the exclusion of all else. Spider words are also particularly self-relevant to phobics. The control group were not aware of the experimental

thrust and were not required to fill in questionnaires until after the experiment had ended. Priming effects cannot therefore be discounted.

Third, though the spider-word interference is reported to be significantly decreased after treatment in the spider phobic group, it is not reported whether this interference was different to or the same as - the change in interference shown by the control group. The study did not examine the cognitive correlates of fear responses either, which may have changed in significant ways and may have illuminated the cognitive component of Foa's and Kozaks's (1986) network. The present study was designed to test the hypothesis that these fear structures, when removed, will result in the elimination of attentional biases and further, that the deconstruction of the fear network in memory structures will affect the cognitive products of this information processing in the form of a shift in the generic meaning of the phobic object in the mind of the phobic as manifested by a change in beliefs and fear intensity.

The questions to be answered were as follows:

- i) Does brief treatment (i.e. under 3 hours duration) produce a significant change in attentional bias as measured by the Stroop, relative to non-treated controls?
- ii) Does brief treatment modify phobic beliefs?
- iii) Is either type of cognitive change related to clinical outcome?

The first question raised is related to information processing. If the interference effect is threat specific, then there is likely to be more change in the treated group than in the control group. If the effect is due to self-relevance or emotionality, there may be an increase in interference after treatment.

## Method

### Design

In order to test the hypothesis that any attentional bias as measured by the Stroop is due to a specific fear of a phobic object, rather than to a preoccupation with a phobic object, it was decided to test spider phobics before and after one session treatment on two key types of measure i.e. the Stroop test and conscious cognitions. As the experiment in chapter 5 has shown that spider phobics and not controls were relatively slower to respond to spider related words than to neutral or emotional controls it was felt unnecessary to use non spider phobics as controls in this instance. In order to check for test-retest effects, spider phobics were used as controls to ensure that any change after treatment was due to the fact of their not being phobic any more, rather than to a practise effect or to a reduction in general anxiety to do with performance or anticipation. Subjects were randomly assigned to one of two groups, treatment or control. Controls were given questionnaires and the Stroop test was administered. These questionnaires included the phobic belief questionnaire as another important part of the experimental purpose was to examine changes in beliefs before and after treatment and the relationship between the amount of this change and the depth of improvement. After filling in these questionnaires, control subjects then went away for 3 hours before returning to fill in more questionnaires, to do the Stroop again and to undergo one session treatment. After being treated they were tested again on the Stroop and questionnaire measures. At follow up a week later, the treated phobics completed questionnaires and underwent another Stroop test. The other group - the treatment group - followed the same procedure except for the initial testing. Their involvement began with the pre-treatment testing, after

which the same sequence of events unfolded as described above.

### Subjects

Subjects were recruited by posters in the local library, the regional health authority and in the local branch of Marks and Spencers department store. There were 25 in all and subject characteristics are shown in detail in table 9:1 below. All subjects scored well above the cut off point for spider phobics as defined by the Watts and Sharrock Spider Phobia Questionnaire (WQS) and the spider phobia questionnaire (SPS) They were all unable to pick up a medium sized spider in a closed glass jar. Groups did not differ in any demographic characteristics or questionnaire measures, including severity of phobia, depression, state or trait anxiety and age.

Table 9:1 Subject Characteristics.

	Treated	Controls
Age	28.92	26.42
Sex Ratio (f:m)	12:1	11:1
Watts and Sharrock Spider Phobia Questionnaire	22.69	22.92
Klorman <i>et.al.</i> (1974) Spider phobia Scale	19.46	17.16
Spielberger Trait	38.62	41.17
Beck Depression Inventory	5.54	6.42

There were no differences between the groups.

### Assessment

#### Behavioural approach test

Subjects participated in a behavioural approach test. During this test subjects were told that they were going to be asked to enter a room in which a medium

sized spider in a closed glass jar was placed on a table one and a half metres from the door. Their task was to enter the room, go across to the table, pick up the jar, open it and put the spider on their hand for 20 seconds. It was emphasised that they were not expected to be able to perform the whole task but were to do as much as they felt able to do. All subjects were able to approach the table to a distance of half a metre (on being reassured that the spider could not escape), but none were able to pick up the jar and all indicated that they felt extremely uncomfortable and wished to leave the room.

### Questionnaires

Questionnaire 1. This was a series of 14 questions to do with demographics, descriptions of phobic incidents, coping strategies and descriptions of phobic objects.

Questionnaire 2. This was initially based on the Chambless Agoraphobic Cognitions Questionnaire. It contained a confidence rating as to how subjects felt they would be able to tolerate being in the same room as the object of their phobias right now at this moment. They were asked to circle a number between 0 and 100. This was followed by 31 statements. Subjects had to rate how much they believed each statement to be true on a scale of 0 (I do not believe this thought at all) to 100 (I am completely convinced this thought is true) while imagining that their phobic object is in the room with them. (Appendix)

Questionnaire 3. Beck Depression Inventory. (Described in detail in chapter 3)

Questionnaire 4. Spielberger STAIy-2 self evaluation questionnaire as a means of general trait anxiety. (Spielberger 1983). (Described in detail in chapter 3)

Questionnaire 5. The Watts and Sharrock Spider Phobia Questionnaire (1984). This was used in its original form of 43 forced choice questions to do exclusively

with spiders (range 0-43, cut off point for spider phobia diagnosis is 14). (Described in detail in chapter 3)

Questionnaire 6. The spider phobia scale (SPS; Klorman *et.al.* 1974), a 31-item self-report instrument measuring fear of spiders (range 0-31). This questionnaire was administered to a large number of subjects by its authors and internal consistency, as estimated by the Kuder-Richardson Formula 20, was high, ranging from .83 to .90. It has since been extensively used as a measure of spider phobia intensity by groups of spider phobia researchers in Maastricht and in Uppsala

Questionnaire 7. Spielberger STAI y-1 self evaluation questionnaire, pertaining to present state of anxiety. (Described in detail in chapter 3)

Questionnaire 8. Visual analogue containing seven items to do with: a) general anxiety level, b) desire to escape) c) to what extent spiders were found to be disgusting, d) coping with anxiety about spiders, e) coping with the situation, f) feeling anxious about spiders, and g) approaching and dealing with a spider.

## Materials

### Stroop Task

For stroop materials and presentation software and hardware see chapter 5.

### Treatment

Clear plastic basin measuring 30x50 cm. Glass, piece of card, video recorder and assorted indigenous spiders, ranging in size from very small to very large.

### Procedure

Subjects were first contacted by mail and sent the Watts and Sharrock (1986) spider phobia questionnaire and a form requesting background information and

personal history of their spider phobia (questionnaire 1). Those subjects fulfilling the criteria were invited to participate in treatment and asked if they were willing to participate in experiments at the time of treatment. Subjects were randomly allocated to either the treatment or control group.

On arrival, subjects were given questionnaires 2 to 8 and the behavioural avoidance test. They then participated in the Stroop task. Those in the control group then left the premises for three hours and returned to repeat the procedure (filling in the questionnaires and doing the Stroop test again), immediately after which they began treatment and the procedure became identical to that of the treatment group described now: Those in the treatment group were first given the questionnaires (2 to 8) and then did the Stroop test. After the Stroop they filled in questionnaires 7 and 8 then immediately started on the treatment. After the treatment goals had been reached (see description of treatment) all subjects were given questionnaires 7 and 8 again before being subjected to the Stroop once more. After the final Stroop test, subjects completed questionnaires 2 to 8. All subjects returned a week later to fill in questionnaires and do the Stroop test for a final time. Fig 9:1 shows a flow chart of this design.

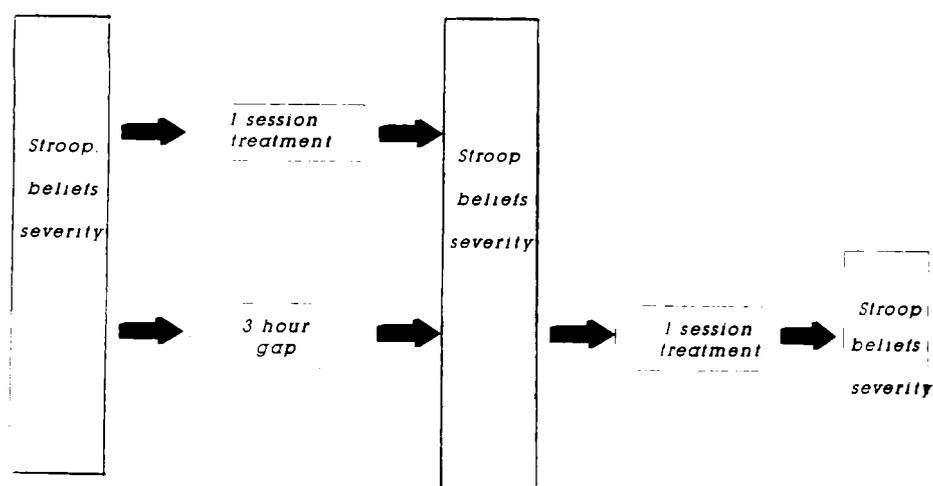


Figure 9:1 Flow chart of design of experiment.

## Treatment

Treatment was as described by Öst (1989a) and Öst, Salkovskis and Hellström (1991) and consisted of a combination of prolonged graded exposure, modelling and information. Therapy began with an interview ascertaining individual responses to spiders in the areas of cognitions, physiology and behaviour. The nature of anxiety, arousal and the relation between avoidance and the maintenance of phobia was also discussed. The subjects beliefs about spiders were challenged and corrected where misinformed, as were as ideas of control and predictability.

The therapist showed the spider phobic the goal of the exercise which was to be able to catch spiders in a glass and to remove them. The subject practised with a glass and a piece of card until judged manually dextrous. Therapy continued with the subject following the example of the therapist and first directing the spider around the bowl with a pen and then with a finger. This continued until the spider phobic's anxiety level had dropped to a negligible level (as ascertained by therapist at regular intervals) with the spider being manipulated on the hands by the subject. Then another larger spider was introduced and the process began again. At all times the therapist emphasised the way in which the spider could be controlled and its movements predicted. The session ended when the patient could handle all the spiders with little or no anxiety, and could relax while it was out of sight either on the arm or back. The session was videotaped so that they could remind themselves of what they had taken place during treatment and how much they had accomplished. They were then given instructions on how to maintain their improvement by practising and any questions were answered.

## Therapist

The author was trained in one-session treatment. Training involved watching therapy videos by Öst and Šalkovskis, and by assisting Šalkovskis in the treatment of several spider phobics.

## Results

### Treatment outcome.

#### Overview

Measures of intensity of spider phobia were compared after treatment/non treatment period. Both groups of subjects were similar in initial measures of spider-phobia intensity, including those of fear, avoidance and interference, and strength of belief in negative cognitions to do with spiders. Those treated were significantly different in their spider assessments after treatment compared to the untreated control group tested after a similar period indicating that treatment was effective. Scales measuring avoidance, fear and interference, also became significantly different between the groups after treatment indicating that it was treatment which had changed beliefs rather than it being an effect of time alone. There were also significant changes in global measures of spider phobia after treatment.

#### Comparison of treatment group with control group

Scores from the spider assessment scale to do with avoidance, fear and interference were collected for both groups immediately after a period during which some people were treated and others not. These were subjected to a one-way analysis of variance. Means are shown in Table 9:2 and in graph form in figure 9:2

Table 9:2 Outcome measures after treatment period both groups.

	Treated	Controls
Toleration	89.23 <sup>***</sup>	30.83
ASS (Avoid small spider)	0.69 <sup>*</sup>	2.83
AMS (Avoid medium spider)	2.08 <sup>**</sup>	4.75
ALS (Avoid large spider)	3.08 <sup>***</sup>	6.92
FSS (Fear small spider)	0.77 <sup>*</sup>	2.33
FMS (Fear medium spider)	1.69 <sup>***</sup>	4.58
FLS (Fear large spider)	2.62 <sup>***</sup>	6.92
Interference	2.08 <sup>*</sup>	3.92

<sup>\*</sup> =  $p < 0.01$ , <sup>\*\*</sup> =  $p < 0.001$ , <sup>\*\*\*</sup> =  $p < 0.0001$ .

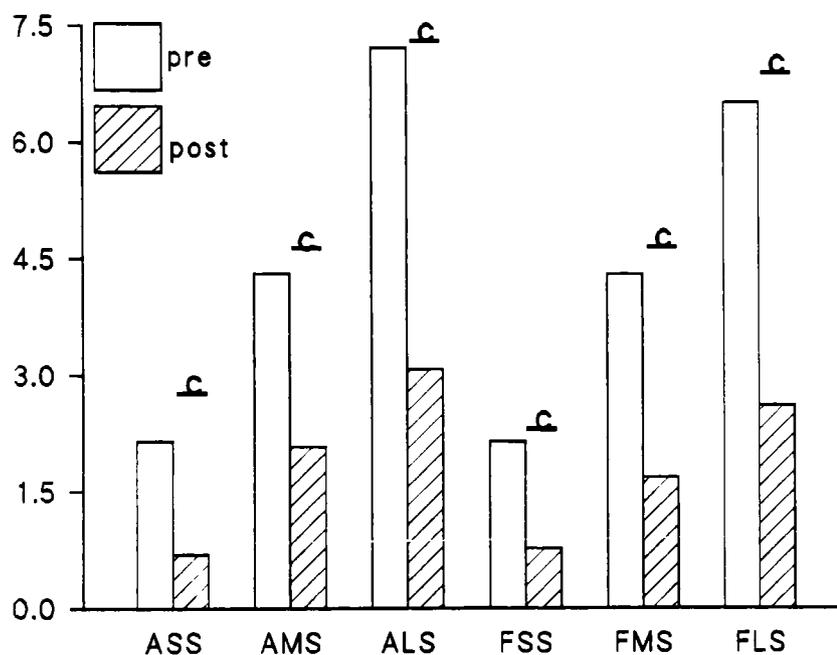


Figure 9:2 Measures of treatment outcome.

('C' shows comparative scores untreated phobics after the same period.)

Scores on the Watts and Sharrock spider phobia scale, and on the Klorman spider phobia scale were gathered for all subjects before and after treatment. These results are shown in table 9:3. There was a significant change in both measures (Watts and Sharrock  $t = 7.00$ ,  $p < 0.0001$ ; Klorman  $t = 7.54$   $p < 0.0001$ ) These results

are comparable with those obtained by Öst, Šalkovskis and Hellström (1992).

Table 9:3 Measures of spider phobia before and after treatment.

	Before treatment	After treatment
Watts and Sharrock	22.80	13.60
Klorman	18.3	8.9

### Summary of Cognitions Results

Spider phobics filled in questionnaires to do with negative beliefs/cognitions about spiders. These fell into the sub-types of harm, coping and disgust cognitions and were shown in chapters 3 and 4 to be implicated in the maintenance of phobic responding. Controls filled in these questionnaires before and after a three hour gap during which they were absent from the experimental setting while the treatment group filled in questionnaires before and after one-session treatment for spider phobia. Results show that the treated group changed significantly in their belief ratings in all three sub-groups, while the untreated group did not.

### Cognitions results

The data was transformed into three sub-groups, disgust cognitions, coping cognitions and harm cognitions, and analysed using a two-way analysis of covariance using one between group factor (treated or untreated) and one within group factor (repetition over time). Initial ratings were used as covariates. Cell means for dependent variables are shown in detail in Table 9:4. Figures 9:3, 9:4 and 9:5 below show these results separately for each type of cognition.

There was a significant main effect of group ( $F_{1,2}=42.20, p>0.0001$ ). There was a significant effect of repetition ( $F_{2,45}=10.90, p>0.001$ ). There was a significant higher order interaction of group x repetition ( $F_{2,45}=8.32, p>0.01$ ).

Table 9:4 Mean belief ratings in sub-groupings, before and after treatment period.

	Treatment group		Control group	
	Pre	Post	Pre	Post
Disgust cognitions	36.37	11.76*	33.93	35.95
Coping cognitions	79.44	38.531*	78.26	78.33
Harm cognitions	30.12	5.50*	33.53	27.56

\* =  $p < 0.0001$

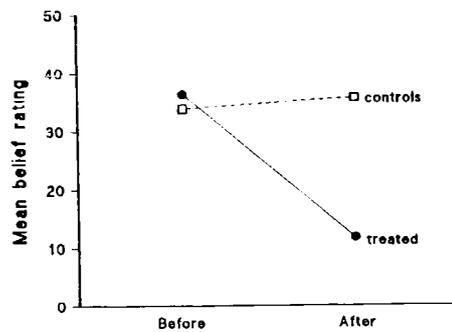


Figure 9:3 Disgust cognitions: pre and post treatment period.

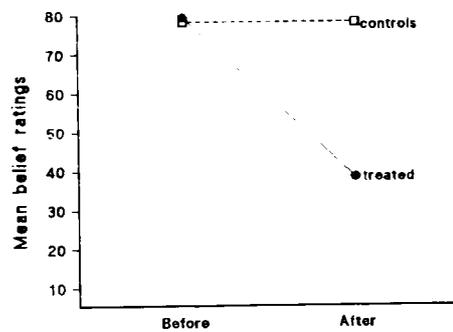


Figure 9:4 Coping cognitions: pre and post treatment period.

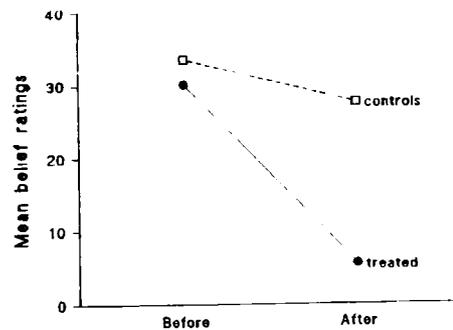


Figure 9:5 Harm cognitions: pre and post treatment period.

### Stroop results.

In chapter 5 it was shown that spider phobics were retarded in their response to spider words in comparison to neutral and emotional words, and compared to phobic and non-phobic controls. In the present experiment, spider phobics were tested on the Stroop test, in exactly the same way as described in chapter 5, both before and after a period during which controls left the experimental setting for three hours and the treatment group underwent treatment for spider phobia. There were no significant differences between groups in reaction time latencies for either test. Both groups reduced their reaction time latencies on the second trial. Data used was from the unmasked condition in the Stroop presentation (see chapter 5). Analysis of the present data also found no differential effects whatsoever in the masked condition. There was no significant effect of spider words on the reaction time latencies.

### Stroop Interference

For every subject the trimmed (2 SDs) mean colour-naming latencies were extracted for each experimental condition and for both groups. As preliminary analysis showed no effect of masking, it was decided to use unmasked reaction time scores only, in keeping with the Watts and Sharrock (1986) analysis and with the final analysis of the experiment described in chapter 5.

An analysis of variance was carried out using one between group factor (treated or not treated) and one within group factor: Wordtype interference (spider, emotional, neutral or disgust before and after treatment period.) These data are summarized in Table 9:5. There was no overall main effect of group ( $F < 1$ ). There was no main effect of wordtype interference ( $F < 1$ ). There was no group x wordtype interaction ( $F = 1.4$ ).

Figs 9:6, 9:7, 9:8 and 9:9 show the results obtained before and after the treatment period, for both the treated and untreated phobics, on reaction times of all four wordtypes in the unmasked condition; these results suggest that decrements associated with treatment are repeated measures (practise) effects not specific to the treated group.

Table 9:5. Trimmed Mean reaction time latencies to unmasked stimuli before and after treatment/no treatment period. Change was calculated and is also shown.

Wordtype	Treated Group			Untreated Group		
	Before	After	(Chg)	Before	After	(Chg)
Spider	720	657	(63)	724	676	(48)
Neutral	701	642	(59)	672	624	(48)
Emotional	696	650	(46)	657	642	(15)
Disgust	709	692	(17)	669	642	(27)

As in chapter 5 , spider and emotional response latencies were calculated using neutral response times as covariates in order to remove any baseline differences. Again, in neither case was there an effect of group ( $F < 1$ ). Tables 9:6 and 9:7 show these adjusted means in full.

Table 9:6 Adjusted means ( Masked ) using neutral word latencies as covariates. Before treatment.

	Treated Group		Untreated Group	
	Before	After	Before	After
Spider Words	592	582	570	558
Emotional words	639	610	618	604

Table 9:7 Adjusted means ( Unmasked ) using neutral word latencies as covariates. Before treatment.

	Treated Group		Untreated Group	
	Before	After	Before	After
Spider words	660	618	697	658
Emotional words	721	662	720	690

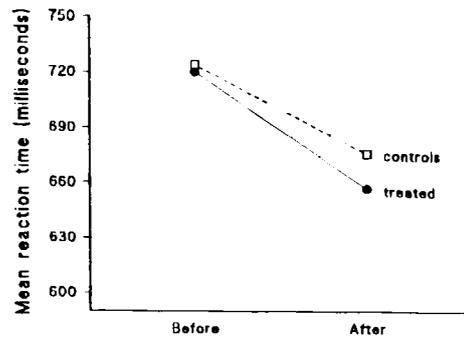


Figure 9:6 Mean reaction times pre and post treatment: Spider words.

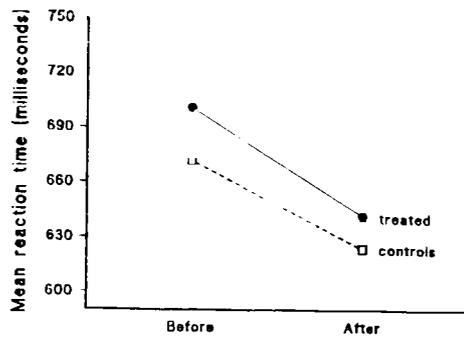


Figure 9:7 Mean reaction times pre and post treatment: Neutral words.

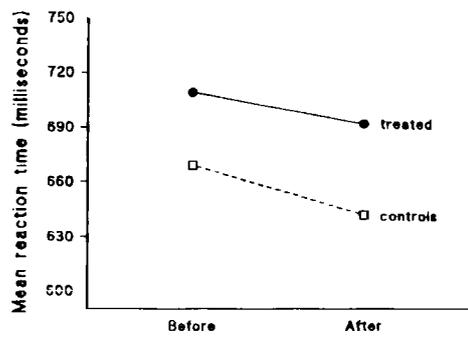


Figure 9:8 Mean reaction times pre and post treatment: Emotional words.

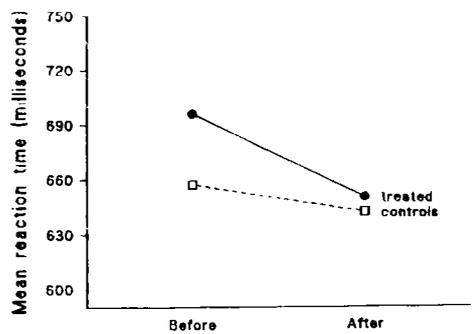


Figure 9:9 Mean reaction times pre and post treatment: Disgust words.

### Correlational Analyses

Changes in the strength of phobic intensity were calculated by subtracting questionnaire scores taken after treatment from those taken before. Data for both groups of subjects was combined to engender statistical strength, having first ascertained that there were no significant differences between groups in treatment outcome and other measures. These differences were found to correlate with changes in coping cognitions, calculated in the same way, and with a further set of cognitive change measures calculated by subtracting the weekly follow-up scores from original scores which resulted in all three types of cognitions being positively correlated with the Watts and Sharrock questionnaire scores. Changes in conscious cognitions would appear to be related to outcome measures. Changes in Stroop interference scores were not correlated to any outcome measures. Table 9:8 shows correlations for scores obtained immediately after treatment, and Table 9:9 for scores obtained a week later at follow-up.

Table 9:8. Correlations between changes in outcome measures with changes in conscious cognitions.

	Change: Disgust Cognitions	Change: Coping cognitions	Change: Harm cognitions
Change: Watts and Sharrock	0.38577 0.0841	0.54830 0.0101	0.42173 0.0569
Change: Spider phobia scale	0.30732 0.1754	0.67144 0.0009	0.26627 0.2433

Table 9:9 Correlations between changes in outcome measures at follow up a week later with changes in conscious cognitions.

	Change: Disgust Cognitions	Change: Coping cognitions	Change: Harm cognitions
Change: Watts and Sharrock	0.56623 0.0075	0.53304 0.0128	0.48496 0.0259
Change: Spider phobia scale	0.19603 0.3944	0.56952 0.0070	0.17396 0.4508

## Discussion

Results show that the one session treatment was highly effective on the full range of all the measures used. These results obtained were directly comparable with those obtained by Öst *et.al.*(1991). Treated spider phobics showed an immediate and substantial decrease in negative beliefs about all aspects of phobic responding, consistent with the hypothesis that exposure treatment changes the meaning of the spider for the phobic.

In contrast to the experiment reported in chapter 5, there was no significant effect of spider words on the reaction time latencies compared with the control words. Although a substantial decrease in Stroop interference for all wordtypes was evident following treatment, the same effect was found in the untreated spider phobic controls. Furthermore, this change did not correlate with measures of treatment outcome at all: the change in Stroop interference after treatment was compared with the outcome measures as a final test of the relevance of the Stroop as a measure of attentional bias in anxiety, and how it relates to phobic intensity. Changes in Stroop interference were not correlated to any of the outcome measures as described above so it is unlikely to have sufficient consistency to be usable as a measure of clinical improvement. This suggests that the improvement may be due to practise effects so neither of the information processing hypotheses were therefore supported. This negative finding could not have been due to an inadequate sample size as there was no detectable trend. It is conceivable that the disgust words could have interfered with the effect in some way, but if this is the case than the test is too fragile to be useful.

The results to do with changes in beliefs however are much more useful. The findings of this study with regard to cognitive change are in line with recent

findings to do with the content and change in phobic cognitions as recently reported by Arntz, Lavy, van den Berg and van Rijsort (1993). Those in the treatment group registered immediate significant changes in their level of belief in all three subcategories of disgust, coping and harm (to do with spiders and their reactions on encountering a spider) after one session treatment. A week later this change was still evident. As noted in chapters 3 and 4, spider phobics do not only fear something which the spider may do but are also afraid of their own reactions. This is in line with earlier findings reported by McNally and Steketee (1985) that many animal phobics are like panic patients in this respect : they fear the consequences (panic, hysteria, making a fool of themselves) contingent upon their being in the presence of the feared object. Spider phobics then, have a sophisticated set of beliefs to do with spiders (and their effect on the phobics) which provide a logical, rational framework for their phobia and from which meaning emerges.

As predicted, after treatment, treated phobic belief ratings changed significantly in all the sub groups. Change was all in one direction on the individual items in the treatment group, with a lower endorsement of negative beliefs. As an example, there was a surprisingly high rating for the belief that subjects would have a heart attack if confronted by a spider (55.38 treatment group and 50.83 control group) before the treatment period which reduced to 12.31 after treatment as compared to 45.00 in the control group. This belief, along with others in the questionnaire, is closely related to panic. Spider phobics also did not believe before treatment that they would lose their fear if they stayed in the room with the spider (I would (not) slowly lose my fear) a belief which may contribute to continued avoidant action. An item which was missed out but

which should be included in future is to do with the content of beliefs to do with actual possible harm which could be inflicted on a person by a spider, being bitten for instance. In conversation many phobics said that they thought spiders normally ran straight at them, that spiders wanted to run on and inside their clothes and that spiders looked at them with malevolent intent. The belief questionnaire used here does not include these kinds of items as it was felt that the Watts and Sharrock questionnaire dealt with the more specific spider beliefs. It might be useful to use these in the future.

During treatment, negative beliefs about spider behaviour, spider harmfulness and the individual's reaction to these and her ability to cope, were disconfirmed. One striking aspect of these, and other, beliefs, is that they are in place despite the fact that spider phobics generally say that they know rationally that spiders cannot harm them. Yet when asked specific questions, or when confronted with a spider, these rational responses are subverted by the set of beliefs specifically to do with the spider which appear to remain in limbo until called up by the feared situation. This is consistent with the hypothesis that for spider phobics, spiders have a different meaning than they do for non phobics, and that this meaning is implicational, overriding knowledge in place at the specific, propositional level and that a change in this generic meaning is associated with emotional change. Davey and others (Davey, 1992; Davey, Forster and Mayhew, 1993; Matchett and Davey, 1991) has proposed that fear of spiders is not associated with fear of actual physical harm, but with fear of contamination, based on studies carried out on a non phobic population. The present results, and those presented in chapter 4, do not support this view. Although there are important elements of contamination fear as evidenced by the disgust cognitions,

they are no more highly rated as aspects of phobic beliefs than are harm cognitions. Both of these are less important in terms of belief intensity than cognitions to do with an inability to cope with the phobic object. It is possible that these contamination factors are more important in a non-clinical dislike of spiders or of other animals perceived to be unclean, like slugs, and again, this is borne out by the findings reported in chapter 4. In order to clarify this it would be valuable to investigate phobic cognitions to do with animals other than spiders. The present findings suggest that it is the meaning of the spider which has changed for phobias during treatment. New information has been absorbed and assimilated allowing accommodation to occur. Effectively, the generic meaning of the threat situation has changed and it is this which seems to be connected to the change in emotional status.

Further investigation into the mechanism by which this meaning changes (by the verbal transmission of information, by observational counter-conditioning, by exposure to the phobic object) would be useful in furtherance of the fine-tuning of the treatment strategy. It remains to be shown whether these belief structures are part of a fear network which remains permanently dismantled by ameliorative treatment, as a one week follow-up period is not long enough to test this. It is clear that one session treatment is very efficient in its changing of beliefs about the self and the spider, and more particularly, the meaning of the spider in relation to the self.

GENERAL DISCUSSION

In this thesis I have examined cognitive factors and beliefs in specific phobias. I have attempted to explore the role of and the relationship between (i) processing of threat-specific information and (ii) thoughts and beliefs relating to perceived threat. A better understanding of these two facets of anxiety responses should help in the comprehension of phobic states in particular and anxiety states in general. The distinction made throughout was between the products of cognitive processes and the processes themselves, with different experiments being devoted to one or the other of these aspects. There has also been an emphasis on the relative importance of propositional or specific meaning, and implicational or generic meaning as they may relate to the acquisition and maintenance of specific phobia.

Evidence for a general bias in the processing of threat material by phobics is inconclusive. However, evidence in support of specific, consciously accessible, meaningful cognitions (or beliefs) as an important factor in the maintenance of phobic responding is relatively more compelling. In particular, the final one-session treatment experiment showed that conscious cognitions but not attentional biases are specifically associated with change in phobic status. In that study both treated and untreated phobics showed comparable changes in attentional processing (as shown by reaction time latencies) over the period concerned, indicating that although these changes took place, they were not a specific consequence of change in phobic status. In contrast to this, there was a large shift in the endorsement of negative phobic beliefs after treatment in the phobics but not after a similar period in the non-treatment phobic group. If subsequent

experimental studies find that such beliefs are important in the maintenance of specific phobias, this has implications for further improvements in treatment. Similar findings in panic (Clark *et al.* 1988) have resulted in the formulation and refinement of treatment techniques specifically intended to change the meaning of a threatening situation. The detection of potentially crucial beliefs of similar kinds to the catastrophic misinterpretations of bodily sensations found in panic may indicate that the treatment development strategies so successfully applied in panic could be used in specific phobias. Development in this area has previously been constrained by the apparently erroneous suggestion that specific phobias are 'non cognitive' and irrational (Seligman 1971).

In the following discussion I will therefore consider the nature of the relationship between conscious cognitions as beliefs or 'meaning', and their association with phobic responding, as well as issues concerning the processing of threat-related information.

#### The information processing view of anxiety

It has been previously presumed that distortions in the processing of information produced distorted thoughts and beliefs as an incidental phenomenon, and much experimental evidence has been provided in support of the information processing bias. Experiments have focused on reaction time to threatening (usually verbal) stimuli. There is also a large literature concerning the part memory plays in the maintenance of depression. However, a different role for memory has been suggested in relation to anxiety. Macleod, Mathews and Tata (1986) suggest that the attentional processes in an anxious person are threat-biased in order to facilitate the perception of emotionally threatening information. In a further important refinement of this, Macleod and Rutherford

(1992) suggested that this processing bias is automatic in individuals with high trait anxiety and that this automaticity increases in its effects along with state anxiety. Individuals with low trait anxiety show an increased tendency to avoid threat information as state anxiety rises, thus reaping the reward of what Macleod and Rutherford call 'a homeostatic emotional system' (Macleod and Rutherford, 1992). However, regardless of trait anxiety scores, the results suggested that information received in the conscious domain was *avoided* if related to threat related personally relevant material. Mogg *et.al.*(1987) further proposed that the anxious individual is biased towards threat information, leading to a faster detection and recognition of possibly harmful objects or situations. Once this is noted, the information is suppressed in some way and that this can lead to a less efficient encoding in memory. Mathews, May, Mogg and Eysenck (1990) state that this bias towards threat cues in anxious people is an 'enduring feature of individuals vulnerable to anxiety, rather than a transient consequence of current mood state alone' (Mathews *et.al.*1990,p166). The implication here is that anxious people are automatically orienting towards threat. Once threat is detected, it is cognitively avoided. That is, there is hypothesised to be a general and automatic processing bias which makes anxious people especially liable to perceive threat but then disattend in a way which prevents the extinction of anxiety.. This also implies that the only cure is counterconditioning because the cognitive processes are regarded as occurring automatically and therefore are not subject to belief change strategies such as cognitive therapy. The assumption in all this is that an anxious person scans the environment for threat cues, orients towards those threat cues and then avoids encoding them in order to alleviate anxiety. This avoidance at a cognitive level then serves to perpetuate the

behaviour by providing relief from anxiety. In conditioning terms this relief from anxiety is negatively reinforcing avoidance behaviour.

### The alternative cognitive view of anxiety

The cognitive view is that anxiety is a direct result of the perception of a situation or stimulus as being a source of danger. Anxiety disorders are said to occur because the sufferer persistently perceives situations as more threatening than they really are. The persistence of anxiety is said to result from at least three important mechanisms:

- 1) Selective attention to potentially threatening stimuli so that these are detected more frequently. This in turn increases the perception of threat and so on in a vicious circle. This process is seen as a largely conscious search for danger to enable safety to be sought. It may be combined, as time goes by, with an increased ability to detect small changes in target stimuli (such as heart rate in panic disorder patients (Ehlers, Margraf and Roth, 1988)).
- 2) Safety behaviours which work in two ways (i) by increasing the occurrence of actual feared stimuli (e.g. thought suppression increasing unwanted thoughts of the phobic object) or (ii) by preventing the disconfirmation of negative beliefs (e.g. 'If I'd stayed near that spider for a moment longer I would have had a heart attack; luckily, I was able to get out in time').
- 3) Physiological changes. Some phobics may be worried about losing control of their anxiety response. This is particularly evident in blood/injury phobics who are particularly sensitive to falls in blood pressure. The perceived physiological changes result in a further increase in anxiety creating yet another vicious circle. Each of these three processes interact with the others in people suffering from anxiety.

This belief-based cognitive view does not require that some people may have a general processing bias, instead the negative beliefs will cause that person to selectively attend to the object or situation which is believed to be threatening, or *means* threat. A situation will only become threatening if it is in a context which activates negative beliefs in the anxious person. They will then seek safety by a variety of means which might include escaping from the situation altogether, by thinking about ways to escape from the threat, or removing it (or getting other people to remove it if it is a phobic object) They may even engage in superstitious rituals in an attempt to reduce the force of its negative meaning. An important feature of the cognitive theory and related views (e.g. Teasdale 1993) is that rather than being passively retrieved as part of the associative network for a fear stimulus, meaning is recreated each time information is retrieved. Clearly, this allows modification of the emotional response according to each specific context in which the phobic object is encountered.

Cognitive avoidance is seen as a special case which comes into play under specific and circumscribed circumstances if the threat is symbolic or semantic for instance (that is, the person knows that the worst thing that can happen is that anxiety may be increased to uncomfortable levels). If the stimulus is real, or shares enough features with the real object to sufficiently approximate it, then attention will be directed to both the threat and to a means of escape and safety (e.g. the location of escape routes). This is conceptualised as a reciprocal relationship between meaning and belief on the one hand and information processing on the other. To the person who is fearful, the experience of being in a potentially harmful situation ( or one which has that meaning to the person) will lead to an increase in vigilance because of the idiosyncratic significance of

the context. Any information entering the system will be processed in this meaningful context and will be as readily available to anxious individuals as to other individuals, rather than subject to some kind of automatic suppression factor. It has been shown here that though attention may be drawn towards a threat-object there seems to be no consequent deficit in recall or recognition capability. This seems to be in line with the theory that fear is an adaptive response which has usefulness for survival. This has important implications for the kinds and amounts of cerebral storage available. It is sensible that attention should be drawn towards threat, but not sensible that information about the threat be ignored. Suppression or cognitive avoidance of such information is only useful in the sense that it temporarily reduces anxiety when in the phobic situation. Studies attempting to show that memory deficits occur in the presence of the object have been at best unconvincing.

It would appear from the outcome of the present experiments that in the context of a feared situation the phobic scans for meaningful information which may take the form of approximations to the form of the feared object as evidenced by phobics who become alarmed at shapes approximating to spiders, like tomato tops - and that this appears to be a strategic deployment of attention available to consciousness (although not necessarily conscious). Thus, the phobic is a victim of potentially modifiable beliefs rather than the victim of general biases which would have to be subject to active compensation in order to remove their effects. The beliefs held by phobics with regard to their phobic object, or more particularly, their reactions to the object, provide an internally logical framework for the phobia, perpetuating its effects and in turn perhaps feeding into the processing network which may then select threat-congruent information and make

this available to the phobic in the form of cognitions or behaviour. Once the belief that the threat situation has the power to harm - either directly or indirectly - is in place this knowledge becomes the agent of harm itself. This knowledge is not always available to consciousness, containing as it does higher order elements of generic meaning which are implicational and as such difficult, if not impossible, to dismantle into their constituent parts.

This is in sharp contrast to the argument that people suffering from anxiety are the victims of generalised automatic information processing disturbances which predispose them to be susceptible to certain types of anxiety disorder, or even that the persistence of the fear response results from their consistency within the fear network and from impairment in the processing mechanisms which leads to the inadequate absorption of disconfirming information in memory. An examination of the workings of memory allows an assessment of whether information is assimilated properly. If it is, then information continues to form useful connections until accommodation happens, when the whole system shifts in order to contain new knowledge. It is this accommodation process which seems to happen in therapy when there is a sudden dramatic change in attitude and understanding towards the problem. It is as if, in Teasdale's terms, there has been a change in the meaning at a generic level, which has a concomitant change in emotional meaning.

The essentially interactive nature of emotion, beliefs and processing factors explored in the preceding chapters allows for a more optimistic prospect of the efficacy of treatment with the emphasis becoming more firmly centred on the primacy of meaning, allowing for the possibility of rapid change in fear responses once the meaning of the stimuli for the individual has been changed.

### The importance of belief

Šalkovskis (1991) has argued that anxiety is directly related to the 'immediate personal and idiosyncratic appraisal of threat' and that there is an internal cohesion in this set of idiosyncratic beliefs which form a logical framework for them and keep them in place, even in the face of apparently contradictory positive information. The results of the questionnaire studies concerning phobic beliefs are consistent with this. The first task undertaken in the exploration of these ideas was to examine phobic cognitions in some detail in order to ascertain whether in fact phobics do have cognitions about their phobic object, and themselves in relation to it, which are different in essence and meaning from non-phobics and which form a logical framework of the kind mentioned above. The findings in chapter 3 suggest that they do. Previous work on cognitions in anxiety disorders has been mostly confined to panic and agoraphobia, and has concentrated on the illusory correlates (or covariation bias) between the object and the perceived consequential risk. Some of the actual content of specific phobic beliefs were elicited by Watts and Sharrock (1984) from spider phobics, though these were mainly concerned with behavioural responses to the presence of a spider rather than beliefs about its properties, the internalised responses of the phobic activated in its presence or beliefs about the actual harm which might follow an encounter with a spider. McNally and Steketee (1985) carried out a general consensus on the stimulus characteristics and feared consequences associated with a variety of animal phobics, while Öst Šalkovskis and Hellstrom (1991) have explored phobic beliefs as an important part of treatment. There has been little written about the actual detail and content of these.

It is clear from the information gathered, and reported in full in chapter three,

that phobics differ radically in beliefs about their phobic object from non-phobics, and that this does not appear to be on a continuum of severity but is quite separate from the beliefs of non-phobic individuals. Also, results from the second study in chapter 3 clearly showed that these beliefs remained fixed even in the face of contradictory information and exposure, for the purpose of assessment, to a variety of spiders. It is established that phobics have different beliefs about their phobic object or situation and that these are not only concentrated on the harm possibly emanating from the object or situation itself, but also include beliefs about the harm emanating from the phobics response, their ability to cope, and in some cases the possible contamination ensuing from contact with the threat stimuli. The final evidence comes from the examination of individual phobic beliefs which contribute to phobic meaning. A high number of phobics showed strong belief (above 40% and often much higher) in the idea that they would come to physical harm, have hysterics, be trapped and so on. This is convincing in showing that phobics have a complex structure of beliefs about their phobia and that this provides a logical framework for their phobia. If you believe you will become paralysed at the sight of a spider, it is likely that you will not wish to encounter one. Similarly, if you believe you will be infected or contaminated by an object, you will wish to avoid it.

#### The role of the emotion of disgust in phobias.

It is this last idea which has formed the basis of the set of experiments concerning the nature of disgust and its impact on the acquisition and maintenance of phobias. This is a recent development in the exploration of responses to threat, as previously the focus of experimental attention has been on fear as the single most anxiety-eliciting factor. The issue of the role of disgust

beliefs in the maintenance and acquisition of phobias was raised by Watts (1986) and continued by Matchett and Davey (1991). Matchett and Davey did not solicit the opinion of phobics in their exploration of the relationship between fear and disgust, but used a random sample of students. Their use of 'normal' fears as the basis for statements about possible maintenance effects of disgust in phobias is based on the assumption that there is a graded continuum of fear responses which are qualitatively similar. An examination of the data on spider phobic cognitions discussed in chapter 3 would seem to be inconsistent with such a hypothesis. There is a bimodal distribution of beliefs with spider phobics completely different from other phobic controls and non-phobic controls. Phobic intensity does not correlate with disgust cognitions about the phobic object, as evidenced by initial results from the first questionnaire study. In the second study the fact that disgust increased after exposure to spiders in the spider phobics may indicate a secondary role for disgust in avoidance mechanisms, but there is little evidence to show any strong connection between disgust and avoidance despite this being apparent in the normal population, as discussed by Matchett and Davey (1991). The second questionnaire study showed that negative cognitions to do with coping and harm seem to be exclusively implicated in the continuance of fear in a selection of phobics generally and in spider phobics specifically.

Davey (1993) has made a case for the association of contamination fear, feelings of disgust and phobic avoidance, and has suggested that this is based on a history, for example in spider phobia, of the spider being associated with the plague. Matchett and Davey (1991) also suggest that there is a correlation between disgust sensitivity and fear of animals (animals which are perceived as being high fear/low predatory and high revulsion) and that this means that disgust may be

implicated in phobic acquisition and maintenance. The experiments reported here have shown that in a phobic group there is little evidence to support the assertion that a measure of global disgust is connected in any way to a particular propensity to be afraid of spiders.

The lack of results in the Stroop task with regard to disgust words indicates that whatever the nature of disgust, it does not appear to be compelling of attention in the way that threat information is compelling. There was absolutely no difference between response times to disgust words, neutral words and emotional words.

A final check on the place of disgust in phobias was the set of two studies which showed phobics and controls a series of pictures to do with first, a variety of more or less disgusting items, and second, a variety of spiders. The evidence from these indicates that spider phobics are more disgusted by spiders than are non spider phobics and that this is related to the amount of fear experienced. However, this is not evidence of disgust as a contributing to fear or avoidance responses. It is more likely to be that disgust is an emotion which is quite distinct from fear and which has its own characteristic physiological, behavioural and cognitive responses.

In summary, three sources have contributed to the dismissal of the idea that disgust is an important factor in phobias : First, the correlational analysis (chapter 3) which showed that controls, other phobics and spider phobics had strong relationships between disgust, coping and harm cognitions on the one hand and fear, interference and general avoidance on the other, with the one solitary exception of spider phobics' disgust cognitions which did not correlate in any way with the intensity of their fear reaction; Second, spider phobics found centipedes,

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human diseases and the more aesthetically pleasing spiders equally disgusting but were not at all phobic (or afraid) of them; Third, Phobic disgust seems to be qualitatively different to non-phobic disgust, with more importance laid on the fear and avoidance characteristics of disgust than on items specifically to do with disgust. The evidence therefore is inconsistent with the hypothesis that any crucial causal links exist between disgust and phobias. This is not to say that there is no place for disgust as part of the overall 'meaning' which a rat, for instance, has for a rat phobic. In fact the meaning of disgust itself in relation to phobias seems to be different to the conventionally accepted one in subtle ways. Results from the mixed group of small animal/blood/vomit phobics sampled here suggest there is no basis for saying that it is an important element in even the maintenance of 'disgusting' phobias. Phobics can, after all, be cured of their phobia while remaining disgusted by its former object.

There appears to be a strong case for the importance of belief in the maintenance of phobias. These beliefs may have to do with disgust but this appears to be only peripherally related to either fear or avoidance and does not have an effect on attentional bias as measured by the Stroop task. However, the role of information processing in the emergence of meaning does not seem to be as automatic as Mathews and others have suggested. There is no evidence here for an automatic pre-attentive processing bias.

#### Evidence for automatic pre-attentive processing biases?

If the processing of threat information is causally connected to the distorted cognitions seen in phobics then there should be evidence of attentional bias in phobics and not in non phobics. The findings of this thesis are consistent with the view that there is attentional bias in the processing of spider-related semantic

stimuli in spider phobics. This is not at an automatic level but appears to require the access of material to consciousness. This was demonstrated here by the lack of interference of threat (spider) words when they were presented pre-consciously in the Stroop task in the masked condition. Interference was evident in the unmasked, conscious domain which may point to the increasing sensitivity to meaning as the information travels through the processing hierarchy in its journey from basic feature detection to conceptual abstractions. The bias found was not related to the emotional content of the words but was related to the particular relevance of the word in relation to the individual's concerns. There was no evidence to support the contention that phobics have a general attentional bias which makes them vulnerable to acquiring a threat-related negative cognitive style. In order to determine the effect of threat as opposed to preoccupation at this semantic level it might be useful to test attentional bias in people who are highly committed to an idea (religion or politics perhaps) or who have an absorbing hobby. Another way, which was done during the course of this research, is to remove the anxiety element from a preoccupation by treatment. So far the evidence has been that meaning has an important role in the functioning of phobic responses. Disgust has not been shown to be an important factor. There was no evidence found for an automatic processing bias but some evidence in support of a strategic processing bias and this led to an examination of the possible ways in which the gathering of information and its subsequent storage is biased in anxious people. It was hypothesised that if the processing of fear or disgust leads to an avoidant strategy, after an initial automatic orientation, then this would be detectable by a memory test. It has been suggested that there are structures within memory which facilitate the retention and acquisition of

certain types of information of particular relevance to an individual. Fear-relevant nodes in memory may be activated by congruent stimuli which in turn will lead to an increase in processing time and a consequent retardation of any response required to that stimuli. Results from the spider Stroop experiment suggest that the network model, and particularly ideas of orientation to threat followed by cognitive avoidance, may not be as crucial in maintaining anxiety as has previously been shown. The use of semantic stimuli in reaction time experiments may represent a special case and may have severe limitations in furthering the understanding of the effect of meaning on processing. Though it is acknowledged that even single words may have be a rich source of meaning this is at the level of specific, propositional meaning is very different in content and structure, according to Teasdale (1993) from the implicational level at which beliefs are hypothesised to operate. Real life stimuli may have a more direct meaning in terms of context, importance and threat specificity. The suggestion made here is that anxiety will be related to the amount of danger (from all these sources of information) subject to appraisal in the environment. Once this threat is encountered and assessed, escape will be planned and executed. In order to test this hypothesis the reaction time experiment was devised, utilising elements of the visual dot probe experiments but using live stimuli. The best way to examine a phobic's responses to a phobic object must be to take a phobic, take a phobic object, put them together in some measurable way, and record what happens.

#### The use of live stimuli

The results of the reaction time experiment using a live stimulus were very interesting. Spider phobics orientated towards threat. Further analysis of their

reaction time latencies in relation to the spider and the door (escape route) gave evidence consistent with the hypothesis that safety seeking behaviour rather than avoidance may be the consequence of confrontation with a phobic stimulus. However, the effect was only evident during the first set of trials so although the second and third sets of results may be due to order effects, the experiment will need further replication. It would be adaptive that this escape behaviour should have evolved in this way. It does not make sense that a threat, once perceived, should be ignored, (cognitively avoided), especially those aspects to do with its position and possible movement. Avoidance and escape have a clear biological function; that is, both serve to reduce danger. *Cognitive* avoidance has a very limited impact in these terms. A flexible response style to danger is a prerequisite of survival in a potentially hazardous environment, enabling the fearful person to a wide range of circumstances. An automatic set of responses, which can only be changed by prolonged and repeated counterconditioning, would not seem to be particularly suited to survival. An example of this flexibility in a small but common way is the woman who suppresses her spider fear in front of her child because it is inappropriate and her child may become fearful also. Spider phobics do not react stereotypically to a spider stimulus - they will react differently to words, to a picture, to a Tarantula in a box or to a spider found on their clothes. In an experimental setting, phobics did not run screaming from the room despite the presence of extremely frightening spider material as they might have done when at home: the context and therefore the meaning of the situation was in some way different.

### Memory

The reaction time and Stroop experiment results did raise more questions about

the kinds of information being attended to. If attention is automatically drawn towards threat and then avoided, then this has implications for the contents of the memory store and the interpretation of subsequent events. The results of the effect of anxiety on memory are extremely equivocal, as has been discussed in chapters 7 and 8.

A way of exploring such hypothesised cognitive avoidance was to examine the memory of spider phobics for actual spiders when the spiders were in realistic, and therefore meaningful, situation. The task was one step removed from reality on video; future research might include a task involving exposure to live spiders *in vivo*, perhaps as part of treatment.

The results of both the memory experiments seem to suggest that a case can be made for the effect of meaning on memory. It was hoped that by using a stimulus which was as near as possible to real life, then some of the ambiguity surrounding the effect of anxiety on memory could be cleared.

The hypothesis was that phobics may avoid spider words, or even the concept 'spider' but that they would not avoid a spider *in vivo*. Spider phobics are attentive to spiders and are concerned as to a spider's exact position in relation to themselves; it would not be sensible to suppress such information in the presence of a live spider. If cognitive avoidance is a factor in the processing of threat information, it was hypothesised that the information suppressed would be confined to spider information which is not important in escape terms, such as the spider's shape or colour.

Spider phobics were no different from controls in their ability to distinguish one film clip of a spider from another. Neither were they any different at remembering details in any of the categories requested. The use of the signal

detection strategy in the recognition experiment shows that the memory trace is equal in respect of sensory characteristics ( $d'$ ) and also that the threshold for retrieval ( $\log \beta$ ) was unaffected by being phobic or non phobic. This suggests that the phobic's attention was being drawn towards the spiders and that priming and elaboration of the information was taking place without the interference of cognitive avoidance effects. This kind of information may be processed in a different way to the processing of pre-conscious stimuli described by Williams *et al.*(1988). They suggest that there are a number of operations performed in the brain which happen before consciousness and that these include 'sensory registration, semantic labelling, associative spread and disambiguation of a stimulus' and this stage in the process 'all meanings of an item are activated'(Williams *et al.*1988, p171). The ambiguity starts to narrow when the activation of all these meanings interacts with the context. Then a 'dominant meaning is selected and alternative interpretations rejected' (ibid). They also go on to propose that it is at this pre-attentive stage that a decision mechanism exists which judges the emotional valence of the stimulus and that there is orientation towards or away from the stimulus. Williams *et al.*(1988) suggest that this then sets the priorities for subsequent processing and that anxious people orient their attentional process towards threat and non anxious people away from threat. They also suggest that the visual dot probe experiment, on which the reaction time experiment here was based (with the Tarantula) is assessing this process. Macleod *et al.*(1984) confirmed this view: anxious people in his study did orient towards the threat word, while non-anxious people oriented away from the threat word and towards the non threat word. This is a very interesting finding and raises all sorts of questions about the nature of mind, which will not be addressed

here.

Again, this process may well be working at the level of initial sensory input a great deal of information is filtered out at this stage but the information processing explanation seems to be rather less useful when dealing with the information system at a conscious level. If threatening information is indeed avoided then there should be a deficit in the memory store. On the evidence of the experiments reported here that does not seem to be the case. There probably is a reciprocal relationship with the stimuli and the response, with constant interactions between the inner and outer environments. In effect, as Śalkovskis (1991) suggests, there is constant reappraisal of all situations.

There may have been ways in which the experience here, of watching videos, could have been made even more meaningful and it would be interesting to find out if phobics are better at encoding stimuli the more meaningful it is. Certainly this would be consistent with results found by Rusted and Dighton (1991) in a prose recall task where spider phobics were more likely than non-phobics to recall spider-related information embedded in the text. Rusted and Dighton do not attribute this finding to the subjective meaning of the text but to 'cognitive preoccupation'. The alternative explanation for their finding proposed here is that the context of the stories, as well as the perspectives required in their reading, made the text and its ideas more meaningful as well as personally relevant.

### The importance of meaning

It has been suggested here that it is the meaning of an object which will determine action and that the emotional response is part of its meaning as well as contributing to it. There is a reciprocal relationship between attention and

what is being attended to (which includes information about past experiences, form, purpose, emotion, meaning, sensory information and everything else that may make up reality). Single words may not necessarily have such a wealth of emotive detail, in the same way that a dictionary definition of a group of words does not have the same impact, or form the same impression as they do collectively. Teasdale and Barnard (1993) give the example that a phrase for instance such as:

"O what can ail thee, knight at arms,  
Alone and palely loitering?"

evokes a feeling which difficult to describe in less than a paragraph of prose and which does not directly relate to the individual meanings of the words which if transliterated would be :

"What is the matter, armed old fashioned soldier,  
Standing by yourself and doing nothing with a pallid expression?"

Teasdale (1993) suggests that this is because the phrase has an overriding, generic, implicational meaning and it is this level of understanding which is linked to emotion and at which emotions can be changed. It is well known that the senses are linked to emotion and memory extremely efficiently, so that the smell of a certain food, country, perfume and so on can access an immediate and vivid memory of the past, including the emotion felt at that time. Odour memory was studied by Kline and Rausch (1985) who found that vivid flashbacks to distinct life events were elicited by brief exposure to olfactory stimuli. Single words will not of necessity incorporate many of the features found in the meaning of a live stimulus or a threatening situation *in vivo* and it is at this level that memory may function most efficiently.

The final test of the links between belief and emotion was in the treatment study.

If Williams *et al.*(1988) are correct, there should be a change in the pre conscious and conscious processing of information once the threat has been removed, and the person previously anxious joins the ranks of the non-anxious. The treatment used here allows a direct test of the theory. Results revealed that change was evident in both treated and untreated phobics and that a similar change was found in response times to neutral, emotional and disgust categories of words. There is no support here for the hypothesis that threat related stimuli are subject to an automatic, or strategic, processing bias which is removed when that stimuli is no longer threatening. The finding indicates that the effect of spider Stroop interference is unreliable and may depend upon between-group differences for its effect.

The data arising from an examination of the change in beliefs appear to be more informative. The treated phobics were significantly different in their level of belief in the negative cognitions in all three categories : disgust, coping and harm, and these changes were still in place at a week's follow up. There seems to have been a shift in the meaning of the spider and themselves in relationship to it which may be similar to the process of accommodation in Piagetian terms. There is a point in treatment, after the assimilation of new knowledge to do with the spider, the nature of anxiety, the phobic's response to the spider and techniques for physically coping with it, when this accommodation appears to happen very suddenly. It is as if their schema to do with spiders, and their relation to them, has shifted and is now composed of different information. Further exploration of this is necessary in order to decide whether this change in the fear network is indicative of a permanent change in processing strategies or whether it is born of temporary euphoria.

Specific phobias are not more irrational than other anxiety disorders; the fear appears to be justified in terms of threat perceived to come from the phobic stimuli. Phobics have a set of beliefs to do with their phobic object which provides a logical framework for the maintenance of phobic responses. The information processing paradigm, with its theoretical basis in conditioning theory, has been influential in removing the important elements of meaning and belief from the cognitive theory of anxiety disorders. This is being reversed by researchers such as Teasdale: there may in the near future be a paradigm shift towards the importance of meaning.

The studies in this thesis focus on the relative merits of examining beliefs as compared to cognitive processes in the maintenance (and by implication the treatment) of specific phobias. It has been suggested that meaning may be the product and director of information processing. Cognitions may be the consciously accessible manifestations of the meaning which a particular object has for the individual. These are often very specific in their content ('I will have a heart attack' and so on) and according to Teasdale (1993), specific meanings are the result of schematic models (generic meanings) which feed into specific meanings and emotion, while themselves being the result of specific meanings, and the thoughts and images generated by them. The modification of thoughts and images in any particular case may only be necessary if this change affects the higher order meaning: Teasdale suggests that it may be that targeting the 'parent' schematic models from which they are derived would be a more useful way of influencing emotional change, while the thoughts and images could be used as 'markers' as to the state of the generic meaning.

One of the problems with this is that if propositional meanings ('specific

meanings') are serving as the junction box of the processing system, then it is still sensible that it is they which are examined. If meaning is an emergent property of specific propositional beliefs thoughts and images, then in order to change the meaning it may still these beliefs which have to be changed, though it is suggested by Teasdale's model that changing other incoming sensory data (bodily state, visual or acoustic input and so on) may also have an effect in changing implicational belief by changing the pattern of the implicational code and thereby allowing the creation of an alternative schematic model. The results from the treatment study in this thesis seem to indicate that an alternative meaning, incorporating all these different elements, has changed the emotional response, but it could be argued that a change in coping behaviour has allowed learning (both cognitive, physiological and behavioural) to take place which feeds directly into the emotional response system. Alternatively, it could be argued that in terms of information processing, a lessening of anxiety has resulted in a change in directional biases towards threat at the initial processing stages and that this has resulted in the changes in the assessment of possible danger.

Many of the results discussed here can be accounted for by other theoretical viewpoints. Modern conditioning theory (Mackintosh, 1983; Rescorla, 1988), and non-associative learning theory (e.g. Davey's (1989) views on UCS revaluation) could account for the change in covariation biases over the course of treatment. These theoretical positions extend traditional, purely reflexive S-R connectionist views to incorporate cognitive components. In essence, it is argued by Rescorla and Mackintosh that classical conditioning involves "the perception of causality"; that is, that the organism comes to realise (believe?) that the CS has *caused* the UCS, and that conditioning results from this perception. Davey extends this view

by demonstrating that evaluation of stimuli can be modified in non-associative ways (e.g. the pairing of two tones at low sound intensity followed by repeated exposure to the second tone at painful intensity in the absence of the first. Subsequent presentation of the first then elicits an apparent CR not previously observed). These developments, together with work on evaluative and semantic conditioning could account for the results obtained here, particularly with respect to the data on self-reported beliefs and their change in the course of treatment. Again, the reaction time experiment involving a live stimuli reported in chapter 6 could be attributed, post-hoc, to learning history variables in spider phobics which would not be expected in non-phobics. Other possibilities (e.g. Marks' exposure principle) cannot account for the results at anything other than a descriptive level, given Marks' rejection of psychological theorizing (1987) and data refuting the necessity for exposure (Öst, 1991).

Beck, Emery and Greenberg's (1985) concept of anxiety schemata comes closest to accounting for the present results. However, their emphasis on the cognitive elements to the exclusion of the physiological and behavioural makes it less useful in the examination of specific phobias, with their strong behavioural and physiological components, and their severely circumscribed stimulus. Nevertheless, their theory could account for the attentional bias found in the reaction time experiment (the activation of danger schema resulting in hypervigilance) and for the change in emotional responses during the treatment session.

No single theory, including ICS, would predict a pattern of results noted in the present studies, largely because of the lack of results found in the memory experiments and the Stroop experiments. Many of the experiments, coming as

they do from the body of work generated by information processing theory, have been explained by their perpetrators in information processing terms. The experiments presented here, coming from that tradition, have also usually been explained in these terms. The reaction time experiment may simply be an illustration of individual differences in attentional bias to emotional stimuli and it may be this which ultimately contributes towards the continuance of anxiety responses. Unfortunately, the results of the Stroop test in the treatment study go some way to showing the inadvisability of using such measures as an index of treatment outcome. This is not to say that information processing is not important, because of course, it is. It is both the instigator and end of an infinitely complex interactive system, while meaning may be at the opposite quadrant of the cycle.

The main question to be answered here must therefore be whether there is any justification for the importation of the concept of 'generic' or 'implicational' meaning into the vocabulary of clinical psychology. What is its potential use and will it promote the development of further therapeutic tools?

There are obvious advantages to using the concept of meaning in a clinical setting. As meaning is usually subjectively comprehensible, the therapist and patient can talk about particular beliefs and negotiate possible alternative responses to a stimulus: it would not be possible to negotiate a change in response latency, however ultimately useful that might be. Ways can be usually be found to challenge beliefs, though not always successfully. Also, barring drugs, there is no other way which is as effective at altering the processing of information, (as evidenced in terms of the Stroop by Watts *et.al.*(1986) and Lavey *et.al.*(1993), but not in this thesis), and in this thesis as suggested by the belief

changes after treatment. With the utilisation of the techniques described here in the treatment chapter, a whole range of sensory and cognitive information is altered by observation, participation and discourse which together change the pattern of the elements from which meaning emerges ('Implicational code' to use Teasdale's words, without taking on the further computational model which he suggests the components in a computer are identical but the same cannot be said of brain components, except in the fundamentally binary system by which it is possible that the brain operates). The emphasis in this theory is on the importance of the input of the whole range of information including sensory, behavioural, kinaesthetic and cognitive elements. It has been suggested that there is a particular pattern of these elements which must be present before emotional change occurs. As an interesting footnote, new, unscientific, left-field therapies such as neuro-linguistic programming are based on the premise that changing particular bodily responses (e.g. eye movements) can change mood. This is also consistent with some aspects of the ICS hypothesis, though it is not within the mainstream of psychological theorising and is of dubious value on its own.

The suggestion that emotional change comes when the 'correct' pattern and sequence of data is achieved by an individual might go some way towards explaining the recognisable moment at which an OCD patient for instance becomes ready to take the risk of stopping rituals, or the point at which eating disorder patients, previously unwilling to abandon their way of looking at themselves and their disorder, suddenly shift and begin to want to change, or, at as more mundane level, the point at which someone decides to give up smoking. The spider phobics in the treatment experiment reported here were relatively unchanged in their ideas about the spider, and more particularly, themselves in

relationship to it, until the point came when a definite and visible shift occurred. This does not happen in all cases, but is certainly consistent with the view that it is only when a particular configuration of information has been reached that a stimulus loses its toxicity. Evidence for this is largely anecdotal but ways of examining the usefulness of such an idea could be undertaken by using a variety of variations on treatment. For instance, treatment of spider phobics could be undertaken using only behavioural and modelling techniques without the cognitive interventions. There could be matched interventions which controlled the amount of exposure. If after exposure *alone* there is a belief change, this would be consistent with the idea that exposure itself works through a change in the associated beliefs. Other ways of testing this may be to look more closely at the effect of successful treatment on attentional or memory processes, in much more detail than has been attempted here. An examination of the way in which people come to make decisions about the threat-element in a variety of disorders utilising techniques from experimental cognitive science may also be illuminating. The basic argument here then is that everything has an impact on meaning ( in much the same way that Mead describes social meaning as being derived from a constant symbolic interaction, leading to infinite re-creation of meaning or reality) and, that being the case, it should be possible to isolate those elements which are necessary and sufficient to change meanings which are damaging or which lead to the formation or perpetuation of emotional disorders, whether these elements are semantic or sensory.

In this thesis I have begun to explore the possibility that the exploration of meaning and its impact on information processing may provide useful clinical tools and potentially gives empiricists another dimension in which to work.

Broadly, the ideas rests on the concept that many anxiety-maintaining factors may be contributing to a particular configuration of information and hence the implication of threat, and that some of these at least will be accessible and modifiable. Concepts such as emotional meaning as an emergent property rather than an encoded proposition may provide experimental substance for clinical observations such as the 'shift' in convictions and emotion.

### Future Research.

As well as the extensions to research suggested above, there are many other possibilities for future research arising from the experiments reported here. It might be useful to elicit subtler ideas about the emotional content of cognitions to do with a threat object than are possible within the confines of a questionnaire. A fruitful area of enquiry might be to solicit a stream of consciousness-type response. The issue of high-level meaning is a difficult one. If the meaning does not depend upon its constituent parts, how is it to be measured? If it is beyond words, how is it to be examined? A first step might be to look at the basic meaning of particular emotional salience to a group of people and try to find any common ground. Phobics would be ideal for this, especially as there is at least the possibility of a consensus about the physical features of their phobic object.

With regard to the Stroop, it is difficult to see how this might be adapted as a useful measure of attentional bias to one or other meanings. A more useful paradigm for future research into attentional bias might be a search task , where anxious people could be required to search for threat items (including meaningful and non-meaningful items) and then non-threat items, amongst neutral items. As

a supplementary to this they could be asked what they remembered of the items used as distraction. However, there is good reason to suggest a re-emphasis of *in vivo* type studies, either in the field or in the laboratory.

Further refinement of the reaction time experiment might include a subsequent task afterwards as a check on the kind of material processed while attention was being directed to a target. It may have been useful here to ask the phobics what they could remember about the spider, the door, or if the sink invaded their consciousness for example. In order to establish whether the results of the first test did indicate a division of attention between threat and safety-seeking behaviour a memory test of some sort of stimuli placed behind the spider at a place upon the wall and the door, may have enabled firmer conclusions to be drawn. This was considered in the present experiments but postponed until a possible second experiment due to limitations of time.

It has already been suggested that the examination of memory function with higher order meaning might be extremely valuable. A design of the kind that Rusted and Dighton (1991) utilised but perhaps using stimuli *in vivo* may be a better test of the efficiency of encoding than that used here. Similarly, testing memory before and after one session treatment would be illuminating in that it would allow assumptions to be made about the effect of emotional change on attentional change, and *vice versa*.

Finally, research into the causal role of beliefs could be undertaken. In panic disorder it is possible to cause a panic attack by the activation of specific cognitions and it would be valuable if this were found to be the case in specific phobia. It may be possible to identify particular beliefs in specific phobics which are causal such as those beliefs which are instrumental in causing a fainting

response in blood phobia. Öst, Sterner and Fellanius (1989) taught blood/injury phobics to apply muscle tension. This has the effect of raising blood pressure sufficiently to counteract the drop in blood pressure experienced at the sight of blood (which is the initial trigger for the feeling of faintness). Öst *et.al.*(1989) found that blood phobics who have been taught this technique reported that they did not actually need to apply this tension when in a subsequent phobic situation. The belief that they could control the faintness may have been in itself preventative. The proposed causal connection between the belief and treatment response could be directly evaluated by teaching blood/injury phobics a technique which does not actually raise blood pressure but which they believe has this effect.

Treatment studies could be carried out to investigate the nature and trigger for the 'shift' discussed above. It may be that some elements of the configuration of data from which meaning emerges are more crucial than others in terms of clinical improvement and this could be tested by designing treatment which removes one of the elements assumed to be important and measuring the ensuing recovery deficits. It might also be useful to investigate the possible formulation of phobic archetypes and their impact on treatment efficacy. As the intensity of belief is also a contributory factor in the pattern contributing to meaning, it might also be useful to examine the individual phobic's beliefs with regard to their relative strength and attempt to manipulate these in order to examine their significance in relation to the overall meaning. However, it will take some time to devise rigorous experimental methodologies with regard to these tentative suggestions.

Cognitive theories have moved away from the simple notion that merely

providing contradictory information is enough to modify beliefs and therefore anxiety. They have also moved away from the idea that cognitive change in itself, as brought about by the power of logic, will be enough to change emotion. Conducting effective belief modification, as in the possible blood/injury experiment outlined above, is a complex undertaking. If the nature of phobic beliefs and the processes involved in their modification were better understood, then therapeutic efforts could be more precisely directed. What is required is a true paradigm shift away from the theoretical underpinnings of two process conditioning theory (even when presented in the guise of information processing). The contribution of belief-based cognitive theories to the treatment of other anxiety disorders is well established. Theoretical refinements of our understanding of the nature of meaning involved in emotional problems (Teasdale, 1993) and the link between beliefs and behaviour (Šalkovskis, 1991) as well as a more precise evaluation of the necessary elements going towards the making of meaning, should allow yet further progress in the understanding and treatment of specific phobia.

## REFERENCES

Achille, M., Stewart, S.H., Dubois-Nguyen, I., Peterson, J.B. and Pihl, R.O. (1991) Social fear and selective attention bias for non-verbal social threat. Paper presented at the Canadian Psychological Association Annual Meeting. Calgary, June 1991.

Alexander, F. and French, T.M. (1946) Psychoanalytic Therapy, New York: Ronald Press.

Alloy, L.B. and Abramson, L.Y. (1988) Depressive realism: Four theoretical perspectives. In L.B. Alloy (Ed.) Cognitive processes in Depression (pp223-265). New York: Guildford Press.

Alloy, L.B. and Tabachnik, N. (1984) Assessment of variation by humans and animals. The joint influence of prior expectations and current situational information. Psychological Review, 91, 112-149.

Angyal, A. (1941) Disgust and related aversions. Journal of Abnormal and Social Psychology, 36, 393-412.

Arieti, S. (1979) New views on the psychodynamics of phobias. American Journal of Psychotherapy, 33, 82-95.

Argas, W.S., Sylvester, D. and Oliveau, D. (1969) The epidemiology of common fears and phobia. Comprehensive Psychiatry, 10, 151-156.

Arntz, A. and Lavy, E. (1993) Does stimulus elaboration potentiate exposure *in vivo* treatment? Two forms of one-session treatment of spider phobia. Behavioural Psychotherapy, 21, 1-12.

Arntz, A., Lavy, E., van den Berg, G. and van Rijsoort, S. (1993) Negative beliefs of spider phobics: a psychometric evaluation of the spider phobia beliefs questionnaire. Advances in Behaviour Research and Therapy, 15, 257-277.

Baer, P.E. and Fuhrer, M.J. (1968) Cognitive processes during differential trace and delayed conditioning of the GSR. Journal of Experimental Psychology, 78, 81-88.

Baer, P.E. and Fuhrer, M.J. (1970) Cognitive processes in the differential trace conditioning of electrodermal and vasomotor activity. Journal of Experimental Psychology, 84, 176-178.

Bandura, A. (1971) Principles of Behaviour Modification. New York: Holt, Rinehart and Winston.

Bandura, A. (1977) Self-efficacy: Toward a unifying theory of behavioural change. Psychological Review, 84, 191-215.

- Bandura, A. and Menlove, F.L. (1968) Factors determining vicarious extinction of avoidance behaviour through symbolic modelling. Journal of Personality and Social Psychology, 8, 999-108.
- Bandura, A. and Rosenthal, T.L. (1966) Vicarious classical conditioning as a function of arousal level. Journal of Personality and Social Psychology, 3, 54-62.
- Barlow, D.H. (1988) Anxiety and its Disorders: The nature and treatment of anxiety and panic. New York: Guildford Press.
- Barnard, P.J. and Teasdale, J.D. (1991) Interacting cognitive subsystems: a systematic approach to cognitive-affective interaction and change. Cognition and Emotion, 5, 1-39.
- Beck, A.T. (1976) Cognitive therapy and the emotional disorders. New York: International Universities Press.
- Beck, A.T. and Clark, D.A. (1988) Anxiety and Depression: An information processing perspective. Anxiety Research, 1, 23-36.
- Beck, A.T. and Emery, G. and Greenberg (1985) Anxiety disorders and phobias: a cognitive perspective. New York: Basic Books.
- Beck, A.T., Epstein, N. and Harrison, R. (1983) Cognitions, attitudes and personality dimensions in depression. British Journal of Cognitive Psychotherapy, 1, 1-16.
- Beck, A.T., Laude, R. and Bohnert, M. (1974) Ideational components of anxiety neurosis. Archives of General Psychiatry, 31, 319-325.
- Beck, A.T., Rush, A.J., Shaw, B.F. and Emery, G. (1979) Cognitive Therapy of Depression: A treatment manual. New York: Guildford Press.
- Bennett-Levy, J. and Marteau, T. (1984) Fear of animals: What is prepared? British Journal of Psychology, 75, 37-42.
- Borkovec, T.D. (1978) Self-efficacy: Cause or reflection of cognitive change? Advances in Behaviour Research and Therapy, 1, 177-193.
- Borkovec, T.D. (1982) Facilitation of inhibition of functional CS exposure in the treatment of phobias. In J. Boulougouris (Ed.) Learning theory approaches to psychiatry. New York: Wiley.
- Bourdon, K.H., Boyd, J.H., Rae, D.S and Burns, B.J. (1988) Gender differences in phobias: Results of the ECA community survey. Journal of Anxiety Disorders, 2, 227-241.
- Bower, G.H. (1981) Mood and Memory. American Psychologist, 36, 129-148.

- Bower, G.H. (1987) Commentary on mood and memory. Behaviour Research and Therapy, 25, 443-456.
- Bradley, B. and Mathews, A. (1983) Negative self schemata in clinical depression. British Journal of Clinical Psychology, 22, 173-181
- Breger, L. and McGaugh, J.L. (1965) Critique and reformulation of "learning theory" approaches to psychotherapy and neurosis. Psychological Bulletin, 63, 338-358.
- Bregman, E.O. (1934) An attempt to modify the emotional attitudes of infants by the conditioned response technique. Journal of Genetic Psychology, 45, 169-198.
- Breslow, R., Kocsis, J. and Belkin, B. (1981) Contribution of the depressive perspective to memory function in depression. American Journal of Psychiatry, 138, 227-230.
- Brewer, W.F. (1974) There is no convincing evidence for operant and classical conditioning in humans. In W.B.Weimer and D.J.Palermo (Eds.) Cognition and the symbolic processes. Hillsdale.NJ: Lawrence Erlbaum Associates.
- Broadbent, D.E. (1958) Perception and Communication Oxford: Pergamon Press
- Broadbent, D.E (1971) Decision and Stress. London Academic Press.
- Broadbent, D.E. and Broadbent, M. (1988) Anxiety and attentional bias: State and Trait. Cognition and Emotion, 2, 165-183.
- Butler, G and Mathews, A. (1983) Cognitive processes in anxiety. Advances in Behaviour Research and Therapy, 5, 51-62.
- Burgess, I.S., Jones, L.M., Robertson, S.A., Radcliffe, W.N. and Emerson, E. (1981) The degree of control exerted by phobic and non-phobic verbal stimuli over the recognition behaviour of phobic and non-phobic subjects. Behaviour Research and Therapy 19, 233-243.
- Cameron, O.G. and Hill, E.M. (1989) Women and anxiety. Psychiatric clinics of North America, 12, 175-186.
- Carroll, J.B., Davies, P. and Richman, B. (1971) The American heritage word frequency book. Boston: Houghton-Mifflin.
- Chambless, D.L. (1988) Gender and Phobia. Congress of the European Association for Behaviour Therapy (1987, Amsterdam). Gedragstherapie, 21, 283-293.
- Chambless, D.L., Caputo, G.C., Bright, P. and Gallagher, R. (1984) Assessment of fear of fear in agoraphobics: The Agoraphobic Cognitions Questionnaire. Journal of Consulting Clinical Psychology, 52, 1090-1097.

- Cherry, E.C. (1953) Some experiments on the recognition of speech, with one and two ears. Journal of the Acoustical Society of America, 24, 975-979.
- Clark, D.M. (1986) A cognitive approach to panic. Behaviour Research and Therapy, 24, 461-470.
- Clark, D.M., Šalkovskis, P.M., Gelder, M., Koehler, K., Martin, M., Anastasiades, P., Hackmann, A., Middleton, H. and Jeavons, A. (1988). Tests of the cognitive theory of panic. In Panic and Phobias II, (Ed.I.Hand and H.U.Wittchen), pp149-158. Heidelberg:Springer-Verlag.
- Cohen, J., Dunbar, K. and McClelland, J.L. (1990) On the control of automatic processes:a parallel distributed processing account of the Stroop effect. Psychological Review, 97, 332-361.
- Cook, M. and Mineka, S. (1989) Observational conditioning of fear to fear-relevant versus fear-irrelevant stimuli in rhesus monkeys. Journal of Abnormal Psychology, 98, 448-459.
- Corteen, E.C. and Wood, B. (1972) Autonomic responses to shock-associated words in an unattended channel. Journal of Experimental Psychology, 94, 308-313.
- Coyne, J.C. and Lazarus, R.S. (1980) Cognitive style, stress perception and coping. In I.L.Katush and L.B.Schlesinger (Eds.) Handbook on stress and anxiety: Contemporary knowledge, theory and treatment (pp.144-158). San Francisco: Jossey-Bass.
- Craik, F.I.M. and Tulving, E. (1975) Depth of processing and the retention of words in episodic memory. Journal of Experimental Psychology:General, 104, 268-294.
- Craske, M.G. and Sipsas, A. (1992) Animal phobia versus claustrophobias: exteroceptive versus interoceptive cues. Behaviour Research and Therapy, 30, 569-581.
- Dalgleish, T. and Watts, F.N. (1990) Biases of attention and memory in disorders of anxiety and depression. Clinical Psychology Review, 10, 589-604.
- Darwin, C. (1872) The Expression of Emotion in Man and Animals. The University of Chicago Press.
- Davey, G.C.L. (1983) An associative view of human classical conditioning. In G.C.L.Davey(Ed.) Animal models of human behaviour. Chichester:John Wiley.
- Davey, G.C.L. (1989) Ecological learning theory.London:Routledge.
- Davey, G.C.L. (1989). UCS revaluation and conditioning models of acquired fears. Behaviour Research and Therapy,27,521-528.

- Davey, G.C.L. (1992) An expectancy model of laboratory preparedness effects. Journal of Experimental Psychology, General, 121, 24-40.
- Davey, G.C.L. (1992) Classical conditioning and the acquisition of human fears and phobias: a review and synthesis of the literature. Advances in Behaviour Research and Therapy 14, 29-66.
- Davey, G.C.L.(1992) Characteristics of individuals with fear of spiders. Anxiety Research, 4, 299-314.
- Davey, G.C.L. (1993) The 'disgusting' spider: The role of disease and illness in the perpetuation of fear of spiders. (in press).
- Davey, G.C., Forster, L. and Mayhew, G. (1993) Familial resemblances in disgust sensitivity and animal phobias. Behaviour Research and Therapy, 31, 41-50.
- Descartes, R. (1650) The Passions of the Soule. London: Martin and Ridley.
- de Silva, P. and Rachman, S. (1981) Is exposure a necessary condition for fear reduction? Behaviour Research and Therapy, 19, 227-232.
- Deutsch, J.A. and Deutsch, D. Attention: Some theoretical considerations. (1963) Psychological Review, 70, 80-90.
- Di Nardo, P.A., Guzy, L.T. and Bak, R.M. (1988) Anxiety response patterns and etiological factors in dog-fearful and non-fearful subjects. Behaviour Research and Therapy, 26, 245-242.
- Dollard, J. and Miller, N.E. (1950) Personality and psychotherapy: An analysis in terms of learning, thinking and culture. New York: McGraw-Hill.
- Ehlers, A., Margraf, J., Davies, S. and Roth, W.T. (1988) Selective processing of threat cues in subjects with panic attacks. Cognition and Emotion, 2, 201-220.
- Ehlers, A., Margraf, J. and Roth, W.T. (1988) Selective information processing, interoception, and panic attacks. In I.Hand and H.U.Wittchen (Eds.) Panic and Phobias 2. Springer-Verlag.
- Ehlers, A., Margraf, J., Roth, W.T., Taylor, C.B. and Birbaumer, N. (1988) Anxiety induced by false heart rate feedback in patients with panic disorder. Behaviour Research and Therapy, 26, 1-11.
- Eich, J.E. (1980) The cue-dependent nature of state-dependent retrieval. Memory and Cognition, 8, 157-173.
- English, H.B. (1929) Three cases of the "conditioned fear" response. Journal of Abnormal and Social Psychology, 24, 221-225.

- Errera, P. (1962) Some historical aspects of the concept, phobia. The Psychiatric Quarterly, 36, 325-336.
- Eysenck, H.J. (1979) The condition model of neurosis. Behavioural and Brain Sciences 2, 155-199
- Eysenck, H.J. and Wilson, G.D. (Eds.) (1973) The experimental study of Freudian theories. London: Methuen.
- Eysenck, M.W., MacLeod, C. and Mathews, A. (1987) Cognitive functioning in anxiety. Psychological Research, 49, 189-195.
- Fazio, A.F. (1969) Verbal and overt-behavioural assessment of a specific fear. Journal of Consulting Clinical Psychology 33, 705-709.
- Finlay-Jones, R.A. and Brown, G.W. (1981) Types of stressful life event and the onset of anxiety and depressive disorders. Psychological Medicine, 11, 813-815.
- Foa, E.B., Blau, J.S., Prout, M. and Latimer, P. (1977) Is horror a necessary component of flooding (implosion)? Behaviour Research and Therapy, 15, 397-402.
- Foa, E.B. and Kozak, M.J. (1985) Treatment of anxiety disorders: implications for psychopathology. In H. Tuma and J.D. Maser (Eds.) Anxiety and the anxiety disorders (pp451-452). Hillsdale, N.J.: Erlbaum
- Foa, E.B. and Kozak, M.J. (1986) Emotional processing of fear: exposure to corrective information. Psychological Bulletin, 99, 20-35.
- Foa, E.B. and McNally, R. (1986) Sensitivity to feared stimuli in obsessive-compulsives: a dichotic listening analysis. Cognitive Therapy and Research, 10, 477-485.
- Foa, E.B., McNally, R. and Murdock, T.B. (1989a) Anxious mood and memory. Behaviour Research and Therapy, 27, 141-147.
- Folkman, S. (1984) Personal control and stress and coping processes: A theoretical analysis. Journal of Personality and Social Psychology, 46, 839-852.
- Folkman, S. and Lazarus, R.S. (1985) If it changes it must be a process: study of emotion and coping during three stages of a college examination. Journal of Personality and Social Psychology, 48, 150-170.
- Folkman, S., Schaefer, C. and Lazarus, R.S. (1979) Cognitive processes as mediators of stress and coping. IN V. Hamilton and D.M. Warburton (Eds.) Human stress and cognition: An information-processing approach. (pp265-298). London: Wiley.

Fonberg, E. (1956) On the manifestation of conditioned defensive reactions on stress. (Cited in Wolpe, 1958 p.92)

Frazer, J.G. (1959) The New Golde Bough: A Study in Magic and Religion (abridged). New York: Macmillan. (Edited by T.H.Gaster, 1922; Original work published 1890)

Freud, S. (1938) In A.A.Bull (ed), The Basic Writings of Sigmund Freud. New York. Random House. (Originally published 1900)

Fyer, A. (1987) Simple Phobias. In D.Klein (Ed.) Anxiety. Basel: Karger.

Garcia, J and Koelling, R. (1966) Relation of cue to consequence in avoidance learning. Psychonomic Science, 4, 123-124.

Garcia, J., McGowan, B.K. and Green, K.F. (1972) Biological constraints on conditioning. In A.H.Black and W.F.Prokasy (Eds.) Classical conditioning II: Current research and theory. New York: Appleton-Century-Crofts.

Garcia, J., Rusiniak, K.W. and Brett, L.P. (1977) Conditioning food-illness aversions in wild animals. In Davis, H. and Hurwitz, H.M.B. (Eds.) Operant pavlovian interactions. New York: Wiley.

Gilligan, S.G. and Bower, G.H. (1984) Cognitive consequences of emotional arousal. In C.Izard, J.Kagan and R.Zajonc (Eds.) Emotions, Cognition and Behaviour. New York: Cambridge University Press.

Glaser, W.R. and Glaser, M.O. (1989) Context effects in Stroop-like word and picture processing. Journal of Experimental Psychology : Human Perception and Performance, 10, 640-654.

Graf, P. and Mandler, G. (1984) Activation makes words more accessible, but not necessarily more retrievable. Journal of Verbal Learning and Verbal Behaviour, 23, 553-568.

Gray, J. (1971) The psychology of fear and stress. New York: McGraw-Hill.

Grieve, J. (1814). (Trans) Celsus, Aulus Cornelius: of medicine. Edinburgh: Dickson.

Groves, P.M. and Thompson, R.F. (1970) Habituation: A dual-process theory. Psychological Review, 77, 419-459.

Hawton, K., Šalkovskis, P.M., Kirk, J. and Clark, D.M. (1989) Cognitive Behaviour Therapy for Psychiatric Problems: A practical guide. Oxford: Oxford University Press.

Hinde, R.A. (1966) Animal Behaviour: A Synthesis of Ethology and Comparative Psychology. New York: McGraw-Hill.

- Holender, D. (1986) Semantic activation without conscious identification in dichotic listening, parafoveal vision, and visual masking: A survey and appraisal. The Behavioural and Brain Sciences, 9, 1-66
- Hope, D.A., Rapee, R.M., Heimberg, R.G. and Dombreck, M.J. (1990) Representations of the self in social phobia: vulnerability to social threat. Cognitive Therapy and Research, 14, 177-189.
- Hugdahl, K., Fredrikson, M. and Öhman, A. (1977) "Preparedness" and "arousability" as determinants of electrodermal conditioning. Behaviour Research and Therapy, 15, 345-353.
- Hugdahl, K. and Öst, L.G. (1985) Subjectively rated physiological and cognitive symptoms in six different clinical phobias. Personality and Individual Differences, 2, 175-188.
- Jacobson, E. (1938) Progressive Relaxation. Chicago: University of Chicago Press.
- Johnston, J.C. and McClelland, J.L. (1980) Experimental tests of a hierarchical model of word identification. Journal of Verbal Learning and Verbal Behaviour, 19, 503-524.
- Jones, M.C. (1924) The elimination of children's fears. Journal of Experimental Psychology, 7, 382-90.
- Kamil, L.J. (1970) Psychodynamic changes through systematic desensitization. Journal of Abnormal Psychology, 76, 199-205.
- Klein, D.F. (1981) Anxiety reconceptualized. In D.F.Klein and J.Rabkin(Eds.). Anxiety:New research and changing concepts. New York:Raven Press.
- Klein, G.S. (1964) Semantic power measured through the interference of words with colour-naming. American Journal of Psychology, 77, 576-588.
- Kleinknecht, R.A. (1982) The origins and remission of fear in a group of tarantula enthusiasts.Behaviour Research and Therapy, 20, 437-443.
- Kleinsmith, L.J. and Kaplan, S. (1963) Paired associated learning as a function of arousal and interpolated interval. Journal of Experimental Psychology, 67, 190-193.
- Kline and Rausch (1985) Olfactory precipitants of flashbacks in post-traumatic stress disorder. Journal of Clinical Psychiatry, 46, 383-384.
- Klinger, E., Barter, S.G., and Maxeiner, M, E. (1981) Current concerns: assessing therapeutic relevant motivation'. In P.C.Kendall and S.D.Hollon (Eds.) Assessment Strategies for Cognitive Behavioural Interventions. New York: Academic Press.

- Klorman, R., Weerts, T.C., Hastings, J.E., Melamed, B.G. and Lang, P.J. (1974) Psychometric description of some specific fear questionnaires. Behaviour Therapy, 5, 401-409.
- Lang, P.J. (1971) The application of psychophysiological methods to the study of psychotherapy and behaviour modification. In Handbook of Psychotherapy and Behaviour Change (Eds. A.E. Bergin and S.L. Garfield) New York: Wiley.
- Lang, P.J. (1977) Imagery in therapy: An information processing analysis of fear. Behaviour Therapy, 8, 862-886.
- Lang, P.J. (1979) A bio-informational theory of emotional imagery. Psychophysiology, 16, 495-512.
- Lang, P.J. (1984) Cognition in emotion: Concept and action. In C.E. Izard, R.J. Zajonc, and J. Kagan (Eds.) Emotion, Cognition and Behaviour (pp192-228). Cambridge: Cambridge University Press.
- Lavy, E., van den Hout, M. and Arntz, A. (1993) Attentional bias and spider phobia: conceptual and clinical issues. Behaviour Research and Therapy, 31, 17-24.
- Lavy, E., van den Hout, M. and Arntz, A. (1993) Attentional bias and facilitated escape. Advances in Behaviour Research and Therapy, 15, 279-289.
- Lawler, E.E., III (1965) Secondary reinforcement value of stimuli associated with shock reduction. Quarterly Journal of Experimental Psychology, 17, 57-62.
- Lazarus, R.S. (1966) Psychological stress and the coping process. New York: McGraw-Hill.
- Lazarus, R.S. (1971) Behaviour Therapy and Beyond. New York: McGraw-Hill
- Lazarus, R.S. (1981) The stress and coping paradigm. In C. Eisdorfer, D. Cohen, A. Kleinman, and P. Maxim (Eds.) Models for clinical psychopathology (pp177-214). New York: Spectrum.
- Lazarus, R.S. (1984) On the primacy of cognition. American Psychologist, 39, 124-129.
- Lazarus, R.S., Kanner, A.D. and Folkmann, S. (1980) Emotions: A cognitive phenomenological analysis. In R. Plutchik and H. Kellerman (Eds.) Emotion: Theory, research and experience. (Vol.1). New York: Academic Press.
- Levis, D.J., and Hare, N. (1977) A review of the theoretical, rational and empirical support for the extinction approach of implosive (flooding) therapy. In M. Hersen, R.M. Eisler and P.M. Miller (Eds.) Progress in behavior modification (Vol.4). New York: Academic Press.

- Levonian, E. (1967) Retention of information in relation to arousal during continuously presented material. American Educational Research Journal, 4, 103-116.
- Liddell, A. and Hart, D. (1992) Comparison between FSS-II scores of two groups of university students sampled 15 yrs apart. Behaviour Research and Therapy, 30, 125-131.
- Liddell, H.G. and Scott, R. (1883) Greek-English lexicon:7th edition. New York: Harper.
- Light, L.L. and Carter-Sobell, L. (1970) The effects of changed semantic context on recognition memory. Journal of Verbal Learning and Verbal Behaviour, 9, 1-11.
- Logan, G.D. (1980) Attention and automaticity in Stroop and priming tasks: Theory and data. Cognitive Psychology, 12, 523-553.
- Mackintosh, N.J. (1983) Conditioning and Associative Learning. New York: Oxford University Press.
- Macleod, C. (1987) Cognitive psychology and cognitive therapy. In Dent, H. (Ed) Clinical Psychology: Research and Developments. Croom Helm.
- MacLeod, C. (1991) Half a century of research on the Stroop effect: an integrative review. Psychological Bulletin, 109, 163-203.
- MacLeod, C. and Mathews, A. (1988) Anxiety and the allocation of attention to threat. The Quarterly Journal of Experimental Psychology, 4, 653-670.
- MacLeod, C. and Mathews, A. (1991) Biased cognitive operations in anxiety: Accessibility of information or assignment of processing priorities? Behaviour Research and Therapy, 29, 599-610.
- MacLeod, C. and Hagan, R. (1992) Individual differences in the selective processing of threatening information, and emotional responses to a stressful life event. Behaviour Research and Therapy, 30, 151-161.
- Macleod, C. and Rutherford, E.M., (1992) Anxiety and the selective processing of emotional information: mediating roles of awareness, trait and state variables, and personal relevance of stimulus materials. Behaviour Research and Therapy 30, 479-491.
- MacLeod, C., Mathews, A. and Tata, P. (1986) Attentional bias in emotional disorders. Journal of Abnormal Psychology, 95, 15-20.
- Macmillan, N.A. and Creelman, C.D. (1991) Detection Theory: A User's Guide. Cambridge University Press.

- McNally, R.J. (1987) Preparedness and phobias: A review. Psychological Bulletin, *101*, 282-303.
- McNally, R.J. and Steketee, G.S. (1985) The etiology and maintenance of severe animal phobias. Behaviour Research and Therapy *23*, 431-435.
- McNally, R.J., Foa, E.B. and Donnell, C.D. (1989) Memory bias for anxiety information in patients with panic disorder. Cognition and Emotion, *3*, 27-44.
- McNally, R.J., Riemann, B.C. and Kim, E. (1990) Selective processing of threat cues in anxiety states. Behaviour Research and Therapy, *28*, 407-412.
- McNally, R.J., Kaspi, S.P., Riemann, B.C. and Zeitlin, S.B. (1990) Selective processing of threat cues in post-traumatic stress disorder. Journal of Abnormal Psychology, *99*, 398-402.
- Makaremi, A. (1989) Mental Health of Iranian high school and college students. Psychological Reports, *64*, 19-22.
- Manstead, A.S.R. and Wagner, H.L. (1981) Arousal, cognition and emotion: An appraisal of two-factor theory. Current Psychological Reviews, *1*, 35-54.
- Marcel, A. (1983) Conscious and unconscious perception: Experiments on visual masking and word recognition. Cognitive Psychology, *15*, 197-237.
- Marshall, G. and Zimbardo, P.G. (1979) Affective consequences of inadequately explained physiological arousal. Journal of Personality and Social Psychology, *37*, 970-998.
- Marks, I.M. (1969) Fears and Phobias, New York: Academic.
- Marks, I.M. (1987) Fears, Phobias, and Rituals, Oxford: Oxford University Press.
- Marks, I.M. and Gelder, M.G. (1966) Different ages of onset in varieties of phobias American Journal of Psychiatry, *123*, 218-221.
- Marshall, W.L., Bristol, D. and Barbaree, H.E. (1992) Cognitions and courage in the avoidance behaviour of phobics. Behaviour Research and Therapy, *30*, 463-470.
- Martin, M., Williams, R.M. and Clark, D.M. (1991) Does anxiety lead to selective processing of threat-related information? Behaviour Research and Therapy, *29*, 147-160.
- Masataka, N. (1993) Effects of experience with live insects on the development of fear of snakes in squirrel monkeys *Saimiri sciureus*. Animal Behaviour, *46*, 741-746.

- Matchett, G. and Davey, G.C.L. (1991) A test of a disease-avoidance model of animal phobias. Behaviour Research and Therapy, 29, 91-94.
- Mathews, A. and Macleod, C. (1985) Selective processing of threat cues in anxiety states. Behaviour Research and Therapy, 23, 563-569.
- Mathews, A. and Macleod, C. (1986) Discrimination of threat cues without awareness in anxiety states. Journal of Abnormal Psychology, 95, 131-138.
- Mathews, A. and Klug, F. (1993) Emotionality and interference with color-naming in anxiety. Behaviour Research and Therapy, 31, 57-62.
- Mathews, A., Mogg, K., May, J. and Eysenck, M. (1989) Implicit and explicit memory bias in anxiety. Journal of Abnormal Psychology, 98, 236-240.
- Mathews, A., May, J., Mogg, K. and Eysenck, M. (1990) Attentional bias in anxiety: selective search or defective filtering? Journal of Abnormal Psychology, 99, 166-173.
- Merckelbach, H., Arntz, A. and De Jong, P. (1991) Conditioning experiences in spider phobics. Behaviour Research and Therapy, 29, 333-335.
- Merckelbach, H., Arntz, A., Arrindell, W.A. and De Jong, P. (1992) Pathways to spider phobia. Behaviour Research and Therapy, 30, 543-546.
- Mineka, S. (1987) A primate model of phobic fears. In H.Eysenck and I.Martin (Eds.) Theoretical foundations of behaviour therapy. New York: Plenum Press.
- Mineka, S. and Cook, M. (1986) Immunization against the observational conditioning of snake fear in rhesus monkeys. Journal of Abnormal Psychology, 95, 307-318.
- Mineka, S., Davidson, M., Cook, M. and Keir, R. (1984) Observational conditioning of snake fear in rhesus monkeys. Journal of Abnormal Psychology, 93, 355-372.
- Mischel, W. (1979) On the interface of cognition and personality: Beyond the person situation debate. American Psychologist, 34, 740-754.
- Mizes, J.S., Landolf-Fritsche, B. and Grossman-McKee, D. (1987) Patterns of distorted cognitions in phobic disorders: an investigation of clinically severe simple phobics, social phobics, and agoraphobics. Cognitive Therapy and Research, 11, 583-592
- Mogg, K., Mathews, A. and Weinman, J. (1987) Memory bias in clinical anxiety. Journal of Abnormal Psychology, 96, 94-98.
- Mogg, K., Mathews, A. and Weinman, J. (1989) Selective processing of threat cues in anxiety states: a replication. Behaviour Research and Therapy, 27, 317-323

- Moray, N. (1959) Attention in dichotic listening: affective cues and the influence of instructions. The Quarterly Journal of Experimental Psychology, 11, 56-60.
- Morton, J. (1978) Facilitation in word recognition: experiments causing change in the logogen model. In Kolers, P.A., Wrolstad, M.E. and Bouma, H. (Eds.) Proceedings of the Conference on the Processing of Visible Language. New York: Plenum.
- Mowrer, O.H. (1947) On the dual nature of learning - a reinterpretation of "conditioning" and "problem-solving." Harvard Educational Review, 17, 102-148.
- Mowrer, O.H. (1950) Learning theory and personality dynamics. New York: Ronald
- Mowrer, O.H. and Mowrer, W.M. (1938) Enuresis - a method for its study and treatment. American Journal of Orthopsychiatry, 8, 436-459.
- Muris, M., de Jong, P., Merckelbach, H. and van Zuuren, F. (1993) Monitoring coping style and exposure outcome in Spider Phobics. Behavioural and Cognitive Psychotherapy, 21, 329-333.
- Murray, E.J. and Foote, F. (1979) The origins of fear of snakes. Behaviour Research and Therapy, 17, 489-493.
- Nasby, W. and Yando, R. (1982) Selective encoding and retrieval of affectively valent information: Two cognitive consequences of childrens mood states. Journal of Personality and Social Psychology, 43, 1244-1253.
- Natale, M. and Hantas, M. (1982) Effect of temporary mood-states on selective memory about the self. Journal of Personality and Social Psychology, 42, 927-934.
- Neisser, U. (1967) Cognitive Psychology. New York: Appleton-Century-Crofts
- Norton, G.R., Schaefer, E., Cox, B., Dorward, J. and Wozney, K. (1988) Selective memory effects in non-clinical panickers. Journal of Anxiety Disorders, 2, 169-177.
- Nunn, J.D., Stevenson, R.J. and Whalan, L. (1984) Selective memory effects in agoraphobic patients. British Journal of Clinical Psychology, 23, 195-201.
- Öhman, A. (1979) Fear relevance, autonomic conditioning and phobias: A laboratory model. In P.O.Sjödé, S.Bates and W.S.Dockens, (Eds.) Trends in Behaviour Therapy, (pp107-133). New York: Academic Press.
- Öhman, A. (1986) Face the beast and fear the face: animal and social fears as prototypes for evolutionary analyses of emotion. Psychophysiology, 23, 123-145.

- Öhman, A., Dimberg, U. and Öst, L.G. (1985) Animal and social phobias: Biological constraints on learned fear responses. In S.Reiss and R.R.Bootzin (Eds.) Theoretical issues in behaviour therapy, (pp123-175). New York: Academic Press.
- Öhman, A., Erixon, G. and Löfberg, U. (1975) Phobias and preparedness: Phobic versus neutral pictures as conditioned stimuli for human autonomic responses. Journal of Abnormal Psychology, 84, 41-45.
- Öst, L.G. (1985) Ways of acquiring phobias and outcome of behavioural treatments. Behaviour Research and Therapy, 23, 683-689.
- Öst, L.G. (1989) One session treatment for specific phobias. Behaviour Research and Therapy, 27, 1-7.
- Öst, L.G. and Hugdahl, K. (1981) Acquisition of phobias and anxiety response patterns in clinical patients. Behaviour Research and Therapy, 19, 439-447.
- Öst, L.G., Salkovskis, P.M. and Hellström, K. (1991) One-session therapist-directed treatment Vs.self-exposure in the treatment of spider phobia. Behaviour Therapy, 22, 407-422.
- Öst, L.G., Sterner, U. and Fellanius, J. (1989) Applied tension, applied relaxation, and the combination in the treatment of blood phobia. Behaviour Research and Therapy, 27, 109-121.
- Oxenbridge, D. (1715) General observations and prescriptions in the practise of physick. 6-9 and 17-18. Mears: London.
- Parkinson, L. and Rachman, S.J. (1981) Intrusive thoughts: The effects of an uncontrived stress. Advances in Behaviour Research and Therapy, 3, 111-118.
- Paul, G.L. (1966) Insight vs.desensitization in psychotherapy : an experiment in anxiety reduction. Stanford, California: Stanford University Press.
- Paul, G.L. (1967) Insight versus desensitisation in psychotherapy two years after termination. Journal of Consulting Psychology, 31, 333-348.
- Piotrowski,C., Sherry, D and Keller, J.W. (1985). Psychodiagnostic test usage: A survey of the Society for Personality Assessment. Journal of personality Assessment, 49, 115-119.
- Posner, M. (1973) Coordination of internal codes. In W.Chase (ed) Visual Information Processing. New York: Academic Press
- Prince, M. (1992) A clinical study of a case of phobia. Journal of Abnormal Psychology 101, 611-616.

- Rachman, S.J. (1977) The conditioning theory of fear acquisition: A critical examination. Behaviour Research and Therapy, 15, 375-387.
- Rachman, S.J. (1978) Fear and courage. San Francisco: W.H.Freeman and Co.
- Rachman, S.J. (1981) The primacy of affect: some theoretical implications. Behaviour Research and Therapy, 19, 279-290.
- Rachman, S.J. and Eysenck, H.J. (1966) Reply to a "critique and reformulation" of behaviour therapy. Psychological Bulletin, 65, 165-169.
- Rachman, S.J. and Wilson, G.T. (1980) The effects of psychological therapy (2nd edition). Elmsord, N.J.: Prentice-Hall.
- Reisenzein, R. (1983) The Schacter theory of emotion: Two decades later. Psychological Bulletin, 94, 239-264.
- Rescorla, R.A. (1967) Pavlovian conditioning and its proper control procedures. Psychological Review, 74, 71-80.
- Rescorla, R.A. (1968) Pavlovian conditioned fear in Sidman avoidance learning. Journal of Comparative and Physiological Psychology, 65, 55-60
- Rescorla, R.A. (1988) Pavlovian conditioning: it's not what you think it is. American Psychologist, 43, 151-160.
- Richards, A., French, C.C., Johnson, W., Naparstek, J. and Williams, J. (1992) Effects of mood manipulation and anxiety on performance of an emotional Stroop task. British Journal of Psychology 83, 479-491.
- Riskind, J.H., Kelley, K., Harman, W., Moore, R. and Gaines, H.S.. (1992) The loomingness of danger: does it discriminate focal phobia and general anxiety from depression? Cognitive Therapy and Research 16, 603-622.
- Robins, L.N., Helzer, J.E., Croughan, R. and Ratcliffe, K.S. (1981) National Institute of Mental Health Diagnostic Interview Schedule: Its history, characteristics and validity. Archives of General Psychiatry, 38, 381-389.
- Robins, L.N., Helzer, J.E., Weissman, M.M., Orvaschel, H., Gruenberg, E., Burke, J.D. and Regier, D.A. (1984) Lifetime prevalence of specific psychiatric disorders in three sites. Archives of General Psychiatry, 41, 949-958.
- Rozin, P. and Fallon, A.E. (1987) A perspective on disgust. Psychological Review, 94, 23-41.
- Rozin, P., Fallon, A.E. and Mandell, R. (1984) Family resemblances in attitudes to food. Developmental Psychology, 20, 309-314.

- Rozin, P., Millman, L. and Nemeroff, C. (1986) Operation of the laws of sympathetic magic in disgust and other domains. Journal of Personality and Social Psychology, 50, 703-712.
- Rush, B. (1979) On the different species of phobias. The weekly magazine of original essays, fugitive pieces, and interesting intelligence. 1 177-180.
- Russell, C. and Davey, G.C.L. (1991) The effects of false response feedback on human 'fear' conditioning. Behaviour Research and Therapy, 29, 191-196.
- Rusted, J. and Dighton, K. (1991) Selective processing of threat-related material by spider phobics in a prose recall task. Cognition and Emotion, 5, 123-132.
- Salkovskis, P.M. (1988) Phenomenology, assessment and the cognitive model of panic. In Panic: psychological perspectives, (ed.S Rachman and J.D.Maser) pp111-136
- Salkovskis, P.M. (1991) The importance of behaviour in the maintenance of panic and anxiety. Behavioural Psychotherapy, 19, 6-19.
- Seligman, M.E.P. (1970) On the generality of the laws of learning. Psychological Review, 77, 406-418.
- Seligman, M.E.P. (1971) Phobias and preparedness. Behaviour Therapy, 2, 307-321.
- Seligman, M.E.P. and Hager, M.(Eds)(1972) Biological boundaries of learning. New York: Appleton-Century-Crofts.
- Schacter, S. and Singer, J. (1962) Cognitive, social and physiological determinants of emotional state. Psychological Review, 69, 379-397.
- Schacter, S. (1964) The interaction of cognitive and physiological determinants of emotional state. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol.1). New York: Academic press.
- Shakespeare, W. (1955 edition) The Complete Works, p209. Oxford University Press: London.
- Shallice, T. (1978) The dominant action system:an information processing approach to consciousness. In Pope and Singer (eds) The Stream of Consciousness, New York, Plenum Press.
- Sheehan, D.V., Sheehan, K.E. and Minichiello, W.E. (1981) Age of onset of phobic disorders: A reevaluation. Comprehensive Psychiatry, 22, 544-553.
- Skinner, B.F. (1971) Science and Human Behaviour. New York: Macmillan.

Skre, I., Onstad, S., Torgersen, S., Lygeren, S. and Kringlen, E. (1993) A twin study of DSM-III-R anxiety disorders. Acta Psychiatrica Scandinavia, 88, 85-92.

Solomon, R.L. and Wynne, L.C. (1954) Traumatic avoidance learning: the principles of anxiety conservation and partial irreversibility. Psychological Review, 61, 353-385.

Solomon, R.L. Kamin, L.J. and Wynne, L.C. (1953) Traumatic avoidance learning: The outcome of several extinction procedures with dogs. Journal of Abnormal Psychology, 48, 391-401.

Spielberger, C.D., (1983) State trait anxiety inventory. Palo Alto, Calif.: Consulting Psychologists Press.

Statistical Analysis System Institute inc. (1992) SAS/Stat User's Guide Version 6, 4th edition, Volumes 1 and 2. Cary, North Carolina: SAS Institute inc..

Steer, R.A., Beck, A.T. and Garrison, B. (1986) Applications of the Beck Depression Inventory. In N.Sartorius and T.A.Bans (Eds) Assessment of Depression (pp 121-142). Geneva, Switzerland: The World Health Organisation.

Stopa, L. and Clark, D.M. (1993) Cognitive processes in social phobia. Behaviour Research and Therapy, 31, 255-267.

Stroop, J.R. (1935) Studies of interference in serial verbal reactions. Journal of Experimental Psychology, 18, 643-662.

Stroop, J.R. (1938) Factors affecting speed in serial verbal reactions. Psychological Monographs, 50, 38-48.

Teasdale, J.D. (1993) Emotion and two kinds of meaning: Cognitive therapy and applied cognitive science. Behaviour Research and Therapy, 31, 339-354.

Teasdale, J.D. and Fogarty, S.J. (1979) Differential effects of induced mood on retrieval of pleasant and unpleasant events from episodic memory. Journal of Abnormal Psychology, 88, 248-257.

Teasdale, J.D. and Russell, M.L. (1983) Differential effects of induced mood on the recall of positive, negative and neutral words. British Journal of Clinical Psychology, 22, 163-172.

Thompson, R.F., Groves, P.M., Teyler, T.J. and Roemer, R.A. (1973) A dual-process theory of habituation: Theory and behaviour. In H.V.S.Peeke and M.J.Herz (Eds.) Habituation (Vol.1). New York: Academic Press.

Thorndike, E.L. (1935) The psychology of wants, interests and attitudes. New York: Appleton, Century.

Thorpe, S.J. (1990) Unpublished pilot study.

- Titchener, E.B. (1908) Lectures on the Elementary Psychology of Feeling and Attention. New York.
- Tomarken, J.T., Mineka, S. and Cook, M. (1989) Fear-relevant selective associations and covariation bias. Journal of Abnormal Psychology 98, 381-394.
- Treisman, A.M. (1964) Verbal cues language and meaning in selective attention. American Journal of Psychology, 77, 206-219.
- Treisman, A.M. and Riley, J.G.A. (1969) Is selective attention selective perception or selective response: a further test. American Journal of Psychology, 77, 206-219.
- Treisman, A.M., Squire, R. and Green, J. (1974) Semantic processing in dichotic listening? A replication. Memory and Cognition, 2, 641-646.
- Turner, D. (1724) A practical dissertation on the venereal disease. Vol.1 96-102. Bonwicke:London.
- Valentine, C.W. (1930) The innate bases of fear. Journal of Genetic Psychology, 37, 394-420.
- Von Korff, M., Shapiro, S., Burke, J.D., Teitlebaum, M., Skinner, E.A., German, P., Turner, R. W., Klein, L. and Burns, B. (1987) Anxiety and depression in a primary care clinic. Archives of General Psychiatry, 44, 152-156.
- Von Streblow, H., Hoffman, J. and Kasielke, E. (1985) Experimental Psychologische Analyse von Gedächtnisprozessen bei Phobikern. Zeitschrift für Psychology, 193, 147-161.
- Wachtel, P. (1977) Psychoanalysis and behaviour therapy: Toward an integration. New York:Basic Books.
- Warren, R.E. (1974) Association, directionality and stimulus encoding. Journal of Experimental Psychology, 102, 151-158.
- Watson, J.B. and Rayner, R. (1920) Conditioned emotional reactions. Journal of Experimental Psychology, 3, 1-4.
- Watts, F.N. (1974) The control of spontaneous recovery of anxiety in imaginal desensitization. Behaviour Research and Therapy, 12, 57-59.
- Watts, F.N. (1979) Habituation model of systematic desensitization. Psychological Bulletin, 86, 627-637.
- Watts, F.N. (1986) Cognitive processing in phobias. Behavioural Psychotherapy 14, 295-301.

- Watts, F.N. and Coyle, K. (1992) Recall bias for stimulus and response anxiety words in spider phobics. Anxiety Research, 4, 315-323.
- Watts, F.N. and Dalglish, T. (1991) Memory for phobia-related words in spider phobics. Cognition and Emotion, 5, 313-329.
- Watts, F.N., Mckenna, F.P., Sharrock, R. and Trezise, L. (1986) Colour naming of phobia related words. British Journal of Psychology, 77, 97-108.
- Watts, F.N. and Sharrock, R. (1984) Questionnaire dimensions of spider phobia. Behaviour Research and Therapy, 22, 575-580.
- Watts, F.N. and Sharrock, R. (1985) Relationships between spider constructs in phobics. British Journal of Medical Psychology, 58, 149-153.
- Watts, F.N., Sharrock, R. and Trezise, L. (1986) Detail and elaboration in phobic imagery. Behavioural Psychotherapy 14, 115-123.
- Watts, F.N., Trezise, L. and Sharrock, R. (1986) Processing of phobic stimuli. British Journal of Clinical Psychology, 25, 253-259.
- White, K. and Davey, G.C.L. (1989) Sensory preconditioning and UCS inflation on human 'fear' conditioning. Behaviour Research and Therapy, 27, 161-166.
- Williams, J.M.G., Watts, F.N., MacLeod, C. and Mathews, A. (1988) Cognitive Psychology and Emotional Disorders. Chichester: Wiley.
- Wittchen, H-U. (1986) Epidemiology of panic attacks and panic disorders. In Panic and Phobias (eds.I.Hand and H-U.Wittchen.) Springer-Verlag:Berlin.
- Wolpe, J. (1958) Psychotherapy by Reciprocal Inhibition. Stanford University Press.
- Wolpe, J. (1961) The systematic desensitization treatment of neuroses. Journal of Nervous and Mental Disorders, 132, 189-203.
- Wolpe, J. and Lang, P.J. (1964) A fear survey schedule for use in behaviour therapy. Behaviour Research and Therapy, 2, 27.
- Zajonc, R.B. (1980) Feeling and thinking: Preferences need no inferences. American Psychologist, 35, 151-175.
- Zajonc, R.B. (1984) On the primacy of affect. American Psychologist, 39, 117-123.
- Zilboorg, G. (1941) A history of Medical Psychology. New York:Norton.
- Zuroff, D.C., Colussy, S.A. and Wielgus, M.S. (1983) Selective memory and depression:a cautionary note concerning response bias. Cognitive Therapy and Research, 7, 223-232.

- Watts, F.N. and Coyle, K. (1992) Recall bias for stimulus and response anxiety words in spider phobics. Anxiety Research, 4, 315-323.
- Watts, F.N. and Dalglish, T. (1991) Memory for phobia-related words in spider phobics. Cognition and Emotion, 5, 313-329.
- Watts, F.N., Mckenna, F.P., Sharrock, R. and Trezise, L. (1986) Colour naming of phobia related words. British Journal of Psychology, 77, 97-108.
- Watts, F.N. and Sharrock, R. (1984) Questionnaire dimensions of spider phobia. Behaviour Research and Therapy, 22, 575-580.
- Watts, F.N. and Sharrock, R. (1985) Relationships between spider constructs in phobics. British Journal of Medical Psychology, 58, 149-153.
- Watts, F.N., Sharrock, R. and Trezise, L. (1986) Detail and elaboration in phobic imagery. Behavioural Psychotherapy 14, 115-123.
- Watts, F.N., Trezise, L. and Sharrock, R. (1986) Processing of phobic stimuli. British Journal of Clinical Psychology, 25, 253-259.
- White, K. and Davey, G.C.L. (1989) Sensory preconditioning and UCS inflation on human 'fear' conditioning. Behaviour Research and Therapy, 27, 161-166.
- Williams, J.M.G., Watts, F.N., MacLeod, C. and Mathews, A. (1988) Cognitive Psychology and Emotional Disorders. Chichester: Wiley.
- Wittchen, H-U. (1986) Epidemiology of panic attacks and panic disorders. In Panic and Phobias (eds.I.Hand and H-U.Wittchen.) Springer-Verlag:Berlin.
- Wolpe, J. (1958) Psychotherapy by Reciprocal Inhibition. Stanford University Press.
- Wolpe, J. (1961) The systematic desensitization treatment of neuroses. Journal of Nervous and Mental Disorders, 132, 189-203.
- Wolpe, J. and Lang, P.J. (1964) A fear survey schedule for use in behaviour therapy. Behaviour Research and Therapy, 2, 27.
- Zajonc, R.B. (1980) Feeling and thinking: Preferences need no inferences. American Psychologist, 35, 151-175.
- Zajonc, R.B. (1984) On the primacy of affect. American Psychologist, 39, 117-123.
- Zilboorg, G. (1941) A history of Medical Psychology. New York:Norton.
- Zuroff, D.C., Colussy, S.A. and Wielgus, M.S. (1983) Selective memory and depression:a cautionary note concerning response bias. Cognitive Therapy and Research, 7, 223-232.

## Appendix: List of contents

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- Questionnaire 6. The fear survey schedule (FSS) (Wolpe and Lang, 1964).
- Questionnaire 7. The Watts and Sharrock Spider Phobia Questionnaire (1984).
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- Questionnaire 9. Beck Depression Inventory.
- Questionnaire 10. Spielberger STAIy-2 self evaluation questionnaire as a means of general trait anxiety. (Spielberger 1983)
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- Questionnaire 12. Dimensions of disgust questionnaire covering 45 items to do with the demographics of disgust.
- Questionnaire 13. Klorman Spider Scale.
- Questionnaire 14. Spider assessment by size: visual analogue.

# Questionnaire 1

Please continue on back of sheet if necessary. subject no:...

Sex: male female

Occupation: .....

Age: .....

Relationship Status (single/with partner/divorced etc).....

What are you phobic about?.....

How old were you when your phobia started?.....

How did it start?.....

.....

.....

How did you feel about it/them before the phobia began?.....

.....

.....

Do you remember an early unpleasant experience connected with your phobic object/situation and if so, would you give a brief description here please? .....

.....

.....

Do other members of your family have phobias? If so, what relationship to you are they and what are they phobic about? .....

.....

.....

Has your phobia been worse than it is now? If so, when, and how much worse? .....

.....

Why do you think you became afraid of it/them? .....

.....

.....

What are you afraid of happening to you? .....

What thought makes you most afraid?.....

Please list below no less than five words describing your phobic object/situation.

.....  
.....  
.....  
.....  
.....

What are the main strategies you use to deal with the situation when you find yourself in your feared situation (eg. keep still, try to distract yourself, look around, freeze etc.).....

Would you be prepared to be interviewed? Yes/No

## Questionnaire 2

PHOBIA. ....

How confident are you that you would be able to tolerate being in the s  
room as a spider right now at this moment?

0 10 20 30 40 50 60 70 80 90 100

Not at all  
confident

Totally  
confident

Using the scale below, please rate how much you believe the follow  
statements right now, at this moment. Imagine that a spider is in the r  
with you.

0 10 20 30 40 50 60 70 80 90 100

I do not  
believe  
this thought  
at all

I am completely  
convinced this  
thought is true

- If confronted by a spider, I would stay calm .....  
If confronted by a spider, I would become contaminated .....  
If confronted by a spider, I would make a fool of myself .....  
If confronted by a spider, I would be interested .....  
If confronted by a spider, I would feel nauseous .....  
If confronted by a spider, I would come to physical harm .....  
If confronted by a spider, I would feel disgusted .....  
If confronted by a spider, I would go mad .....  
If confronted by a spider, I would be able to cope .....  
If confronted by a spider, I would be excited .....  
If confronted by a spider, I would try to deal with it .....  
If confronted by a spider, I would slowly lose my fear .....  
If confronted by a spider, I would feel faint .....

If confronted by a spider, I would find it repulsive	.....
If confronted by a spider, I would lose control of myself	.....
If confronted by a spider, I would not cope with it	.....
If confronted by a spider, I would become contaminated	.....
If confronted by a spider, I would be paralysed	.....
If confronted by a spider, I would feel unclean	.....
If confronted by a spider, I would be hysterical	.....
If confronted by a spider, I would find someone to help	.....
If confronted by a spider, I would be unable to escape	.....
If confronted by a spider, I would not eat food it had	
	been near
	.....
If confronted by a spider, I would become infected	.....
If confronted by a spider, I would have a heart attack	.....
If confronted by a spider, I would act foolish	.....
If confronted by a spider, I would lose control of my	
	bladder or bowels
	.....
If confronted by a spider, I would scream	.....
If confronted by a spider, I would be perfectly at ease	.....
If confronted by a spider, I would be indifferent	.....
If confronted by a spider, I would feel fine	.....
If confronted by a spider, I would feel trapped	.....

This questionnaire was a development of one used in pilot work on spider phobics. Most of the items were generated by two clinicians experienced in the one-session treatment of spider phobia (Lars-Goren Öst and Paul Šalkovskis) on the basis of face validity vis a vis beliefs expressed by phobic during high levels of exposure. The format of the scale was based on Šalkovskis and Clark's (Šalkovskis, 1990) modification of the Chambless Agoraphobic Cognitions Questionnaire (Chambless, Caputo, Bright and Gallagher, 1984). Subsequent criterion validation was carried out in a small scale study carried out by undergraduate student under Dr. Šalkovskis' supervision: the test re-test reliability at that point was found to be in the region of  $r(\text{pearson})0.9$ . The final version was developed by the author as a result of further pilot work in the early stages of the thesis, and the present study constitutes further validation work. In the present study, test re-test reliability was found to be  $r(\text{pearson})0.91$ .

This questionnaire was designed to investigate the range of beliefs which spider phobics have about spiders and themselves in relation to it. The beliefs looked as though they would fall into three loose categories, and for ease of comparison they were assigned to one of these on logical grounds. Subscale validation was initially carried out by having 5 clinicians rate each item as belonging to a particular category for spider phobics.

In order to further check that subgroups were internally cohesive a correlational analysis was carried out between all the individual items in each group. An analysis was also carried out between these items and the subgroup totals (in each case the individual item was removed from the subgroup total before the computation was carried out). Results are shown in full below.

'b' followed by a number denotes the individual item as ordered on the questionnaire. 'Disg', 'harm' and 'cop' denote the subgroup totals with the relevant 'b' number removed from the particular analysis.

In almost all cases it can be seen that although all the items are significantly correlated with all the subgroup totals, it is clear that disgust items are all more correlated with the disgust total than they are with the other two totals. This holds true for the other two groups, indicating that items may form distinct sub-sets. It is also clear that item b10 should be excluded from future questionnaires as it is unreliable.

Results are shown in full below.

Disgust Cognitions

	b2	b5	b7	b14	b18	b22	b23	Disg.	Harm.	Cop.
b2	1.0000 0.0									
b5	0.3606 0.0023	1.0000 0.0								
b7	0.4576 0.0001	0.4219 0.0003	1.0000 0.0							
b14	0.2943 0.0141	0.4424 0.0001	0.6691 0.0001	1.0000 0.0						
b18	0.7116 0.0001	0.1928 0.1123	0.4168 0.0004	0.3140 0.0086	1.0000 0.0					
b22	0.3473 0.0035	0.2798 0.0199	0.4306 0.0002	0.5281 0.0001	0.3644 0.0021	1.0000 0.0				
b23	0.7750 0.0001	0.2864 0.0171	0.4536 0.0001	0.2239 0.0643	0.7664 0.0001	0.2773 0.0211	1.0000 0.0			
Disg. total	0.6804 0.0001	0.6001 0.0001	0.8035 0.0001	0.7609 0.0001	0.6636 0.0001	0.7269 0.0001	0.6269 0.0001	1.0000 0.0		
Harm. total	0.5894 0.0001	0.5441 0.0001	0.5469 0.0001	0.4747 0.0001	0.5409 0.0001	0.5801 0.0001	0.5303 0.0001	0.75150 .0001	1.0000 0.0	
Cop. total	0.3438 0.0038	0.5492 0.0001	0.5447 0.0001	0.6737 0.0001	0.3998 0.0007	0.6382 0.0001	0.2978 0.0130	0.7504 0.0001	0.7937 0.0001	1.0000 0.0

Harm Cognitions

	b3	b6	b8	b13	b15	b17	b19	b21	b24	b25	b26	b27	b31
b3	1.0000 0.0												
b6	0.4707 0.0001	1.0000 0.0											
b8	0.5898 0.0001	0.6308 0.0001	1.0000 0.0										
b13	0.3981 0.0007	0.5791 0.0001	0.5940 0.0001	1.0000 0.0									
b15	0.4258 0.0003	0.5401 0.0001	0.6017 0.0001	0.6766 0.0001	1.0000 0.0								
b17	0.6048 0.0001	0.6052 0.0001	0.6431 0.0001	0.6375 0.0001	0.7046 0.0001	1.0000 0.0							
b19	0.5881 0.0001	0.6184 0.0001	0.6974 0.0001	0.6379 0.0001	0.8335 0.0001	0.7861 0.0001	1.0000 0.0						
b21	0.6269 0.0001	0.6090 0.0001	0.6033 0.0001	0.5423 0.0001	0.5214 0.0001	0.6526 0.0001	0.6297 0.0001	1.0000 0.0					
b24	0.4443 0.0001	0.3924 0.0009	0.6030 0.0001	0.6370 0.0001	0.4966 0.0001	0.3589 0.0025	0.4625 0.0001	0.3807 0.0013	1.0000 0.0				
b25	0.8566 0.0001	0.4937 0.0001	0.6504 0.0001	0.4788 0.0001	0.7019 0.0001	0.5829 0.0001	0.6364 0.0001	0.5713 0.0001	0.5086 0.0001	1.0000 0.0			
b26	0.3408 0.0042	0.1385 0.2564	0.4303 0.0002	0.5137 0.0001	0.4274 0.0002	0.4916 0.0001	0.4126 0.0004	0.4862 0.0001	0.5029 0.0001	0.4017 0.0006	1.0000 0.0		
b27	0.6961 0.0001	0.3881 0.0010	0.6090 0.0001	0.4329 0.0001	0.7225 0.0001	0.5217 0.0001	0.7302 0.0001	0.6197 0.0001	0.4650 0.0001	0.7164 0.0001	0.3114 0.0092	1.0000 0.0	
b31	0.6348 0.0001	0.5247 0.0001	0.7032 0.0001	0.5125 0.0001	0.6828 0.0001	0.7073 0.0001	0.7123 0.0001	0.7005 0.0001	0.4221 0.0003	0.6177 0.0001	0.3728 0.0016	0.6629 0.0001	1.0000. 0
Disg. total	0.5686 0.0001	0.6460 0.0001	0.6494 0.0000	0.5288 0.0001	0.6371 0.0001	0.5270 0.0001	0.7040 0.0001	0.6244 0.0001	0.3885 0.0010	0.6515 0.0001	0.1393 0.2537	0.6253 0.0001	0.620 0.001
Harm. total	0.8025 0.0001	0.6998 0.0001	0.8208 0.0001	0.7257 0.0001	0.8557 0.0001	0.8827 0.0001	0.8828 0.0001	0.7887 0.0001	0.6145 0.0001	0.8303 0.0001	0.5110 0.0001	0.8129 0.0001	0.838 0.001
Cop. total	0.6690 0.0001	0.4585 0.0001	0.5174 0.0001	0.5094 0.0001	0.7476 0.0001	0.8659 0.0001	0.7405 0.0001	0.6487 0.0001	0.2797 0.0199	0.6950 0.0001	0.2648 0.0279	0.6146 0.0001	0.676 0.001

Coping Cognitions

	b1	b4	b9	b10	b11	b12	b16	b20	b28	b29	b30
b1	1.0000 0.0										
b4	0.5753 0.0001	1.0000 0.0									
b9	0.8278 0.0001	0.5464 0.0001	1.0000 0.0								
b10	0.1069 0.3699	0.3213 0.0071	0.0855 0.4848	1.0000 0.0							
b11	0.6366 0.0001	0.5062 0.0001	0.6013 0.0001	0.1681 0.1674	1.0000 0.0						
b12	0.49854 0.0001	0.3673 0.0019	0.4718 0.0001	0.2586 0.3169	0.5037 0.0001	1.0000 0.0					
b16	0.7754 0.0001	0.5169 0.0001	0.7279 0.0001	0.2032 0.0940	0.6780 0.0001	0.4516 0.0001	1.0000 0.0				
b20	0.7709 0.0001	0.4267 0.0004	0.6748 0.0001	0.2330 0.0541	0.6360 0.0001	0.4233 0.0003	0.7771 0.0001	1.0000 0.0			
b28	0.8274 0.0001	0.5575 0.0001	0.7311 0.0001	0.0955 0.4350	0.5993 0.0001	0.3940 0.0008	0.7278 0.0001	0.7660 0.0001	1.0000 0.0		
b29	0.7417 0.0001	0.5206 0.0001	0.6391 0.0001	0.1285 0.2927	0.5526 0.0001	0.3366 0.0047	0.6988 0.0001	0.7025 0.0001	0.9010 0.0001	1.0000 0.0	
b30	0.8105 0.0001	0.5585 0.0001	0.4178 0.0004	0.1213 0.3209	0.5863 0.0001	0.3728 0.0016	0.7576 0.0001	0.7620 0.0001	0.9813 0.0001	0.9047 0.0001	1.0000 0.0
Disg. total	0.6965 0.0001	0.4145 0.0004	0.6536 0.0001	0.0517 0.6733	0.5580 0.0001	0.3124 0.0090	0.7345 0.0001	0.7308 0.0001	0.7104 0.0001	0.6827 0.0001	0.7319 0.0001
Harm. total	0.7981 0.0001	0.4479 0.0001	0.7863 0.0001	0.1276 0.2960	0.6143 0.0001	0.4389 0.0002	0.7827 0.0001	0.7331 0.0001	0.6693 0.0001	0.6384 0.0001	0.6659 0.0001
Cop. total	0.8989 0.0001	0.6837 0.0001	0.8304 0.0001	0.2880 0.0164	0.7627 0.0001	0.5973 0.0001	0.8658 0.0001	0.85354 0.0001	0.9086 0.0001	0.8542 0.0001	0.9074 0.0001

### Questionnaire 3

On a scale of 0-10, when 0 is not frightened at all and 10 is the most frightened you have ever been, what number would you ascribe to your reaction to the following, if you came across one:

EAGLE....._____	JELLYFISH....._____
RAT....._____	SNAIL....._____
BEAR....._____	SPIDER....._____
COCKROACH....._____	TIGER....._____
LION....._____	SLUG....._____
MAGGOT....._____	SNAKE....._____
SHARK....._____	WOLF....._____
FROG....._____	SWAN....._____
ELEPHANT....._____	PIG....._____

## Questionnaire 4

Below you are asked to imagine a number of situations. On a scale of 1-9, (when 1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly, 5 = neither like nor dislike, 6 = like slightly, 7 = like moderately, 8 = like very much, 9 = like extremely.) rate how much you would like to eat the following:

Imagine a bowl of a particular type of soup that you like extremely to eat (that you would rate '9'). How much would you like to eat that soup in the following conditions (enter a number from 1-9)?:

1. from a thoroughly washed used dog bowl ..... \_\_\_\_\_
2. from a brand new dog bowl ..... \_\_\_\_\_
3. from an ordinary soup bowl, after it was poured out of a thoroughly washed used dog bowl ..... \_\_\_\_\_
4. same as 3, but the soup is cooked for 15 mins before you eat it ..... \_\_\_\_\_
5. in an ordinary bowl, stirred by a thoroughly washed used fly swatter ..... \_\_\_\_\_
6. in an ordinary bowl, stirred by a brand new fly swatter ..... \_\_\_\_\_
7. in an ordinary bowl, cooked for 15 mins after being stirred by a thoroughly washed used fly swatter ..... \_\_\_\_\_
8. stirred by a thoroughly washed used comb ..... \_\_\_\_\_
9. stirred by a thoroughly washed used comb and then cooked for 15 mins ..... \_\_\_\_\_
10. stirred by a brand new comb ..... \_\_\_\_\_

Consider a bowl of this soup with a washed, dead grasshopper in the bottom. How much would you like to eat?:

11. all of this soup (but not the grasshopper itself) ..... \_\_\_\_\_
12. a little soup from the top of the bowl ..... \_\_\_\_\_
13. all of the soup after the grasshopper was removed ..... \_\_\_\_\_
14. new soup from the same bowl ..... \_\_\_\_\_
15. new soup from the same bowl, but after it had been washed three times ..... \_\_\_\_\_
16. new soup from the same bowl, after it had been in a dishwasher once ..... \_\_\_\_\_

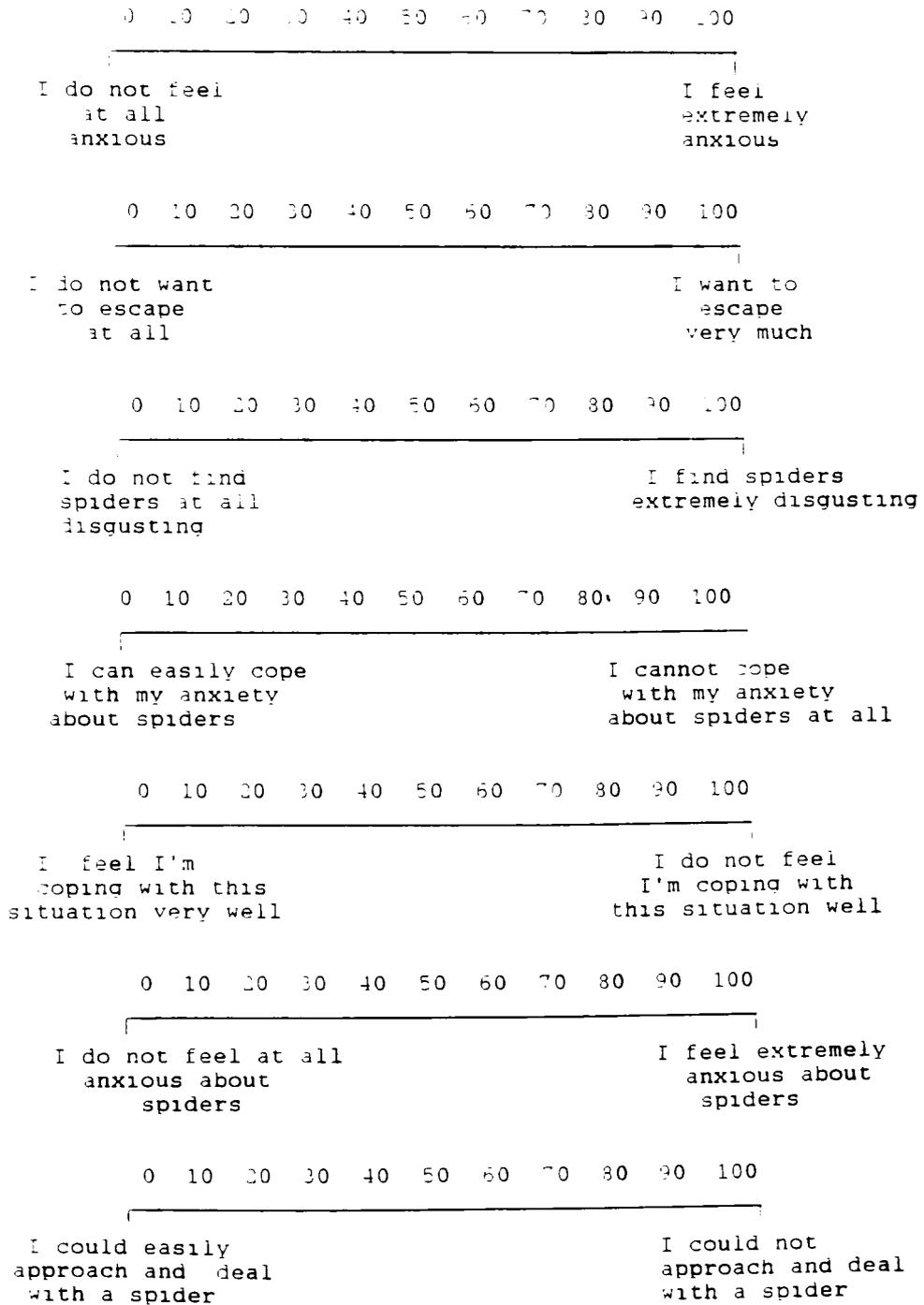
Consider the same type of soup, in a new setting, and without any grasshopper. Now suppose that a clean non-toxic leaf from a houseplant falls into the soup, and goes to the bottom. How much would you like to eat?

- 17. all of this soup, but not the leaf, itself . . . . . \_\_\_\_\_
- 18. a little soup from the top of the bowl . . . . . \_\_\_\_\_
- 19. all of this soup after the leaf was removed . . . . . \_\_\_\_\_
- 20. new soup from the same bowl . . . . . \_\_\_\_\_

Imagine a biscuit that you like extremely to eat (rating of 9). Rate how much you would like to eat this biscuit, after a bite had been taken by:

- 21. an acquaintance . . . . . \_\_\_\_\_
- 22. a good friend . . . . . \_\_\_\_\_
- 23. a waiter in a restaurant . . . . . \_\_\_\_\_
- 24. How much would you like to eat the above biscuit, (unbitten) after it had fallen on a lawn while you were picnicking? . . . \_\_\_\_\_

Questionnaire 5



Using the scales below, please rate how much you would avoid a spider because of fear or other unpleasant feelings

(circle number which applies)

0-----1-----2-----3-----4-----5-----6-----7-----8  
could not    slightly    definitely    markedly    always  
avoid it    avoid it    avoid it    avoid it    avoid it

Using the scales below, please rate how much fear or other unpleasant feelings you would experience if you were in the proximity of a spider

0-----1-----2-----3-----4-----5-----6-----7-----8  
no            slight    definite    marked    extreme  
fear            fear            fear            fear            fear

Now please rate how much the problem upsets you and/or interferes with your normal activities using the scale below.

0-----1-----2-----3-----4-----5-----6-----7-----8  
does not    slightly/    definitely/    markedly/    very severely/  
sometimes    often    very often    continuously

## Questionnaire 6

The items in this part of the questionnaire refer to experiences that may cause fear or other, related unpleasant feelings. Read each item and then circle one option to the right of the item to indicate how much you are disturbed by it. Answer all the items. Please work rapidly and do not spend too much time on any one item.

KEY: NA - Not at all.  
 AL - A little.  
 FA - A fair amount.  
 MU - Much.  
 VM - Very much.

- |  |       |    |    |    |    |    |
|--|-------|----|----|----|----|----|
| 1. Noise of vacuum cleaners                                    | ..... | NA | AL | FA | MU | VM |
| 2. Open wounds   | ..... | NA | AL | FA | MU | VM |
| 3. Being alone   | ..... | NA | AL | FA | MU | VM |
| 4. Loud noises   | ..... | NA | AL | FA | MU | VM |
| 5. Dead people   | ..... | NA | AL | FA | MU | VM |
| 6. Speaking in public  | ..... | NA | AL | FA | MU | VM |
| 7. Crossing streets  | ..... | NA | AL | FA | MU | VM |
| 8. People who seem insane                                      | ..... | NA | AL | FA | MU | VM |
| 9. Being in a strange place                                    | ..... | NA | AL | FA | MU | VM |
| 10. Falling  | ..... | NA | AL | FA | MU | VM |
| 11. Automobiles  | ..... | NA | AL | FA | MU | VM |
| 12. Being teased   | ..... | NA | AL | FA | MU | VM |
| 13. Dentists   | ..... | NA | AL | FA | MU | VM |
| 14. Thunder  | ..... | NA | AL | FA | MU | VM |
| 15. Sirens   | ..... | NA | AL | FA | MU | VM |
| 16. Failure  | ..... | NA | AL | FA | MU | VM |
| 17. Entering a room where other people are already seated..... | ..... | NA | AL | FA | MU | VM |
| 18. High places on land  | ..... | NA | AL | FA | MU | VM |
| 19. Worms  | ..... | NA | AL | FA | MU | VM |
| 20. Imaginary creatures  | ..... | NA | AL | FA | MU | VM |
| 21. Receiving injections                                       | ..... | NA | AL | FA | MU | VM |
| 22. Strangers  | ..... | NA | AL | FA | MU | VM |
| 23. Bats   | ..... | NA | AL | FA | MU | VM |
| 24. Journeys by train  | ..... | NA | AL | FA | MU | VM |
| 25. Feeling angry  | ..... | NA | AL | FA | MU | VM |
| 26. People in authority  | ..... | NA | AL | FA | MU | VM |

NB. NA-not at all, AL-a little, FA-a fair amount, MU-much, VM-very much.

27. Flying insects	NA	AL	FA	MU	VM
28. Seeing other people injected	NA	AL	FA	MU	VM
29. Sudden noises	NA	AL	FA	MU	VM
30. Journeys by car	NA	AL	FA	MU	VM
31. Vomiting	NA	AL	FA	MU	VM
32. Crowds	NA	AL	FA	MU	VM
33. Cats	NA	AL	FA	MU	VM
34. One person bullying another	NA	AL	FA	MU	VM
35. Tough looking people	NA	AL	FA	MU	VM
36. Birds	NA	AL	FA	MU	VM
37. Sight of deep water	NA	AL	FA	MU	VM
38. Being watched working	NA	AL	FA	MU	VM
39. Dead animals	NA	AL	FA	MU	VM
40. Weapons	NA	AL	FA	MU	VM
41. Dirt	NA	AL	FA	MU	VM
42. Journeys by bus	NA	AL	FA	MU	VM
43. Crawling insects	NA	AL	FA	MU	VM
44. Seeing a fight	NA	AL	FA	MU	VM
45. Ugly people	NA	AL	FA	MU	VM
46. Fire	NA	AL	FA	MU	VM
47. Sick people	NA	AL	FA	MU	VM
48. Being criticized	NA	AL	FA	MU	VM
49. Strange shapes	NA	AL	FA	MU	V
50. Being in an elevator	NA	AL	FA	MU	V
51. Witnessing surgical operations	NA	AL	FA	MU	V
52. Angry people	NA	AL	FA	MU	V
53. Mice or rats	NA	AL	FA	MU	V
54. Human blood	NA	AL	FA	MU	V
55. Animal blood	NA	AL	FA	MU	V
56. Parting from friends	NA	AL	FA	MU	V
57. Enclosed places	NA	AL	FA	MU	V
spects of a surgical operation	NA	AL	FA	MU	V

NB. NA-not at all, AL-a little, FA-a fair amount, MU-much, VM-very much.

59. Feeling rejected by others	NA	AL	FA	MU	VI
60. Journeys by airplane	NA	AL	FA	MU	VI
61. Medical odors	NA	AL	FA	MU	VI
62. Feeling disapproved of	NA	AL	FA	MU	V
63. Harmless snakes	NA	AL	FA	MU	V
64. Cemeteries	NA	AL	FA	MU	V
65. Being ignored	NA	AL	FA	MU	V
66. Darkness	NA	AL	FA	MU	V
67. Premature heart beats (missing a beat)	NA	AL	FA	MU	V
68. Nude men	NA	AL	FA	MU	V
69. Nude women	NA	AL	FA	MU	V
70. Lightning	NA	AL	FA	MU	V
71. Doctors	NA	AL	FA	MU	V
72. People with deformities	NA	AL	FA	MU	V
73. Making mistakes	NA	AL	FA	MU	V
74. Looking foolish	NA	AL	FA	MU	V
75. Large open spaces	NA	AL	FA	MU	V
76. Dogs	NA	AL	FA	MU	
77. Being seen unclothed	NA	AL	FA	MU	
78. Germs	NA	AL	FA	MU	
79. Harmless spiders	NA	AL	FA	MU	
80. Fish	NA	AL	FA	MU	

## Questionnaire 7

Please circle Yes or No after each question:

- |   |     |    |
|---|-----|----|
| 1. Do you check the lounge for spiders before sitting down?   | Yes | No |
| 2. Can you deal effectively with spiders yourself when you find them?                                       | Yes | No |
| 3. Are spiders insects?   | Yes | No |
| 4. Do you sometimes dream about spiders?  | Yes | No |
| 5. Do you ever make plans in case you come across a spider?   | Yes | No |
| 6. Do you sometimes look at the corners of the room for spiders?  | Yes | No |
| 7. Do you get other people to get rid of spiders when you find them?  | Yes | No |
| 8. When imagining a spider, is it always the same one or kind?  | Yes | No |
| 9. Do you think a lot about spiders?  | Yes | No |
| 10. Would you know how to cope with spiders in the bath?  | Yes | No |
| 11. When watching television, would you notice a spider crawling across the floor elsewhere in the room?    | Yes | No |
| 12. Do spiders have six legs?   | Yes | No |
| 13. Do you sometimes use a broom or a newspaper to deal with a spider?                                      | Yes | No |
| 14. Do you worry more about spiders than most people?   | Yes | No |
| 15. Do you feel a lot more secure if someone else is in the house, in case you come across a spider?        | Yes | No |
| 16. When you imagine a spider, can you see parts of it in great detail?                                     | Yes | No |
| 17. Do you check the bedroom for spiders before going to sleep?   | Yes | No |
| 18. When you find a spider in a room, would you avoid going in that room until someone else had removed it? | Yes | No |
| 19. Do you ever find yourself thinking about spiders for no reason?   | Yes | No |
| 20. Are spiders solely meat eaters?   | Yes | No |
| 21. Would you get help if you came across a spider?   | Yes | No |
| 22. Do you ever lie in bed at night and listen out for spiders?   | Yes | No |
| 23. If you <u>thought</u> you saw a spider would you go for a closer look?                                  | Yes | No |
| 24. Do you sometimes find it an effort to keep thoughts of spiders out of your mind?                        | Yes | No |

11.	Would your mind be a lot easier if spiders didn't exist?	Yes	No
12.	Do you have a good idea whereabouts spiders are likely to appear?	Yes	No
13.	Are you always on the lookout for spiders?	Yes	No
14.	Do you often think about particular parts of spiders, for example the fangs?	Yes	No
15.	If you find a spider in the bath, would you, say, use a shower to wash the spider down the plughole?	Yes	No
16.	Are you sometimes distracted by thoughts of spiders?	Yes	No
17.	Have you a 'plan for action' in case you find a spider in the kitchen?	Yes	No
18.	Are you sometimes haunted by thoughts of spiders?	Yes	No
19.	Do you make very certain there are no spiders around before taking a bath?	Yes	No
20.	If you discover a spider in the room, do you leave the room straight away?	Yes	No
21.	When watching television do you think more about the danger of there being a spider in the room than about the programme?	Yes	No
22.	When you see a spider, does it take a long time to get it out of your mind?	Yes	No
23.	Do you know when (what time of year) you are likely to come across a spider?	Yes	No
24.	Do you sometimes sense the presence of a spider without actually seeing it?	Yes	No
25.	Are you slightly scared to enter a room, say a bathroom, where spiders have been in the past?	Yes	No
26.	If there's a spider in the house, are you the most likely person to find it?	Yes	No
27.	Have you had nightmares about spiders?	Yes	No
28.	Would you think about using a broom to deal with a spider in the kitchen?	Yes	No
29.	Can you spot a spider out of the corner of your eye?	Yes	No

## Questionnaire 8

PLEASE CIRCLE WHICHEVER ANSWER IS MOST OFTEN TRUE. THANKYOU.

- |   |     |    |
|---|-----|----|
| Do you check for them in the vicinity before you feel comfortable?                          | YES | NO |
| Can you deal effectively with one when confronted?  | YES | NO |
| Do you sometimes dream about them?  | YES | NO |
| Do you ever make plans in case you come across them?  | YES | NO |
| When reading would you notice one of them moving nearby?                                    | YES | NO |
| When imagining one, is it always the same one or kind?                                      | YES | NO |
| Do you think a lot about them?  | YES | NO |
| Could you ever touch one?   | YES | NO |
| Do you worry more about them than most people?  | YES | NO |
| Do you feel a lot more secure if there is someone else with you when you see one?           | YES | NO |
| When you imagine one, can you see parts of it in great detail?                              | YES | NO |
| When you come across one, do you wait for someone else to deal with it before you carry on? | YES | NO |
| Do you ever find yourself thinking about them for no reason?                                | YES | NO |
| Do you ever lie in bed at night and listen out for them?                                    | YES | NO |
| If you <i>thought</i> you saw one would you go for a close look?                            | YES | NO |
| Do you sometimes find it an effort to keep thoughts of them out of your mind?               | YES | NO |
| Would your mind be a lot easier if they didn't exist?                                       | YES | NO |
| Are you always on the lookout for them?   | YES | NO |



## Questionnaire 9

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### BECK INVENTORY

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Name \_\_\_\_\_ Date \_\_\_\_\_

On this questionnaire are groups of statements. Please read each group of statements carefully. Then pick out the one statement in each group which best describes the way you have been feeling the PAST WEEK, INCLUDING TODAY. Circle the number beside the statement you picked. If several statements in the group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

- 1 0 I do not feel sad.  
1 I feel sad.  
2 I am sad all the time and I can't snap out of it.  
3 I am so sad or unhappy that I can't stand it.
- 2 0 I am not particularly discouraged about the future.  
1 I feel discouraged about the future.  
2 I feel I have nothing to look forward to.  
3 I feel that the future is hopeless and that things cannot improve.
- 3 0 I do not feel like a failure.  
1 I feel I have failed more than the average person.  
2 As I look back on my life, all I can see is a lot of failures.  
3 I feel I am a complete failure as a person.
- 4 0 I get as much satisfaction out of things as I used to.  
1 I don't enjoy things the way I used to.  
2 I don't get real satisfaction out of anything anymore.  
3 I am dissatisfied or bored with everything.
- 5 0 I don't feel particularly guilty.  
1 I feel guilty a good part of the time.  
2 I feel quite guilty most of the time.  
3 I feel guilty all of the time.
- 6 0 I don't feel I am being punished.  
1 I feel I may be punished.  
2 I expect to be punished.  
3 I feel I am being punished.
- 7 0 I don't feel disappointed in myself.  
1 I am disappointed in myself.  
2 I am disgusted with myself.  
3 I hate myself.
- 8 0 I don't feel I am any worse than anybody else.  
1 I am critical of myself for my weaknesses or mistakes.  
2 I blame myself all the time for my faults.  
3 I blame myself for everything bad that happens.
- 9 0 I don't have any thoughts of killing myself.  
1 I have thoughts of killing myself, but I would not carry them out.  
2 I would like to kill myself.  
3 I would kill myself if I had the chance.
- 10 0 I don't cry any more than usual.  
1 I cry more now than I used to.  
2 I cry all the time now.  
3 I used to be able to cry, but now I can't cry even though I want to.
- 11 0 I am no more irritated now than I ever am.  
1 I get annoyed or irritated more easily than I used to.  
2 I feel irritated all the time now.  
3 I don't get irritated at all by the things that used to irritate me.
- 12 0 I have not lost interest in other people.  
1 I am less interested in other people than I used to be.  
2 I have lost most of my interest in other people.  
3 I have lost all of my interest in other people.
- 13 0 I make decisions about as well as I ever could.  
1 I put off making decisions more than I used to.  
2 I have greater difficulty in making decisions than before.  
3 I can't make decisions at all anymore.
- 14 0 I don't feel I look any worse than I used to.  
1 I am worried that I am looking old or unattractive.  
2 I feel that there are permanent changes in my appearance that make me look unattractive.  
3 I believe that I look ugly.
- 15 0 I can work about as well as before.  
1 It takes an extra effort to get started at doing something.  
2 I have to push myself very hard to do anything.  
3 I can't do any work at all.
- 16 0 I can sleep as well as usual.  
1 I don't sleep as well as I used to.  
2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.  
3 I wake up several hours earlier than I used to and cannot get back to sleep.
- 17 0 I don't get more tired than usual.  
1 I get tired more easily than I used to.  
2 I get tired from doing almost anything.  
3 I am too tired to do anything.
- 18 0 My appetite is no worse than usual.  
1 My appetite is not as good as it used to be.  
2 My appetite is much worse now.  
3 I have no appetite at all anymore.
- 19 0 I haven't lost much weight, if any, lately.  
1 I have lost more than 5 pounds. I am purposely trying to lose weight.  
2 I have lost more than 10 pounds, by eating less. Yes \_\_\_\_\_ No \_\_\_\_\_  
3 I have lost more than 15 pounds.
- 20 0 I am no more worried about my health than usual.  
1 I am worried about physical problems such as aches and pains; or upset stomach; or constipation.  
2 I am very worried about physical problems and it's hard to think of much else.  
3 I am so worried about my physical problems that I cannot think about anything else.
- 21 0 I have not noticed any recent change in my interest in sex.  
1 I am less interested in sex than I used to be.  
2 I am much less interested in sex now.  
3 I have lost interest in sex completely.

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Questionnaire 10

**SELF-EVALUATION QUESTIONNAIRE**

STAI Form Y-2

Name \_\_\_\_\_ Date \_\_\_\_\_

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

ALMOST NEVER  
SOME TIMES  
OFTEN  
ALMOST ALWAYS

- 21. I feel pleasant ..... ① ② ③ ④
- 22. I feel nervous and restless ..... ① ② ③ ④
- 23. I feel satisfied with myself ..... ① ② ③ ④
- 24. I wish I could be as happy as others seem to be ..... ① ② ③ ④
- 25. I feel like a failure ..... ① ② ③ ④
- 26. I feel rested ..... ① ② ③ ④
- 27. I am "calm, cool, and collected" ..... ① ② ③ ④
- 28. I feel that difficulties are piling up so that I cannot overcome them ..... ① ② ③ ④
- 29. I worry too much over something that really doesn't matter ..... ① ② ③ ④
- 30. I am happy ..... ① ② ③ ④
- 31. I have disturbing thoughts ..... ① ② ③ ④
- 32. I lack self-confidence ..... ① ② ③ ④
- 33. I feel secure ..... ① ② ③ ④
- 34. I make decisions easily ..... ① ② ③ ④
- 35. I feel inadequate ..... ① ② ③ ④
- 36. I am content ..... ① ② ③ ④
- 37. Some unimportant thought runs through my mind and bothers me ..... ① ② ③ ④
- 38. I take disappointments so keenly that I can't put them out of my mind ..... ① ② ③ ④
- 39. I am a steady person ..... ① ② ③ ④
- 40. I get in a state of tension or turmoil as I think over my recent concerns and interests ..... ① ② ③ ④

Questionnaire 11

SELF-EVALUATION QUESTIONNAIRE

Developed by Charles D. Spielberger
in collaboration with
R. L. Gorsuch, R. Lushene, P. R. Vagg, and G. A. Jacobs

STAI Form Y-1

Name \_\_\_\_\_ Date \_\_\_\_\_ S \_\_\_\_\_
Age \_\_\_\_\_ Sex: M \_\_\_\_\_ F \_\_\_\_\_ T \_\_\_\_\_

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

VERY MUCH SO
MODERATELY SO
SLIGHTLY
NOT AT ALL

- 1. I feel calm
2. I feel secure
3. I am tense
4. I feel strained
5. I feel at ease
6. I feel upset
7. I am presently worrying over possible misfortunes
8. I feel satisfied
9. I feel frightened
10. I feel comfortable
11. I feel self-confident
12. I feel nervous
13. I am jittery
14. I feel indecisive
15. I am relaxed
16. I feel content
17. I am worried
18. I feel confused
19. I feel steady
20. I feel pleasant



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Questionnaire 12

PLEASE THINK ABOUT THE THING/OBJECT/ANIMAL THAT YOU FIND MOST DISGUSTING.

PLEASE WRITE IT DOWN HERE.....

PLEASE KEEP THIS THOUGHT IN MIND AS YOU ANSWER THE FOLLOWING QUESTIONS (BY CIRCLING THE APPROPRIATE WORD)

When I see this disgusting object:

- |   |                                     |
|---|-------------------------------------|
| My skin crawls                              | Never seldom sometimes often always |
| I close off my nostrils                     | Never seldom sometimes often always |
| I am afraid                                 | Never seldom sometimes often always |
| I grimace                                   | Never seldom sometimes often always |
| I try to avoid it                           | Never seldom sometimes often always |
| I feel contaminated                         | Never seldom sometimes often always |
| I would touch it                            | Never seldom sometimes often always |
| I think it could contaminate me             | Never seldom sometimes often always |
| I become paralysed                          | Never seldom sometimes often always |
| I feel nauseous                             | Never seldom sometimes often always |
| I start to sweat                            | Never seldom sometimes often always |
| I tremble                                   | Never seldom sometimes often always |
| I dislike its colour                        | Never seldom sometimes often always |
| I think it is slimy                         | Never seldom sometimes often always |
| I think it smells unpleasant                | Never seldom sometimes often always |
| I think it is malformed                     | Never seldom sometimes often always |
| I hold my breath                            | Never seldom sometimes often always |
| I dislike the thought of touching it        | Never seldom sometimes often always |
| I cover my mouth                            | Never seldom sometimes often always |
| I will avoid places I think it can be found | Never seldom sometimes often always |
| I feel dirty                                | Never seldom sometimes often always |
| I could swallow it                          | Never seldom sometimes often always |
| I could eat something it had touched        | Never seldom sometimes often always |

It is black	Never seldom sometimes often always
It is biological	Never seldom sometimes often always
I think it is dirty	Never seldom sometimes often always
I leave quickly	Never seldom sometimes often always
It sounds repellant	Never seldom sometimes often always
I think its proportions are wrong	Never seldom sometimes often always
It is brown	Never seldom sometimes often always
I look away	Never seldom sometimes often always
My nose wrinkles	Never seldom sometimes often always
My stomach heaves	Never seldom sometimes often always
I want to wash my hands if I touch it accidentally	Never seldom sometimes often always
It is brown	Never seldom sometimes often always
It can move fast	Never seldom sometimes often always
I wash my hands	Never seldom sometimes often always
It is small	Never seldom sometimes often always
It is red	Never seldom sometimes often always
I think it is harmful	Never seldom sometimes often always
I feel unclean in its presence	Never seldom sometimes often always
I would get help to remove it	Never seldom sometimes often always
I think it looks awful	Never seldom sometimes often always
It reminds me of something else	Never seldom sometimes often always
I think it looks diseased	Never seldom sometimes often always

# Questionnaire 13

## SPIDER PHOBIA SCALE

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

This questionnaire consists of 18 statements concerning how you react to spiders. Each statement can either be "true" or "false". Try to decide which best describes the thoughts or experiences that you recently have had. Please circle a "T" or a "F" after each statement. Works quickly and don't stop and think too much about any question. It is your first impression that we are interested in. Remember to answer all questions!!

1. I avoid walking in parks or going for outings because there may be spiders there. T
2. I would feel some discomfort if I held a toy spider in my hand.. T
3. If, during a movie, a spider is shown on the screen I look away T
4. I dislike looking at newspaper pictures of spiders. T
5. If there is a spider on the ceiling above my bed I cannot go to sleep unless someone kills it. T
6. I like watching spiders spin cobwebs.. T
7. I get terrified at the thought of touching a harmless spider. T
8. If someone says that there are spiders in the vicinity I get all tensed up..... T
9. I would not go down to the basement to fetch something if I thought that there might be spiders there.. T
10. I would feel all at ease if a spider crawled out of my shoe as I was going to put it on.. T
11. When I see a spider I feel tense and worried. T
12. I like reading articles about spiders.. T
13. I feel sick when I see spiders.. T
14. Spiders can be useful sometimes..... T
15. I shudder when I think about spiders. T
16. I have nothing against being in the vicinity of a harmless spider if there is someone that I trust around. T
17. Some spiders are very beautiful to look at. T
18. I don't believe that anyone could hold a spider in the hand without showing fear.. T

19. Spiders move in a repulsive way. T F
20. Touching a dead spider with the help of a long stick would not affect me very much. T F
21. If I see a spider while cleaning the attic I would probably run away. T F
22. I am more frightened of spiders than of any other animal. T F
23. I would not like to travel to Mexico or Central America because there are so many poisonous spiders there. T F
24. I am careful when buying fruit because there may be spiders among the bananas. T F
25. I am not afraid of spiders that are not poisonous. T F
26. I would not study biology if I thought that would be forced to touch live spiders. T F
27. Spiders are very artistic. T F
28. I don't think that I am more frightened of spiders than most people are. T F
29. I would not pick up a newspaper if I knew that it had something about spiders in it. T F
30. Even if I was late for an important meeting I would not take a shortcut through a subway. T F

# Questionnaire 14

## Spider assessment

Name. . . . . Date. . . . .

Using the scales below, please rate how much you would avoid the type of spiders described below because of fear or other unpleasant feelings (circle number which applies)

1. A small spider

0-----1-----2-----3-----4-----5-----6-----7-----8  
would not    slightly    definitely    markedly    always  
avoid it    avoid it    avoid it    avoid it    avoid it

2. A medium size spider

0-----1-----2-----3-----4-----5-----6-----7-----8  
would not    slightly    definitely    markedly    always  
avoid it    avoid it    avoid it    avoid it    avoid it

3. A large spider

0-----1-----2-----3-----4-----5-----6-----7-----8  
would not    slightly    definitely    markedly    always  
avoid it    avoid it    avoid it    avoid it    avoid it

Using the scales below, please rate how much fear or other unpleasant feelings you would experience if you saw spiders of the sizes described (circle the number which applies).

1. A small spider

0-----1-----2-----3-----4-----5-----6-----7-----8  
no            slight            definite            marked            extreme  
fear            fear            fear            fear            fear

2. A medium size spider

0-----1-----2-----3-----4-----5-----6-----7-----8  
no            slight            definite            marked            extreme  
fear            fear            fear            fear            fear

3. A large spider

0-----1-----2-----3-----4-----5-----6-----7-----8  
no            slight            definite            marked            extreme  
fear            fear            fear            fear            fear

Now, please rate how much the problem upsets you and/or interferes with your normal activities using the scale below.

0-----1-----2-----3-----4-----5-----6-----7-----8  
does not    slightly    definitely    markedly    very severely  
sometimes    often    very often    continuously