A derived relational model of thought suppression.

Hooper, Nicholas James

Swansea University
Prifysgol Abertawe

A Derived Relational Model of Thought Suppression

Nicholas James Hooper

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Summary (Abstract)

Thought suppression is the attempted removal of unwanted thoughts. A plethora of previous research suggests that thought suppression is ineffective and possibly even counterproductive. However, the psychological processes involved in suppression are still underspecified. The current thesis aimed to examine the processes involved in thought suppression and to provide alternative techniques that may be more effective in the management of unwanted thoughts. To that end, Chapters 2 and 3 of the current thesis investigated the two key phenomena in the thought suppression literature, the immediate enhancement and rebound effects. Results from Experiments 1-4 indicated that participants, for the most part, found it difficult to suppress their thoughts during a five minute suppression phase, and also tended to have the unwanted thought re-emerge in a five minute phase following suppression, providing evidence for both the immediate enhancement and rebound effects. Chapter 4 (Experiment 5) provided a model of the immediate enhancement and rebound effects in terms of derived stimulus relations. The findings suggested that thought suppression attempts are ineffective due to the large number of intended and unintended environmental reminders. Experiments 6(a) and 6(b) extended on Experiment 5 by demonstrating how those relations might affect overt behaviour. Finally, Chapter 5 aimed to compare thought suppression with alternative strategies for dealing with unwanted thoughts. Acceptance and Commitment Therapy (ACT) was designed to undermine the negative behavioural consequences of derived stimulus relations. Experiments 7, 8 and 9 compared thought suppression with two components of the ACT model (i.e., mindfulness and defusion). The findings indicated, across both self report and behavioural measures, that the ACT techniques provided useful alternatives to thought suppression. In conclusion, the current thesis provides a behavioural model of the counterproductive nature of thought suppression whilst providing favourable evidence of alternative methods in the management of unwanted thoughts.

Declaration and Statements

Declaration

This work has not been previously accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

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Statement 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used, the extent and nature of the correction is clearly marked in a footnote(s).

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Statement 2

I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter library loan, and for the title and summary to be made available to outside organizations.

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Table of Contents

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Chapter 1

A Derived Relational Model of Thought Suppression

1.1 Thought suppression in historical terms

Self doubt, fear of social inadequacy, moral shame, health worries, sexual thoughts, and aggressive thoughts are among common unwanted thoughts (Reed, 1985). Problems in relationships and school, worries about life, the future, death, victimisation, sexual impulses and lack of basic necessities are others (Shackleford & Wegner, 1984). When such unwanted thoughts arise they are typically met with a desire to remove them from consciousness. In fact research suggests that 4 out of 5 people will attempt suppression as the preferred coping strategy in dealing with unwanted thoughts (Rachman & Da Silva, 1978). According to Erdelyi and Goldberg (1979) that may be the case as thought suppression is seen as a way to reduce the distress associated with disturbing thoughts. However, over the past few decades a wide body of research in the area of thought suppression indicates that thought suppression does not reduce this distress, but rather increases it (Shackleford & Wegner, 1984; Purdon & Clark, 2000).

Wegner, Schneider, Carter and White conducted the first experimental investigation of thought suppression in 1987. In this study participants were randomly assigned to either a suppression or expression group. The suppression group were instructed to "think of anything but try not to think of a white bear" (p.6) for a phase of five minutes. Following this initial suppression phase the same group of participants were instructed to "think of a white bear" for a further five minute phase. The expression group received the same instructions over two five minute phases, however they received them in reverse order. The findings indicated that both groups were unable to suppress thoughts of a white bear (i.e., the target unwanted thought) and that participants in the suppression/expression group demonstrated significantly more thoughts of a white bear during the second phase (i.e., expression phase) than participants who were initially instructed to think of a white bear. Wegner et al. (1987) referred to the increase in the target thought (i.e. thoughts of a white bear) during the suppression phase as the immediate enhancement effect and the increase in the target thought following suppression (during expression) the rebound effect. Wegner et al's (1987) seminal study was the beginning of an extensive body of experimental work on this coping strategy, although literature in the area of thought suppression probably dates back to Sigmund Freud.

Freud was the first psychologist to recognise that human beings often have a desire to banish certain thoughts out of mind. According to Freud's psychoanalytic theory (1958) people can successfully suppress their thoughts. To account for this Freud coined the term repression, which essentially refers to the erasure of thoughts from memory. Freud's definition of repression suggests that it is possible to purposely 'forget' unwanted thoughts without ever having any knowledge of these attempts. This was believed to occur via unconscious processes, which aimed to protect us from harmful memories, by keeping them out of consciousness. While psychoanalytic theory gained popularity in the mid 20th century, the work has contacted much criticism in the last 50 years due to the lack of scientific or empirical support for its core concepts (Erdelyi & Goldberg, 1979). Despite this Freud can be commended on two aspects of his work in this domain. First, he suggested that mental control can 'backfire' (Wegner, 1989 pp 9), and research on various topics (e.g., depression, anxiety, weight loss, smoking cessation etc, Section 1.3.1) has supported this postulate, that is, mental control has been demonstrated to have maladaptive effects (Wenzlaff, Wegner & Roper, 1988; Salkovskis & Campbell, 1994; Polivy & Herman, 1985; Salkovskis & Reynolds, 1994). Second, Freud was the first to understand the meta-cognitive element associated with thought suppression i.e. in order to suppress a thought one first has to know what that thought is. More specifically it is impossible to suppress a thought when that thought is part of the rule to suppress (Wegner, et al 1987). Other than Freud, William James had previously indirectly contributed towards thought suppression research with his work on mental control. Unlike Freud, who viewed mental control as something human beings struggle with internally (Wegner, 1989), James (1890) suggested, via the application of will and attention, that one could purposefully and successfully control ones thoughts. John Dewey (1922), agreed with James on this point; however he suggested that achieving suppression is more difficult than James (1890) would have theorised, suggesting that in order to achieve successful thought suppression a certain amount of practice would first be needed.

Each of the aforementioned psychologists held a position in which thought suppression was deemed possible. However, despite the common conception that people can change their thoughts, these hypotheses were put forward without any empirical basis. Indeed, currently, there is research, which suggests that thought

suppression is in fact very difficult, if not impossible (see Section 1.2.2). Further research seems to suggest that thought suppression not only causes an increase in the unwanted thought, but may actually be a causal and maintaining factor in any number of psychological disorders (see Section 1.3). Despite this research, theories which account for the unsuccessful nature of thought suppression are few and far between.

The 'Theory of Psychological Reactance' as proposed by Brehm (1966) could account for the immediate enhancement effect. This theory suggests that people will naturally do the opposite to that which they are instructed, or will 'react' to any instruction which limits their freedom. In this case the typical participant exposed to a thought suppression preparation will think of the unwanted thought when instructed not to do so. However this theory fails to account for results found in the concentration phase of the original white bear study. According to the theory of psychological reactance, when instructed to concentrate on the thought of a white bear, the participant should have done the opposite. However no such effect was found, thereby questioning the theories validity. Wegner et al (1987) named this 'Negative Injunction', referring to the way in which the theory cannot account for the after effects (the concentration phase) of attempted suppression. An alternative to psychological reactance was proposed under the rubric of Self Perception Theory (Bem, 1972), according to which, a person, who carries out a certain behaviour when under constraint, will carry out that behaviour to a greater degree when the constraints are removed. As a simple metaphor, it is possible that when restricted to a 30 mph driving zone that people may rise above the speed limit at times, however immediately after leaving that speed zone people may find themselves accelerating at higher speeds more often as a result of the constraint removal. Although this theory provides little relevance to results associated with the typical suppression phase, it could account for the inflation of thoughts experienced in the concentration phase. However, if this were the case it would be predicted that the amount of concentration phase intrusions would be based upon the amount of suppression phase intrusions i.e. the amount of acceleration is based on the amount to which one was constrained. However no such relationship has been found (Wegner et al, 1987).

Without a full explanation of the processes involved in thought suppression, Daniel Wegner aimed to build upon the aforementioned theories, beginning with his

seminal study in 1987. This study was inspired primarily by a Russian Fairy Tale, which documents how a young Russian boy, named Tolstoy, was challenged by his brother to stand in the corner until he could stop thinking of a white bear (hence the use of 'white bear' as the unwanted thought in a number of thought suppression related studies). Of course Tolstoy was unable to stop thoughts of a white bear entering his mind, demonstrating the futility of mental control. Upon reading this story, Daniel Wegner became interested in the topic of thought suppression and created the aforementioned 'white bear' thought suppression experiment in 1987.

1.2 The basic areas of research

This initial seminal study generated a wealth of research in the area of thought suppression. This research, in the non clinical research arena, centres on the following topics; the contemporary theories that attempt to account for unsuccessful suppression, the immediate enhancement effect, the rebound effect, the various distraction methods that may be used in attempting to achieve successful suppression, the effect of suppression over time, the attempted suppression of higher valence thoughts, the physiological effects of thought suppression and the methodological problems associated with thought suppression research. The introduction to this thesis will aim to explore each of these areas in order to facilitate an understanding of the empirical work that will follow.

1.2.1 Contemporary theories of thought suppression

1.2.1.1 Environmental Cueing Hypothesis (ECH)

In order to account for the counterproductive effects of thought suppression, Wegner (1989) has proposed the 'Environmental Cueing Hypothesis' (ECH). According to the ECH, suppression involves two cognitive control processes (Wegner & Erber, 1992). One process, which is not under conscious control, and is known as the automatic target search, automatically searches through consciousness for evidence of the unwanted thought. A second, intentional or consciously controlled process, referred to as the controlled distracter search, searches through memory and the environment looking for distracting information. As the automatic process does not require continuous monitoring it can detect evidence of the

unwanted thought more rapidly than an individual can consciously generate distracters. As a result, the unwanted thought re-emerges into consciousness and becomes associated with the intended distracter so that henceforward the distracter may be more likely to cue the unwanted thought. Once the first distracter has thus effectively failed to divert attention from the unwanted thought other distracting thoughts are generated. However, the same process occurs and eventually a number of (intended distracter) stimuli within memory and the environment become associated with the unwanted thought and exposure to these previously encountered distracters prompts the re-emergence of the unwanted thought into consciousness to an even greater extent. The end result is hyper-accessibility of the unwanted thought during a suppression episode, and rebound of the thought following the attempt to suppress.

Wegner, Schneider, Knutson and McMahon (1991) provided evidence in favour of ECH. Their experiment involved three five minute phases. In the first five minute phase participants were asked to suppress a target thought (i.e., thoughts of a white bear) whilst a slideshow (A) was shown in the background. Then, in the second phase, participants had to express thoughts of the target whilst a second slideshow (B) was shown in the background. Finally, in the third phase, participants had to express thoughts of the target whilst slideshow A was again shown in the background. Participants were required to indicate any occurrence of the target thought by ringing a bell. The results indicated that the thought rebounded significantly more in an expression phase during which the same slideshow (A) that was shown in the initial suppression phase was shown, providing evidence that a suppressed thought could be triggered by cues in the environment.

In a subsequent study, Wegner and Erber (1992) extended the environmental cueing research. In this study, after an initial five minute suppression phase, participants were asked to continue to suppress a target word whilst completing another task concurrently. In this task participants were given one word at a time and were asked to provide a word associated with the supplied word. The results showed that participants, when given a word closely associated with the target word, would often say the target word that they were meant to be suppressing. The authors suggested that this happened because the target word had been directly cued by the closely linked (directly associated/related) words. Furthermore, in more recent

research, Najmi and Wegner (2008) replicated these effects using a lexical decision paradigm. Participants in their study were instructed to either suppress or concentrate on a target word for a five minute phase. After the five minute phase they were instructed to continue to suppress/concentrate on the target word whilst completing an associative priming lexical decision task. The lexical task presented word pairs sequentially, participants were required to press the spacebar if the second word was written in English. The results indicated that when participants were primed with a word closely associated with the target word they responded significantly faster. This suggested, once again, that the suppressed word was cued by the closely linked (directly associated/related) words.

Muris, Merckelbach and De Jong (1993) provided further evidence for the ECH. They asked one group of participants to complete the typical white bear study in a tidy room, whilst asking a second group to complete the same procedure in an untidy room. Results revealed that those asked to suppress in an untidy room experienced significantly more intrusions. This was said to have happened because participants had more in their environment to distract and therefore remind themselves of the unwanted thought.

The idea that environmental cues can serve to remind us of unwanted thoughts is not an idea that contradicts common sense. Kanfer (1980) gave evidence for such an assertion by suggesting that human beings will often alter their environment to either avoid unwanted thoughts, or to remind them of things they wished to hold in memory, for example, the way in which human beings will remove and replace photographs. In spite of common sense examples, empirical research is needed to solidify such a theory. The research discussed in previous paragraphs seems to lend strong support to the notion that thought suppression is difficult due to directly associated environmental cues, however, a behavioural phenomenon known as stimulus equivalence suggests that if there is intentional relating of stimuli in the environment then unintentional relations may also emerge (Dymond & Roche, 2009). If so, then the futility of attempting to suppress one's thoughts may be understood not only in terms of intentional processes but also unintentional ones.

1.2.1.2 A Behavioural Account of Cognition

Stimulus equivalence is an empirically demonstrable phenomenon in which, by training a series of unidirectional relations between arbitrary stimuli, a number of untrained or derived relations emerge in an overall pattern according to which the stimuli seem subsequently to be treated as mutually substitutable or equivalent. Using the simplest possible example, imagine participants are trained, using arbitrary stimuli A, B and C to choose B in the presence of A, and C in the presence of B. Stimulus equivalence is subsequently demonstrated if they show a number of further 'derived' relations including reversing the trained relations by choosing A in presence of B, and B in presence of C; and combining the trained relations by choosing C with A and vice versa. If all emergent relations proposed here control responding, then A, B and C are effectively being treated by the participant as equivalent or mutually substitutable and are said to function as a derived equivalence relation or equivalence class (Sidman, Kirk, & Wilson-Morris, 1985; Sidman, 1994).

Equivalence is typically trained and tested using conditional discriminations / match-to-sample (MTS) procedures and is a well researched phenomenon within behaviour analysis, not least as a result of its potential generativity. In this respect, a further effect associated with stimulus equivalence known as transfer of function, is of particular interest. Importantly, after an equivalence relation is formed, and a psychological function is established for one member of that relation, that function may transfer to other members of that relation in the absence of explicit training. For example, if A, B and C are members of an equivalence relation as described in the previous paragraph and A acquires anxiety eliciting functions through pairing with shock, then B and C may acquire a similar function without needing to be similarly associated with shock but simply by virtue of being in the equivalence relation with A.

Transfer of function has been demonstrated with a number of different behavioural functions, including avoidant responses, preferences, self discrimination, moods (See Dymond & Rehfeldt, 2000 for a review). To take two examples of particular relevance to the current research; Smyth, Barnes-Holmes and Forsyth (2006) conducted a study which aimed to display a derived transfer of self reported arousal functions. In particular the study showed that spider fearful participants reported an increase in arousal not only when presented with the principal stimulus

(in this case a spider attack video), but also when presented with the equivalence trained, direct and derived stimuli, thereby displaying a transfer of stimulus functions. Additionally Auguston and Dougher (1997) demonstrated the transfer of avoidance functions through equivalence. Participants were first trained in two-four member equivalence relations. Next they were exposed to a conditioning procedure in which shock was paired with one member of one relation only. Participants were then trained in a differential signaled avoidance task during which they learned to avoid shock by making a particular response in the presence of the conditioned shock stimulus. Finally, it was demonstrated that they also displayed the avoidance response in the presence of stimuli equivalent to the conditioned shock stimulus but not to stimuli in the other equivalence relation.

The empirical phenomenon of transfer of function through derived equivalence may allow for the modelling and exploration of interference with thought suppression via unintentional relations. From the current perspective, thinking is part of our repertoire of learned behaviour. More specifically, thinking is covert responding which produces thoughts which may then become stimuli for further covert responding. Thought suppression is the attempt to respond away from certain thought stimuli when they arise by focusing attention on alternative internal and external stimuli. Thought suppression interference occurs when the to-be-avoided stimulus is presented to the person. Thought suppression fails when the person responds to the to-be-avoided stimulus rather than responding away from it. This might occur with direct thought suppression interference or as a result of some other process that results in the presentation of the thought. Amongst these latter processes is derived relational responding.

Derived (unintentional) relations may interfere with thought suppression in the following manner. Imagine a child who fears spiders. At some point, she might learn that spiders (A) lay eggs (B). She might also learn that eggs are one of the ingredients of cake (C). These learned relations may allow her to derive a relation between spiders and cake without any direct association of these stimuli being necessary (see Barnes-Holmes, Cochrane, Barnes-Holmes, Stewart, & McHugh, 2004). The child's fear may lead to attempts to suppress thoughts of spiders. However, there might also be a transfer of functions through equivalence from spiders to cake such that being reminded of the stimulus 'cake' might also be

something that cues 'spider'. Thus the unintentionally related stimulus 'cake' becomes something to be suppressed also. And of course if these two apparently unconnected stimuli may be thus related then a vast array of other stimuli may be similarly implicated, making thought suppression even more futile than even ECH might predict.

Chapter 4 of the current thesis aims to further investigate the possible role that derived stimulus relations may have in the context of thought suppression, whilst also maintaining contact with the ECH. Specifically, it will use the stimulus equivalence paradigm to demonstrate that directly trained and derived stimuli may render thought suppression impossible.

1.2.2 The Immediate Enhancement Effect

The seminal thought suppression study (Wegner et al, 1987) found that when instructed not to think about a 'white bear' for a five minute phase that the exact thought would enter the mind of the participants between 6 and 7 times. This failure to banish an unwanted thought during the suppression phase was referred to as the immediate enhancement effect. Although the ECH would account for the immediate enhancement effect by suggesting that various external cues make thought suppression impossible, there has been both research for and against the idea that thought suppression and the immediate enhancement effect are possible. Indeed research validating the assumption that the attempted suppression of a target thought ironically leads to an increase in that thought has 'yielded a morass of conflicting results' (Muris et al, 1993, p. 609).

The majority of research that has investigated the immediate enhancement effect has employed a similar experimental paradigm, based on the original white bear study. In short these preparations tend to include two five minute phases. In the first five minute phase the participants are instructed to suppress an unwanted thought, whilst in the second five minute phase they are instructed to concentrate/think freely. In both conditions the participant has to indicate the presence of the unwanted thought each time it comes to mind by pressing an event marker/ringing a bell/ pressing the space bar. The dependent variable therefore is the amount of self reported unwanted thought intrusions that participants experience

during each five minute phase. Due to this similarity in procedure, only a summary of the immediate enhancement effect research findings is necessary.

A number of studies have investigated the effect; Salkovskis and Campbell (1994) included a suppression group, a suppression group with a distraction instruction and a control group with no suppression instruction in their study. The results showed that the suppression and suppression with distraction groups both reported significantly more thought intrusions than the control group. Muris, Merckelback, Van Den Hout and De Jong (1992) conducted a similar study where they compared the suppression of an emotional story with that of a neutral one. Results showed that when compared to a control group, participants instructed to suppress the neutral story exhibited an immediate enhancement effect. Interestingly those suppressing the emotional story did not; the possible reasons for such a finding are discussed in Section 1.2.6. Similarly Lavy and Van Den Hout (1990) found that when participants were instructed to suppress a neutral thought (that of a vehicle) they tended to have thoughts of vehicles enter their mind significantly more than controls. Additionally, whilst employing an identical experimental paradigm to the aforementioned studies previous research that employed longer suppression phases still found the immediate enhancement effect (Rassin, Merkelback & Muris, 1997; Trinder & Salkovskis, 1994).

In an attempt to move away from the self report measures used in the traditional thought suppression preparations, some research has been designed to provide implicit measures of thought suppression. For example, Lavy and Van Den Hout (1994) asked participants to complete an implicit stroop task. The thought suppression stroop task required participants to indicate the colour of a word appearing on the screen. A variety of words, which included the target word, appeared in either red or blue and participants were required to identify the word colour by means of pressing a pre-assigned key on the key board. The participants' response time to the target word and the control words was measured. Half of the participants were asked to suppress a target thought while completing the stroop task, whilst half were provided with no instruction. The results found that participants instructed to suppress a target neutral thought showed an attentional bias towards the target word on the implicit measure, suggesting the existence of a slightly different but valid immediate enhancement effect. Results from a study by

Wegner and Erber (1992; see Section 1.2.1.1) provided similar evidence to those of Lavy and Van Den Hout (1994). In experiment 1 Wegner and Erber (1992) asked participants to make word associations to a word prompt, whilst suppressing/concentrating on a target word. Results showed, in line with their predictions, that participants often provided the exact suppression target when prompted with related cues, in comparison to control words, and those in a concentration group. In the second experiment of the paper Wegner and Erber (1992) utilized the stroop paradigm in a procedure identical to that of Lavy and Van Den Hout (1994); specifically finding that thought suppression increased the accessibility of the unwanted thought. It was suggested that this increased accessibility of the unwanted thought reflects the immediate enhancement effect seen in the traditional Wegner paradigm.

More recently, however, there has been some evidence to suggest that it may be possible to suppress one's thoughts. For example, Anderson and Green (2001) employed the 'think, no think' paradigm. This procedure compared two conditions; first, all participants had to learn a number of associations between a series of two random noun pairs. Subsequently, one condition required participants to suppress these associations, whilst the second condition required the participants to try to remember them. For example, all participants might have been asked to suppress/remember that the words 'house' and 'banana' were linked. Subsequent recall tests would determine the effects of each instruction. According to the ironic effects of suppression, the participants, when asked to suppress, should have been able to recall the word associations as well as those asked to remember. However, the findings indicated that participants were able to suppress the word associations relative to baseline. Nevertheless, the effect sizes in this study were small and the amount of to-be suppressed words was high. Additionally, Bulevich, Roediger and Balota (2003) suggested that recent attempts have failed to replicate the think no think effect.

More relevant to the current perspective however, is that a number of studies using the typical white bear paradigm have failed also to find the immediate enhancement effect (Muris Merkelback & De Jong, 1993; Roemer & Borkovec, 1994). Clark Ball and Pape (1991) instructed their participants to either suppress or monitor their thoughts about a story that had been read to them. Their results

revealed no immediate enhancement effect. However, the most notable study which provided evidence for the idea of successful suppression was a meta-analysis conducted by Abramowitz, Tolin and Street (2001). Their analysis of 28 thought suppression studies aimed to assess the evidence for Wegner's immediate enhancement and rebound effects. The meta-analysis suggested that there was, in fact, no immediate enhancement effect which would suggest that suppression in the short term may well be effective.

As the evidence for the immediate enhancement effect is mixed, Chapters 2 and 3 of the current thesis will seek to further explore the immediate enhancement effect, by employing the typical thought suppression paradigm, whilst using a range of distraction techniques across both neutral and high valence thoughts.

1.2.3 The Rebound Effect

Wegner et al (1987) found, during the concentration phase that followed suppression, that participants would experience significantly more intrusions than those who were instructed to concentrate on the unwanted thought before suppression. Wegner et al (1987) suggested that the suppression attempt caused the unwanted thought to rebound an increased amount of times after the suppression phase had ended; this was labelled the rebound effect. The possibility that a rebound effect exists is important as it represents a laboratory model for the aetiology of real life obsessions (Wegner, 1989). Specifically showing how the attempted suppression of an unwanted thought can cause that exact thought to enter consciousness on multiple occasions after the suppression attempt has ended.

However, research on the rebound effect is difficult to interpret due to the two different rebound instructions that participants have received across the empirical literature. In the original Wegner et al (1987) study participants were given the concentration rebound instruction, where participants were encouraged 'to think about the unwanted thought'. Indeed a number of thought suppression studies have replicated the typical rebound results when the concentration instruction is employed (Lavy & Van Den Hout, 1990; Clark et al, 1991; McNally & Ricciardi, 1996). However this instruction has been heavily criticized for lacking in ecological validity (see Section 1.2.8), prompting the emergence of the think free instruction, where participants are instructed 'to think of anything they like but that if they should have

the unwanted thought come to mind then they should press the space bar just as before'. The think free rebound instruction has become common place in thought suppression literature. Despite this procedural alteration, the definition of the rebound effect has remained the same i.e. significantly more intrusions are needed in the rebound phase than in the suppression phase. This seems somewhat surprising as it is unlikely that participants who are given a think free instruction would signal as many intrusions as those asked to concentrate on an unwanted thought. Due to this alteration, the majority of thought suppression research finds no rebound effect. However, this may be a result of the fact that they were testing for the original concentration definition of the rebound effect, not a definition which took the procedural alteration into consideration.

The traditional thought suppression paradigm, utilizing the think free rebound instruction, has been employed across a number of studies using a variety of unwanted target thoughts, most of which found no rebound effect, according to the strict definition of rebound (Liberman & Forster, 2000; Merkelback, Muris Van den Hour & de Jong, 1991; Rutledge, Hollengurg & Hancock, 1993 and Nixon, Flood & Jackson, 2006). In contrast to this, Abramowitz et al (2001) in their meta-analysis did find evidence of a minor rebound effect, however a number of the studies used in this meta analysis used a concentration instruction. Finally, Clark, Ball and Pape (1991) and Roemer and Borkovec (1994) did find evidence of a rebound effect using a think free rebound instruction. Due to the mixed research findings, Chapters 2 and 3 of the current thesis aim to determine whether a rebound effect emerges across neutral and high valence thoughts, in both the short term and the long term, and across a number of different distraction techniques.

1.2.4 Distraction methods

One potential reason that people engage in distraction when attempting to suppress an unwanted thought might be due to the supposed short term relief of anxiety that can be felt as a result of it (Mullen & Suls, 1982). Indeed, Wegner and Gold (1995) suggested that the most common way in which one would attempt suppression would be via distraction. In other words, in order to suppress an unwanted thought we will often attempt to occupy ourselves with a variety of other thoughts. Of course in accordance with the ECH, distraction attempts are eventually

futile because the more distracters that one uses to divert attention away from the unwanted thought, the more environmental cues there are to remind us of it. With distraction holding such an important role in attempted suppression Chapters 2 and 3 of the current thesis aim to determine the effect that different distraction techniques will have on the immediate enhancement and rebound effects.

The topic of distraction within thought suppression has not received much attention since the inception of the white bear study. Nevertheless a variety of distraction based studies have displayed some interesting results. Wegner (1989) suggested that the quality of the distracter is a pivotal factor if successful suppression is to be achieved. Specifically, Wegner (1989) suggested that the distracter must be sufficiently absorbing, as distracters that were not interesting enough, or distracters that challenge our intellects too much would cause an early return to the unwanted thought. Indeed, Csikszentmihalyi (1975) previously proposed, in what he termed Flow Theory, that people are most absorbed when they are engaging in an activity which precisely matches their capabilities, a theory which may be applicable to the success that absorbing distracters may have in the area of attempted thought suppression. Brucato (1978) found evidence to support this assumption. He instructed all participants to under-take a cold pressor task, whilst supplying the participants with a number of different distracters. The findings from this study suggested that distracters that were too simple or too difficult cause an increased amount of intrusions, compared to more absorbing distracters where the unwanted thought occurrence was less. Additionally, Corah, Gale and Illig (1979) found that participants who were played music (non absorbing distracter) during a dental procedure experienced significantly more self reported pain than those who played a video game (absorbing distracter). McCaul and Mallot (1984) also conducted a study on amount of perceived pain and found that those participants with absorbing distracters reported less pain than those with distracters that were too simple or too difficult. It must be added that the authors only found this effect for mild pain, not severe. Finally, Westcott and Horan (1977) found that not all absorbing distraction needs to be pleasant. Their study found that students could withstand a cold pressor task for significantly longer than controls when asked to imagine having an argument with an intimidating professor.

In terms of the quality of the distracter, the research suggests that the more absorbing the distracter, the better one's chances are of achieving successful suppression. However, objective research is difficult to conduct on the absorption of a distracter, due the subjective nature of absorbing distraction; what one person finds distracting, another would not. Empirically speaking, a more objective study of distraction, which has received more attention within the field of thought suppression, is the type of distraction technique that is used. Chapters 2 and 3 aim to address Wegner et al.'s (1987) assertion that the ironic effects of thought suppression during the suppression phase could be undermined via the use of a focussed distracter. Wegner (1989) argued that people will generally engage in unfocussed or self distraction where the number of possible distracters is large, resulting in a greater number of environmental cues. With this as a logical back drop Wegner et al (1987) found that when they limited the amount of distracters that the number of unwanted thought intrusions in the suppression phase decreased. Specifically, Wegner et al (1987) demonstrated that when participants were asked to suppress via the use of a focussed distracter (i.e. red volkswagon) that the unwanted thought occurrence was reduced. In addition their study found that if one was 'successful' in a suppression attempt by using a focussed distracter that one subsequently experiences a larger post suppression rebound effect. Since the seminal research, a number of studies have demonstrated the advantages of using a focussed distracter. Lin and Wicker (2007) instructed participants either to suppress an unwanted thought via self distraction or via the use of a focussed distraction task in a study which employed the typical thought suppression procedure. Results showed that participants in the focussed distraction condition experienced significantly less unwanted thought intrusions when compared to the suppression group. However the results showed no evidence of a post suppression rebound effect in the focussed distraction group. Salkovskis and Campbell (1994) also compared the use of self distraction versus focussed distraction in a similar preparation and their findings suggested that the focussed distraction group experienced fewer intrusions than the self distraction group. They additionally found no evidence of a heightened rebound effect. Salkovskis and Reynolds (1994) and Cioffi and Hollaway (1993) employed a different dependent measure in the form of a cold pressor task. Specifically, both studies showed that those participants who suppressed their pain via a focused

distracter kept their hand submerged in icy water (i.e. tolerated pain) significantly longer than those asked to self distract.

In all, the literature suggests that engaging in focussed distraction helps alleviate the amount of unwanted thought intrusions, whilst the effect that this has on post suppression rebound is uncertain. Chapters 2 and 3 of the current thesis explore the issue of distraction by comparing a number of distraction techniques, whilst employing both neutral and higher valence thoughts. If the use of a focussed distracter does help alleviate the effects of attempted suppression then such a finding could have broader implications within the clinical arena, where the management of unwanted thoughts is widely researched.

1.2.5 The effects of suppression over time

Despite advances in our research of the immediate enhancement and rebound effects in the short term, very little research has been conducted on the effects of longer term repeated suppression attempts on thought occurrence during suppression and rebound/think free phases. The reason such research gains importance is due to the fact that it is unlikely that people will have to deal with an unwanted thought on only one occasion. It is more likely that we have to deal with unwanted thoughts over a certain period of time, in a somewhat cyclical nature between suppression and think free phases (Wegner, 1989). Indeed Wegner (1989) coined a term for the everyday cycles of suppression and non suppression that one may experience when attempting to banish an unwanted intrusive thought, an 'indulgence cycle'.

An 'indulgence cycle' refers to the process by which a person will move from a phase of suppression to a phase of expression. Wegner (1989) suggested that real life suppression attempts would occur on multiple occasions, so that one would repeatedly be entering phases of suppression and expression. Wegner (1989) suggested that the first suppression-expression cycle (i.e. the first indulgence cycle) results in a rebound effect. This increases thought frequency and prompts further suppression. However, further suppression will be more difficult due to the increased frequency of thoughts. Subsequently thought suppression attempts in the 2nd suppression phase will be more difficult, prompting a second and larger rebound effect. This cycle continues until the thought is constantly on one's mind, magnifying the futility associated with thought suppression attempts. This

interpretation of how an unwanted target thought can gain further salience is consistent with Wegner's (1989) Environmental Cueing Hypothesis. The more indulgence cycles one enters the more distracters will become linked to the unwanted target thought. This will make suppression attempts ever more futile as thought intrusions will increase as does the number of retrieval cues in the environment.

According to Wegner (1989) over the course of multiple cycles, the unwanted target thought occurrences may increase sufficiently to prompt the development of an obsession. Additionally, Hardy and Brewin (2005) suggested that indulgence cycles could provide the mechanism from which clinical obsessions form. This assumption is in line with research in the area of the development of clinical disorders in which the role of negative unwanted intrusive thoughts has been highlighted (Purdon & Clark, 1993). However, to date, only two studies have directly tested the impact of more than one indulgence cycle on thought occurrence.

In the first of these studies, Hardy and Brewin (2005) instructed two groups of participants (high vs. low obsessionality) to complete two indulgence cycles. An escalation of target thoughts in the high obsession group was predicted but no such escalation emerged. However, a small non significant increase in target thoughts from the first to second expression phase did emerge, suggesting that a more pronounced rebound effect may be forming over multiple indulgence cycles. Hardy and Brewin (2005) suggested that future research should include more indulgence cycles in order to determine whether a further escalation in thought frequency after repeated indulgence cycles would occur. Additionally, the authors suggested their use of a personally relevant target thought may have confounded the impact of repeated indulgence cycles. Specifically, it is possible that the high obsession participants may have had a history of practised suppression with the personally relevant target thought. According to Hardy and Brewin (2005) this could have afforded them increased effectiveness at suppressing the unwanted target when compared to their low obsession counterparts.

In the second of these studies, Williams and Moulds (2007) determined the effects of repeated suppression on the frequency and features of visual intrusions amongst high and low dysphoric undergraduates. Again, two indulgence cycles, and high valence (but not personally relevant) target thoughts were employed. The valence of the target thought was operationalised by exposing participants to a video

clip of a suicide. In line with Hardy and Brewin (2005), no increase in reported target thought occurrence emerged in the phases following initial and repeated suppression attempts. Surprisingly, the results from both studies appear to contradict Wegner's (1989) initial prediction that multiple indulgence cycles would induce an escalation in the occurrence of an unwanted thought.

With this contradiction in mind Experiment 2 of the thesis will seek to further explore the effects of engaging in multiple indulgence cycles on unwanted thought occurrence. Specifically, the experiment will aim to determine, in terms of unwanted thought intrusions, if the immediate enhancement and rebound effects will continue/escalate over a longer period of time.

1.2.6 Suppressing high valence thoughts

The inability to successfully suppress ones thoughts becomes particularly relevant due to the link between attempted thought suppression and clinical disorders such as OCD (Freeston & Ladouceur, 1997), GAD (Beckner, Rink, Roth & Margraf, 1988) PTSD (Foa, Steketee & Rothbaum, 1989; Ehlers & Steil, 1995), specific phobias (Thorpe & Salkovskis, 1997) and depression (Wegner, 1994) (See Section 1.3 for greater detail of this link). Although the futility of thought suppression and its link to clinical disorders have both been widely documented the relationship between thought suppression and clinical disorders, at a process level, is relatively underrepresented in the research field. That is, it is unclear as to what causes the supposed link between thought suppression and the development of psychological disorders.

Muris et al (1992) suggest that research on neutral thoughts may not generalise to psychopathology; citing that 'clinical studies' (Rachman & Hodgson, 1980) indicate that obsessions mostly concern religious, sexual or aggressive themes, that is, emotional topics. Therefore perhaps research which investigates the suppression of personally relevant and high valence thoughts may be more appropriate, as it is unlikely that people engage in the suppression of neutral thoughts in everyday life. Additionally, it is possible that the high valence nature of an unwanted thought may play some part in the development of a psychological disorder. One reason this may be the case is due to the fact that it might be expected

that an emotional and personally relevant thought will intrude more than a neutral thought (Muris & Merckelback, 1991). Perhaps this accelerated intrusion rate could provide the mechanism by which a psychological disorder could develop, as the greater the contact with the unwanted thought, the more one is reminded of unwanted feelings that may accompany it.

A number of basic studies have compared the suppression of neutral versus emotional thoughts (e.g., Muris et al., 1992; Kelly & Kahn, 1994). Davies and Clark (1998) found that participants asked to suppress high emotional disturbing material experienced a significant rebound when compared to controls. Whilst Harvey and Bryant (1998) found that participants who were asked to suppress thoughts of a violent film reported more film-related thoughts than participants who were asked to suppress thoughts of a neutral film. Likewise Petrie, Booth and Pennebaker (1998) found that participants found it easier to suppress thoughts about daily events than about emotional issues. Rachman (1982) found that college students reported more difficulties in suppressing thoughts that were emotionally distressing. They concluded that emotional reactions to a thought can cause impairment in one's ability to suppress it. However, these studies were conducted with non-clinical populations where the emotional thought was created for each participant. Thus some researchers have speculated that emotional thoughts, which are not personally relevant, may not be appropriate to investigate the role of thought suppression in psychopathology (Muris et al., 1992). The degree to which participants find the thought personally relevant may affect the degree to which they are able to suppress the thought (Abramowitz, Tolin & Street, 2001); indeed Salkovskis and Campbell (1994) found that participants find it particularly difficult to suppress personally relevant thoughts.

Research investigating the suppression of personally relevant thoughts has covered a variety of areas, for example, the suppression of food related thoughts leads to further binge eating (Keys, Brozek, Henshel Mickelson & Taylor, 1950), restrainers (people who were on a diet or were trying not to eat too much) actually ate more ice cream than any other group in a milkshake ice cream test (Herman & Mack, 1975), using suppression as a dietary technique actually lead to overeating (Polivy & Herman, 1985), worriers had twice as many unpleasant unwanted thoughts as did controls (Matthews & Milroy, 1993), burn victims who attempted to suppress

thoughts of their burns reported significantly more unwanted intrusions compared to non suppressors (Lawrence, Fauerbach & Munster, 1996), the suppressing of stereotypic thoughts caused a shift in subsequent behaviour which emphasized these stereotypes (Macrae, Bodenhausen, Milne & Jetten, 1994), people who tried not to think of a bereavement took longer to get over their loss (Lindemann, 1944), participants who had attempted to suppress a recent traumatic event, experienced intrusions that were more frequent, more intense and often more dramatic than the actual occurrence of the event (Rassin, Merkelback & Muris, 2000), people who were instructed to suppress thoughts of an imminent painful electric shock experienced huge increases in anxiety and anxious thoughts (Koster Rassin, Crombez & Naring, 2003), incest victims who try to block out their thoughts become 'obsessed' by their memories (Silver, Boon & Stones, 1983), those required to complete a sentence after being told to suppress all sexist tendencies, tended to be more sexist in their sentence completion than controls (Wegner, Erber & Bowman, 1993) and people who try to deceive others via suppression often give away the truth (De Paulo, Lanier & Davis, 1983). Each of these studies appears to demonstrate the futility associated with the suppression of a personally relevant thought. However, arguably the most widely employed clinical group when dealing with suppression and high valence personally relevant material, in a laboratory setting, involved phobic populations.

Specific phobias, which have a prevalence rate of 10-11% in the general population (American Psychiatric Association, 1994), involve personally relevant, high valence thoughts which may attract attempts at suppression. However, research has suggested that thought suppression may be a causal factor in the development and maintenance of a phobia (Wegner, 1989; Salkovskis, 1989). Muris, De Jong, Merkelbach, Postema and Vet (1998) found that dental fearful patients reported higher levels of intrusive and negative thinking during a dental procedure than non fearful patients. Similarly, Fawzy, Hecker and Clark (2006) found that participants who were instructed to suppress snake related thoughts exhibited a more pronounced attentional bias towards snake related pair words suggesting a causal relationship between thought suppression and attentional bias for snake related thoughts. Wenzel, Barth and Holt (2003) also reported that participants experienced fearful related thoughts for a longer phase of time when implementing suppression strategies.

Arntz, Lavy, Van den Berg and Van Rijsoort (1993) found that spider fearful participants, using a suppression strategy, do report multiple negative distressing thoughts when confronted with a spider.

Despite the evidence which suggests that emotional, high valence and personally relevant thoughts render suppression attempts more difficult, there is nonetheless evidence to suggest that emotional valence of the target thought may have no effect, or may actually cause a decrease in the target thought. Rachman (1982) proposed that when individuals become accustomed to unwanted thoughts through repeated exposure, their emotional response to those thoughts is reduced, and consequently they are able to forget them more easily. He suggested that habituation training (expression of unwanted thoughts) can thus lead to a decrease in subsequent emotional cognitive intrusions. A number of studies have varied the emotional valence of the target thought and have found that emotional valence target thoughts are actually easier to suppress than neutral target thoughts (Wenzlaff & Wegner, 2000). For example Roemer and Borkevec (1994) examined the effect of suppressed material with different emotional valence; neutral, anxious and depressing target thoughts. They predicted that participants would find it harder to suppress emotional material leading to a greater rebound effect. Contrary to their predictions the results indicated that participants suppressed the target thought irrespective of emotional valence. However, it has been argued that although the experimenters used emotionally distressing material, they were not personally relevant. The use of a personally relevant distressing thought would hold more salience for an individual because of a history with such an unwanted thought.

In a subsequent study on the effects of thought suppression on personally intrusive thoughts, Kelly and Kahn (1994: Experiment 2) randomly assigned participants to four experimental groups. Group 1 involved initial suppression of a pleasant intrusive thought, group 2 involved initial expression of a pleasant intrusive thought, group 3 had to suppress an unpleasant intrusive thought and group 4 had to express an unpleasant intrusive thought. Results showed participants who suppressed a pleasant thought experienced the rebound effect whereas participants who were suppressing an unpleasant intrusive thought did not experience the rebound effect. Kelly and Kahn (1994) suggested that the failure to observe the rebound effect of personally intrusive thoughts may be linked to participant's experience of

suppressing such thoughts. As participants in this study were permitted to choose their own commonly occurring intrusive thought, they may have already had a set of "backup" distracters that have been effective in reducing those thoughts in the past, thus minimizing the rebound effect. Finally Muris, Merkelbach, Horselenberg, Sijsenaar and Leeuw (1997) found that spider fearful participants only experienced a similar increase of thought intrusions to that of a non spider fearful participant, when the suppression target was 'spider'; suggesting that valence had no effect on thought intrusions.

The literature on thought suppression and high valence thoughts has mixed research findings. Therefore, the central theme of Experiment 3 of the current thesis is to determine the exact nature and relevance that valence has on attempted suppression. Specifically, Experiment 3 will seek to further explore the effect that suppressing a high valence thought has on unwanted thought occurrence, in terms of both the immediate enhancement and rebound effects.

1.2.7 The physiological effects of thought suppression

One common denominator in the majority of typical thought suppression studies is the use of self report measures. That is, each participant is responsible to report the intrusion of the unwanted thought based on their own awareness. However, the accuracy of self report has been brought into question (Purdon & Clark, 2000, see Section 1.2.8). Unfortunately, it is difficult to avoid such measures when studying participants' thoughts, however one way, which may provide further evidence as to the effects of attempted suppression, may be the use of physiological measures.

A number of studies have used physiological measures within the area of thought suppression. If ones physiology changes during the act of suppression, then it could provide one link between thought suppression and psychological disorder, as a greater physiological reaction to an unwanted thought may be at the heart of physiological and psychological distress. In particular studies have been conducted which link thought suppression of high valence thoughts with physiological measures; however mixed results have again emerged. Borkovec (1974) conducted a study on participants with snake phobias, where he gradually introduced each participant to a real life snake. However he encouraged one group to suppress

thoughts of snakes and encouraged the other group to think about the snakes. Despite an initial increase, the people who attempted to think about the snake actually showed a reduced heart rate than those who tried to suppress it. Petrie, Booth and Pennebaker (1998) obtained results that suppression may affect the immune system. They asked participants to write either a factual or personally relevant passage for 15 minutes a day for three days. Following each 15 minute phase half of the participants were asked to suppress all thoughts of what they had written. The results showed that behaviourally the participants indicated the presence of a personally relevant thought more so than a neutral thought. Physiologically, suppression caused a decrease in certain t lymphocytes; however this effect did not differ between the emotional and neutral suppressors. This result suggested that the valence of the thought had no impact on the physiology of the participants; however it seemed that the simple act of suppressing, regardless of valence, caused a physiological change.

Gross and Levenson (1993; 1997) conducted two studies which produced opposite results to that of Petrie et al (1998). In their first study Gross and Levenson (1993) found that reported intrusions between the emotional and neutral groups did not differ, however reliable physiological differences were found between participants asked to suppress their emotional response to a disgust-inducing film and those who had to suppress their emotional response to a neutral film. In the latter study Gross and Levenson (1997) produced similar findings which suggested that the suppression of emotional material produced different Skin Conductance Levels (SCL), respiratory and immune system functions to that suppression of neutral material. Wegner, Shortt, Blake and Page (1990) instructed participants to either suppress or express four thoughts; one thought was exciting, the other three were less so. Results showed that suppression of exciting thoughts did not produce the immediate enhancement or rebound effect behaviourally, that is, participants did not signal different intrusion rates across the four words. However, the participants SCL showed that suppression of exciting (sex) thoughts produced a greater physiological arousal, suggesting that the suppression of a high valence thought does produce a different physiological reaction to suppressing a neutral thought.

Wegner and Gold (1995) found similar results in their hot flame/ cold flame study. Participants underwent three 8 minute phases; in the first and third phases the participants were free to think of whatever they wanted, for the second 8 minute

phase they were instructed to suppress. The to-be suppressed thought differed depending on which group the participant was randomly assigned to. That is, participants either had to suppress a past relationship they still cared for (i.e., hot flame group) or a past relationship that meant nothing to them (i.e., cold flame group). The findings indicated no group differences in terms of measured thought intrusions. The physiological data, however, showed that the suppression of the hot flame produced a greater SCL than the cold flame group. Wegner and Zanakos (1994) re-analyzed the data from Wegner and Gold (1995) in order to determine the degree to which thought suppression predisposes someone to emotional dishabituation (emotional dishabituation suggests that those people who are high in thought suppression tendencies may be able to suppress their thoughts, due to practise effects, more successfully than those lower in thought suppression tendencies). Their results showed that those participants higher in thought suppression tendencies demonstrated a higher SCL response to suppressing a hot flame than those lower in thought suppression tendencies who also were suppressing thoughts of a hot flame. This result contradicts the predictions of emotional dishabituation as suppression of high valence material produces inflated SCL responses.

Muris, Merkelbach, Van Den Hout and De Jong (1992) conducted two studies investigating thought suppression, valence and physiology. In their first study they employed only a neutral thought and found an SCL difference between the suppression and the non suppression groups. In their second study they introduced the topic of valence. They found, interestingly, a behavioural difference between the neutral and emotional groups, however the difference pointed in the opposite direction to what we would expect; participants suppressing the neutral story experienced more thought intrusions than those suppressing the emotional story. Due to failures in the SCL equipment, the results only showed a weak effect of general suppression and displayed no group differences in terms of SCL. Finally Cioffi and Hollaway (1993) conducted a study where participants had to complete a cold pressor task. Whilst their hand was submerged they had to either distract themselves by thinking of their home, pay close attention to the pain in their hand or they had to suppress all pain related thoughts and feelings. The results showed that participants in the suppression group not only reported more pain in the 2 minutes that followed

the cold pressor task than those in the other groups, but that during the task the suppression group had higher levels of skin conductance.

Experiment 4 of the thesis aims to investigate the use of physiological measures within thought suppression research. Specifically, it aims to determine if there are any physiological effects (SCL) of attempted thought suppression, of either high valence or neutral stimuli via the traditional white bear paradigm.

1.2.8 Methodological issues

Before moving onto the more clinical applications of thought suppression, some empirical issues in the literature have caused debate and warrant discussion. The current thesis reports on a number of thought suppression studies, where such methodological issues both arise and are investigated; therefore Section 1.2.8 attempts to explain the common criticisms and subsequent solutions that have been levelled against thought suppression related research. A secondary aim of this section is to provide the reader with some background to the particular preparations that will be employed in the empirical chapters that follow.

The first of these issues surrounds research that has criticized the expression/concentration instruction as having no real life applicability (Lavy & Van Den Hout, 1990). Rassin, Muris, Jong and De Bruin (2005) argue that the expression instruction is problematic, as it lacks external validity, which renders findings from studies involving this instruction limited. Specifically, in real life it is unlikely that people go through a phase of expression after suppression. In fact Wegner (1989) noted that suppression was normally followed by a phase during which the thought is not actively suppressed. In terms of the effect such an instruction has on the experimental paradigm, the expression instruction seems to inflate the rebound effect, in terms of unwanted intrusions, when compared to liberal instructions, which more accurately reflects how phases of suppression and non suppression work in real life. For these reasons the liberal rebound/think free instruction is currently used predominantly in thought suppression research (Liberman & Forster, 2000; Merkelback, Muris, Van den Hout & de Jong, 1991; Rutledge, Hollengurg & Hancock, 1993; Nixon, Flood & Jackson, 2006; Clark et al, 1991). This instruction informs the participant, during the phase after attempted suppression, that they are

free to think of anything they like, but that if the unwanted thought should come to mind then they should indicate its presence by pressing the space bar. This instruction is thought to mirror a real life suppression episode more accurately than the expression/concentration instruction (McNally & Ricciardi, 1996; Rassin, Muris, Jong & De Bruin, 2005). Thus, each rebound phase in the current thesis will involve a liberal rebound/think free instruction.

Second, it has been suggested that the traditional thought suppression experimental design, which instructs participants not to think of a 'white bear', may provide the typical thought suppression results, not as an artefact of suppression, but as an artefact of the paradigm itself (Clark, Ball, & Pape, 1991). It is possible that the somewhat peculiar and unrealistic experimental conditions of being sat alone in a room and being asked to monitor ones thoughts may have caused the desired effects, regardless of whether the participants received a suppression or think free instruction. Indeed, to combat this issue, the majority of thought suppression related research now employs a baseline condition, in which participants are instructed to think of anything they like, but to indicate presence of the unwanted thought should it appear in consciousness. This baseline condition aims to determine the number of occurrences of the 'unwanted thought' in a five minute phase when there is no suppression instruction in place. Hypothetically speaking, if participants with a think free instruction signals an intrusion a similar amount of times to a participant given a direct suppression instruction, then it could be assumed that the amount of space bar presses signalled by those undergoing a suppression phase is no more than those receiving no suppression instruction, thereby suggesting that participants are signalling the intrusion as an artefact of the paradigm, and not due to the effects of attempted suppression. A baseline phase can be operationalised in one of two ways. One method is to employ a within subjects comparison where all participants in the study complete three phases: 1) a baseline phase, 2) a suppression phase, and 3) a liberal think free phase (for example, Wegner & Gold, 1995; Marcks & Woods, 2005). In this case, participants in the second phase would have to signal the intrusion significantly more than they did in the first phase in order for there to be an immediate enhancement effect. The second method is a between subjects comparison, where the experimental group complete a suppression and subsequent think free phase, and a baseline group complete two think free phases sequentially

(for example, Clark et al, 1991; Clark et al, 1993). Here, participants in the suppression group have to signal the intrusion significantly more than those in the baseline group in order for there to be an immediate enhancement effect. The relevant studies of the current thesis will employ the latter format as it avoids the effects that fatigue might have on participants having to monitor their thoughts for three successive five minute phases, although it must be added that both formats have been found to have the desired effects in the aforementioned research.

Third, criticisms have been made concerning the self report nature of thought suppression studies. That is, each participant is responsible for reporting the intrusion of the unwanted thought. However, there is no assurance that participants will engage in the experiment or report accurately the amount of intrusions that they experience. Research specifically investigating self report measures, outside the thought suppression arena, have shown that self report measures can be somewhat unreliable (Schwarz, 1999; Schwarz, Strack & Mai, 1991). More importantly within the area of thought suppression, further criticisms have been made. Purdon and Clark (2000) infer that self report measures of thought suppression are unreliable as they promote participant reactivity, with subjects tending to overestimate or underestimate thought frequencies depending on the instructions they receive. Despite these criticisms recent research has been conducted which suggests that self report, especially in a research area where the amount of other options are limited (i.e. because thoughts are viewed as internal events), may be more reliable than first assumed. Criticisms of self reports measures question whether the participants are susceptible to demand characteristics. However, Rassin (2005) suggests that the 'correct' answer in a typical thought suppression study is not easy to ascertain, (that is, the amount of times one should signal the intrusion), prompting the participants to simply adhere to the experimental instructions. Empirically speaking, a number of studies have compared the number of self reported intrusions and estimated frequency of intrusions and the findings suggest that self reports provide fairly accurate results (Nelson-Gray, Herbert, Herbert, Farmer, Badawi & Lin, 1990; Frederikson, Epstein & Kosevski, 1975 & Rassin, 2005). However, as there is no way to determine the exact number of unwanted thought intrusions, this criticism will always maintain some relevance. In order to avoid the issue of self report, some thought suppression related research successfully employed alternative measures, for

example, measuring participants physiology (Wegner, Shortt, Blake & Page, 1990; Petrie, Booth & Pennebaker, 1998) or employing implicit measures (e.g., the stroop task) or dependent variables based on retrieval of word associations (Wegner & Erber, 1992; Lane & Wegner, 1995; Anderson & Green, 2001). In the earlier studies of the current thesis the issue of self report is unavoidable whilst replicating the white bear paradigm. However, Chapter 3 and 4 aim to address the issue of self report in the thought suppression literature. Specifically, Chapter 3 systematically reports on the alternative dependent measure of SCL during attempted suppression, while Chapter 4 details an alternative paradigm that circumvents the need for participants to report the number of unwanted thought intrusions.

To summarise, in light of the methodological issues in the thought suppression literature detailed above the current thesis will employ the liberal think free rebound instruction, include baseline measures of unwanted intrusive thoughts, and employ both self report and non self report based dependent variables. Having reviewed basic areas of thought suppression research, let us now consider its clinical applications.

1.3 The clinical importance of thought suppression

1.3.1 Research linking thought suppression and psychopathology

Previous researchers have suggested that thought suppression may contribute to the aetiology and maintenance of many if not all disorders within psychopathology (Najmi & Wegner, 2008). This is a tentative suggestion as psychological theories which have attempted to trace the route of clinical disorders to one common cause have generally failed; repression (Freud, 1958), inferiority (Adler, 1956) and low self regard (Rogers, 1951). According to Najmi and Wegner (2008) the default coping strategy for unwanted thoughts is to attempt to get rid of them, and this rule applies to each unwanted thought across each disorder (e.g. thoughts of fear in phobias, or low self esteem in depression) within psychopathology. The production of undesirable thoughts is a by-product of any clinical disorder (e.g., thoughts of feared stimuli to an anxious client) and this promotes the need for a strategy to deal with this content. Given that attempted suppression is the most widely reported strategy for dealing with unwanted thoughts

and the empirical evidence that suggests such attempts can be counterproductive, researchers have suggested that thought suppression may 'expand the psychological damage, prolong the course, and make them more resistant to treatment' (pp 447-448). Indeed, it has been suggested that the attempted suppression of unwanted content, could in fact exacerbate certain disorders (Salkovskis, 1996). Najmi and Wegner (2008) suggest that thought suppression does not necessarily cause a disorder; more that reacting to the unwanted thought with a suppression attempt may only serve to complicate the issue. This assertion is illustrated by research which successfully links thought suppression with a wide range of psychological disorders such as Obsessive Compulsive Disorder (OCD) and Depression amongst others (Salkovskis & Campbell, 1994; Wenzlaff et al, 1988).

The link between thought suppression and OCD across the research findings appears to be quite consistent. For example, studies have found that clients with OCD experience an increase in intrusive thoughts when asked to use suppression as a strategy, this was found both in a laboratory and a real world setting, over a short (5 minute) and a longer time phase (four days) when compared to non OCD controls (Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994). Additionally, McNally and Ricciardi (1996) found that participants instructed to suppress an 'obsessional thought' had that thought come to occur significantly more than a neutral thought. Tolin, Abramowitz, Prezeworski and Foa (2002) investigated a deficit amongst OCD patients to suppress a neutral thought in a two experiment paper. Results from their first experiment found that OCD clients experienced an immediate enhancement of unwanted thought intrusions when compared to controls. In the second experiment participants, whilst receiving a suppression instruction, were required to indicate if a word appearing on a screen was a real word or a non word. The results displayed that participants had a decreased lexical decision time for suppressed words suggesting that deficiencies in suppression were existent. Finally, a study which displays the prevalence for suppression as a coping strategy in OCD populations, Freeston and Ladouceur (1997) found that 76% of OCD patients reported repeated attempts at suppressing their unwanted thoughts.

The links between thought suppression and depression can also be found in a number of research studies. In one such study Wenzlaff et al (1988) instructed depressed or normal individuals to suppress either a nice or distressing story. Results

showed that depressed participants experienced a similar amount of intrusions when suppressing the nice story, importantly however, the depression group suppressing the distressing story experienced far more target related intrusions. Conway, Howell and Giannopoulos (1991) found that dysphoric participants who had been given negative feedback regarding their performance on a bogus test experienced multiple intrusions of their 'failure' during a subsequent suppression phase, when compared to non dysphoric participants. Turner, Beidel and Nathan (1985) found that people with depression often experienced, despite attempts at thought suppression, a lack of ability to avoid unwanted thoughts. Finally, Bywaters, Andrade and Turpin (2004) found that depressed participants were worse at suppressing negative thoughts than non depressed participants.

OCD and depression are two of the more prevalent psychological disorders; however thought suppression has been linked to a number of other psychological issues. For example, insomniacs who used thought suppression as a technique for dealing with their insomnia, sleep less and report having worse sleep when compared to controls (Harvey, 2003), participants asked to suppress their worries experienced significantly more intrusions than those suppressing a neutral thought (Beckner, Rinck, Roth & McGrath, 1998), participants wishing to quit smoking experience far more smoking related intrusions when asked to use suppression as a strategy (Salkovskis & Reynolds, 1994) and heavy social drinkers instructed to suppress thoughts of the amount they were drinking, actually drank more units of alcohol than heavy drinker control participants given no instruction (Palfai, Colby, Monti & Rohsenow, 1997).

With the variety of research evidence linking thought suppression to psychological disorders/issues it seems as though Najmi and Wegner (2008) may have found a common link between all disorders. Indeed this finding does not seem that surprising when one considers that co-morbidity rate between psychological disorders is so high (Strosahl, 1994). However what is surprising is that despite this evidence, thought suppression is the most popular way in which we deal with unwanted thoughts. With the aforementioned evidence suggesting that thought suppression may have unfortunate effects, it seems as though an alternative way to manage unwanted thoughts is needed. One way, which has emerged over the last three decades, is psychological acceptance. Indeed early research by Frankl (1960)

and Solymon Garza-Perez, Ledwidge and Solymon (1972), which modelled a minor form of acceptance by instructing clients to think about their unwanted thoughts, suggested that such a strategy could be effective. Later studies which compared thought suppression versus acceptance strategies (Eiffert & Heffner, 2003; Hayes et al, 1999) substantiated this claim. One therapy which has particular relevance to this thesis because of the links it makes between thought suppression, acceptance and psychological disorder is Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 1999). The reason ACT could be considered important in the current context is because not only does it also maintain that there is a common factor underlying all psychological dysfunction (ACT holds that experiential avoidance, such as suppressing thoughts, is the underlying factor) but it also provides a behavioural model of psychological acceptance, which can be seen as an alternative to thought suppression in the management of unwanted thoughts.

1.3.2 Acceptance and Commitment Therapy (ACT; Hayes et al, 1999) as an alternative

Thought suppression is the primary way in which most people will deal with their unwanted thoughts (Rachman & Da Silva, 1978). However, as detailed exhaustively above, such attempts, not only prove futile but may also at worst cause and maintain psychological disorders. Considering the extent to which thought suppression may affect levels of psychological well being, the need for a viable alternative for dealing with unwanted thoughts is needed. Within psychotherapy thought suppression can be seen as an attempt at controlling unwanted thoughts. However, in spite of the widespread knowledge of the futile nature of thought suppression, the majority of therapeutic approaches also emphasize control based strategies for dealing with unwanted thoughts. The therapist will generally encourage thought control via such techniques as distraction (James & Hardardottir, 2002; Jaremko, 1978) emotional manipulation (Ahles, Blanchard & Levanthal, 1983) stress inoculation (Hackett & Horan, 1980) and even suppression (Harvey & McGuire, 2000). However, a growing body of research has suggested that such attempts at control based strategies are futile and often counterproductive (Cioffi &Hollaway, 1993; Hayes, Wilson, Follette, Gifford & Strosahl, 1996; Hayes et al, 1999; Waddell, 1987, Turner, Beidel & Nathan, 1985; Marcks & Woods, 2005).

Indeed, according to recent behaviourally based therapies (e.g. DBT; Linehan, 2000; ACT; Hayes et al, 1999) such attempts at controlling private events are not possible due to the relational nature of language (Blackledge, 2007; see Section 1.3.2.1). Thought suppression can be viewed as a form of experiential avoidance (Hayes et al, 1999). Experiential avoidance refers to attempts to alter the frequency, duration, or form of negatively evaluated private events such as thoughts, feelings, memories, and the context that engenders them (Hayes et al, 1999). However, attempting to avoid such experiences is considered a core psychological process underlying the onset and maintenance of psychological disorders (Boelen & Reijntjes, 2008). One therapy which provides an alternative to control based strategies, which has lately received strong support, is Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 1999).

ACT is a third wave behavioural therapy that encourages what is referred to in the literature as psychological flexibility. Psychological flexibility involves contacting the present moment fully and choosing to change *or* persist in behaviour in the service of valued ends (Hayes, Luoma, Bond, Masuda & Lillis, 2006). Put more simply, ACT encourages clients to understand that they can still behave in a way that is consistent with their values, whilst having unwanted thoughts.

1.3.2.1. Relational Frame Theory (Hayes, Barnes Holmes & Roche, 2001)

Possibly the most important feature of ACT to the thought suppression literature is that it is grounded in a theory of language and cognition; Relational Frame Theory (RFT). A number of species capable of complex forms of learning can be taught to respond to relations among stimuli. For example, in Harmon, Strong and Pasnak's study (1982), adult rhesus monkeys were consistently taught to select the taller of two stimuli, and in subsequent testing they chose a taller novel stimulus rather than the previously reinforced smaller stimulus, thus demonstrating that the critical responses were made on the basis of the relative rather than the absolute properties of the stimuli. This form of relational responding is referred to as physical or non-arbitrary relational responding because the relational responses are made on the basis of the physical or formal relations amongst stimuli. According to Relational Frame Theory (RFT; Hayes, Barnes-Holmes & Roche, 2001) language-able humans also show an additional, more specialised form of relational responding of which neither non-language able humans nor other species seem capable. In this form of

relational responding, referred to as arbitrarily applicable relational responding (AARR), responding is not controlled solely by the physical or non-arbitrary relations between the stimuli but by arbitrary contextual cues.

RFT proposes that humans learn AARR on the basis of a unique history of reinforcement provided by the human verbal community. The earliest and simplest form of AARR that humans learn is responding to the symmetrical relations between words and objects. For example, a child may be taught to orient towards a particular object in the presence of a novel word in the context of an interaction such as the following: 'Where is Teddy?' [Child looks at Teddy], 'Good boy!' This interaction may be represented as follows: Hear Name A - Orient towards Object B. The child may also be taught to produce the name or an approximation of the name in the presence of the object: [Teddy shown to Child] 'Who is this?' [Child: 'Teddy'], 'Good boy!' (See Object B – Produce Name A). Initially, the child must be explicitly taught each such symmetrical relation (i.e., A-B; B-A). However, according to RFT, after a child has received a sufficient number of exemplars of bi-directional training in this relational response, eventually generalization occurs so that contextual cues such as 'is' or the object-naming context itself become sufficient to instantiate derived symmetrical relational responding with novel word-object combinations. In other words, at this point, the child need be taught in only one direction (i.e., either 'name-object' or 'object-name') and can then derive in the other direction (i.e., 'object-name' or 'name-object', respectively).

As outlined in the preceding paragraph, the earliest and most basic form of AARR is also the earliest and most basic form of language (i.e., reference). From an RFT perspective, the continued development of AARR corresponds with the continued development of language and verbal skills, a contention supported by a growing body of empirical evidence (e.g., Barnes, McCullagh, & Keenan, 1990; DiFore, Dube, Oross, Wilkinson, Deutsch, & McIlvane, 2001; Devany, Hayes, & Nelson, 1986; Dickins, Singh, Roberts, Burns, Downes, Jimmieson, & Bentall, 2001; Dugdale & Lowe, 1990; 2000; Hayes & Bissett, 1998; Hayes & Hayes, 1992; Lipkens, Hayes, & Hayes, 1993; Sidman, Rauzin, Lazar, Cunningham, Tailby, & Carrigan, 1982; Sidman & Tailby, 1982; Staunton, Barnes-Holmes, Whelan, & Barnes-Holmes, 2002).

The symmetrical relational responding involved in the object-name reference relation is classified by RFT as a form of co-ordination or sameness responding because the object and the name are treated as being the same as each other. When more than two stimuli are involved in an arbitrarily applicable 'sameness' relation then the term 'stimulus equivalence' is often used to describe the relationship among the stimuli concerned (see Section 1.2.1.2). Sidman (1971) was one of the first behavioural researchers to empirically demonstrate this phenomenon. He trained learning-disabled participants to form three member equivalence relations between pictures, objects and written words and demonstrated a consequent sizeable increase in these participants' vocabulary and reading ability. RFT research has also identified and investigated a number of other forms of arbitrarily applicable relations, or relational frames, in addition to relations of co-ordination. These include relations of opposition (Dymond & Barnes, 1997; Roche & Barnes, 1996; 1997; Steele & Hayes, 1991), distinction (Roche & Barnes, 1996), comparison (e.g., more than, less than; see e.g., Dymond & Barnes, 1995; O' Hora, Roche, Barnes-Holmes, & Smeets, 2002), perspective (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004), analogy (Barnes, Hegarty & Smeets, 1997; Stewart, Barnes-Holmes, & Roche, 2004), and temporal relations (O' Hora et al., 2002; O'Hora, Barnes-Holmes, Roche, & Smeets, 2004).

In spite of the fact that there is a multitude of forms of AARR, according to RFT, all examples of this phenomenon possess the following three characteristics:

(i) *Mutual entailment* refers to the fundamental bi-directionality of relational responding. In a specified context, if stimulus A is related to stimulus B in a characteristic way, it is entailed that in that context, stimulus B will be related to stimulus A in another characteristic way. For example in a specified context, if A is more than B, then it can be derived that in that context, B is less than A.

(ii) *Combinatorial entailment* refers to a derived stimulus relation where two or more stimulus relations mutually combine. In a specified context, if stimulus A is related to stimulus B in a characteristic way and stimulus B is also related to stimulus C in a characteristic way, a derived stimulus relation can be entailed between stimulus A and stimulus C in that context. For example, if A is less than B and B is less than C then it can be derived that A is less than C and C is more than A.

This combinatorially entailed relation between stimulus A and stimulus C however, may not always be specified. For example, if A is less than B and B is more than C, it can be derived that A and C are in some way related but this relationship cannot be specified.

(iii) *Transformation of stimulus functions* refers to the transformation of psychologically relevant functions of a stimulus in accordance with the underlying derived relation in a given context. If stimulus A is related to stimulus B then in a context that selects particular psychological functions of A as relevant, the functions of B may be transformed in accordance with the underlying relation and the particular functions of A that are relevant. . This phenomenon is what gives relational responding its psychological significance. It allows functions of an event to be determined not only by an individual's direct history with that event but also by how that event participates in derived relations with other events (Wilson & Blackledge, 1999). For example, if stimulus A is in an equivalence / co-ordination relation with the neutral stimulus B, and stimulus A acquires fear eliciting functions, these functions may be transferred to stimulus B, so that this previously neutral stimulus B may now elicit fear. Similarly, stimulus functions can also be transformed in accordance with other forms of arbitrarily applicable relations. For example if stimulus A is in a relation of opposition with an initially neutral stimulus B and stimulus A subsequently acquires aversive functions, then in particular contexts in which the aversive functions of A are relevant, stimulus B may be transformed in accordance with the underlying relation such that B acquires reinforcing functions. Parenthetically, note that when a relation is one of equivalence / sameness / co-ordination the term 'transfer' is used, because the psychological function that is derived is the same as the original function whereas if the relation is other than equivalence (e.g., opposition, distinction) then the term 'transformation' is used because the function that is derived is not the same as the original function (e.g., in the example of transformation via opposition relations just given, the aversive function is transformed into a reinforcing function).

Transformation of stimulus functions is particularly important in the RFT approach to language in that this phenomenon can account for how language can change the psychological functions of an event. It also accounts for how words can acquire the meaning of their referents allowing the psychological functions of

referents and events to be mediated or re-lived through the individual's thoughts. Thus, a significant quantity of empirical research has already been carried out in relation to this phenomenon. Transformation of a number of different varieties of psychological function has already been empirically demonstrated. These include transformation of conditioned reinforcing functions (Hayes, Brownstein, Devany, Kohlenberg, & Shelby, 1987; Hayes, Kohlenberg, and Hayes, 1991) discriminative functions (Hayes et al., 1987), elicited conditioned emotional responses (Dougher, Auguston, Markham, Greenway, & Wulfert, 1994), ordinal functions (Sigurdardottir, Green & Saunders, 1991), extinction functions (Dougher, et al., 1994), and self-discrimination functions (Dymond & Barnes, 1994). Transformation of function has also been empirically demonstrated in accordance with a number of different arbitrarily applicable relational patterns including opposition (Roche & Barnes, 1997; Roche, Barnes-Holmes, Smeets, Barnes-Holmes, & McGeady, 2000; Whelan & Barnes-Holmes, 2004) and comparison (e.g., more than / less than, see e.g., Dymond & Barnes, 1995).

The foregoing provides a description of the main properties of arbitrarily applicable relational responding (AARR), which is the key to the RFT perspective on language and complex human behaviour more generally. As defined earlier, AARR is responding in accordance with relations between stimuli which is determined, not by the physical characteristics of the stimuli involved, but by additional, arbitrary contextual cues. Thus, one of the key determining characteristics of AARR is contextual control. Contextual control is perhaps the most critically important feature of AARR as it is this which allows relational responding to be arbitrarily applied. Contextual control permits virtually any arbitrary stimulus to participate in a relational class, regardless of the physical properties of that stimulus. It manages the complexity of AARR, determining the relations that will be formed and transformations of stimulus functions. Contextual cues themselves are those features of the environment that predict reinforcement for a certain form of AARR. Any feature of the environment can function as a contextual cue. Studies have demonstrated the ability of various stimuli such as tones (Bush, Sidman & de Rose, 1989), shapes (Kennedy & Laitinen, 1988) and background colours (Wulfert & Hayes, 1988) to function as contextual cues. In natural language words, phrases,

tone of voice, facial expressions and the form or structure of a sentence often act as contextual cues.

RFT proposes that contextual control over relational responding is established through multiple-exemplar training (MET). In MET an individual is given multiple opportunities to make a particular response in a given context and to experience its consequences. The features of the task irrelevant for obtaining reinforcement (e.g. the physical properties of the relata) will vary across opportunities while the conditions necessary for obtaining reinforcement (i.e., the contextual cues) will remain constant. Over a number of trials the individual learns to discriminate the features of the environment which are likely to predict reinforcement for a particular type of relational response. These features of the environment become the contextual cues which control relational responding. The individual learns that in the presence of these cues a certain type of relational response is likely to be reinforced even when it is not supported by the physical properties of relata. For example, after reinforcement over multiple trials for applying a 'bigger than' relational response to different stimuli in the presence of the arbitrary symbol ###, this symbol will predict reinforcement for applying a 'bigger than' relation to any stimuli. Therefore, in the presence of the symbol ###, an individual could learn that the nonsense syllable 'gug' is bigger than the nonsense syllable 'xav', and entail that 'xav' is smaller than 'gug' in this context. Another way in which it is thought that contextual control may emerge is on the basis of a trained or derived relation to an established contextual cue. For example, if 'greater than' is in an equivalence class with 'bigger than', and 'greater than' predicts reinforcement for a certain type of relational response, through bi-directional transformation of stimulus function, 'bigger than' is likely to also predict reinforcement for that type of relational response, thus acquiring the function of contextual control.

Acceptance and Commitment Therapy is based on the principles of Relational Frame Theory. According to RFT AARR and the transformation of stimulus functions provide us with a behavioural model of human language and cognition. Language and cognitive processes are associated with many psychopathologies (Williams, 2001) and RFT provides an account of how these processes are learned. The contextually controlled relational nature of language as articulated by RFT suggests that rather than attempting to change aversive content,

we should instead attempt to change the context in which aversive content occurs. Acceptance and Commitment Therapy is a treatment package that has been designed to directly break down the literal hold AARR has on human behaviour (see Chapter 5 and Section 1.3.2.2 for more detail on these processes).

1.3.2.2. ACT Related Research

Research investigating the efficacy of ACT has gained real impetus over the last decade (Hayes, Luoma, Bond, Masuda & Lillis, 2006). This evidence can be divided into 4 sections; 1). correlational research; 2). outcome studies; 3). case studies and 4). component studies. The current thesis does not report on correlational research, outcome studies or case studies. For this reason the work in this area will only be summarized below. However, Chapter 5 of the current thesis is comprised of three ACT component studies, which directly compare thought suppression versus components of the ACT model. For this reason the area of ACT component research is described in greater detail.

The primary aim of ACT based correlational research is to determine the relationship between experiential avoidance (see Section 1.3.2) and clinically relevant behaviours. To that end, studies in this area have involved comparing scores on measures of psychological acceptance/experiential avoidance, via the Acceptance and Action Questionnaire II (AAQ II, Bond, Hayes, Baer, Carpenter, Orcutt, Waltz & Zettle, under review, see appendix 1), with a variety of measures of psychopathology. The AAQ II is a 10 item questionnaire which aims to measure the individual's tendency to view their thoughts as literally true, to avoid negative experiences and to be unable to choose how to overtly behave due to covert negative content. Thus the AAQ II measures psychological flexibility (see Section 1.3.2). To date, in terms of two of the major psychopathological disorders, 20 correlational studies on depression have provided positive correlations between r=0.37 and r = 0.77, whilst 14 studies on anxiety have produced positive correlations between r=0.16 and r=0.76 (Ruiz, 2010), suggesting that higher levels of experiential avoidance are positively linked with higher levels of psychopathology. Additionally, the AAQ II has been positively correlated with psychological dysfunction in a number of other areas; chronic pain (McCracken & Vowles, 2007), mental health

within a work setting (Bond & Bunce, 2003) stress caused by important life events (Farach, Menin, Smith & Mandelbaum, 2008) and the mediation of borderline personality disorder (Gratz, Tull & Gunderson, 2008).

Outcome studies aim to determine the success of the ACT package as a whole in a variety of domains. Research has found positive clinical outcomes in a number of areas; depression (Zettle & Hayes, 1986; Zettle & Rains, 1989) anxiety disorders (Twohig, Hayes & Masuda, 2006; Twohig, 2007) social phobias (Block, 2002; Dalrymple & Herbert, 2007) sub clinical worries (Montesinos, Luciano & Ruiz, 2006) psychotic symptoms (Bach & Hayes, 2002; Gaudiano & Herbert, 2006) personality disorders (Gratz & Gunderson, 2006) addictive behaviours (Hayes, Wilson, et al, 2004) chronic pain (Dahl, Wilson & Nilsson, 2004; Vowles & McCracken, 2008) smoking cessation (Gifford et al, 2004) reducing distress with cancer patients (Montesinos & Luciano, 2005) epilepsy (Lundgren, Dahl, Yardi & Melin, 2008) weight loss (Forman, Butryn, Hoffman & Herbert, 2009) in work settings (Bond & Bunce, 2000) and sports performance (Fernandes, Secades, Terrados, Garcia & Garcia, 2004; Ruiz & Luciano 2009). Finally, case studies, which are based around the improvement of an individual patient, have also detailed the improvements that can be made as a result of ACT. This evidence can also be found in the variety of disorders mentioned in the previous section. For a more detailed review of correlational research, outcomes studies and case studies see Hayes, Luoma, Bond, Masuda & Lillis (2006) and Ruiz (2010).

ACT component studies involve specifically targeting the effectiveness of individual components of the ACT model as mediators of behavioural change. Currently, according to the ACT Hexaflex, there are six processes that contribute towards psychological flexibility that are magnified within a therapy context; Acceptance, Cognitive Defusion, Contact with the Present Moment (i.e., mindfulness), Self as Context, Values and Committed Action. Acceptance in the ACT model, which should not be confused with resignation, refers the way in which clients should embrace private events, and to be willing to have them when attempts at changing their frequency might seem more natural. Cognitive Defusion techniques encourage clients to step away from, or not to buy into their thoughts. This attempt at de-literalisation, via a variety of metaphors (Hayes & Strosahl, 2004), displays how the ACT model tries to change the way in which the client will interact with private

events, by altering the underlying function of undesirable thoughts. Whilst Being Present encourages the client to maintain non judgemental contact with psychological and environmental events that occur, this is often accomplished through mindfulness exercises. Despite the majority of component studies being based around acceptance, defusion and being present/mindfulness (as described below), the other three processes are equally as important. Self as context, is a critical process, as without it the processes of mindfulness and defusion are not fostered. Specifically, self as context refers to the way in which clients are encouraged to take a number of different perspectives, allowing them to be aware of one's flow of experiences without becoming too attached to them. Values are equally as important as self as context, as they single handedly guide action (Plumb et al., 2009). Through the processes of mindfulness and defusion clients are encouraged not to act on the basis of their thoughts but rather to act in a value consistent manner. Without the specification of such values, the guide to action remains unclear. Finally Committed Action refers to way in which ACT encourages the development of larger patterns of behaviour that are consistent with the clients chosen values.

Hayes, Luoma, Bond, Masuda and Lillis (2006) suggest that studies which investigate the individual components of the ACT model are crucial to the efficacy of such a treatment. They hold this view because outcome studies, which despite providing valuable evidence to the overall effectiveness of the therapy, do not allow a microscopic view of the elements of the therapy that work, and those that work less well. Without such study, the improvement of the therapy as a whole will suffer. Since the inception of ACT, researchers have been encouraged to investigate the efficacy of all six ACT components; however research currently published tends to centre on the processes of acceptance, defusion and mindfulness. Indeed, according to Ruiz (2010), the ACT component studies that centre on these three processes, can be divided into three sections; the effect of experiential avoidance on an experimental task, the effect of acceptance based coping instructions and the effect of brief ACT protocols.

There have been a number of studies which, among other dependent measures, have investigated the effect of high versus low experiential avoidance on behaviour. Generally research conducted in this area has involved a median split of participants based on their pre-experimental scores on the AAQ II. As an example,

Cochrane, Barnes-Holmes, Barnes-Holmes, Stewart and Luciano (2007) found that those high in experiential avoidance, when undertaking a simple matching task, took longer to emit a correct response that produced an aversive rather than a neutral picture, than their low avoidance counterparts, whilst additionally reporting greater levels of anxiety. Zettle, Hocker, Mick, Scofield, Peterson, Hyunsung & Sudarijanto (2005) provided a behavioural measure of the effects of being high or low in experiential avoidance, specifically finding that those participants high in experiential avoidance, instructed to keep their hands submerged in icy water, did so for significantly less time than those low in experiential avoidance. Feldner, Zvolencsky, Eifert and Spira (2003) found that participants high in experiential avoidance reported more discomfort and anxiety when completing a carbon dioxide enriched air challenge (i.e., an aversive task) than their low experiential avoidance counterparts. The study also compared the use of a suppression versus acceptance instruction on high experiential avoiders and found that those given the suppression instruction reported higher discomfort and anxiety levels. Finally Sloan (2004) found that participants with high levels of experiential avoidance demonstrated greater emotional reactivity compared to those low in experiential avoidance when watching pleasant and unpleasant film clips. The results indicated an overlap between high experiential avoiders and high emotionality (which is linked to neuroticism and psychopathology). The High EA group also demonstrated a higher level of emotional regulation in responding to emotive stimuli. Taken together these results seem to suggest that those participants high in experiential avoidance experience more discomfort in the management of unwanted thoughts.

As noted above ACT component studies can also involve comparing acceptance based strategies with alternative strategies for dealing with unwanted psychological content. Keogh, Bond, Hamner and Tilson (2005) found that female participants given an acceptance intervention kept their hands submerged under icy water for significantly longer than those supplied with a distraction based intervention. Campbell-Sils, Barlow, Brown and Hoffman (2006) compared the effects of suppression versus acceptance in dealing with unwanted thoughts arising from a highly emotional film. Specifically participants in the acceptance condition, in a self report measure following the emotional film, showed lower negative affect than those in the suppression condition. Together these two experiments suggest that

participants provided with acceptance instructions perform in more clinically desirable ways.

One potential weakness of these studies may be that they do not strictly resemble acceptance as delivered in vivo ACT. Specifically, acceptance in the therapeutic setting is not presented via a direct instruction, but rather via a number of metaphors and experiential exercises. For this reason analogue studies that provide more experiential component inductions may be more relevant to the ACT model. Hayes, Bissett et al., (1999) showed that participants given a 90 minute ACT protocol scored significantly better on a cold pressor task than those given a 90 minute control based protocol. Gutierrez, Luciano, Rodriguez and Fink (2004) found that participants given a 20 minute ACT protocol had a significantly greater tolerance on a pain task than those given a control based intervention, Additionally, participants in this study were supplied with a believability measure post intervention/task; a believability measure aims to determine how the participant interacts with their thoughts after having received the intervention. One primary aim of ACT is to enable clients to step away from their thoughts, or lessen their believability. In line with this rationale the participants given the acceptance intervention also scored lower on a believability measure, suggesting that they were able to step away from their thoughts and control their actions significantly more than a group exposed to a control based intervention.

One study that directly examined the difference between instruction and experiential protocol was conducted by McMullen, Barnes-Holmes, Barnes-Holmes, Stewart, Luciano and Cochrane (2009). These researchers replicated the Gutierrez et al (2004) study, with the addition of two conditions; an acceptance instruction and a control based instruction. The results showed that only those participants who underwent the ACT based protocol showed an increased tolerance of pain. Finally, Forman, Hoffman, McGrath, Herbert, Brandsma and Lowe (2007) found that those given acceptance based protocols, versus distraction/cognitive re-structuring protocols, demonstrated a greater ability to deal with food cravings. Overall research which compares ACT versus control based protocols tend to display the advantages of an ACT based approach. Chapter 5 of the current thesis aims to compare the usefulness of thought suppression based inductions to ACT component inductions. As the ACT components of mindfulness and defusion receive the most research

attention in this area, and as they are arguably easier to study in an experimental setting, Chapter 5 will specifically compare thought suppression versus mindfulness/defusion inductions in the management of unwanted thoughts.

1.4 Conclusion

The current thesis has three main aims; first, it aims to determine whether thought suppression is possible. To that end, key processes in the thought suppression literature will be systematically manipulated, namely, the immediate enhancement and rebound effects, across both neutral and high valence stimuli utilizing a number of distraction techniques (Chapter 2 and 3). Second, the current work aims to investigate whether a behavioural model of equivalence could account for the unsuccessful nature of thought suppression (Chapter 4). And finally it aims to determine whether psychological acceptance is a viable alternative to thought suppression for dealing with unwanted thoughts (Chapter 5).

Chapter 2

Testing immediate enhancement and rebound effects.

2. Introduction

Rachman and Da Silva (1978) suggest that 80% of people will attempt to control their thoughts via suppression, so that when an unwanted thought is in consciousness, many people will try their best to avoid it. In spite of this, a plethora of previous research suggests that thought suppression is not possible (Salkovskis & Campbell, 1994; Lavy & Van Den Hout, 1990). The first empirical model of thought suppression was reported in the seminal paper by Wegner et al (1987) which found that the more one tries to banish a certain thought the more it will appear in consciousness. Wegner et al (1987) employed a self report paradigm that required participants to 'not think about a white bear' for a five-minute phase. Participants were instructed that if they were to think of a 'white bear' to ring a bell that was placed in front of them on a table. During the second five-minute phase participants were cycled into what the researchers referred to as the 'concentration' phase. In this phase participants had to concentrate on the thought of a 'white bear' as much as possible, once again indicating the presence of this thought by ringing the bell. The study comprised of two groups, the first group were exposed to the 'suppress phase' for the first five minutes followed by the 'concentration phase' for the second five minutes, whereas the second group were exposed to the phases in the reversed order (i.e. concentration first followed by suppression).

The results of the study were two fold. First, it appeared that participants, when asked not to think of a neutral thought (white bear), proceeded to have that unwanted thought enter consciousness around 6 or 7 times within the suppression phase. Wegner et al (1987) labelled this inability to suppress ones thoughts the 'Immediate Enhancement Effect'. Since its conception the immediate enhancement effect has received both support for (Bowers & Woody, 1996; Lavy & Van Den Hout, 1990) and against it (Clark et al, 1991; Clark et al, 1993). Second, Wegner et al (1987) found that those who had spent an initial 5 minute phase suppressing the unwanted thought, would then have that thought come to mind an inflated amount of times during the concentration phase, when compared to those who had not initially attempted to suppress the thought. This phenomenon was labelled 'The Rebound

Effect' and was taken as evidence that the effects of attempted suppression (unwanted thought intrusions) may still be apparent after a phase of suppression. Again the rebound effect has supporting research (Abramowitz et al, 2001; Clark et al, 1990) and research which questions its validity (Kelly & Kahn, 1994; Nixon & Jackson, 2006). For more in depth details of research based on the immediate enhancement and rebound effects see Chapter 1.

Due to the conflicting results in the literature, the aim of this first empirical chapter is to study in greater detail the immediate enhancement effect and the rebound effect. Specifically aiming to determine if thought suppression is possible, whilst also investigating the after effects of attempted suppression. As distraction is the principal way in which we attempt to suppress unwanted thoughts (Gold & Wegner, 1995) the first experiment of the thesis will study the effects that various distraction techniques have on the aforementioned phenomena. Rachman and Da Silva (1978) found that people will almost always give 'distraction' as their answer when asked 'how do you avoid unwanted thoughts?' A number of studies have tested the effects of distraction on thought suppression. This work primarily stems from the original white bear study (Wegner et al, 1987) in which Wegner demonstrated the ironic effects of attempted suppression could be bypassed by the use of a focussed distracter. Since then Lin and Wicker (2007) and Salkovskis and Campbell (1994) have both found that focussed distraction has indeed lessened the amount of unwanted thought intrusions, whilst Salkovskis and Reynolds (1994) and Cioffi and Holloway (1993) found the positive effects of focussed distraction in the areas of smoking cessation and pain tolerance, respectively.

Such research gains applied importance for a few reasons. First, if focussed distraction does obliterate the effects of thought suppression then this technique could be used to help those dealing with negative unwanted thoughts. Second, if focussed distraction did provide a way around the effects of thought suppression then various clinical therapies (for example, Acceptance and Commitment Therapy; ACT Hayes, Strosahl & Wilson, 1999), which encourage people to accept rather than avoid their unwanted experiences (e.g., thoughts), could be brought into question. For these reasons Experiment 1 will aim to determine the effects of various distraction techniques on the number of unwanted thought intrusions. Specifically, it

aims to determine whether the immediate enhancement and rebound effect still exist under self, multiple and focussed distraction techniques.

Experiment 2 of the current chapter has a slightly different methodology but with similar aims to that of Experiment 1. Instead of examining the effects of different distraction techniques on the immediate enhancement effect and the rebound effect, Experiment 2 will aim to further investigate the underlying process of the aforementioned phenomena by examining the effects that thought suppression has over a longer period of time. Indeed such an experimental idea is not entirely novel as Wegner (1989) coined the term 'indulgence cycle', which refers to the cycles of suppression and non suppression that one will experience over time during everyday life. According to this account the more cycles one enters the more pronounced rebound effect would occur. Despite Wegner (1989) having coined this term only two empirical experiments have studied indulgence cycles, both Hardy and Brewin (2005) and Williams and Mould (2007) found that engaging in repeated suppression induced a maintained rebound effect. Experiment 2 of this chapter aims to determine the effect of engaging in multiple suppression cycles, and whether the immediate enhancement and rebound effects will persist over time.

2.1 Experiment 1

Wegner (1989) suggested that the most common way to avoid 'thoughts of X' is to distract oneself by 'thinking of Y'. Within his research Wegner (1989) proposed that in order for a distracter to successfully over-ride unwanted thought intrusions the distracter would have to be sufficiently 'absorbing'. Evidence in favour of such an assertion arises in research on pain tolerance. For example, both McCaul and Mallot (1984) and Corah, Gale and Illig (1979) found that the use of absorbing distracters enabled participants to endure significantly more pain than those encouraged to self distract. Wegner (1989) therefore advocated that the 'quality of the distracter could have a critical influence on the degree to which the distraction can hold one's attention away from the unwanted thought' (pp. 63). According to Wegner (1987) the typical method of thought suppression is to engage in unfocussed self distraction. This technique refers to the natural way in which one

will jump from thought to thought in search of respite from an unwanted thought. He suggested that such a strategy would be futile and could even cause a pre-occupation with the unwanted thought due to the way in which these distracters would later serve as environmental reminders (ECH), advocating that the use of a focussed distracter may be more appropriate.

The current study aims to test the efficacy of a number of distraction techniques, in terms of the number of occurrence of the unwanted thoughts produced. To that end four groups will be employed. The first group is the 'self distraction group' which refers to the typical thought suppression group where no exact distraction technique is in place. Instead participants are asked to suppress all thoughts of a specified 'unwanted thought', in which they are encouraged to provide their own distracters. The second is referred to as the 'focussed distraction group', in which the participants are asked to concentrate on one distracter for the duration of the five minute phase, whilst attempting to suppress an unwanted thought. Previous research on focussed distraction suggests that it may lessen the effects of attempted suppression (Lin & Wicker, 2007; Salkovskis & Campbell, 1994). Third, a novel distraction technique will be employed, in which the participants will receive multiple distracters in the form of words, for the five minute phase, whilst attempting to suppress a target thought. This group will provide a comparison that is directly opposite to focussed distraction in order to determine the effect that this will have on thought occurrence, in terms of the immediate enhancement effect and the rebound effect. This group will be labelled the 'multiple distraction group'. Lastly a group of participants will undergo two think free phases which will serve as a baseline condition. The baseline condition is in place to measure the importance of the intrusion rate experienced by the other three experimental groups. If participants in those groups press the space bar no more than the baseline group, then the effects of attempted suppression could be said to be minimal. This group will be referred to as the 'baseline group'.

It is predicted, in accordance with the aforementioned literature, that the focussed distraction group will experience no more thought intrusions than that of the baseline group. Whilst it is expected that the self distraction group and the

multiple distraction group will experience a larger number of unwanted thought intrusions.

2.1.1. Method

Participants

60 undergraduates (48 female and 12 male) at Swansea University were paid 2 credits for their participation in the experiment. The credit system at Swansea University allows each undergraduate to receive up to 48 credits in order to run research for their final year project, each credit is worth 15 minutes of participation in a study. The participants had a mean age of 22.4 years (SD; 9.007). The sample was non clinical. However participants were screened for depression, thought suppression tendencies and emotional avoidance (see later). The assignment of participants to experimental conditions was randomized. 15 participants were assigned to the self distraction group, 15 were assigned to the multiple distraction group, 15 were assigned to the focused distraction group and 15 were assigned to the baseline group.

Design

The study involved a 4 (group; self distraction, multiple distraction, focussed distraction and baseline) x 2 (phase; suppression and think free) mixed design with repeated measures on the second factor. The dependent variable in this experiment was the number of times the participants from each group would press the space bar in each of the two phases.

Apparatus

The experiment was completed in a laboratory at the Swansea University. The laboratory was quiet and free from distraction. It contained a desk, a chair, a standard computer (Processor) with a 14-inch screen and standard computer mouse. The participant's responses were controlled by the computer program, which was created in Visual Basic TM 6.

Materials

In order to avoid confounding the results three screening questionnaires were administered. The questionnaires consisted of the Acceptance and Action Questionnaire II (AAQ II; Bond et al., 2005), the White Bear Suppression Inventory (Wegner & Zanakos, 1994) and the Beck Depression Inventory (Beck et al, 1961). See below for further details. The data for 2 participants was removed for a high score on the depression inventory (a score of 10 or more warranted exclusion). Each participant was given details of the University counselling service in the debriefing session following the study, no direct action was taken as a result of a high BDI score. The remainder of the participants scored within the normal range (Overall mean scores: AAQ II = 54.15, WBSI = 44.5, BDI = 5.2)

The Acceptance and Action Questionnaire (AAQ-2: Bond, Hayes, Baer, Carpenter, Orcutt, Waltz & Zettle, under review, see appendix 1)

This is a self report measure created to assess a person experiential avoidance. Experiential avoidance, which is also called experiential control, is when a person endeavour's to control or alter the form, frequency or situational sensitivity of internal experiences (Hayes et al., 1996). A 10 item version of the questionnaire was completed by each participant. The ten statements vary from "It's ok if I remember something unpleasant" to "emotions cause problems in my life". There are seven response choices and scores may range from 7 to 70. High scores infer a high rate of experiential avoidance and low scores are said to indicate acceptance and commitment to action.

The White Bear Suppression Inventory (WBSI: Wegner and Zanakos, 1994, see appendix 2)

This is also a self report measure. The WBSI aims to measure a person's tendency to suppress unwanted negative thoughts. It is a 15 item questionnaire with statements ranging from "I have thoughts that I cannot stop" to "I have thoughts that I try to avoid". Answers are given on a 5 point scale of how much the participant agrees or disagrees with the particular statement. Scores may range 15 to 75. High scores suggest a tendency to suppress unpleasant thoughts. Research generated by

Muris, Merckelbach and Horselenberg (1996) showed the instrument to be reliable in terms of internal consistency and test re-test stability.

Beck's depression inventory (BDI; Beck Steer & Brown, 1996, see appendix 3)

The BDI is a questionnaire utilized to measure for signs of depression and can provide an estimate of depressive severity. The questionnaire consists of 21 statements. Status is assessed in terms of how the subject has felt in the week before that present moment and including the day of testing. The participant picks one of four statements for each of the 21 components. Each statement has a numerical value beside it going from 0 to 3. The values are accumulated to give individual BDI score. A participant's score is then compared to the following ratings to determine level of depression; 0-9 normal non-depressed range; 10-15 mild depression; 16-19 mild to moderate depression; 20-29 moderate to severe depression; 30-63 severe depression. Participants with scores of nine and lower were employed in this study.

Procedure

On each subject's arrival at the experimental lab, the participant was greeted by a male experimenter. Upon completion of the consent form the participants were randomly assigned to one of four experimental groups (i.e., self distraction, multiple distraction, etc).

Self distraction group

If assigned to the self distraction group the following procedure occurred; via verbal and written instructions the participants were instructed that for the following five minute phase they had to try their best to suppress a certain thought that would be given to them by the experimenter (the 'unwanted thought') and that if they did happen to think of the 'unwanted thought' in this five minute phase then they were required to press the space bar each time the thought occurred and reoccurred. The instruction was as follows; '*In the next five minutes please try not to think of a 'white bear'. Every time you have 'white bear' come to mind, though, please press the space bar in front of you'.*

After the initial five minute phase the researcher re-entered the room and gave the participant the think free instruction. Participants were told that for this final five minute phase that they could think about anything they liked (including the unwanted thought). The participants were again told that if they did happen to think of the 'unwanted thought' from stage 1 then they should continue to press the space bar each time the thought occurred and reoccurred. The instruction was as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*'

Multiple distraction group

If assigned to the multiple distraction group the following procedure occurred; participants were instructed, via verbal and written instructions, that for the following five minute phase they would have to try their best to suppress a certain thought that the experimenter would provide (the 'unwanted thought'). However they were told that in order to help them in their suppression attempt that 60 random words (see appendix 4) would appear every five seconds on the computer screen in front of them, and that they should think of these words instead of the unwanted thought. Most importantly the participants were told that if they were to think of the unwanted thought then they must press the space bar on the computer keyboard each time the thoughts occurs and reoccurs. The instruction was as follows; '*In the next five minutes please try not to think of a 'white bear'. Instead think of the words that will appear on the screen to distract yourself. However, if you do have 'white bear' come to mind, though, please press the space bar in front of you'.*

After the five minute phase the researcher entered the room to administer a think free instruction for the second five minute phase. The instruction read as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*'

Focussed distraction group

If assigned to the focussed distraction group the following procedure occurred; participants were instructed, via verbal and written instructions, that for the following five minute phase they would have to try their best to suppress a certain thought that the experimenter would provide (the 'unwanted thought'). However they were told that in order to help them in their suppression attempt that they should focus on one thought instead, which in this case, was the thought of a 'red volkswagon'. Then the participants were told that if they were to think of the unwanted thought then they must press the space bar on the computer keyboard each time the thoughts occurs and reoccurs. The instruction was as follows; '*In the next five minutes please try not to think of a 'white bear'. Instead try to think of a red volkswagon. However if you do have 'white bear' come to mind, though, please press the space bar in front of you'.*

After the five minute phase the researcher entered the room to administer a think free instruction for the second five minute phase. The instruction read as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*'

Baseline group

If assigned to the baseline group the participants received two think free five minute phases. Before the first five minute phase the researcher, in written and verbal form, gave the following instruction '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before*'. Upon completion of the first five minute phase the researcher re-entered the room and gave the identical think free instruction for the second time.

Finally, the importance of signalling the presence of each unwanted thought was stressed to each participant via the following instruction, which was administered immediately prior to engaging in the first five minute period; 'if *you should happen to think of the 'unwanted thought' in either phase then it is important*

that you press the space bar each time it comes to mind'. After completing the study, subjects were debriefed and their credit was administered.

2.1.2. Results

Questionnaires

In order to ensure that the results were obtained as a result of the independent variable manipulated (i.e., distraction technique) and not pre-experimental experiential avoidance, sub clinical depression or high levels of suppression, it was important that there are no differences between the groups on the screening questionnaires (i.e., the AAQ, WBSI and BDI). A 3 (Questionnaire; AAQ II, WBSI, BDI) x 4 (Group; self distraction, multiple distraction, focussed distraction, baseline) mixed ANOVA revealed no significant main effect for Questionnaire, $F\ (2,108) = 0.803;\ p > 0.05$, and no significant interaction between Questionnaire and Group, $F\ (6,\ 108) = 0.715;\ p > 0.05$. Post hoc Tukey HSD tests additionally revealed no significant difference (see Table 1) between the self distraction group (AAQ II = 53.6, WBSI = 43.6, BDI = 4.2), the multiple distraction group (AAQ II = 55.2, WBSI = 44.7, BDI = 4.9), the focussed distraction group (AAQ II = 55.4, WBSI = 44.1, BDI = 5.6), and the baseline group (AAQ II = 52.4, WBSI = 45.4, BDI = 6.1) on any of the questionnaires.

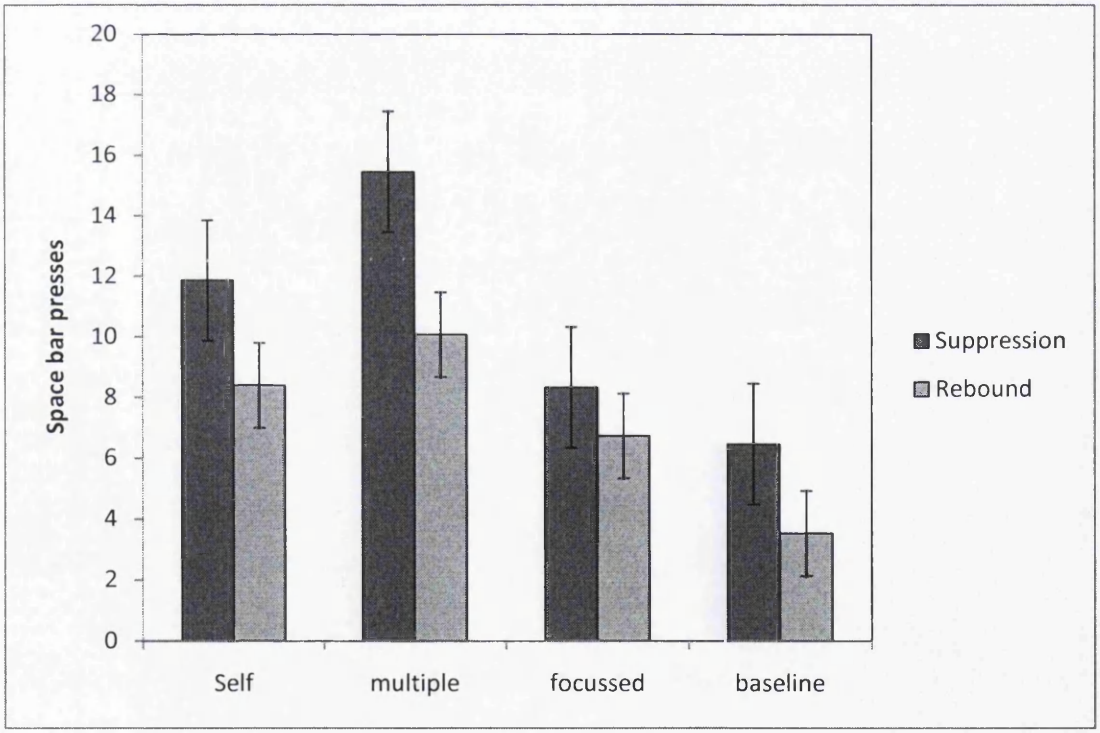
Comparison	**AAQ**	**WBSI**	**BDI**
Self v Multiple	*t(26) = -0.502*	*t(26) = -0.358*	*t(26) = 0.343*
Self v focussed	*t(28) = 0.487*	*t(28) = 0.286*	*t(28) = -0.521*
Self v baseline	*t(28) = 0.-631*	*t(28) = 0.241*	*t(28) = -0.892*
Multiple v focussed	*t(26) = 0.-113*	*t(26) = -0.168*	*t(26) = 0.487*
Multiple v baseline	*t(26) = 0.740*	*t(26) = 0.153*	*t(26) = 0.635*
Focussed v baseline	*t(28) = 0.810*	*t(28) = 0.220*	*t(28) = 0.276*

Table 1. The difference between each group on the various questionnaires. All non significant at the 0.05 level, Experiment 1.

Number of intrusions

The dependent variable in the study was the number of times each participant pressed the space bar in both the suppression and think free/rebound phases. Figure 1 displays that the multiple distraction group (suppression phase M = 15.46, SD = 10.95; rebound phase M = 10.07, SD = 8.27) and the self distraction group (suppression phase M = 11.86, SD = 8.7; rebound phase M = 8.4, SD = 8.6) indicated presence of the unwanted thought the most. Whilst the focussed distraction group (suppression phase M = 8.33, SD = 6.66; rebound phase M = 6.73, SD = 5.88) and the baseline group (suppression phase M = 6.46, SD = 2.53; rebound phase M = 3.53, SD = 2.58) appeared to press the space bar less.

Figure 1. Number of unwanted thought intrusions for each group in each phase, Experiment 1.



Statistical analyses were conducted to determine any differences between the groups. A 2 (Phase: Suppression versus Rebound) x 4 (Group: Self, Multiple, Focussed, Baseline) mixed ANOVA revealed a significant main effect for Phase,

$F(1,54) = 18.708; = p < 0.05$, and no significant main interaction between Phase and Group, $F(3, 54) = 0.986; p > 0.05$.

In order to determine the between group differences in the number of space bar presses post hoc Tukey HSD tests (Table 2) were conducted between the four groups across the suppression and think free phases. For the suppression phase, the analyses revealed no significant main effect between the self distraction group and the multiple distraction group, or between the self distraction group and the focussed distraction group. However, a significant main effect was found between the self distraction group and the baseline group. Further Tukey HSD tests revealed a significant main effect between the multiple distraction group and the baseline group, and between the multiple distraction group and the focussed distraction group ($p<.05$). Finally, no significant main effect was found between the focussed distraction group and the baseline group.

These results suggest that participants in the self distraction and the multiple distraction groups indicated unwanted thought intrusions significantly more than the baseline group. Therefore, thought suppression via these forms of distractions appears to be ineffective. However, the results for the focussed distraction group indicated a similar number of unwanted thought intrusions compared to baseline. That is, participants in this group did not press the space bar more than the baseline group, suggesting that focussed distraction might bypass the ironic effects of thought suppression.

In terms of rebound the post hoc Tukey HSD tests (Table 2) revealed a significant main effect between the self distraction group and the baseline group and between the multiple distraction group and the baseline group. However, no significant main effect was found between the focussed distraction group and the baseline group, between the multiple distraction group and the self distraction group, between the multiple distraction group and the focussed distraction group, or between the focussed distraction group and the self distraction group. These results suggest that in the think free phase following attempted suppression, that those participants in the multiple and self distraction groups indicated a greater number of unwanted intrusions than the baseline group. However, the focussed distraction

group demonstrated no such effect suggesting that focussed distraction eradicated the rebound effect found in the other groups.

Comparison	Suppression Phase	Rebound Phase
Self v Multiple	$t(26) = -0.967; p > 0.05$	$t(26) = -0.523; p > 0.05$
Self v focussed	$t(28) = 1.249; p > 0.05$	$t(28) = 0.619; p > 0.05$
Self v baseline	$t(28) = 2.308; p < 0.05$	$t(28) = 2.097; p < 0.05$
Multiple v focussed	$t(26) = 2.112; p < 0.05$	$t(26) = 1.245; p > 0.05$
Multiple v baseline	$t(26) = 3.093; p < 0.05$	$t(26) = 2.911; p < 0.05$
Focussed v baseline	$t(28) = 1.014; p > 0.05$	$t(28) = 1.928; p > 0.05$

Table 2. The post hoc Tukey HSD tests conducted between the self distraction, multiple distraction, focussed distraction and baseline groups, Experiment 1.

Finally, paired sample t tests were conducted to determine if any differences emerged, in terms of thought intrusions, between the suppression and think free phases within each group. The results showed a significant main effect for the self distraction group, $t(14) = 2.374; p < 0.05$, and the baseline group , $t(14) = 3.803; p < 0.05$. However, no significant difference was found for the multiple distraction group, $t(12) = 2.063; p > 0.05$, or the focussed distraction group, $t(14) = 1.524; p > 0.05$. These results show that those participants in the self and baseline groups experienced the unwanted thought significantly more in the suppression phase than the think free phase. The participants in the multiple and focussed groups however, experienced a similar number of thought intrusions in both phases.

In summary, participants in the focussed distraction group experienced a similar amount of thought intrusions as those in the baseline condition, where as those in the self and multiple distraction groups experienced significantly more, this was the case for both the suppression and think free phases. In addition to this, in no group did the participants experience an increased amount of intrusions during the

think free phase. However participants in the multiple and self distraction groups did experience the unwanted thought significantly more than the baseline group for this second phase.

2.1.3. Discussion

The results of Experiment 1 suggest that engaging in focussed distraction may obliterate the normal ironic effects of attempted thought suppression. Namely, participants who engaged in focussed distraction demonstrated no immediate enhancement effect and no rebound effect. In contrast to this, participants exposed to either self or multiple distraction techniques experienced an inflation of unwanted thought intrusions in both the suppression and think free phases, providing evidence in favour of the immediate enhancement effect and the rebound effect.

These results concur with the previous literature on focussed distraction. Lin and Wicker (2007) and Salkovskis and Campbell (1994) both found that engaging in focussed distraction aided suppression attempts. Additionally, the findings that the self and multiple distraction techniques produced an inflation in the number of unwanted thoughts also agrees with previous research. Wegner (1989) suggested that when engaging in self distraction we naturally consult a number of distracters. With this in mind it is no surprise that those engaging in the multiple distraction technique, experienced a similar amount of intrusions as those in a self distraction technique where participants may have engaged with multiple distracters independently and without direct instruction. In addition to agreeing with previous literature, the results of the current study also concur with the predictions of Wegner's ECH, which suggests that limiting the number of distracters also limits the amount of environmental reminders.

This finding is also of clinical relevance. Specifically, it suggests that the immediate enhancement effect and the rebound effect, which underpin the counterproductive nature of attempted suppression can be circumvented via focussed distraction. However, perhaps more importantly, according to Wegner (1989) and Hayes et al (1999) engaging in focussed distraction has low ecological validity, as in everyday life thought suppression would be rendered impossible given the multiple cues in our environment that serve to remind us of the unwanted target. The results

from the multiple and self distraction conditions, that demonstrated the inflated occurrence of the unwanted thought, bolster this argument.

Taken together the results of Experiment 1 suggest that the most commonly employed techniques for suppressing an unwanted thought are at best ineffective and at worst counterproductive. Participants who engage in self and multiple distraction techniques experience both the immediate enhancement and rebound effects. One possible reason for this may lie in the fact that both groups were reacting similarly when receiving the thought suppression instruction, namely they were both drawing on multiple distracters. In future research, one could ascertain how the participants interact with each technique by including a 'speak aloud' instruction. Such a manipulation could also be used to ascertain the number/type of distracters being used in the self suppression condition. These distracters could then be used as the stimuli in the multiple distraction group. This would ensure that the differences between the groups were due to self generation and not the number of words generated.

Nevertheless the results demonstrate the futile nature of attempted suppression via distraction. One final limitation of Experiment 1 is that only the effects of attempted suppression, over a short 5-10 minute phase was measured. However, according to Wegner (1989) it is more likely that unwanted thoughts return in a cyclical nature. Experiment 2 aims to determine the effect of multiple suppression and think free phases on thought occurrence.

2.2. Experiment 2

In order to further investigate the immediate enhancement effect and the rebound effect Experiment 2 of the thesis aims to study the effects of engaging in repeated suppression over time. Wegner (1989) coined the term 'indulgence cycle' to refer to the cycles of suppression and non suppression that one will engage in on a day to day basis (for a more in depth review of the indulgence cycle literature please refer to Section 1.2.5 of the General Introduction). Despite Wegner (1989) coining this term only two previous studies, that of Hardy and Brewin (2005) and Williams and Moulds (2007) have researched these phenomena using a paradigm which

studies the effects of suppression over time. Both of these studies found an immediate enhancement effect, in that participants would repeatedly experience the intrusion in the suppression periods. Additionally both studies found a minor rebound effect in that engaging in repeated suppression produced maintenance of intrusions in each of the respective rebound periods. However, it is hard to draw basic conclusions on the impact of multiple indulgence cycles from these studies as both demonstrations employed populations instructed to suppress high valence material. It is possible that the high valence nature of the suppressed items confounded the effect of the indulgence cycles. Additionally, while both studies exposed participants to two indulgence cycles, neither involved exposure to multiple indulgence cycles.

The current study will therefore differ from the two previous studies in four key ways. First, by only studying personally relevant or high valence target thoughts, the previous studies do not provide evidence as to how individuals' respond when attempting to suppress a neutral thought. When dealing with high valence thoughts it is likely that participants engage in suppression attempts with the material even when not instructed to do so, thus confounding the experimental findings. As suggested by Hardy and Brewin (2005), participants' history of practised suppression may have impacted on their suppression attempts. The current study controls for participants' history with the to-be-suppressed item by employing a neutral rather than high valence target thought. Second, the suppression and expression phases in the previous studies have been between two and three minutes. This does not reflect the timeframe typically employed in thought suppression studies (e.g. Wegner, et al., 1987). The current study employs five minute suppression and expression phases in line with seminal thought suppression studies (Wegner & Erber, 1992; Merckelbach, Muris, Van Den Hout & De Jong, 1991).

Third, the current study will employ three indulgence cycles, as opposed to two, to determine the effects of an inflated number of indulgence cycles. Lastly, previous studies in this area have employed two groups who both completed two full indulgence cycles. The current study aims to determine the effect of multiple indulgence cycles on target thought occurrence. To that end, a group of control

participants will be recruited. This group will only be instructed to complete one suppression attempt and thereafter the number of target thought occurrences across the same timeframe as the repeated suppression group will be recorded.

Therefore, the aim of the study is to determine the effect of repeated indulgence cycles of a neutral target thought on thought occurrence. Participants will be assigned to one of two groups. The 'repeated suppression' group will be instructed to complete three indulgence cycles. The 'suppress think-free' group will be instructed to suppress a target thought once for one five minute phase, and thereafter to think freely for five, five minute phases. It is predicted, within the repeated suppression group, that participants will continue to experience an immediate enhancement effect in each of the suppression periods. Between the groups it is predicted that participants in the 'repeated suppression' group, during each of the three comparable rebound phases (phase 2, phase 4 and phase 6), will report an inflated number of target thoughts when compared to those in the 'suppress think-free' group. This finding would provide evidence that engaging in multiple indulgence cycles, even of pre-experimentally neutral thoughts, can cause an increase in the occurrence of a target thought. This result would lend support to Wegner's (1989) Environmental Cueing Hypothesis of how thought intrusions can escalate in everyday life, as the ECH would suggest that the more indulgence cycles one enters, the more distracters will be used, meaning that more environmental cues will render the attempt less likely to be successful.

Additionally, a novel analysis will be conducted on the data. According to Wegner (1989) participants will re-engage with a suppression attempt once the target thought has occurred in a rebound phase. Therefore, it can be understood that the first time an unwanted thought re-surfaces is the most important intrusion as it will prompt the next suppression attempt. Indeed this would analogue more accurately how suppression and rebound occur in everyday life. People do not experience suppression and rebound phases, instead they attempt not to think about a certain thought, and then they move on, before an environmental cue prompts the re-emergence of the unwanted thought. Importantly at this point, people do not enter a five minute think free phase; instead they immediately attempt to suppress it again.

To this end, it is predicted that the 'repeated suppression' group will have the target thought re-enter consciousness significantly more quickly than the 'suppress think free' group. If this is the case then it might provide valuable information as to how an unwanted target thought becomes an obsession, because the more we suppress, the more quickly the unwanted thought will return.

2.2.1. Method

Participants

Thirty-four undergraduates at Swansea University were paid 3 credits for their participation in the experiment. (Mean age; 20.11 years, SD; 3.97). 29 females and 5 males participated in the study. The sample was non clinical.

Design

The study was a 2 (group; repeated suppression vs. suppress think-free) x 6 (five minute phases) mixed design. There were two dependent variables; number of space bar presses in each of the five minute phases, and response latencies in each of the expression phases of the first unwanted thought intrusion.

Stimuli

Screening questionnaires

In order to avoid confounding the results three screening measures were administered: the *Acceptance and Action Questionnaire II* (AAQ II; Bond et al., 2005), the *White Bear Suppression Inventory* (WBSI, Wegner & Zanakos, 1994), the *Beck Depression Inventory* (BDI, Beck, Steer & Brown, 1996) to screen for pre-experimental levels of emotional avoidance, thought suppression and depression, respectively (for further details on these questionnaires see Experiment 1). The data for 6 participants was omitted based on a high BDI score (10 or over). The remaining 28 participants (14 in each group) scored within a normal range. (Overall mean scores: AAQ II = 53.54, WBSI = 44.31, BDI = 5.39)

Procedure

On each subject's arrival at the experimental laboratory participants were randomly assigned to one of two experimental groups (i.e., the 'repeated suppression' group or the 'suppress think free' group).

(i) *Repeated suppression group:* Participants were first exposed to the 'suppression instruction': '*In the next five minutes please try not to think of a 'white bear'. Every time you have 'white bear' come to mind, though, please press the space bar in front of you'*. This was followed by the 'liberal rebound' instruction: '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*' The participants repeated this procedure another two times. Therefore, in total, the participants from the 'repeated suppression' group alternated between three suppression instructions and three liberal rebound instructions.

(ii) *Suppress think-free group:* Participants assigned to this group were provided with identical instructions for the first two five minute phases (i.e., suppression and liberal rebound instructions). However, for the third five minute phase, rather than receiving the suppression instruction participants received the liberal rebound instruction. Participants continued to receive the liberal rebound instruction for the remainder of the three five minute phases.

Upon completion of the final liberal rebound phase all participants were debriefed and thanked for their participation.

2.2.2. Results

Questionnaires

In order to ensure that the results were attained as a result of the independent variable manipulated and not individual differences, it is important that there are no differences between the groups in terms of questionnaires scores. A 2 (Group; repeated suppression vs suppress think free) x 3 (Questionnaire; AAQ II, WBSI, BDI) mixed ANOVA revealed no significant main effect for Questionnaire, $F(1, 50) = 0.592$; $p > 0.05$, and no significant interaction between Questionnaire and Group,

F (3, 50) = 0.253; p > 0.05. Post hoc Tukey HSD tests revealed no significant difference (see Table 3) between the repeated suppression group (AAQ II = 53.37, WBSI = 46.18, BDI = 5.62) and the suppress think free group (AAQ II = 53.72, WBSI = 42.44, BDI = 5.16)

Comparison	**AAQ**	**WBSI**	**BDI**
Repeated suppression vs. Suppress think free	*t(26) = 0.187*	*t(26) = 0.408*	*t(26) = 0.201*

Table 3. The difference between the repeated suppression group and suppress think free group on the pre screening questionnaires. All non significant at the 0.05 level, Experiment 2.

Number of intrusions

The mean amount of times that the participants from the 'repeated suppression' group and the 'suppress think-free' group pressed the space bar in each phase are represented in Table 4. The amount of target thought occurrences across the suppression phases, for the repeated suppression group, remained constant (Phase 1 M = 6.35, Phase 3 M = 5.07, Phase 5 M = 5.64). There also appeared to be no difference between the three liberal rebound phases for the 'repeated suppression' group (Phase 2 M = 4.07, Phase 4 M = 4.14, Phase 6 M = 3.57), indicating that repeated suppression caused neither an increase nor a decrease in target thought occurrences. However, a different pattern emerged for the 'suppress think-free' group, with a gradual decline of space bar presses across the five liberal rebound phases (Phase 1 M = 6.85, Phase 2 M = 3.57, Phase 3 M = 3.14, Phase 4 M = 2.5, Phase 5 M = 2.64, Phase 6 M = 1.78)

Group	Phase 1 Suppression	Phase 2 Rebound	Phase 3 Suppression/ Rebound	Phase 4 Rebound	Phase 5 Suppression/ Rebound	Phase 6 Rebound
Repeated suppression	6.35	4.07	5.07	4.14	5.64	3.57
Suppress think free	6.85	3.57	3.14	2.5	2.64	1.78

Table 4. The mean amount of space bar presses across the 6 phases for both groups, Experiment 2.

In order to determine any significant differences and interactions across group and phase a 2 (repeated suppression group vs. suppress think free) x 6 (phase) mixed ANOVA was conducted. The results revealed a significant main effect for phase, $F\ (5,\ 130) = 10.305;\ p < 0.05$ suggesting that there was a difference in the amount of times that the target thought occurred depending on the phase participants were in. The results also revealed a near interaction between phase and group, $F(5,\ 130) = 2.140;\ p = 0.065$ suggesting that the difference in the occurrence of the target thought across phases varied depending on whether the participants were in the 'repeated suppression' or the 'suppress think free' group. This suggests that the occurrence of the target thought was inflated in the 'repeated suppression' group when compared to the 'suppress think free' group.

Suppression versus Rebound

Suppression phases

In order to determine whether there was any significant difference in the number of space bar presses across the three suppression phases for the 'repeated suppression' group, using Holm's sequential Bonferroni approach, paired samples *t* tests revealed that there was no significant difference emerged between the first and second suppression phases, $t(13) = 1.93;\ p > 0.05$, between the second and the third suppression phases, $t(13) = -0.62;\ p > 0.05$, and between the first and the third suppression phases, $t(13) = 0.65;\ p > 0.05$. These results suggest that the intrusion rate did not increase, but, rather, it was maintained across phases.

Liberal Rebound phases

In order to determine if there were any significant differences between the two groups across the three comparable liberal rebound phases, a 2 (repeated suppression group vs. suppress think free group) x 3 (phase 2, phase 4 and phase 6) mixed ANOVA was conducted. The results revealed a significant main effect for phase, $F(2,\ 52) = 2.85;\ p < 0.05$, suggesting that the phase affected the amount of

target thought occurrences. In addition to this the analysis revealed a significant linear trend, $F(1,26) = 5.35$; $p < 0.05$, suggesting that the space bar presses gradually declined across phases.

In order to explore any significant differences between phases 2, 4 and 6 for the repeated suppression group, using Holm's sequential Bonferroni approach, paired sample t tests were conducted. The results revealed no significant differences between the three phases. Phase 2 and 4, $t(13) = -0.78$, $p > 0.05$, Phase 4 and 6, $t(13) = 1.23$; $p > 0.05$, Phase 2 and 6, $t(13) = 0.68$; $p > 0.05$. These results suggest that over the three liberal rebound phases the number of space bar presses (i.e. target thought occurrences) was again maintained, but did not increase.

For the 'suppress think-free' group, despite the trend towards a gradual decline, the difference between phase 2 and 4, $t(13) = 1.48$; $p > 0.05$ and the difference between phase 4 and 6, $t(13) = 1.51$; $p > 0.05$, were not significant. However, the difference between phase 2 and phase 6 was significant, $t(13) = 2.77$; $p < 0.05$. The result suggests that the amount of target thought occurrences for the 'suppress think free' group in the liberal rebound phases gradually declines over time when compared to the 'repeated suppression' group where the number of intrusions across liberal rebound phases was maintained.

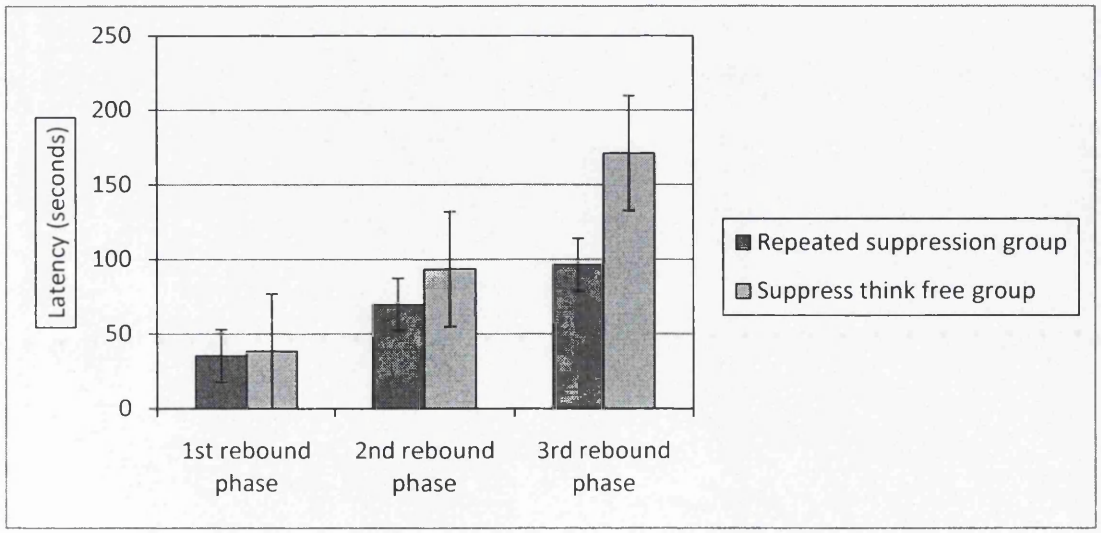
Repeated Suppression group versus Suppress think free group

In order to determine if there was any difference between the comparable liberal rebound phases for the 'repeated suppression' group and the 'suppress think free' group a series of independent sample t tests were conducted. There was no significant difference between the two groups, in the number of target thought occurrences, for phase 2, after both groups had completed one indulgence cycle, $t(26) = 0.44$; $p > 0.05$. There was also no significant difference between phase 4 of each group, $t(26) = 1.46$; $p > 0.05$. However, a significant difference did emerge in the number of space bar presses in phase 6 between the two groups, $t(26) = 1.74$; $p < 0.05$, indicating that participants in the 'repeated suppression' group had the target thought intrude significantly more in the last liberal rebound phase than those in the suppress think-free group.

Response latency of first thought occurrence

Further analysis was conducted in order to determine whether there were any differences within and between groups in terms of the first target thought occurrence (i.e., the response latency before the first space bar press) in each of the liberal rebound phases. Figure 2 shows the mean amount of lapsed time before the thought occurred in each of the three comparable liberal rebound phases. In the first liberal rebound phase the response latency was similar in the 'repeated suppression' group (M = 35.44 seconds) and the 'suppress think free' group (M =38.53 seconds). However, by the second liberal rebound phase the gap had increased between the 'repeated suppression' group (M = 69.58 seconds) and the 'suppress think-free' group (M = 93.51 seconds). Finally, the response latencies in the third liberal rebound phase indicated a larger difference between the 'repeated suppression' group (M = 96.49 seconds) and the 'suppress think-free' group (M = 171.19 seconds). For both groups, the amount of time taken for the first target thought intrusion to occur increased from the first to the second and second to the third liberal rebound phases. Additionally, the target thought, for those participants in the 'repeated suppression' group, tended to re-emerge more quickly in the second and third liberal rebound phases in comparison to the 'suppress think-free' group.

Figure 2. The amount of lapsed time (in seconds) before the space bar was pressed in both groups, Experiment 2.



In order to determine if there were any significant differences across both groups for the three comparable rebound phases a 2 (Group; repeated suppression group vs. suppress think free group) x 3 (Phase; phase 2, phase 4, phase 6) mixed ANOVA was conducted. The results revealed a significant main effect for Phase, $F(2,46) = 10.01; p < 0.05$, and no interaction was found between Phase and Group, $F(2, 46) = 2.03; p > 0.05$. Using Holm's sequential Bonferroni approach paired sample t tests were conducted to determine where the differences emerged between the liberal rebound phases within each of the groups. For the 'repeated suppression' group, it was found that there was no significant difference between the first liberal rebound phase and the second, $t(13) = -1.60; p > 0.05$, between the first liberal rebound phase and the third, $t(13) = -1.80; p > 0.05$ and between the second and the third liberal rebound phases, $t(13) = -1.45; p > 0.05$, suggesting that the target thought re-occurred equally as quickly across all three liberal rebound phases.

For the 'suppress think-free' group there was no significant difference between the first liberal rebound phase and the second, $t(13) = -0.70; p > 0.05$. However, there was a significant difference between first liberal rebound phase and the third, $t(13) = -4.17; p<0.05$ and between the second liberal rebound phase and the third, $t(13) = -2.67; p<0.05$, suggesting that the target thought gradually re-occurred significantly more slowly across time.

Independent sample t tests were conducted to determine if there were any significant differences between the 'repeated suppression' group and the 'suppress think free' group. The t tests revealed no significant main effect between either group in the first liberal rebound phase, $t(26) = -0.16; p > 0.05$, or in the second liberal rebound phase, $t(26) = -0.58; p > 0.05$. However by the third rebound phase there was a significant difference between the first time that the target thought re-occurred between the 'repeated suppression' group and the suppress think-free group, $t(26) = -1.84; p<0.05$, suggesting that participants who repeatedly suppressed, by the third liberal rebound phase, experienced the target thought significantly more quickly than those in the 'suppress think-free' group

Summary

The current results suggested that engaging in multiple indulgence cycles maintains the intrusion rate of an unwanted thought. Those who only suppressed once experienced a gradual decline in thought intrusions over the course of the three comparable liberal rebound phases. The results also suggest that those participants who engaged in multiple indulgence cycles had the target thought re-occur significantly more quickly, in each comparable rebound phase, than those in the suppress think-free group.

2.2.3. Discussion

In Experiment 2 participants in the 'repeated suppression' group demonstrated neither an increase nor decrease in target thought occurrences across suppression or liberal rebound phases. However, these participants did produce significantly more target thought occurrences in the liberal rebound phases when compared to the 'suppress think-free' group, whose intrusion rate significantly declined across liberal rebound phases. Additionally, the 'repeated suppression' group also had the target thought re-emerge significantly more quickly than the 'suppress think-free' group across the three liberal rebound phases. These results seem to suggest that repeatedly engaging in attempted thought suppression will maintain the immediate enhancement effect and a rebound effect across time.

According to the Environmental Cueing Hypothesis (ECH), multiple indulgence cycles over time should cause an increase in the number of unwanted thoughts in both suppression and expression phases (Wegner, 1989). Our finding supports previous research that demonstrated no increase in the number of unwanted thoughts across suppression and rebound phases (Hardy & Brewin, 2005; Williams & Mould, 2007). However, it is important to note that although repeated thought suppression may not cause an increase in unwanted thoughts during multiple indulgence cycles, it does appear to have a maintenance effect. Specifically, maintenance in the number of unwanted thoughts was found in both the suppression and liberal rebound phases for the 'repeated suppression' but not the 'suppress think free' group.

The current study also involved a novel comparison between the latency until the occurrence of the first target thought in each liberal rebound phase, indicating a shorter latency between onset of initial thought occurrence for the repeated suppression group in comparison to the suppress think free group. This analysis extends on the Environmental Cueing Hypothesis indicating that thought suppression and expression are cyclical in nature, that is, we alternate between phases of suppression and expression (think-free phases). When attempting to suppress a target thought, individuals will alternate between attempting to suppress and subsequently moving onto another activity to further distract themselves. At a later point the initial target thought will likely rebound (Wegner, 1989). Only one instance of the target thought is necessary for an individual to re-engage in a phase of attempted suppression. Thus, it suggests that the most important target thought in a liberal rebound phase may be the initial thought occurrence. The results of the current study demonstrate that repeated suppression causes the target thought to re-enter significantly more quickly. This rapid re-occurrence of the target thought could represent the method by which the thought suppression becomes increasingly counterproductive, as across indulgence cycles, the thought continues to re-emerge more quickly.

Abramowitz et al (2001) found minor evidence for a Rebound Effect suggesting that attempted suppression may have longer term effects, this result was partly replicated in the current study as participants in the 'repeated suppression' group continued to think of the target thought when they were provided with think-free instructions. However, the ECH would predict an escalation in the amount of intrusions during rebound phases, whereas the current experiment did not produce such an escalation. One possible explanation for this result could be the clinical nature of the experimental laboratory. Each participant completed the experiment in a blank room with no windows, thereby limiting the amount of external distracters. Possibly in a real life scenario, where multiple external distracters are available, the target thought would escalate in the rebound phase due to increasing number of distracters becoming associated with and thus cueing the target thought. Such an escalation would be consistent with Wegner's (1989) ECH. Future research should

provide participants with multiple distracters in order to determine whether these distracters would come to cue the target thought.

One issue worth noting in the current study is that the level of effort involved in instructional adherence differed across groups, that is, the 'repeated suppression' group had to suppress the target thought for a total of 15 minutes whereas the 'suppress think free' group only had to suppress the target for 5 minutes. This activity no doubt primed the thought in a way that did not occur for the free think group. Specifically, the participants in the 'repeated suppression' group were sitting inactive, monitoring thoughts, no doubt cycling between idle thoughts (e.g. what to have for lunch, what to do after the study, whether their roommate is angry about something, etc.) and a return to the task at hand – "what am I doing? Oh yes, I'm suppressing thoughts about white bears..."). Whereas participants in the 'suppress think free' group were simply allowed to think about whatever they liked, with only one task, which was to register whether they had the target thought. It could reasonably be argued that the suppression instructions resulted in greater priming of the target thought than the think free instructions. However, in real life terms this reflects the distinction between two different coping strategies in dealing with unwanted thoughts, namely, attempted suppression versus acceptance of thought occurrence (for a detailed account of acceptance see Hayes, Strosahl & Wilson, 2001). In addition to the issue of motivation there is also the possibility of habituation occurring, that is, perhaps participants in both groups through multiple five minute periods became less sensitive to the unwanted thought through repeated exposure, therefore decreasing the amount of unwanted thought intrusions signalled. Indeed, the results from the suppress think free group suggest that such habituation may have occurred. However, those repeatedly suppressing maintained the level of intrusions in both suppression and think free phases, suggesting that habituation does not occur when participants are given repeated suppression instructions.

One potential weakness with the current study was that no baseline group was included in order to determine what the average number of thought occurrences would be without the suppression instruction. Rather than including a pre experimental baseline to collate the number of pre experimental thoughts about the target a between participant control group was employed in the current study in

which participants were provided with no suppression instruction during the second two suppression phases. Importantly, a recent study by Marcks and Woods (2005) took a baseline measure of the amount of thought intrusions in a baseline five minute phase (identical to the experimental phase length herein) and found that the mean number of target thought occurrences in a group of undergraduate participants was 2.2. The 'repeated suppression' group from the current study reported between 4-6 intrusions for each suppression and liberal think free phase, suggesting that the number of thoughts about a target was inflated when the target was a to-be-suppressed item. Finally, it is worth noting that all participants in Experiment 2 were exposed to the self suppression instruction, this instruction was chosen as self suppression is the most widely employed suppression strategy in the thought suppression literature. Nevertheless it is possible that within self suppression, participants may have used multiple distracters or a focused distracter in their attempt to suppress. The variability between the two techniques would have an effect on the amount of unwanted thought intrusions; therefore future research should include post phase questions which ascertain the type of technique used.

The current study only exposed participants to three indulgence cycles, future research should include additional indulgence cycles in order to provide more information as to whether occurrence of the target thought would continue to be maintained across repeated suppression attempts, in both the repeated suppression and the suppress think-free groups, or whether after an increased number of suppression attempts the occurrence of the target thought would gradually fade. However, the findings herein provide tentative evidence that the occurrence of the target thought would be maintained across multiple indulgence cycles. Such maintenance highlights the counterproductive nature of suppression as a coping strategy for unwanted thoughts, a suggestion that has been iterated by behavioral and cognitive psychotherapies such as Acceptance and Commitment Therapy (Hayes, Strosahl &Wilson, 1999).

2.3. Concluding Comments

Experiment 1 aimed to determine the effect that engaging in different distraction techniques would have on unwanted thought intrusions in both the

suppression and think free periods. When compared to baseline, an inflation of target unwanted thoughts experienced in a suppression period would qualify as an immediate enhancement effect, whilst an inflation of target unwanted thoughts experienced in the think free phase would qualify as a rebound effect. The study found that engaging in multiple and self distraction caused both an immediate enhancement effect and a rebound effect, whilst engaging in focussed distraction obliterated both effects.

These results are consistent with Wegner's (1989) ECH as well as being consistent with the stimulus equivalence theory of thought suppression that was described in the general introduction. Specifically, limiting the amount of distracters also limits the amount of environmental cues that serve to remind us of unwanted thoughts. At first glance this could be seen as having some important clinical relevance, however the idea of using focussed distraction as a way of dealing with unwanted thoughts becomes a ridiculous notion when one considers the way in which we generally live our lives; we do not live our lives in one room where there are no external reminders, but in a world where there are multiple distracters/reminders available to us. Considering such an inference is important for one crucial reason; the fact that engaging in multiple and self distraction, two techniques that reflect the types of strategies available to us on a daily basis, does not work, suggests that engaging in the suppression of unwanted thoughts, is indeed a futile strategy. In terms of both immediate enhancement and rebound, the results suggest that not only will one struggle to actively suppress a thought during a suppression period, but that thought will also re-appear and rebound at a later stage.

With the way in which thought suppression occurs in everyday life becoming the focal point of this research, Experiment 2 aimed to study the effects of engaging in multiple indulgence cycles, which, according to Wegner (1989), mirrors the way in which we experience unwanted thoughts in an everyday sense. According to the ECH, the more one engages in thought suppression, the more external distracters will be used, meaning that more environmental reminders will serve to remind us of the unwanted thought causing a gradual inflation of the amount of unwanted thought intrusions experienced.

The results of Experiment 2, however, did not find such an inflation when the effects of repeatedly suppressing over time was studied. Specifically the results found that engaging in repeated suppression merely caused a maintenance of the immediate enhancement and rebound effects, when compared to controls, instead of causing the expected inflation of unwanted thoughts. Immediately this provides evidence which contradicts the ECH, and also the behavioural account of thought suppression. However when one considers more closely the laboratory setting in which the study was conducted, it becomes apparent that these results should have perhaps been expected. Simply put, the aforementioned theories suggest that the more distracters there are the more one will experience the unwanted thought, however in an experimental setting where there are a limited amount of distracters present in the room, it is no surprise that such a ceiling effect was reached in terms of the amount of unwanted thought experienced. Despite not strictly adhering to the predictions of the ECH, Experiment 2, much like Experiment 1, seems to suggest that engaging in thought suppression is a futile strategy for dealing with unwanted thoughts, as the more one tries to banish an unwanted thought, the more that thought will appear, both during and after the suppression period.

In conclusion, Experiments 1 and 2 both lend support to the immediate enhancement effect and the rebound effect. However, in applied terms, it is difficult to suggest that the ironic results associated with the suppression of a neutral thought can also be generalized to the suppression of high valence thoughts. Considering that the majority of people experiencing psychological dysfunction are dealing with high valence, personally relevant thoughts, the need for thought suppression research utilising high valence thoughts becomes evident. Chapter 3 of the thesis will attempt to study the effects of suppressing such high valence thoughts.

Chapter 2

Testing immediate enhancement and rebound effects.

2. Introduction

Rachman and Da Silva (1978) suggest that 80% of people will attempt to control their thoughts via suppression, so that when an unwanted thought is in consciousness, many people will try their best to avoid it. In spite of this, a plethora of previous research suggests that thought suppression is not possible (Salkovskis & Campbell, 1994; Lavy & Van Den Hout, 1990). The first empirical model of thought suppression was reported in the seminal paper by Wegner et al (1987) which found that the more one tries to banish a certain thought the more it will appear in consciousness. Wegner et al (1987) employed a self report paradigm that required participants to 'not think about a white bear' for a five-minute phase. Participants were instructed that if they were to think of a 'white bear' to ring a bell that was placed in front of them on a table. During the second five-minute phase participants were cycled into what the researchers referred to as the 'concentration' phase. In this phase participants had to concentrate on the thought of a 'white bear' as much as possible, once again indicating the presence of this thought by ringing the bell. The study comprised of two groups, the first group were exposed to the 'suppress phase' for the first five minutes followed by the 'concentration phase' for the second five minutes, whereas the second group were exposed to the phases in the reversed order (i.e. concentration first followed by suppression).

The results of the study were two fold. First, it appeared that participants, when asked not to think of a neutral thought (white bear), proceeded to have that unwanted thought enter consciousness around 6 or 7 times within the suppression phase. Wegner et al (1987) labelled this inability to suppress ones thoughts the 'Immediate Enhancement Effect'. Since its conception the immediate enhancement effect has received both support for (Bowers & Woody, 1996; Lavy & Van Den Hout, 1990) and against it (Clark et al, 1991; Clark et al, 1993). Second, Wegner et al (1987) found that those who had spent an initial 5 minute phase suppressing the unwanted thought, would then have that thought come to mind an inflated amount of times during the concentration phase, when compared to those who had not initially attempted to suppress the thought. This phenomenon was labelled 'The Rebound

Effect' and was taken as evidence that the effects of attempted suppression (unwanted thought intrusions) may still be apparent after a phase of suppression. Again the rebound effect has supporting research (Abramowitz et al, 2001; Clark et al, 1990) and research which questions its validity (Kelly & Kahn, 1994; Nixon & Jackson, 2006). For more in depth details of research based on the immediate enhancement and rebound effects see Chapter 1.

Due to the conflicting results in the literature, the aim of this first empirical chapter is to study in greater detail the immediate enhancement effect and the rebound effect. Specifically aiming to determine if thought suppression is possible, whilst also investigating the after effects of attempted suppression. As distraction is the principal way in which we attempt to suppress unwanted thoughts (Gold & Wegner, 1995) the first experiment of the thesis will study the effects that various distraction techniques have on the aforementioned phenomena. Rachman and Da Silva (1978) found that people will almost always give 'distraction' as their answer when asked 'how do you avoid unwanted thoughts?' A number of studies have tested the effects of distraction on thought suppression. This work primarily stems from the original white bear study (Wegner et al, 1987) in which Wegner demonstrated the ironic effects of attempted suppression could be bypassed by the use of a focussed distracter. Since then Lin and Wicker (2007) and Salkovskis and Campbell (1994) have both found that focussed distraction has indeed lessened the amount of unwanted thought intrusions, whilst Salkovskis and Reynolds (1994) and Cioffi and Holloway (1993) found the positive effects of focussed distraction in the areas of smoking cessation and pain tolerance, respectively.

Such research gains applied importance for a few reasons. First, if focussed distraction does obliterate the effects of thought suppression then this technique could be used to help those dealing with negative unwanted thoughts. Second, if focussed distraction did provide a way around the effects of thought suppression then various clinical therapies (for example, Acceptance and Commitment Therapy; ACT Hayes, Strosahl & Wilson, 1999), which encourage people to accept rather than avoid their unwanted experiences (e.g., thoughts), could be brought into question. For these reasons Experiment 1 will aim to determine the effects of various distraction techniques on the number of unwanted thought intrusions. Specifically, it

aims to determine whether the immediate enhancement and rebound effect still exist under self, multiple and focussed distraction techniques.

Experiment 2 of the current chapter has a slightly different methodology but with similar aims to that of Experiment 1. Instead of examining the effects of different distraction techniques on the immediate enhancement effect and the rebound effect, Experiment 2 will aim to further investigate the underlying process of the aforementioned phenomena by examining the effects that thought suppression has over a longer period of time. Indeed such an experimental idea is not entirely novel as Wegner (1989) coined the term 'indulgence cycle', which refers to the cycles of suppression and non suppression that one will experience over time during everyday life. According to this account the more cycles one enters the more pronounced rebound effect would occur. Despite Wegner (1989) having coined this term only two empirical experiments have studied indulgence cycles, both Hardy and Brewin (2005) and Williams and Mould (2007) found that engaging in repeated suppression induced a maintained rebound effect. Experiment 2 of this chapter aims to determine the effect of engaging in multiple suppression cycles, and whether the immediate enhancement and rebound effects will persist over time.

2.1 Experiment 1

Wegner (1989) suggested that the most common way to avoid 'thoughts of X' is to distract oneself by 'thinking of Y'. Within his research Wegner (1989) proposed that in order for a distracter to successfully over-ride unwanted thought intrusions the distracter would have to be sufficiently 'absorbing'. Evidence in favour of such an assertion arises in research on pain tolerance. For example, both McCaul and Mallot (1984) and Corah, Gale and Illig (1979) found that the use of absorbing distracters enabled participants to endure significantly more pain than those encouraged to self distract. Wegner (1989) therefore advocated that the 'quality of the distracter could have a critical influence on the degree to which the distraction can hold one's attention away from the unwanted thought' (pp. 63). According to Wegner (1987) the typical method of thought suppression is to engage in unfocussed self distraction. This technique refers to the natural way in which one

will jump from thought to thought in search of respite from an unwanted thought. He suggested that such a strategy would be futile and could even cause a pre-occupation with the unwanted thought due to the way in which these distracters would later serve as environmental reminders (ECH), advocating that the use of a focussed distracter may be more appropriate.

The current study aims to test the efficacy of a number of distraction techniques, in terms of the number of occurrence of the unwanted thoughts produced. To that end four groups will be employed. The first group is the 'self distraction group' which refers to the typical thought suppression group where no exact distraction technique is in place. Instead participants are asked to suppress all thoughts of a specified 'unwanted thought', in which they are encouraged to provide their own distracters. The second is referred to as the 'focussed distraction group', in which the participants are asked to concentrate on one distracter for the duration of the five minute phase, whilst attempting to suppress an unwanted thought. Previous research on focussed distraction suggests that it may lessen the effects of attempted suppression (Lin & Wicker, 2007; Salkovskis & Campbell, 1994). Third, a novel distraction technique will be employed, in which the participants will receive multiple distracters in the form of words, for the five minute phase, whilst attempting to suppress a target thought. This group will provide a comparison that is directly opposite to focussed distraction in order to determine the effect that this will have on thought occurrence, in terms of the immediate enhancement effect and the rebound effect. This group will be labelled the 'multiple distraction group'. Lastly a group of participants will undergo two think free phases which will serve as a baseline condition. The baseline condition is in place to measure the importance of the intrusion rate experienced by the other three experimental groups. If participants in those groups press the space bar no more than the baseline group, then the effects of attempted suppression could be said to be minimal. This group will be referred to as the 'baseline group'.

It is predicted, in accordance with the aforementioned literature, that the focussed distraction group will experience no more thought intrusions than that of the baseline group. Whilst it is expected that the self distraction group and the

multiple distraction group will experience a larger number of unwanted thought intrusions.

2.1.1. Method

Participants

60 undergraduates (48 female and 12 male) at Swansea University were paid 2 credits for their participation in the experiment. The credit system at Swansea University allows each undergraduate to receive up to 48 credits in order to run research for their final year project, each credit is worth 15 minutes of participation in a study. The participants had a mean age of 22.4 years (SD; 9.007). The sample was non clinical. However participants were screened for depression, thought suppression tendencies and emotional avoidance (see later). The assignment of participants to experimental conditions was randomized. 15 participants were assigned to the self distraction group, 15 were assigned to the multiple distraction group, 15 were assigned to the focused distraction group and 15 were assigned to the baseline group.

Design

The study involved a 4 (group; self distraction, multiple distraction, focussed distraction and baseline) x 2 (phase; suppression and think free) mixed design with repeated measures on the second factor. The dependent variable in this experiment was the number of times the participants from each group would press the space bar in each of the two phases.

Apparatus

The experiment was completed in a laboratory at the Swansea University. The laboratory was quiet and free from distraction. It contained a desk, a chair, a standard computer (Processor) with a 14-inch screen and standard computer mouse. The participant's responses were controlled by the computer program, which was created in Visual Basic TM 6.

Materials

In order to avoid confounding the results three screening questionnaires were administered. The questionnaires consisted of the Acceptance and Action Questionnaire II (AAQ II; Bond et al., 2005), the White Bear Suppression Inventory (Wegner & Zanakos, 1994) and the Beck Depression Inventory (Beck et al, 1961). See below for further details. The data for 2 participants was removed for a high score on the depression inventory (a score of 10 or more warranted exclusion). Each participant was given details of the University counselling service in the debriefing session following the study, no direct action was taken as a result of a high BDI score. The remainder of the participants scored within the normal range (Overall mean scores: AAQ II = 54.15, WBSI = 44.5, BDI = 5.2)

The Acceptance and Action Questionnaire (AAQ-2: Bond, Hayes, Baer, Carpenter, Orcutt, Waltz & Zettle, under review, see appendix 1)

This is a self report measure created to assess a person experiential avoidance. Experiential avoidance, which is also called experiential control, is when a person endeavour's to control or alter the form, frequency or situational sensitivity of internal experiences (Hayes et al., 1996). A 10 item version of the questionnaire was completed by each participant. The ten statements vary from "It's ok if I remember something unpleasant" to "emotions cause problems in my life". There are seven response choices and scores may range from 7 to 70. High scores infer a high rate of experiential avoidance and low scores are said to indicate acceptance and commitment to action.

The White Bear Suppression Inventory (WBSI: Wegner and Zanakos, 1994, see appendix 2)

This is also a self report measure. The WBSI aims to measure a person's tendency to suppress unwanted negative thoughts. It is a 15 item questionnaire with statements ranging from "I have thoughts that I cannot stop" to "I have thoughts that I try to avoid". Answers are given on a 5 point scale of how much the participant agrees or disagrees with the particular statement. Scores may range 15 to 75. High scores suggest a tendency to suppress unpleasant thoughts. Research generated by

Muris, Merckelbach and Horselenberg (1996) showed the instrument to be reliable in terms of internal consistency and test re-test stability.

Beck's depression inventory (BDI; Beck Steer & Brown, 1996, see appendix 3)

The BDI is a questionnaire utilized to measure for signs of depression and can provide an estimate of depressive severity. The questionnaire consists of 21 statements. Status is assessed in terms of how the subject has felt in the week before that present moment and including the day of testing. The participant picks one of four statements for each of the 21 components. Each statement has a numerical value beside it going from 0 to 3. The values are accumulated to give individual BDI score. A participant's score is then compared to the following ratings to determine level of depression; 0-9 normal non-depressed range; 10-15 mild depression; 16-19 mild to moderate depression; 20-29 moderate to severe depression; 30-63 severe depression. Participants with scores of nine and lower were employed in this study.

Procedure

On each subject's arrival at the experimental lab, the participant was greeted by a male experimenter. Upon completion of the consent form the participants were randomly assigned to one of four experimental groups (i.e., self distraction, multiple distraction, etc).

Self distraction group

If assigned to the self distraction group the following procedure occurred; via verbal and written instructions the participants were instructed that for the following five minute phase they had to try their best to suppress a certain thought that would be given to them by the experimenter (the 'unwanted thought') and that if they did happen to think of the 'unwanted thought' in this five minute phase then they were required to press the space bar each time the thought occurred and reoccurred. The instruction was as follows; '*In the next five minutes please try not to think of a 'white bear'. Every time you have 'white bear' come to mind, though, please press the space bar in front of you'.*

After the initial five minute phase the researcher re-entered the room and gave the participant the think free instruction. Participants were told that for this final five minute phase that they could think about anything they liked (including the unwanted thought). The participants were again told that if they did happen to think of the 'unwanted thought' from stage 1 then they should continue to press the space bar each time the thought occurred and reoccurred. The instruction was as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*'

Multiple distraction group

If assigned to the multiple distraction group the following procedure occurred; participants were instructed, via verbal and written instructions, that for the following five minute phase they would have to try their best to suppress a certain thought that the experimenter would provide (the 'unwanted thought'). However they were told that in order to help them in their suppression attempt that 60 random words (see appendix 4) would appear every five seconds on the computer screen in front of them, and that they should think of these words instead of the unwanted thought. Most importantly the participants were told that if they were to think of the unwanted thought then they must press the space bar on the computer keyboard each time the thoughts occurs and reoccurs. The instruction was as follows; '*In the next five minutes please try not to think of a 'white bear'. Instead think of the words that will appear on the screen to distract yourself. However, if you do have 'white bear' come to mind, though, please press the space bar in front of you'.*

After the five minute phase the researcher entered the room to administer a think free instruction for the second five minute phase. The instruction read as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*'

Focussed distraction group

If assigned to the focussed distraction group the following procedure occurred; participants were instructed, via verbal and written instructions, that for the following five minute phase they would have to try their best to suppress a certain thought that the experimenter would provide (the 'unwanted thought'). However they were told that in order to help them in their suppression attempt that they should focus on one thought instead, which in this case, was the thought of a 'red volkswagon'. Then the participants were told that if they were to think of the unwanted thought then they must press the space bar on the computer keyboard each time the thoughts occurs and reoccurs. The instruction was as follows; '*In the next five minutes please try not to think of a 'white bear'. Instead try to think of a red volkswagon. However if you do have 'white bear' come to mind, though, please press the space bar in front of you'.*

After the five minute phase the researcher entered the room to administer a think free instruction for the second five minute phase. The instruction read as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*'

Baseline group

If assigned to the baseline group the participants received two think free five minute phases. Before the first five minute phase the researcher, in written and verbal form, gave the following instruction '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before*'. Upon completion of the first five minute phase the researcher re-entered the room and gave the identical think free instruction for the second time.

Finally, the importance of signalling the presence of each unwanted thought was stressed to each participant via the following instruction, which was administered immediately prior to engaging in the first five minute period; 'if *you should happen to think of the 'unwanted thought' in either phase then it is important*

that you press the space bar each time it comes to mind'. After completing the study, subjects were debriefed and their credit was administered.

2.1.2. Results

Questionnaires

In order to ensure that the results were obtained as a result of the independent variable manipulated (i.e., distraction technique) and not pre-experimental experiential avoidance, sub clinical depression or high levels of suppression, it was important that there are no differences between the groups on the screening questionnaires (i.e., the AAQ, WBSI and BDI). A 3 (Questionnaire; AAQ II, WBSI, BDI) x 4 (Group; self distraction, multiple distraction, focussed distraction, baseline) mixed ANOVA revealed no significant main effect for Questionnaire, $F\ (2,108) = 0.803;\ p > 0.05$, and no significant interaction between Questionnaire and Group, $F\ (6, 108) = 0.715;\ p > 0.05$. Post hoc Tukey HSD tests additionally revealed no significant difference (see Table 1) between the self distraction group (AAQ II = 53.6, WBSI = 43.6, BDI = 4.2), the multiple distraction group (AAQ II = 55.2, WBSI = 44.7, BDI = 4.9), the focussed distraction group (AAQ II = 55.4, WBSI = 44.1, BDI = 5.6), and the baseline group (AAQ II = 52.4, WBSI = 45.4, BDI = 6.1) on any of the questionnaires.

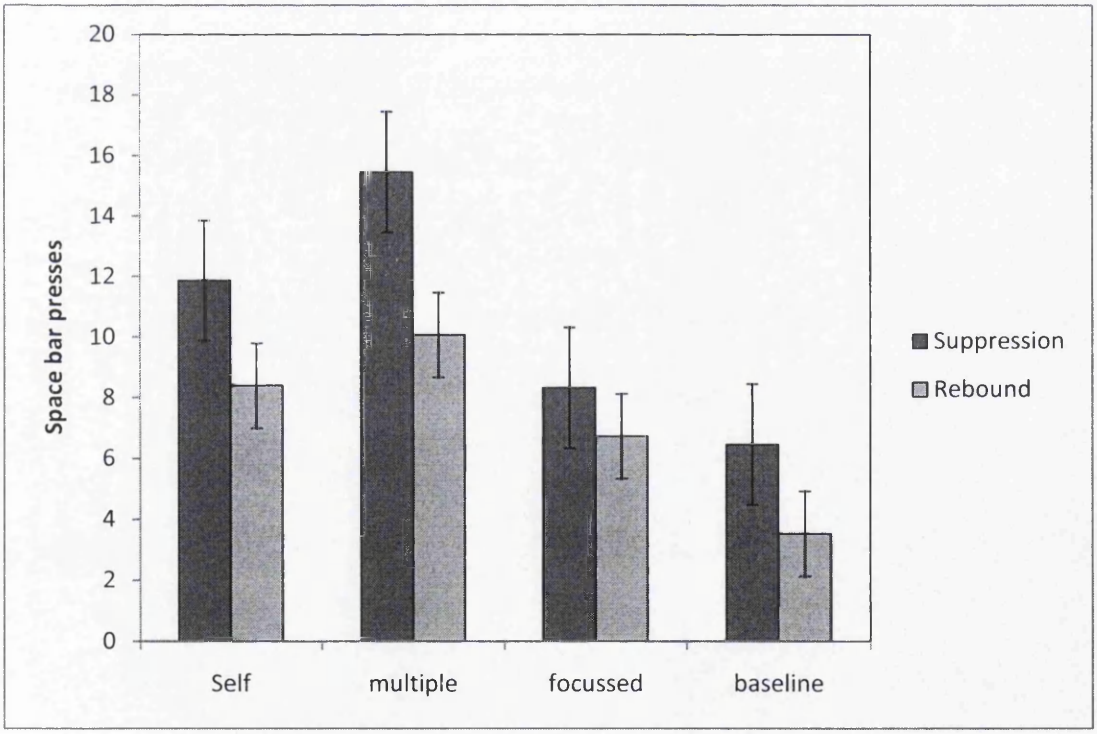
Comparison	AAQ	WBSI	BDI
Self v Multiple	*t(26) = -0.502*	*t(26) = -0.358*	*t(26) = 0.343*
Self v focussed	*t(28) = 0.487*	*t(28) = 0.286*	*t(28) = -0.521*
Self v baseline	*t(28) = 0.-631*	*t(28) = 0.241*	*t(28) = -0.892*
Multiple v focussed	*t(26) = 0.-113*	*t(26) = -0.168*	*t(26) = 0.487*
Multiple v baseline	*t(26) = 0.740*	*t(26) = 0.153*	*t(26) = 0.635*
Focussed v baseline	*t(28) = 0.810*	*t(28) = 0.220*	*t(28) = 0.276*

Table 1. The difference between each group on the various questionnaires. All non significant at the 0.05 level, Experiment 1.

Number of intrusions

The dependent variable in the study was the number of times each participant pressed the space bar in both the suppression and think free/rebound phases. Figure 1 displays that the multiple distraction group (suppression phase M = 15.46, SD = 10.95; rebound phase M = 10.07, SD = 8.27) and the self distraction group (suppression phase M = 11.86, SD = 8.7; rebound phase M = 8.4, SD = 8.6) indicated presence of the unwanted thought the most. Whilst the focussed distraction group (suppression phase M = 8.33, SD = 6.66; rebound phase M = 6.73, SD = 5.88) and the baseline group (suppression phase M = 6.46, SD = 2.53; rebound phase M = 3.53, SD = 2.58) appeared to press the space bar less.

Figure 1. Number of unwanted thought intrusions for each group in each phase, Experiment 1.



Statistical analyses were conducted to determine any differences between the groups. A 2 (Phase: Suppression versus Rebound) x 4 (Group: Self, Multiple, Focussed, Baseline) mixed ANOVA revealed a significant main effect for Phase,

$F(1,54) = 18.708; = p < 0.05$, and no significant main interaction between Phase and Group, $F(3, 54) = 0.986; p > 0.05$.

In order to determine the between group differences in the number of space bar presses post hoc Tukey HSD tests (Table 2) were conducted between the four groups across the suppression and think free phases. For the suppression phase, the analyses revealed no significant main effect between the self distraction group and the multiple distraction group, or between the self distraction group and the focussed distraction group. However, a significant main effect was found between the self distraction group and the baseline group. Further Tukey HSD tests revealed a significant main effect between the multiple distraction group and the baseline group, and between the multiple distraction group and the focussed distraction group ($p<.05$). Finally, no significant main effect was found between the focussed distraction group and the baseline group.

These results suggest that participants in the self distraction and the multiple distraction groups indicated unwanted thought intrusions significantly more than the baseline group. Therefore, thought suppression via these forms of distractions appears to be ineffective. However, the results for the focussed distraction group indicated a similar number of unwanted thought intrusions compared to baseline. That is, participants in this group did not press the space bar more than the baseline group, suggesting that focussed distraction might bypass the ironic effects of thought suppression.

In terms of rebound the post hoc Tukey HSD tests (Table 2) revealed a significant main effect between the self distraction group and the baseline group and between the multiple distraction group and the baseline group. However, no significant main effect was found between the focussed distraction group and the baseline group, between the multiple distraction group and the self distraction group, between the multiple distraction group and the focussed distraction group, or between the focussed distraction group and the self distraction group. These results suggest that in the think free phase following attempted suppression, that those participants in the multiple and self distraction groups indicated a greater number of unwanted intrusions than the baseline group. However, the focussed distraction

group demonstrated no such effect suggesting that focussed distraction eradicated the rebound effect found in the other groups.

Comparison	Suppression Phase	Rebound Phase
Self v Multiple	$t(26) = -0.967; p > 0.05$	$t(26) = -0.523; p > 0.05$
Self v focussed	$t(28) = 1.249; p > 0.05$	$t(28) = 0.619; p > 0.05$
Self v baseline	$t(28) = 2.308; p < 0.05$	$t(28) = 2.097; p < 0.05$
Multiple v focussed	$t(26) = 2.112; p < 0.05$	$t(26) = 1.245; p > 0.05$
Multiple v baseline	$t(26) = 3.093; p < 0.05$	$t(26) = 2.911; p < 0.05$
Focussed v baseline	$t(28) = 1.014; p > 0.05$	$t(28) = 1.928; p > 0.05$

Table 2. The post hoc Tukey HSD tests conducted between the self distraction, multiple distraction, focussed distraction and baseline groups, Experiment 1.

Finally, paired sample t tests were conducted to determine if any differences emerged, in terms of thought intrusions, between the suppression and think free phases within each group. The results showed a significant main effect for the self distraction group, $t(14) = 2.374; p < 0.05$, and the baseline group , $t(14) = 3.803; p < 0.05$. However, no significant difference was found for the multiple distraction group, $t(12) = 2.063; p > 0.05$, or the focussed distraction group, $t(14) = 1.524; p > 0.05$. These results show that those participants in the self and baseline groups experienced the unwanted thought significantly more in the suppression phase than the think free phase. The participants in the multiple and focussed groups however, experienced a similar number of thought intrusions in both phases.

In summary, participants in the focussed distraction group experienced a similar amount of thought intrusions as those in the baseline condition, where as those in the self and multiple distraction groups experienced significantly more, this was the case for both the suppression and think free phases. In addition to this, in no group did the participants experience an increased amount of intrusions during the

think free phase. However participants in the multiple and self distraction groups did experience the unwanted thought significantly more than the baseline group for this second phase.

2.1.3. Discussion

The results of Experiment 1 suggest that engaging in focussed distraction may obliterate the normal ironic effects of attempted thought suppression. Namely, participants who engaged in focussed distraction demonstrated no immediate enhancement effect and no rebound effect. In contrast to this, participants exposed to either self or multiple distraction techniques experienced an inflation of unwanted thought intrusions in both the suppression and think free phases, providing evidence in favour of the immediate enhancement effect and the rebound effect.

These results concur with the previous literature on focussed distraction. Lin and Wicker (2007) and Salkovskis and Campbell (1994) both found that engaging in focussed distraction aided suppression attempts. Additionally, the findings that the self and multiple distraction techniques produced an inflation in the number of unwanted thoughts also agrees with previous research. Wegner (1989) suggested that when engaging in self distraction we naturally consult a number of distracters. With this in mind it is no surprise that those engaging in the multiple distraction technique, experienced a similar amount of intrusions as those in a self distraction technique where participants may have engaged with multiple distracters independently and without direct instruction. In addition to agreeing with previous literature, the results of the current study also concur with the predictions of Wegner's ECH, which suggests that limiting the number of distracters also limits the amount of environmental reminders.

This finding is also of clinical relevance. Specifically, it suggests that the immediate enhancement effect and the rebound effect, which underpin the counterproductive nature of attempted suppression can be circumvented via focussed distraction. However, perhaps more importantly, according to Wegner (1989) and Hayes et al (1999) engaging in focussed distraction has low ecological validity, as in everyday life thought suppression would be rendered impossible given the multiple cues in our environment that serve to remind us of the unwanted target. The results

from the multiple and self distraction conditions, that demonstrated the inflated occurrence of the unwanted thought, bolster this argument.

Taken together the results of Experiment 1 suggest that the most commonly employed techniques for suppressing an unwanted thought are at best ineffective and at worst counterproductive. Participants who engage in self and multiple distraction techniques experience both the immediate enhancement and rebound effects. One possible reason for this may lie in the fact that both groups were reacting similarly when receiving the thought suppression instruction, namely they were both drawing on multiple distracters. In future research, one could ascertain how the participants interact with each technique by including a 'speak aloud' instruction. Such a manipulation could also be used to ascertain the number/type of distracters being used in the self suppression condition. These distracters could then be used as the stimuli in the multiple distraction group. This would ensure that the differences between the groups were due to self generation and not the number of words generated.

Nevertheless the results demonstrate the futile nature of attempted suppression via distraction. One final limitation of Experiment 1 is that only the effects of attempted suppression, over a short 5-10 minute phase was measured. However, according to Wegner (1989) it is more likely that unwanted thoughts return in a cyclical nature. Experiment 2 aims to determine the effect of multiple suppression and think free phases on thought occurrence.

2.2. Experiment 2

In order to further investigate the immediate enhancement effect and the rebound effect Experiment 2 of the thesis aims to study the effects of engaging in repeated suppression over time. Wegner (1989) coined the term 'indulgence cycle' to refer to the cycles of suppression and non suppression that one will engage in on a day to day basis (for a more in depth review of the indulgence cycle literature please refer to Section 1.2.5 of the General Introduction). Despite Wegner (1989) coining this term only two previous studies, that of Hardy and Brewin (2005) and Williams and Moulds (2007) have researched these phenomena using a paradigm which

studies the effects of suppression over time. Both of these studies found an immediate enhancement effect, in that participants would repeatedly experience the intrusion in the suppression periods. Additionally both studies found a minor rebound effect in that engaging in repeated suppression produced maintenance of intrusions in each of the respective rebound periods. However, it is hard to draw basic conclusions on the impact of multiple indulgence cycles from these studies as both demonstrations employed populations instructed to suppress high valence material. It is possible that the high valence nature of the suppressed items confounded the effect of the indulgence cycles. Additionally, while both studies exposed participants to two indulgence cycles, neither involved exposure to multiple indulgence cycles.

The current study will therefore differ from the two previous studies in four key ways. First, by only studying personally relevant or high valence target thoughts, the previous studies do not provide evidence as to how individuals' respond when attempting to suppress a neutral thought. When dealing with high valence thoughts it is likely that participants engage in suppression attempts with the material even when not instructed to do so, thus confounding the experimental findings. As suggested by Hardy and Brewin (2005), participants' history of practised suppression may have impacted on their suppression attempts. The current study controls for participants' history with the to-be-suppressed item by employing a neutral rather than high valence target thought. Second, the suppression and expression phases in the previous studies have been between two and three minutes. This does not reflect the timeframe typically employed in thought suppression studies (e.g. Wegner, et al., 1987). The current study employs five minute suppression and expression phases in line with seminal thought suppression studies (Wegner & Erber, 1992; Merckelbach, Muris, Van Den Hout & De Jong, 1991).

Third, the current study will employ three indulgence cycles, as opposed to two, to determine the effects of an inflated number of indulgence cycles. Lastly, previous studies in this area have employed two groups who both completed two full indulgence cycles. The current study aims to determine the effect of multiple indulgence cycles on target thought occurrence. To that end, a group of control

participants will be recruited. This group will only be instructed to complete one suppression attempt and thereafter the number of target thought occurrences across the same timeframe as the repeated suppression group will be recorded.

Therefore, the aim of the study is to determine the effect of repeated indulgence cycles of a neutral target thought on thought occurrence. Participants will be assigned to one of two groups. The 'repeated suppression' group will be instructed to complete three indulgence cycles. The 'suppress think-free' group will be instructed to suppress a target thought once for one five minute phase, and thereafter to think freely for five, five minute phases. It is predicted, within the repeated suppression group, that participants will continue to experience an immediate enhancement effect in each of the suppression periods. Between the groups it is predicted that participants in the 'repeated suppression' group, during each of the three comparable rebound phases (phase 2, phase 4 and phase 6), will report an inflated number of target thoughts when compared to those in the 'suppress think-free' group. This finding would provide evidence that engaging in multiple indulgence cycles, even of pre-experimentally neutral thoughts, can cause an increase in the occurrence of a target thought. This result would lend support to Wegner's (1989) Environmental Cueing Hypothesis of how thought intrusions can escalate in everyday life, as the ECH would suggest that the more indulgence cycles one enters, the more distracters will be used, meaning that more environmental cues will render the attempt less likely to be successful.

Additionally, a novel analysis will be conducted on the data. According to Wegner (1989) participants will re-engage with a suppression attempt once the target thought has occurred in a rebound phase. Therefore, it can be understood that the first time an unwanted thought re-surfaces is the most important intrusion as it will prompt the next suppression attempt. Indeed this would analogue more accurately how suppression and rebound occur in everyday life. People do not experience suppression and rebound phases, instead they attempt not to think about a certain thought, and then they move on, before an environmental cue prompts the re-emergence of the unwanted thought. Importantly at this point, people do not enter a five minute think free phase; instead they immediately attempt to suppress it again.

To this end, it is predicted that the 'repeated suppression' group will have the target thought re-enter consciousness significantly more quickly than the 'suppress think free' group. If this is the case then it might provide valuable information as to how an unwanted target thought becomes an obsession, because the more we suppress, the more quickly the unwanted thought will return.

2.2.1. Method

Participants

Thirty-four undergraduates at Swansea University were paid 3 credits for their participation in the experiment. (Mean age; 20.11 years, SD; 3.97). 29 females and 5 males participated in the study. The sample was non clinical.

Design

The study was a 2 (group; repeated suppression vs. suppress think-free) x 6 (five minute phases) mixed design. There were two dependent variables; number of space bar presses in each of the five minute phases, and response latencies in each of the expression phases of the first unwanted thought intrusion.

Stimuli

Screening questionnaires

In order to avoid confounding the results three screening measures were administered: the *Acceptance and Action Questionnaire II* (AAQ II; Bond et al., 2005), the *White Bear Suppression Inventory* (WBSI, Wegner & Zanakos, 1994), the *Beck Depression Inventory* (BDI, Beck, Steer & Brown, 1996) to screen for pre-experimental levels of emotional avoidance, thought suppression and depression, respectively (for further details on these questionnaires see Experiment 1). The data for 6 participants was omitted based on a high BDI score (10 or over). The remaining 28 participants (14 in each group) scored within a normal range. (Overall mean scores: AAQ II = 53.54, WBSI = 44.31, BDI = 5.39)

Procedure

On each subject's arrival at the experimental laboratory participants were randomly assigned to one of two experimental groups (i.e., the 'repeated suppression' group or the 'suppress think free' group).

(i) *Repeated suppression group:* Participants were first exposed to the 'suppression instruction': '*In the next five minutes please try not to think of a 'white bear'. Every time you have 'white bear' come to mind, though, please press the space bar in front of you'*. This was followed by the 'liberal rebound' instruction: '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'white bear' happens to enter your mind, then you should press the space bar as before.*' The participants repeated this procedure another two times. Therefore, in total, the participants from the 'repeated suppression' group alternated between three suppression instructions and three liberal rebound instructions.

(ii) *Suppress think-free group:* Participants assigned to this group were provided with identical instructions for the first two five minute phases (i.e., suppression and liberal rebound instructions). However, for the third five minute phase, rather than receiving the suppression instruction participants received the liberal rebound instruction. Participants continued to receive the liberal rebound instruction for the remainder of the three five minute phases.

Upon completion of the final liberal rebound phase all participants were debriefed and thanked for their participation.

2.2.2. Results

Questionnaires

In order to ensure that the results were attained as a result of the independent variable manipulated and not individual differences, it is important that there are no differences between the groups in terms of questionnaires scores. A 2 (Group; repeated suppression vs suppress think free) x 3 (Questionnaire; AAQ II, WBSI, BDI) mixed ANOVA revealed no significant main effect for Questionnaire, $F(1, 50) = 0.592; p > 0.05$, and no significant interaction between Questionnaire and Group,

F (3, 50) = 0.253; p > 0.05. Post hoc Tukey HSD tests revealed no significant difference (see Table 3) between the repeated suppression group (AAQ II = 53.37, WBSI = 46.18, BDI = 5.62) and the suppress think free group (AAQ II = 53.72, WBSI = 42.44, BDI = 5.16)

Comparison	**AAQ**	**WBSI**	**BDI**
Repeated suppression vs. Suppress think free	*t(26) = 0.187*	*t(26) = 0.408*	*t(26) = 0.201*

Table 3. The difference between the repeated suppression group and suppress think free group on the pre screening questionnaires. All non significant at the 0.05 level, Experiment 2.

Number of intrusions

The mean amount of times that the participants from the 'repeated suppression' group and the 'suppress think-free' group pressed the space bar in each phase are represented in Table 4. The amount of target thought occurrences across the suppression phases, for the repeated suppression group, remained constant (Phase 1 M = 6.35, Phase 3 M = 5.07, Phase 5 M = 5.64). There also appeared to be no difference between the three liberal rebound phases for the 'repeated suppression' group (Phase 2 M = 4.07, Phase 4 M = 4.14, Phase 6 M = 3.57), indicating that repeated suppression caused neither an increase nor a decrease in target thought occurrences. However, a different pattern emerged for the 'suppress think-free' group, with a gradual decline of space bar presses across the five liberal rebound phases (Phase 1 M = 6.85, Phase 2 M = 3.57, Phase 3 M = 3.14, Phase 4 M = 2.5, Phase 5 M = 2.64, Phase 6 M = 1.78)

Group	Phase 1 Suppression	Phase 2 Rebound	Phase 3 Suppression/ Rebound	Phase 4 Rebound	Phase 5 Suppression/ Rebound	Phase 6 Rebound
Repeated suppression	6.35	4.07	5.07	4.14	5.64	3.57
Suppress think free	6.85	3.57	3.14	2.5	2.64	1.78

Table 4. The mean amount of space bar presses across the 6 phases for both groups, Experiment 2.

In order to determine any significant differences and interactions across group and phase a 2 (repeated suppression group vs. suppress think free) x 6 (phase) mixed ANOVA was conducted. The results revealed a significant main effect for phase, $F\ (5,\ 130) = 10.305;\ p < 0.05$ suggesting that there was a difference in the amount of times that the target thought occurred depending on the phase participants were in. The results also revealed a near interaction between phase and group, $F(5,\ 130) = 2.140;\ p = 0.065$ suggesting that the difference in the occurrence of the target thought across phases varied depending on whether the participants were in the 'repeated suppression' or the 'suppress think free' group. This suggests that the occurrence of the target thought was inflated in the 'repeated suppression' group when compared to the 'suppress think free' group.

Suppression versus Rebound

Suppression phases

In order to determine whether there was any significant difference in the number of space bar presses across the three suppression phases for the 'repeated suppression' group, using Holm's sequential Bonferroni approach, paired samples *t* tests revealed that there was no significant difference emerged between the first and second suppression phases, $t(13) = 1.93;\ p > 0.05$, between the second and the third suppression phases, $t(13) = -0.62;\ p > 0.05$, and between the first and the third suppression phases, $t(13) = 0.65;\ p > 0.05$. These results suggest that the intrusion rate did not increase, but, rather, it was maintained across phases.

Liberal Rebound phases

In order to determine if there were any significant differences between the two groups across the three comparable liberal rebound phases, a 2 (repeated suppression group vs. suppress think free group) x 3 (phase 2, phase 4 and phase 6) mixed ANOVA was conducted. The results revealed a significant main effect for phase, $F(2,\ 52) = 2.85;\ p < 0.05$, suggesting that the phase affected the amount of

target thought occurrences. In addition to this the analysis revealed a significant linear trend, $F(1,26) = 5.35; p < 0.05$, suggesting that the space bar presses gradually declined across phases.

In order to explore any significant differences between phases 2, 4 and 6 for the repeated suppression group, using Holm's sequential Bonferroni approach, paired sample t tests were conducted. The results revealed no significant differences between the three phases. Phase 2 and 4, $t(13) = -0.78, p > 0.05$, Phase 4 and 6, $t(13) = 1.23; p > 0.05$, Phase 2 and 6, $t(13) = 0.68; p > 0.05$. These results suggest that over the three liberal rebound phases the number of space bar presses (i.e. target thought occurrences) was again maintained, but did not increase.

For the 'suppress think-free' group, despite the trend towards a gradual decline, the difference between phase 2 and 4, $t(13) = 1.48; p > 0.05$ and the difference between phase 4 and 6, $t(13) = 1.51; p > 0.05$, were not significant. However, the difference between phase 2 and phase 6 was significant, $t(13) = 2.77; p < 0.05$. The result suggests that the amount of target thought occurrences for the 'suppress think free' group in the liberal rebound phases gradually declines over time when compared to the 'repeated suppression' group where the number of intrusions across liberal rebound phases was maintained.

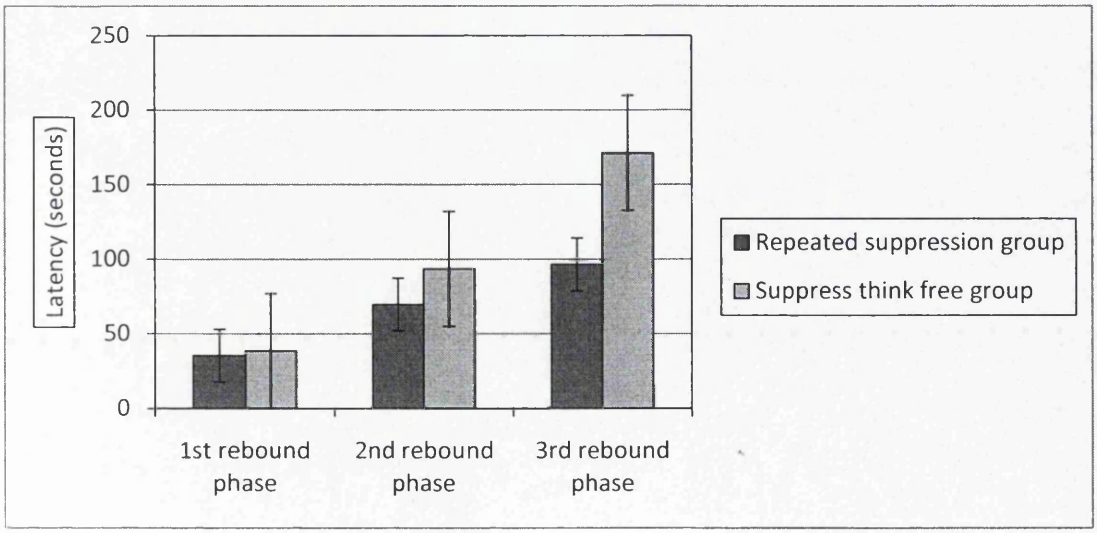
Repeated Suppression group versus Suppress think free group

In order to determine if there was any difference between the comparable liberal rebound phases for the 'repeated suppression' group and the 'suppress think free' group a series of independent sample t tests were conducted. There was no significant difference between the two groups, in the number of target thought occurrences, for phase 2, after both groups had completed one indulgence cycle, $t(26) = 0.44; p > 0.05$. There was also no significant difference between phase 4 of each group, $t(26) = 1.46; p > 0.05$. However, a significant difference did emerge in the number of space bar presses in phase 6 between the two groups, $t(26) = 1.74; p < 0.05$, indicating that participants in the 'repeated suppression' group had the target thought intrude significantly more in the last liberal rebound phase than those in the suppress think-free group.

Response latency of first thought occurrence

Further analysis was conducted in order to determine whether there were any differences within and between groups in terms of the first target thought occurrence (i.e., the response latency before the first space bar press) in each of the liberal rebound phases. Figure 2 shows the mean amount of lapsed time before the thought occurred in each of the three comparable liberal rebound phases. In the first liberal rebound phase the response latency was similar in the 'repeated suppression' group (M = 35.44 seconds) and the 'suppress think free' group (M =38.53 seconds). However, by the second liberal rebound phase the gap had increased between the 'repeated suppression' group (M = 69.58 seconds) and the 'suppress think-free' group (M = 93.51 seconds). Finally, the response latencies in the third liberal rebound phase indicated a larger difference between the 'repeated suppression' group (M = 96.49 seconds) and the 'suppress think-free' group (M = 171.19 seconds). For both groups, the amount of time taken for the first target thought intrusion to occur increased from the first to the second and second to the third liberal rebound phases. Additionally, the target thought, for those participants in the 'repeated suppression' group, tended to re-emerge more quickly in the second and third liberal rebound phases in comparison to the 'suppress think-free' group.

Figure 2. The amount of lapsed time (in seconds) before the space bar was pressed in both groups, Experiment 2.



In order to determine if there were any significant differences across both groups for the three comparable rebound phases a 2 (Group; repeated suppression group vs. suppress think free group) x 3 (Phase; phase 2, phase 4, phase 6) mixed ANOVA was conducted. The results revealed a significant main effect for Phase, $F(2,46) = 10.01; p < 0.05$, and no interaction was found between Phase and Group, $F(2, 46) = 2.03; p > 0.05$. Using Holm's sequential Bonferroni approach paired sample t tests were conducted to determine where the differences emerged between the liberal rebound phases within each of the groups. For the 'repeated suppression' group, it was found that there was no significant difference between the first liberal rebound phase and the second, $t(13) = -1.60; p > 0.05$, between the first liberal rebound phase and the third, $t(13) = -1.80; p > 0.05$ and between the second and the third liberal rebound phases, $t(13) = -1.45; p > 0.05$, suggesting that the target thought re-occurred equally as quickly across all three liberal rebound phases.

For the 'suppress think-free' group there was no significant difference between the first liberal rebound phase and the second, $t(13) = -0.70; p > 0.05$. However, there was a significant difference between first liberal rebound phase and the third, $t(13) = -4.17; p<0.05$ and between the second liberal rebound phase and the third, $t(13) = -2.67; p<0.05$, suggesting that the target thought gradually re-occurred significantly more slowly across time.

Independent sample t tests were conducted to determine if there were any significant differences between the 'repeated suppression' group and the 'suppress think free' group. The t tests revealed no significant main effect between either group in the first liberal rebound phase, $t(26) = -0.16; p > 0.05$, or in the second liberal rebound phase, $t(26) = -0.58; p > 0.05$. However by the third rebound phase there was a significant difference between the first time that the target thought re-occurred between the 'repeated suppression' group and the suppress think-free group, $t(26) = -1.84; p<0.05$, suggesting that participants who repeatedly suppressed, by the third liberal rebound phase, experienced the target thought significantly more quickly than those in the 'suppress think-free' group

Summary

The current results suggested that engaging in multiple indulgence cycles maintains the intrusion rate of an unwanted thought. Those who only suppressed once experienced a gradual decline in thought intrusions over the course of the three comparable liberal rebound phases. The results also suggest that those participants who engaged in multiple indulgence cycles had the target thought re-occur significantly more quickly, in each comparable rebound phase, than those in the suppress think-free group.

2.2.3. Discussion

In Experiment 2 participants in the 'repeated suppression' group demonstrated neither an increase nor decrease in target thought occurrences across suppression or liberal rebound phases. However, these participants did produce significantly more target thought occurrences in the liberal rebound phases when compared to the 'suppress think-free' group, whose intrusion rate significantly declined across liberal rebound phases. Additionally, the 'repeated suppression' group also had the target thought re-emerge significantly more quickly than the 'suppress think-free' group across the three liberal rebound phases. These results seem to suggest that repeatedly engaging in attempted thought suppression will maintain the immediate enhancement effect and a rebound effect across time.

According to the Environmental Cueing Hypothesis (ECH), multiple indulgence cycles over time should cause an increase in the number of unwanted thoughts in both suppression and expression phases (Wegner, 1989). Our finding supports previous research that demonstrated no increase in the number of unwanted thoughts across suppression and rebound phases (Hardy & Brewin, 2005; Williams & Mould, 2007). However, it is important to note that although repeated thought suppression may not cause an increase in unwanted thoughts during multiple indulgence cycles, it does appear to have a maintenance effect. Specifically, maintenance in the number of unwanted thoughts was found in both the suppression and liberal rebound phases for the 'repeated suppression' but not the 'suppress think free' group.

The current study also involved a novel comparison between the latency until the occurrence of the first target thought in each liberal rebound phase, indicating a shorter latency between onset of initial thought occurrence for the repeated suppression group in comparison to the suppress think free group. This analysis extends on the Environmental Cueing Hypothesis indicating that thought suppression and expression are cyclical in nature, that is, we alternate between phases of suppression and expression (think-free phases). When attempting to suppress a target thought, individuals will alternate between attempting to suppress and subsequently moving onto another activity to further distract themselves. At a later point the initial target thought will likely rebound (Wegner, 1989). Only one instance of the target thought is necessary for an individual to re-engage in a phase of attempted suppression. Thus, it suggests that the most important target thought in a liberal rebound phase may be the initial thought occurrence. The results of the current study demonstrate that repeated suppression causes the target thought to re-enter significantly more quickly. This rapid re-occurrence of the target thought could represent the method by which the thought suppression becomes increasingly counterproductive, as across indulgence cycles, the thought continues to re-emerge more quickly.

Abramowitz et al (2001) found minor evidence for a Rebound Effect suggesting that attempted suppression may have longer term effects, this result was partly replicated in the current study as participants in the 'repeated suppression' group continued to think of the target thought when they were provided with think-free instructions. However, the ECH would predict an escalation in the amount of intrusions during rebound phases, whereas the current experiment did not produce such an escalation. One possible explanation for this result could be the clinical nature of the experimental laboratory. Each participant completed the experiment in a blank room with no windows, thereby limiting the amount of external distracters. Possibly in a real life scenario, where multiple external distracters are available, the target thought would escalate in the rebound phase due to increasing number of distracters becoming associated with and thus cueing the target thought. Such an escalation would be consistent with Wegner's (1989) ECH. Future research should

provide participants with multiple distracters in order to determine whether these distracters would come to cue the target thought.

One issue worth noting in the current study is that the level of effort involved in instructional adherence differed across groups, that is, the 'repeated suppression' group had to suppress the target thought for a total of 15 minutes whereas the 'suppress think free' group only had to suppress the target for 5 minutes. This activity no doubt primed the thought in a way that did not occur for the free think group. Specifically, the participants in the 'repeated suppression' group were sitting inactive, monitoring thoughts, no doubt cycling between idle thoughts (e.g. what to have for lunch, what to do after the study, whether their roommate is angry about something, etc.) and a return to the task at hand – "what am I doing? Oh yes, I'm suppressing thoughts about white bears…"). Whereas participants in the 'suppress think free' group were simply allowed to think about whatever they liked, with only one task, which was to register whether they had the target thought. It could reasonably be argued that the suppression instructions resulted in greater priming of the target thought than the think free instructions. However, in real life terms this reflects the distinction between two different coping strategies in dealing with unwanted thoughts, namely, attempted suppression versus acceptance of thought occurrence (for a detailed account of acceptance see Hayes, Strosahl & Wilson, 2001). In addition to the issue of motivation there is also the possibility of habituation occurring, that is, perhaps participants in both groups through multiple five minute periods became less sensitive to the unwanted thought through repeated exposure, therefore decreasing the amount of unwanted thought intrusions signalled. Indeed, the results from the suppress think free group suggest that such habituation may have occurred. However, those repeatedly suppressing maintained the level of intrusions in both suppression and think free phases, suggesting that habituation does not occur when participants are given repeated suppression instructions.

One potential weakness with the current study was that no baseline group was included in order to determine what the average number of thought occurrences would be without the suppression instruction. Rather than including a pre experimental baseline to collate the number of pre experimental thoughts about the target a between participant control group was employed in the current study in

which participants were provided with no suppression instruction during the second two suppression phases. Importantly, a recent study by Marcks and Woods (2005) took a baseline measure of the amount of thought intrusions in a baseline five minute phase (identical to the experimental phase length herein) and found that the mean number of target thought occurrences in a group of undergraduate participants was 2.2. The 'repeated suppression' group from the current study reported between 4-6 intrusions for each suppression and liberal think free phase, suggesting that the number of thoughts about a target was inflated when the target was a to-be-suppressed item. Finally, it is worth noting that all participants in Experiment 2 were exposed to the self suppression instruction, this instruction was chosen as self suppression is the most widely employed suppression strategy in the thought suppression literature. Nevertheless it is possible that within self suppression, participants may have used multiple distracters or a focused distracter in their attempt to suppress. The variability between the two techniques would have an effect on the amount of unwanted thought intrusions; therefore future research should include post phase questions which ascertain the type of technique used.

The current study only exposed participants to three indulgence cycles, future research should include additional indulgence cycles in order to provide more information as to whether occurrence of the target thought would continue to be maintained across repeated suppression attempts, in both the repeated suppression and the suppress think-free groups, or whether after an increased number of suppression attempts the occurrence of the target thought would gradually fade. However, the findings herein provide tentative evidence that the occurrence of the target thought would be maintained across multiple indulgence cycles. Such maintenance highlights the counterproductive nature of suppression as a coping strategy for unwanted thoughts, a suggestion that has been iterated by behavioral and cognitive psychotherapies such as Acceptance and Commitment Therapy (Hayes, Strosahl &Wilson, 1999).

2.3. Concluding Comments

Experiment 1 aimed to determine the effect that engaging in different distraction techniques would have on unwanted thought intrusions in both the

suppression and think free periods. When compared to baseline, an inflation of target unwanted thoughts experienced in a suppression period would qualify as an immediate enhancement effect, whilst an inflation of target unwanted thoughts experienced in the think free phase would qualify as a rebound effect. The study found that engaging in multiple and self distraction caused both an immediate enhancement effect and a rebound effect, whilst engaging in focussed distraction obliterated both effects.

These results are consistent with Wegner's (1989) ECH as well as being consistent with the stimulus equivalence theory of thought suppression that was described in the general introduction. Specifically, limiting the amount of distracters also limits the amount of environmental cues that serve to remind us of unwanted thoughts. At first glance this could be seen as having some important clinical relevance, however the idea of using focussed distraction as a way of dealing with unwanted thoughts becomes a ridiculous notion when one considers the way in which we generally live our lives; we do not live our lives in one room where there are no external reminders, but in a world where there are multiple distracters/reminders available to us. Considering such an inference is important for one crucial reason; the fact that engaging in multiple and self distraction, two techniques that reflect the types of strategies available to us on a daily basis, does not work, suggests that engaging in the suppression of unwanted thoughts, is indeed a futile strategy. In terms of both immediate enhancement and rebound, the results suggest that not only will one struggle to actively suppress a thought during a suppression period, but that thought will also re-appear and rebound at a later stage.

With the way in which thought suppression occurs in everyday life becoming the focal point of this research, Experiment 2 aimed to study the effects of engaging in multiple indulgence cycles, which, according to Wegner (1989), mirrors the way in which we experience unwanted thoughts in an everyday sense. According to the ECH, the more one engages in thought suppression, the more external distracters will be used, meaning that more environmental reminders will serve to remind us of the unwanted thought causing a gradual inflation of the amount of unwanted thought intrusions experienced.

The results of Experiment 2, however, did not find such an inflation when the effects of repeatedly suppressing over time was studied. Specifically the results found that engaging in repeated suppression merely caused a maintenance of the immediate enhancement and rebound effects, when compared to controls, instead of causing the expected inflation of unwanted thoughts. Immediately this provides evidence which contradicts the ECH, and also the behavioural account of thought suppression. However when one considers more closely the laboratory setting in which the study was conducted, it becomes apparent that these results should have perhaps been expected. Simply put, the aforementioned theories suggest that the more distracters there are the more one will experience the unwanted thought, however in an experimental setting where there are a limited amount of distracters present in the room, it is no surprise that such a ceiling effect was reached in terms of the amount of unwanted thought experienced. Despite not strictly adhering to the predictions of the ECH, Experiment 2, much like Experiment 1, seems to suggest that engaging in thought suppression is a futile strategy for dealing with unwanted thoughts, as the more one tries to banish an unwanted thought, the more that thought will appear, both during and after the suppression period.

In conclusion, Experiments 1 and 2 both lend support to the immediate enhancement effect and the rebound effect. However, in applied terms, it is difficult to suggest that the ironic results associated with the suppression of a neutral thought can also be generalized to the suppression of high valence thoughts. Considering that the majority of people experiencing psychological dysfunction are dealing with high valence, personally relevant thoughts, the need for thought suppression research utilising high valence thoughts becomes evident. Chapter 3 of the thesis will attempt to study the effects of suppressing such high valence thoughts.

Chapter 3

The immediate enhancement effect, the rebound effect and valence.

3. Introduction

The counterproductive nature of thought suppression has been well documented in the literature and it has been demonstrated that people have difficulty suppressing a neutral thought (Lavy & Van den Hout, 1990; Rassin, Merkelback & Muris, 1997; Trinder & Salkovskis, 1994; Clark, Ball & Pape, 1991; Salkovskis & Campbell, 1994). Indeed Chapter 2 of the current thesis (Experiments 1 and 2) found that suppression attempts were futile, when participants attempted to suppress via multiple and self distraction techniques, both over a short and longer period of time. Interestingly, in accordance with previous literature, the use of focused distraction seemed to obliterate the immediate enhancement and rebound effects.

However, Muris et al (1992) suggested that the suppression of neutral thoughts may not generalize to psychopathology, suggesting instead that people are likely to engage in the suppression of personally relevant high valence thoughts. Personally relevant high valence thoughts refer to those thoughts which are most likely to bother people due to their meaningful nature. In particular neutral thoughts differ from high valence thoughts in how emotional they are, how familiar they are, how easily imaginable they are and how complex they are (Kelly & Kahn, 1994). In general, we tend to attempt to suppress thoughts which surround personally relevant and salient content, such as thoughts of a loved one for the bereaved, or thoughts of stimuli we are phobic of (e.g., spiders, public speaking). The experiments reported in Chapter 2 only involved the manipulation of neutral thoughts. However, in the thought suppression literature a number of studies have examined the effects of suppressing high valence thoughts (see Sections 1.2.5 and 1.2.6). In order to measure the impact of suppressing high valence thoughts both behavioural and physiological measures have been employed. The results of this body of research has been mixed, some studies have found behavioural effects (McNally & Ricciardi,1996; Muris et al, 1998; Wenzel et al, 2003) and some have not (Kelly & Kahn,1994; Muris et al, 1997). Some have found behavioural but no physiological effects (Petrie et al, 1998), some have found physiological effects but no behavioural effects (Gross & Levenson, 1993, 1997; Wegner et el, 1990; Wegner & Gold, 1995). Some have found that physiological effects of suppression are not linked to valence but that any

attempted suppression elicits adverse physical responses (Muris et al, 1991, 1992, Cioffi & Hollaway, 1993).

The stimuli chosen in the thought suppression literature to manipulate valence stimuli have varied, for example, studies have used past relationships (Wegner & Gold, 1995), negative images (Davies & Clark, 1998) and phobic related material (Fawzy, Hecker and Clark, 2006). The most widely used clinically related stimuli have involved phobic related content. The recruitment of phobic populations has been the most popular for a number of reasons; first the incidence rate for specific phobias in the general population is between 10 and 11% (American Psychiatric Association, 1994), suggesting that many people are experiencing high valence unwanted phobia related thoughts. Second, the valence level across participants can be controlled for by employing standardised screening tools related to the specific target phobia. And third, research investigating specific phobias has suggested that thought suppression may be a causal and maintaining factor of the phobia (Wegner, 1989; Salkovskis, 1989). To date, a number of studies have been conducted on phobia related thoughts, as a method of studying the effects of attempted suppression of high valence unwanted thoughts. However, to date the findings are mixed with some of these studies demonstrating an effect of valence (Wenzel, Barth and Holt, 2003; Arntz, Lavy, Van den Berg and Van Rijsoort, 1993), and others not doing so (Muris, Merkelbach, Horselenberg, Sijsenaar and Leeuw, 1997; see Section 1.2.6)

Given the contradictory findings in the literature on thought suppression of high valence personally relevant thought items, Chapter 3 aims to investigate whether instructions to suppress an emotionally relevant (spider to spider-fearful) and neutral (spider to non-spider-fearful) thought item would lead to an immediate enhancement effect and/or a rebound effect. The first experiment (Experiment 3) in the current chapter will replicate and extend on the first experiment in the second chapter (Experiment 1); it will test the effects of self distraction, multiple distraction, focused distraction and a baseline condition on unwanted thought occurrence, with the inclusion of a high valence thought (spider) instead of a neutral one (white bear). Experiment 4 aims to further explore the possible relationship between thought

suppression and physiological arousal by introducing a physiological dependent variable; that is, it will involve exposing participants to the typical white bear preparation, while measuring each participant's Skin Conductance Levels (SCL) for the duration of the experiment, in order to ascertain if the suppression of a high valence thought causes a different physiological reaction to the suppression of a low valence thought.

3.1 Experiment 3

The current experiment is the first to investigate systematic distraction techniques under the manipulation of valence. Specifically, it aims to investigate the immediate enhancement and rebound effects, when a number of distraction techniques are employed. However, instead of employing a neutral thought as in Experiment 1, the valence of the thought will be manipulated. The manipulation of valence will be implemented in order to determine whether higher valence unwanted thoughts will cause an increase in the amount of unwanted thought intrusions during and after a suppression attempt. As mentioned in Section 1.2.6 of Chapter 1, in general it is unlikely that human beings will engage in the suppression of neutral stimuli (Rachman & Hodson, 1980), suggesting that thought suppression studies which employ a neutral thought may lack ecological validity. Additionally, if the suppression of high valence material causes an increase in the amount of unwanted intrusive thoughts, then such a finding could provide a possible mechanism for how unwanted thoughts form the basis for clinical obsessions which manifest themselves in various psychological disorders. The general aim of the current experiment is to determine whether the suppression of high valence thoughts will cause an increase in thought intrusions, when a number of distraction techniques are employed. A secondary aim of the current chapter will be to determine whether the use of a focused distracter, as opposed to self distraction, will reduce the immediate enhancement effect with a high valence thought, in the same manner as was observed with neutral thoughts.

To that end, the current study will employ the exact experimental paradigm to that of Experiment 1, with the addition of valence. Specifically 8 experimental

groups will be recruited, that is two groups of participants (a spider fearful and non spider fearful group) will be exposed to a focused distraction, a multiple distraction, a self distraction and a baseline group. The dependent variable in the study will be the amount of unwanted thought intrusions each group experiences in both five minute periods; suppression and rebound. It is predicted, in accordance with the results from Experiment 1, and in accordance with the ECH, that spider fearful and non spider fearful participants from the focused distraction group will not demonstrate an immediate enhancement effect, i.e. they will not experience more intrusions than baseline, whereas the self and multiple distraction groups will. Secondly, it is expected that the spider fearful participants will experience significantly more unwanted thought intrusions than their non spider fearful counterparts across all three distraction techniques.

3.1.1. Method

Participants

128 undergraduates (91 female and 37 male) at Swansea University were paid 2 credits for their participation in the experiment (Mean age; 21.2 years, SD; 5.902). The sample was non clinical. However participants were screened for depression, thought suppression tendencies and emotional avoidance, which resulted in the data from 8 participants being excluded (see later).

Design

The study involved a 4 (condition; self distraction, multiple distraction, focused distraction and baseline) x 2 (valence; spider fearful and non spider fearful) x 2 (phase; suppression and think free) mixed design with repeated measures on the third factor. The assignment of participants to experimental conditions, in terms of distraction technique, was randomized; 30 participants were assigned to the self distraction group, 30 were assigned to the multiple distraction group, 30 were assigned to the focused distraction group and 30 were assigned to the baseline group. However, within each distraction group, 15 participants were spider fearful and 15 participants were non spider fearful. The dependent variable in this experiment was the amount of times the participants from each group would press the space bar in each of the two phases.

Apparatus

The experiment was completed in a laboratory at Swansea University. The laboratory was quiet and free from distraction. It contained a desk, a chair, a standard computer (Processor) with a 14-inch screen and standard computer mouse. The participant's responses were controlled by the computer program, which was created in Visual Basic™ 6.

Materials

In order to avoid confounding the results with high pre-experimental levels of emotional avoidance, excessive suppression or depression three screening questionnaires were administered. The questionnaires consisted of the Acceptance and Action Questionnaire II (AAQ II; Bond et al., under review), the White Bear Suppression Inventory (Wegner & Zanakos, 1994) and the Beck Depression Inventory (Beck et al, 1961). See Experiment 1 for further details. The data for 8 participants was removed due to high scores on the depression inventory (a score of 10 or more warranted exclusion). The remainder of the participants scored within the normal range (overall mean scores: AAQ II = 50.55, SD = 9.21; WBSI = 47.71, SD = 7.83; BDI = 7.6, SD = 2.64). One additional measure was administered so that the participants could be divided into spider fearful and non spider fearful groups. In the current study a score of 50 plus on the Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995, see appendix 5) warranted inclusion in the spider fearful group, whereas participants with scores of 40 and under were included in the non spider fearful group. (Average FSQ scores – spider fearful self distraction group = 85.29, non spider fearful self distraction group = 31.24, spider fearful multiple distraction group = 88.83, non spider fearful multiple distraction = 28.31, spider fearful focused distraction group = 90.03, non spider fearful focused distraction group = 29.73, spider fearful baseline group = 84.92, non spider fearful baseline group = 29.63)

Procedure

On each subject's arrival at the experimental lab, the participant was greeted by a male experimenter. Upon completion of the consent form the participants were

required to complete the FSQ, which resulted in assignment to the spider fearful or non spider fearful groups in one of the four experimental conditions (i.e., self distraction, multiple distraction, focused distraction or baseline). Before receiving experimental instructions each participant was seated in front of the computer screen in the laboratory. Loaded onto the computer was the five minute space bar program, which recorded the amount of times the participant pressed the space bar in the five minute period.

Self distraction group

If assigned to the self distraction group, whether spider fearful or non spider fearful, the following procedure occurred; via verbal and written instructions the participants were instructed that for the following five minute phase they had to try their best to suppress a certain thought that would be given to them by the experimenter (the 'unwanted thought') and that if they did happen to think of the 'unwanted thought' in this five minute phase then they were required to press the space bar each time the thought occurred and reoccurred. The instruction was as follows; '*In the next five minutes please try not to think of a 'spider'. Every time you have 'spider' come to mind, though, please press the space bar in front of you'.*

After the initial five minute phase the researcher re-entered the room and gave the participant the 'think free' instruction. Participants were told that for this final five minute phase that they could think about anything they liked (including the unwanted thought). The participants were again told that if they did happen to think of the 'unwanted thought' from stage 1 then they should continue to press the space bar each time the thought occurred and reoccurred. The instruction was as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'spider' happens to enter your mind, then you should press the space bar as before.*'

Multiple distraction group

If assigned to the multiple distraction group, whether spider fearful or non spider fearful, the following procedure occurred; participants were instructed, via

verbal and written instructions, that for the following five minute phase they would have to try their best to suppress a certain thought that the experimenter would provide (the 'unwanted thought'). However they were told that in order to help them in their suppression attempt that 60 words (see appendix 4), which were presented in random order and appeared no more than one time each, would appear every five seconds on the computer screen in front of them, and that they should think of these words instead of the unwanted thought. Most importantly the participants were told that if they were to think of the unwanted thought then they must press the space bar on the computer keyboard each time the thoughts occurs and reoccurs. The instruction was as follows; '*In the next five minutes please try not to think of a 'spider'. Instead think of the words that will appear on the screen to distract yourself. However if you do have 'spider' come to mind, though, please press the space bar in front of you'.*

After the five minute phase the researcher entered the room to administer a 'think free' instruction for the second five minute phase. The instruction read as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'spider' happens to enter your mind, then you should press the space bar as before.*'

Focused distraction group

If assigned to the focused distraction group, whether spider fearful or non spider fearful, the following procedure occurred; participants were instructed, via verbal and written instructions, that for the following five minute phase they would have to try their best to suppress a certain thought that the experimenter would provide (the 'unwanted thought'). However they were told that in order to help them in their suppression attempt that they should focus on one thought instead, which in this case, was the thought of a 'red volkswagon'. Then the participants were told that if they were to think of the unwanted thought then they must press the space bar on the computer keyboard each time the thoughts occurs and reoccurs. The instruction was as follows; '*In the next five minutes please try not to think of a 'spider'. Instead*

try to think of a red volkswagon. However if you do have 'spider' come to mind, though, please press the space bar in front of you'.

After the five minute phase the researcher entered the room to administer a 'think free' instruction for the second five minute phase. The instruction read as follows; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'spider' happens to enter your mind, then you should press the space bar as before.*'

Baseline group

If assigned to the baseline group the participants received two 'think free' five minute phases. Before the first five minute phase the researcher, in written and verbal form, gave the following instruction, this was identical across both the spider fearful and non spider fearful groups; '*Now for the following five minute phase you are free to think of whatever you like. If however the thought of a 'spider' happens to enter your mind, then you should press the space bar as before*'. Upon completion of the first five minute phase the researcher re-entered the room and gave the identical 'think free' instruction for the second time.

Finally, before commencing in the experiment, the importance of signalling the presence of each unwanted thought was stressed to each participant in each group via the following instruction; '*if you should happen to think of 'spider' in either phase then it is important that you press the space bar each time it comes to mind'.* After completing the study, subjects were debriefed and their credit was administered.

3.1.2. Results

Questionnaires

In order to ensure that the participants did not differ in pre-experimental levels of depression, suppression and emotional avoidance pre-experimental screening questionnaires were administered. The average scores (see Table 5) seem to suggest little difference between groups. A 3 (Questionnaire) x 8 (Group) mixed

ANOVA revealed a significant main effect for Questionnaire, $F(2, 224) = 845.971$; $p < 0.05$, however no significant interaction was found between Questionnaire and Group, $F(14, 224) = 1.111$; $p > 0.05$, suggesting that there was no difference between each group in terms of questionnaire score. Subsequent post hoc Tukey tests additionally revealed no significant difference between any group on any measure at the 0.05 level.

Group	AAQ	WBSI	BDI
Spider fearful self distraction group	50.93 (8.56)	46.46 (8.57)	6.73 (2.67)
Non spider fearful self distraction group	50.26 (6.93)	49.00 (5.86)	7.46 (3.18)
Spider fearful multiple distraction group	52.00 (7.38)	48.6 (5.48)	6.53 (2.69)
Non spider fearful multiple distraction group	50.46 (5.98)	49.66 (7.29)	7.46 (3.1)
Spider fearful focused distraction group	55.4 (8.53)	46.40 (7.72)	9.93 (4.02)
Non spider fearful focused distraction group	52.66 (8.35)	46.26 (6.27)	4.33 (3.87)
Spider fearful baseline group	44.93 (6.91)	48.46 (8.13)	9.5 (4.26)
Non spider fearful baseline group	47.73 (7.83)	46.86 (7.58)	8.86 (4.65)

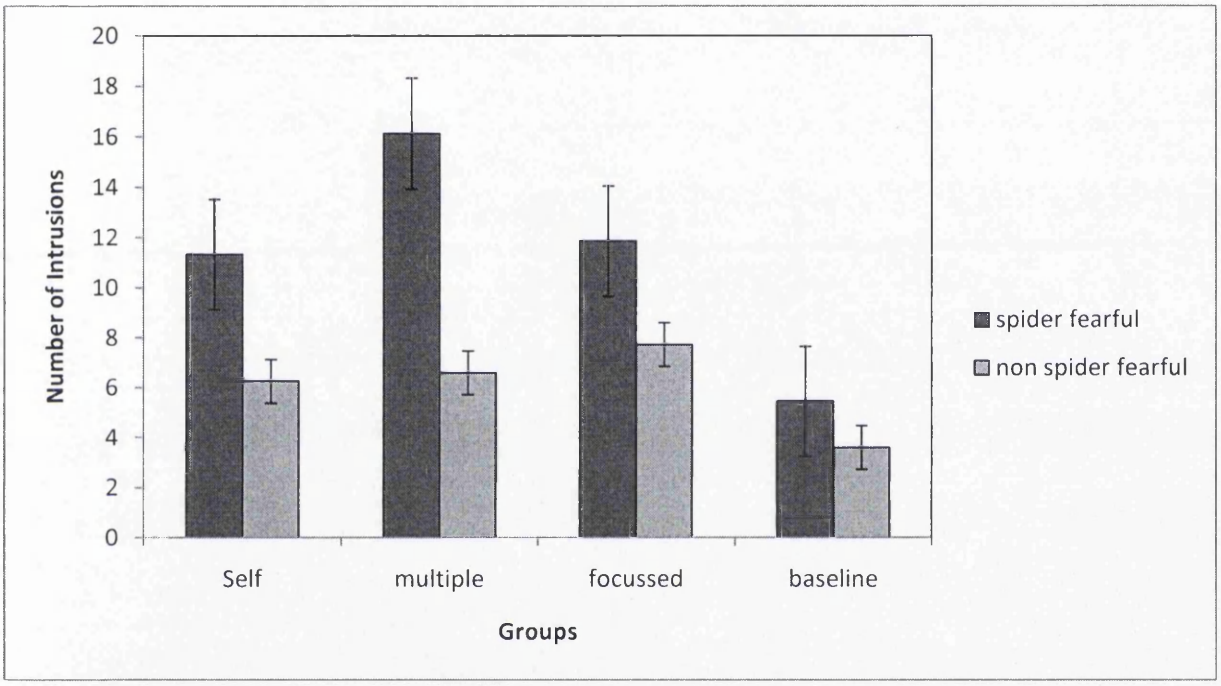
Table 5. Mean (and standard deviation) scores for each group on the AAQ, WBSI and BDI, Experiment 3.

Number of intrusions; suppression phase

One dependent variable in the study was the amount of times each participant pressed the space bar in the suppression phase. Figure 3 depicts the number of times the spider fearful and non spider fearful participants pressed the spacebar (thus indicating the occurrence of the unwanted thought) during this phase, in terms of self distraction (spider fearful M = 11.33 SD = 4.98, non spider fearful M = 6.26 SD = 7.95) multiple distraction (spider fearful M = 16.13 SD = 12.81, non spider fearful M = 6.6 SD = 7.34) focused distraction (spider fearful M = 11.86 SD = 10.76, non spider fearful M = 7.73 SD = 7.81) and baseline (spider fearful M = 5.46 SD = 3.31, non spider fearful M = 3.6 SD = 2.38). On visual inspection it can be seen from the figure that, in general, spider fearful participants experienced more unwanted

thoughts than non spider fearful participants. Additionally the emergent trend suggests that the multiple distraction group experienced the most unwanted thought intrusions, however the focused distraction group did not experience the predicted reduction in unwanted thought intrusions.

Figure 3. Amount of unwanted thought intrusions, during the suppression phase, for each group in each condition, Experiment 3.



In order to determine whether any differences between the groups would emerge an omnibus mixed ANOVA, which included both the suppression and rebound phases was conducted. A 4 (Condition; self distraction, multiple distraction, focused distraction and baseline) x 2 (Valence; spider fearful and non spider fearful) x 2 (Phase; suppression and think free) revealed a significant main effect for Phase, $F\ (1,\ 112) = 13.610\ p < 0.05$, no significant interaction between Phase and Valence, $F\ (3,\ 112) = 1.443;\ p > 0.05$, a near to significant interaction between Phase and Condition $F\ (1,\ 112) = 2.812\ p > 0.096$, and no interaction across Phase, Valence and Condition $F\ (3,\ 112) = 0.587\ p > 0.05$.

These results suggested that there were group differences within the experiment that warranted further analysis. Therefore, a uni-variate between subjects ANOVA was conducted on the suppression data from the 8 groups, this also

revealed a significant main effect for Condition, $F(7,112) = 4.112; = p < 0.05$, suggesting that there was a difference between groups in terms of distraction technique and valence.

Post hoc Tukey HSD tests were conducted between the eight groups for the suppression phase. For the spider fearful groups, the analyses revealed no significant main effect between the self distraction group, the multiple distraction group and the focused distraction group. However, all three spider fearful groups experienced more unwanted thought intrusions than the spider fearful baseline group. This result suggests that an immediate enhancement effect exists when utilizing higher valence unwanted thoughts, across all distraction techniques. For the non spider fearful group, the analyses again revealed no significant main effect between the self distraction, multiple distraction and focused distraction groups; however, interestingly, there was also no difference between these three groups and the non spider fearful baseline group, suggesting that the use of a neutral thought in this experiment did not produce the immediate enhancement effect.

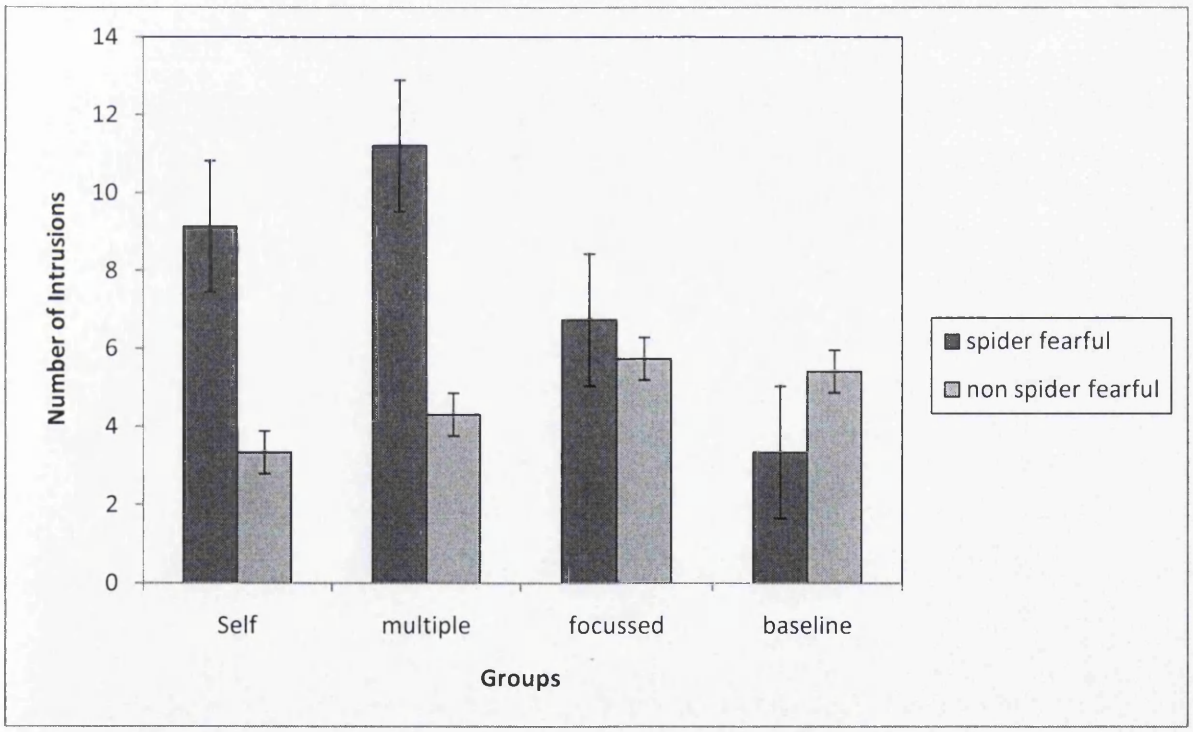
Finally, the results revealed a significant main effect for the number of unwanted thought intrusions, between the spider fearful and non spider fearful groups, in the self and multiple distraction groups. However no such effect was found for the focused distraction and baseline groups. This result suggests that when using a self or multiple distraction technique on high valence thoughts, that suppression is more difficult. However the use of focused distraction might loosen these effects of valence. Overall, all distraction techniques were futile in removing the immediate enhancement effect, however this was only found across high valence stimuli. Additionally, participants in the spider fearful groups tended to experience more unwanted thought intrusions than non spider fearful participants.

Number of intrusions; rebound/think free phase

The second dependent variable in the study was the amount of times each participant pressed the space bar in the think free phase. Figure 4 displays the results that the spider fearful and non spider fearful participants recorded during this phase, in terms of self distraction (spider fearful M = 9.13 SD = 6.26, non spider fearful M

= 3.33 SD = 2.38) multiple distraction (spider fearful M = 11.2 SD = 10.16 , non spider fearful M = 4.3 SD = 5.87) focused distraction (spider fearful M = 6.73 SD = 5.27, non spider fearful M = 5.73 SD = 5.99) and baseline (spider fearful M = 3.33 SD = 2.96, non spider fearful M = 5.4 SD = 4.96). The figure seems to suggest that, in general, spider fearful participants will experience more unwanted thoughts than non spider fearful participants, in the period following attempted suppression. Secondly the figure suggests that the multiple distraction group experienced the most unwanted thought intrusions, while the focused distraction group seemed to display a minor reduction in unwanted thought intrusions compared to the other experimental groups.

Figure 4. Amount of unwanted thought intrusions, during the rebound phase, for each group in each condition, Experiment 3.



The aforementioned omnibus test allowed further statistical analyses to be conducted on the groups in the rebound phase. Therefore a uni-variate between subjects ANOVA conducted on the rebound data revealed a significant main effect for Condition, $F(7,112) = 3.346; = p < 0.05$, suggesting that there were differences between the groups in terms of distraction technique and valence in this phase.

Post hoc Tukey HSD tests conducted on the spider fearful groups revealed no significant main effect between the self distraction group, the multiple distraction group and the focused distraction group. However each group recorded significantly more unwanted thought intrusions than the spider fearful baseline group, providing possible evidence of a rebound effect. In terms of the non spider fearful groups however, no such effects were found; no significant difference was found between each of the three experimental groups and the non spider fearful baseline group, suggesting that the use of a neutral thought removed the rebound effect. Finally, in the phase that followed attempted suppression spider fearful participants experienced more unwanted thought intrusions than non spider fearful participants in the self and multiple distraction conditions, however no such effect was found for the focused distraction or baseline groups. These results mirror the results found from the suppression phase. Specifically, all distraction techniques resulted in a rebound effect, but only during the suppression of a high valence thought. And secondly the spider fearful participants tended to press the space bar more than their non spider fearful counterparts.

Comparison	Suppression Phase	Rebound Phase
Self spider v self non spider	$t(28) = 2.090; p < 0.05$	$t(28) = 3.351; p < 0.05$
Focused spider v focused non spider	$t(28) = 1.204; p > 0.05$	$t(28) = 0.845; p > 0.05$
Multiple spider v multiple non spider	$t(26) = 2.500; p < 0.05$	$t(26) = 2.265; p < 0.05$
Baseline spider v baseline non spider	$t(28) = 1.771; p > 0.05$	$t(28) = -1.383; p > 0.05$
Self spider v focused spider	$t(28) = -0.174; p > 0.05$	$t(28) = 1.135; p > 0.05$
Self spider v multiple spider	$t(26) = -1.352; p > 0.05$	$t(26) = -0.670; p > 0.05$
Self spider v baseline spider	$t(28) = 3.798; p < 0.05$	$t(28) = 3.240; p < 0.05$
Focused spider v multiple spider	$t(28) = 0.988; p > 0.05$	$t(28) = 1.511; p > 0.05$
Focused spider v baseline spider	$t(26) = 2.201; p < 0.05$	$t(26) = 2.177; p < 0.05$
Multiple spider v baseline spider	$t(28) = 3.122; p < 0.05$	$t(28) = 2.877; p > 0.05$
Self non spider v focused non spider	$t(28) = -0.509; p > 0.05$	$t(28) = -1.441; p > 0.05$

Self non spider v multiple non spider	$t(26) = -0.119; p > 0.05$	$t(26) = -0.611; p > 0.05$
Self non spider v baseline non spider	$t(26) = 1.243; p > 0.05$	$t(26) = -1.453; p > 0.05$
Focused non spider v multiple non spider	$t(26) = -0.409; p > 0.05$	$t(26) = -0.646; p > 0.05$
Focused non spider v baseline non spider	$t(28) = 1.959; p > 0.05$	$t(28) = 0.166; p > 0.05$
Multiple non spider v baseline non spider	$t(26) = 1.504; p > 0.05$	$t(26) = -0.537; p > 0.05$

Table 6. The post hoc Tukey HSD tests for both phases across all conditions, Experiment 3.

Finally, paired sample t tests were conducted to determine if any differences emerged, in terms of thought intrusions, between the suppression and think free phases within each group. The results showed no significant main effect for the self distraction spider fearful group $t(14) = 1.551, ; > 0.05$, for the self distraction non spider fearful group $t(14) = 1.387, ; > 0.05$, for the multiple distraction spider fearful group $t(14) = 1.540, ; > 0.05$, for the focused distraction non spider fearful group $t(14) = 0.915, ; > 0.05$ and for the baseline non spider fearful group $t(14) = -1.704, ; > 0.05$. The participants in these groups pressed the space bar a similar amount of times in both the suppression and think free periods; finding no rebound effect in the strictest sense of its definition. However participants in the multiple distraction non spider fearful group $t(14) = 2.527, ; < 0.05$, the focused distraction spider fearful group $t(14) = 2.343, ; < 0.05$ and the baseline spider fearful group $t(14) = 2.849, ; < 0.05$ pressed the space bar significantly more in the suppression period than the think free period, thereby finding a reversal of a rebound effect.

In summary, all distraction groups, which employed a high valence thought, resulted in an immediate enhancement effect and a rebound effect, whereas no such effect was found with the neutral thought. Secondly, spider fearful participants tended to press the space bar significantly more than non spider fearful participants. Thirdly, participants did not experience an inflation in unwanted thought occurrence during the think free phase.

3.1.3. Discussion

The results of the current experiment somewhat contradict the experimental predictions. It was predicted that all participants in the multiple and self distraction groups would experience the immediate enhancement and rebound effects. However the effects were only demonstrated for the spider fearful groups, suggesting that the immediate enhancement effect and rebound effect only exist for high valence stimuli. Second, it was predicted that all focused distraction groups would experience no immediate enhancement effect or rebound effect. The non spider fearful focused distraction group did not experience either; however the spider fearful focused distraction group experienced significantly more unwanted thought intrusions in both phases than the spider fearful baseline group, thereby suggesting that the use of a high valence unwanted thought makes even focused distraction a futile suppression strategy. Finally it was predicted that spider fearful participants would press the space bar more than non spider fearful participants. This effect was found for the self and multiple distraction groups, suggesting that the suppression of a high valence thought is more difficult than that of a neutral one. However, no such effect was found for the spider fearful focused distraction group, who despite scoring significantly more than the spider fearful baseline group, did not outscore the non spider fearful focused distraction group; suggesting that focused distraction might loosen the effects of suppressing a high valence thought.

The findings from the comparison of distraction techniques indicate that none of the distraction techniques were successful in suppressing the high valence target thought. Additionally, the results demonstrated that when a high valence word was the target of suppression, the suppression via these distraction techniques was more pronounced than that of the neutral thought. In the Wegner et al (1987) original white bear study participants were required to self distract, that is, they had to provide their own distracters to rid themselves of the unwanted thought. Experiment 3 replicated this effect with the additional manipulation of valence. Specifically, the study found that the high valence group had the unwanted thought enter consciousness significantly more than the low valence group. Wegner (1989) suggested that having distracters that were sufficiently absorbing could remove the ironic effects of suppression. However when participants were given distracters

every 5 seconds, they continued to have the unwanted thought enter consciousness an inflated number of times. Finally, Wegner et al (1987) suggested that a focused distracter should have been more successful in facilitating attempted suppression. However, the current results demonstrated, in direct contrast to the results of Experiment 1, that spider fearful participants using focused distraction had the unwanted thought enter consciousness a similar amount of times to the multiple and self distraction groups, and significantly more than the baseline group, suggesting that emotional valence renders even the focused distraction technique futile. One explanation for such a finding could be accounted for by the ECH; specifically the ECH predicts that the more distracters there are, the more difficult the unwanted thought is to suppress due to environmental cues. It is possible within this scenario that the meaningful nature of the unwanted thought made all attempts at focused distraction futile, causing the participant to engage in other distraction attempts, thereby extending the amount of environmental reminders.

The results of the experiment provide support that a personally relevant, high valence thought is more difficult to suppress than a neutral one. The results may be of interest to those researching the development and maintenance of phobias, and in turn could be of interest to those who treat other psychological disorders to which thought suppression has been linked. Specifically the current study shows that phobic individuals have the unwanted thought enter consciousness far more than a neutral thought, regardless of distraction techniques used; indicating that valence of the to-be-suppressed item has an effect on how much that unwanted thought enters the mind. This high thought occurrence could be a maintaining factor in any disorder as the more one avoids the unwanted thought the more that thought appears.

Nevertheless, one possible criticism of Experiment 3 might be the self report nature of the dependent measure employed (i.e., pressing the spacebar to indicate the occurrence of the unwanted thought, see Section 1.2.8). And despite receiving elements of support (Rassin, 2005), the need for other methods of measuring the effects of thought suppression has gained increasing coverage in the literature (Purdon & Clark, 2000). With this in mind Experiment 4 of the thesis aimed to

employ an additional measure, that is, a physiological measure of the effects of attempted thought suppression.

3.2. Experiment 4

Experiment 3 found behavioural differences between spider fearful and non spider fearful participants in terms of the number of emergent unwanted thought intrusions during and immediately after a suppression attempt. Specifically, spider fearful participants have the unwanted thought occur significantly more than non spider fearful participants. In terms of a link between thought suppression and clinical disorders, these results suggest that attempted suppression of personally relevant thoughts may contribute, to and facilitate the maintenance of clinical problems such as phobias (Wegner, 1989; Salkovskis, 1989) simply due to the inflated number of intrusions experienced when attempting to suppress high valence thoughts.

However, as the self report nature of the typical Wegner paradigm has been criticized (Purdon & Clark, 2000), other means of determining the effects of attempted thought suppression are important to measure, for this reason the current study will measure each participants physiological reactions whilst undertaking the typical Wegner paradigm. If suppressing personally relevant thoughts causes an increase in physiological arousal then this too would provide further tentative evidence of the counterproductive effects of attempted suppression. The physiological effects of thought suppression have been measured in a number of ways; heart beat, respiratory functions, lymphocyte count etc (Borkovec, 1974; Gross & Levenson, 1997; Petrie, Booth & Pennebaker, 1998; see Section 1.2.7). However the primary way in which participant's physiology has been measured in this area is via Skin Conductance Levels (SCL).

The current study aims to add further evidence to a growing body of literature on thought suppression, valence and physiology. To that end, the traditional 'white bear' procedure as used by Wegner and Gold (1995; see section 1.2.7 for further details), in a study that directly target valence, will be employed, comprising of three 5 minute phases; 1) the think free phase, 2) the suppression

phase, and 3) the liberal rebound phase. In order to manipulate valence, the behavioural and physiological results of spider fearful participants will be compared to that of non spider fearful participants. Such an experimental paradigm using this sub clinical population has been previously employed in the thought suppression literature (Muris, Merkelbach, Horselenberg, Sijsenaar & Leeuw, 1997; Arntz, Lavy, Van den Berg & Van Rijsoort, 1993) and may serve to strengthen/weaken the current links between thought suppression and the development of phobias. Despite spider fearful populations being studied in a variety of thought suppression based experiments, no study to date has employed physiological equipment with this group. The study will involve a between group comparison (comprising of spider fearful, non spider fearful and baseline groups) across two dependent measures (thought intrusions and skin conductance level). One point worth noting is that each of the groups in the current experiment will employ self distraction during the five minute suppression period. This distraction method has been chosen for four reasons. Firstly, self distraction is the primary way in which we address unwanted thoughts in everyday life (Wegner, 1989). Secondly, self distraction is the type of distraction technique employed in the majority of thought suppression related research. In addition to this, and perhaps more importantly, the results of Experiment 1 and 3 revealed that the only distraction technique which provides some alleviation of the immediate enhancement effect is focused distraction. However, according to the ECH engaging in focused distraction in everyday life is impossible due to continual exposure to environmental stimuli that will remind us of the to-be-suppressed target. And finally, given that in Experiment 3 no difference was found between each of the distraction techniques when valence was manipulated, the most appropriate technique for Experiment 4 is self distraction.

3.2.1. Method

Participants

64 students at Swansea University received course credit for their participation in the experiment (49 were female and 15 were male, mean age; 19.77 years, SD; 1.53). The sample was non clinical.

Design

The study had a 2 (group: spider-fearful or non spider-fearful) x 3 (phase: think free, suppress/liberal rebound and liberal rebound) x 2 (condition; experimental or baseline) mixed design with repeated measures on the second factor. This left four groups of participants; a spider fearful and a non spider fearful group completing the experimental condition, and a spider fearful and non spider fearful group completing the baseline condition. There were two dependent variables, 1) amount of spacebar presses recorded in the second and third phases and 2) skin conductance level (SCL) across each of the three phases. It must be clarified that despite there being three five minute phases, all three phases will only be analyzed for the SCL dependent variable, whilst the behavioural dependent variable (space bar presses) only involves data from the 2nd and 3rd phases. It would have been possible to provide a think free instruction in the first phase so that the phase could be included in the behavioural analysis; however the aim of this phase was simply to measure a baseline SCL. If a think free instruction were included then this may have affected the baseline SCL reading as they would have a slightly different task to those who having no contact with the unwanted thought in this phase.

Stimuli

Screening questionnaires

Three screening measures were administered: Acceptance and Action Questionnaire (*AAQ II*; Bond et al, under review), White Bear Suppression Inventory (*WBSI*; Wegner & Zanakos, 1994), Beck Depression Inventory (*BDI*; Beck, Steer & Brown, 1996) to screen for pre-experimental levels of emotional avoidance, anxiety, thought suppression and depression, respectively. Most participants fell within a normal range however the data of four participants was excluded due to high scores on the depression inventory (a score of 10+ on the BDI qualified as a high score). The overall mean scores were: AAQ II = 51, WBSI = 48.5, BDI = 5.78. As with experiment 3, the FSQ was again administered to participants in order to ascertain the spider fearful and non spider fearful groups. (Average FSQ scores – spider

fearful experimental group = 85.29, spider fearful baseline group = 87.6, non spider fearful experimental group = 27.93, non spider fearful baseline group = 25.42)

Skin Conductance Level (SCL) Measurement

Electrodes were attached with Velcro fasteners to the second phalanges of the first and third fingers of the participants' non dominant hand (Fowles, Christie, Edelberg, Grings, Lykken & Venables, 1981). The electrodes were connected to an ADI instruments ML865 Powerlab 4/25 T System, which continuously monitored and recorded SCL during the study. SCL was measured in Volts (V) and recorded every second during each phase; these measurements, for each five minute phase, were collated to create an overall average SCL. SCL elevation was derived from the difference between the participants baseline SCL in the initial think free five minute phase in comparison with SCL in the two later phases.

Procedure

On each participant's arrival at the prescribed room, the participant was greeted by a male experimenter. Before commencing the study participants were required to complete the consent form, the screening questionnaires and the FSQ. Before receiving experimental instructions each participant was seated in front of the computer screen in the laboratory. Loaded onto the computer was the five minute space bar program, which recorded the amount of times the participant pressed the space bar in the five minute period. All participants, regardless of group, were provided with the target word/thought 'spider'.

Experimental Condition

After having the electrodes attached participants entered a five minute think free phase which served as a baseline SCL measure. The instruction for this phase was as follows; *'In the next five minutes, you are free to think of what you like.'* The participants then entered the second phase of the study, the suppression phase, for which they received the following instructions; *'In the next five minutes, try your*

best not to think of a 'spider'. Every time you do think of a 'spider' please press the space bar on the computer in front of you'. Finally the participants were cycled into a liberal rebound phase and instructed as follows; *'In the next five minutes, you are free to think of what you like. If however the thought of a 'spider' does enter your awareness then please press the space bar just as before'.*

Baseline Condition

After having the electrodes attached the participants in the baseline group also entered a five minute think free phase which served as a baseline SCL. The instruction being '*In the next five minutes, you are free to think of what you like.*' The participants then entered the second five minute phase where they were given the liberal rebound instruction '*In the next five minutes, you are free to think of what you like. If however the thought of a 'spider' does enter your awareness then please press the space bar just as before'.* Finally participants entered the third five minute phase where they again received the liberal rebound instruction.

To summarise, the experimental condition participants completed a think free phase, a suppression phase and a liberal rebound phase, whilst the baseline participants completed a think free phase, followed by two liberal rebound phases. All participants were instructed to keep their non dominant hand as still as possible during the course of the experiment. Upon completion of the study, subjects were debriefed and course credit was allocated to them.

3.2.2. Results

Questionnaire Measures

In order to avoid confounding the results participants in each of the four groups had to score similarly on each of the screening questionnaires. A 4 (Group; spider fearful experimental, spider fearful baseline, non spider fearful experiment, non spider fearful baseline) x 3 (Questionnaire; AAQ II, WBSI, BDI) mixed ANOVA revealed no significant main effect for Questionnaire, $F(1, 58) = 0.508; p > 0.05$, and no significant interaction between Group and Questionnaire, $F(3, 58) = 0.274 ; p > 0.05$. Post hoc Tukey HSD tests (see Table 7) indicated that there were

no differences on these questionnaires, between the spider fearful experimental group (AAQ II = 51.52, WBSI = 48.88, BDI = 6.41), the spider fearful baseline group (AAQ II = 49.86, WBSI = 49.83, BDI = 6.46), the non spider fearful experimental group (AAQ II = 53.4, WBSI = 46.66, BDI = 5.2) and the non spider fearful baseline group (AAQ II = 49.47, WBSI = 51.05, BDI = 5.11).

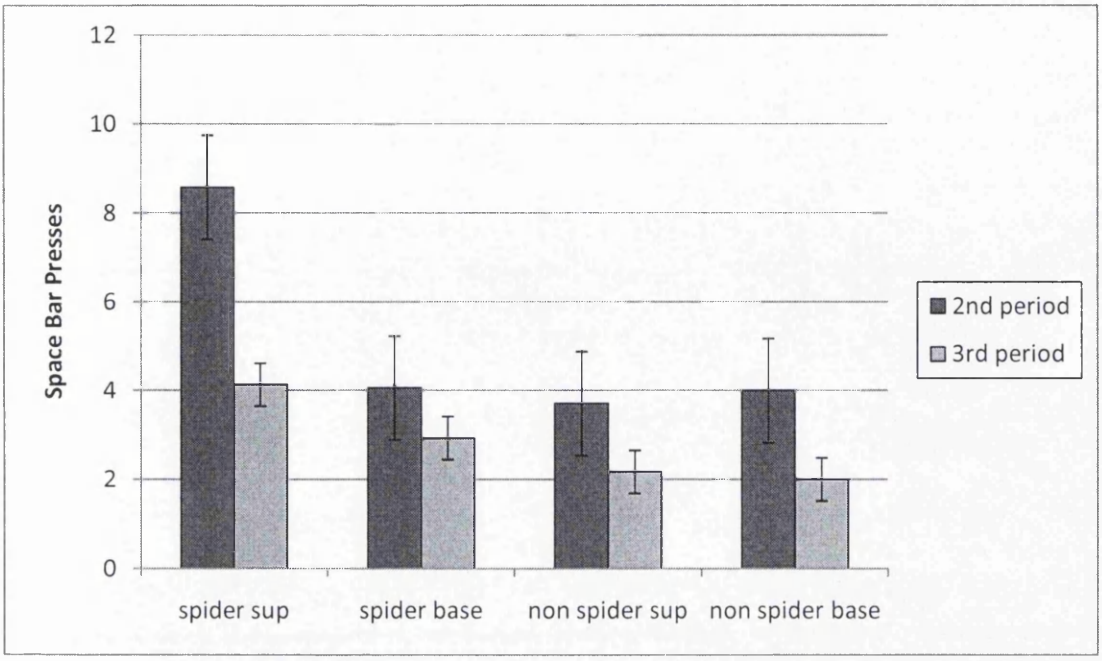
Comparison	AAQ	WBSI	BDI
Spider exp v non spider exp	*t(32) = -0.414*	*t(32) = 0.268*	*t(32) = 0.030*
Spider exp v spider base	*t(30) = 1.174*	*t(30) = -1.914*	*t(30) = -0.732*
Spider exp v non spider base	*t(29) = -0.573*	*t(29) = 0.672*	*t(29) = -0.762*
Non spider exp v spider base	*t(30) = 0.487*	*t(30) = -1.518*	*t(30) = -0.578*
Non spider exp v non spider base	*t(29) = 1.444*	*t(29) = -1.976*	*t(29) = 0.107*
Spider base v non spider base	*t(27) = -0.140*	*t(27) = -0.372*	*t(27) = -1.004*

Table 7. The difference between each group on the various questionnaires. All non significant at the 0.05 level, Experiment 4.

Behavioral measure: Thought Intrusions

The amount of times each participant pressed the space bar in the second and third five minute phases served as one dependent variable. Figure 5 shows how the amount of space bar presses differed between groups; the spider fearful experimental group (2^{nd} phase M = 8.58, 3^{rd} phase M = 4.13) appeared to press the space bar more than the non spider fearful experimental group (2^{nd} phase M = 3.71, 3^{rd} phase M = 2.17), the spider fearful baseline group (2^{nd} phase M = 4.06, 3^{rd} phase M = 2.93) and the non spider fearful baseline group (2^{nd} phase M = 4, 3^{rd} phase M = 2).

Figure 5. The amount of times participants pressed the space bar in the second and third five minute phases, Experiment 4.



A 2 (Phase; experimental or baseline) x 4 (Group; spider fearful experimental, spider fearful baseline, non spider fearful experimental, non spider fearful baseline) mixed ANOVA revealed a significant main effect for Group, $F\ (1, 56) = 18.56,\ p < 0.05$, and a significant interaction between Phase and Group, $F\ (2, 56) = 3.729;\ p < 0.05$ Subsequently post hoc Tukey HSD tests were conducted on the data to determine where the differences were.

First, the tests were performed on the data from the 2nd phase. The experimental groups in this phase received a suppression instruction, whereas the baseline groups received a liberal rebound instruction. The results revealed a significant main effect between the spider fearful experimental group and the non spider fearful experimental group, $t(32) = 2.283,\ p < 0.05$, the spider fearful baseline group, $t(30) = 2.017,\ p < 0.05$, and the non spider fearful baseline group, $t(29) = 2.008$, $p < 0.05$, suggesting that the spider fearful group had the unwanted thought 'spider' occur significantly more often than those in each of the other groups. However, no significant main effect was found, between the non spider fearful

experimental group and the spider fearful baseline group, $t(30) = -0.308$, $p > 0.05$ between the non spider fearful experiential group and the non spider fearful baseline group, $t(29) = -0.258$, $p > 0.05$ and between the spider fearful baseline group and the non spider fearful baseline group $t(27) = 0.059$, $p > 0.05$. Thus, the non spider fearful participants who were required to suppress experienced the same amount of thought intrusions as those with no suppression instruction.

Second, a series of post hoc Tukey HSD tests were conducted on the 3rd phase. For this phase each group received liberal rebound instructions. The results revealed a significant main effect between the spider fearful experimental group and the non spider fearful experimental group, $t(32) = 2.062$, $p < 0.05$, and between the spider fearful experimental group and the non spider fearful baseline group, $t(29) = 2.462$, $p < 0.05$, suggesting that, in the phase following attempted suppression, the spider fearful experimental group had the thought come to mind significantly more than the experimental and baseline non spider fearful groups. However importantly, no significant main effect was discovered between the spider fearful experimental group and the spider fearful baseline group $t(29) = 1.047$, $p > 0.05$, suggesting that in the liberal rebound phase, spider fearful participants without any prior suppression instruction will indicate just as many thought intrusions as those with who have undergone a 5 minute suppression phase beforehand. Finally no significant differences were found between the non spider fearful experimental group and the spider fearful baseline group, $t(30) = -0.695$, $p > 0.05$ between the non spider fearful experiential group and the non spider fearful baseline group, $t(29) = -0.216$, $p > 0.05$ and between the spider fearful baseline group and the non spider fearful baseline group $t(27) = 899$, $p > 0.05$, suggesting that non spider fearful participants who had previously undergone a suppression phase, did not experience any greater intrusion rebound than those who had not undergone a suppression phase.

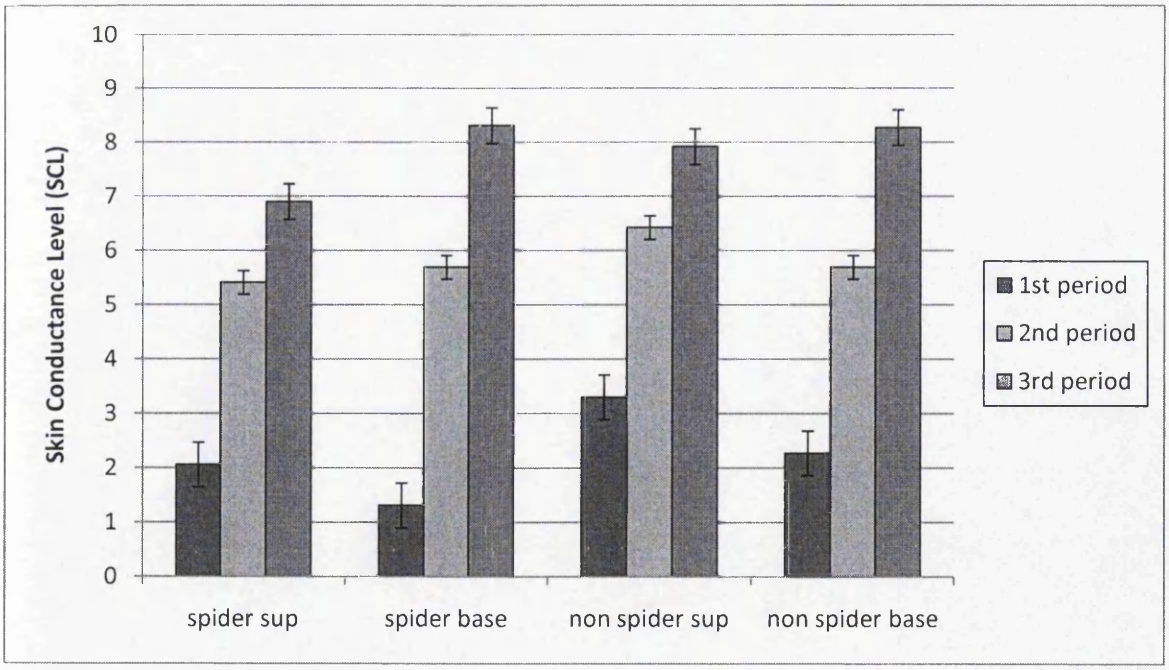
In summary, the spider fearful group experienced an immediate enhancement ~~effect,~~effect; they had the unwanted thought intrude significantly more than baseline and the non spider fearful groups. However the non spider fearful group did not experience such an increase; suggesting that only under the high valence condition did an immediate enhancement effect occur. The liberal rebound analysis revealed

that those participants in the two spider fearful groups experienced a significantly greater thought intrusion in comparison to the other groups, regardless of whether they had received a suppression or baseline instruction; questioning the validity of any rebound effect.

Physiological measure; Skin Conductance Levels (SCL)

Each group of participants had their SCL measured for each of the three five minute phases. Figure 6 displays the differences between each phase and each group. The figure appears to show little difference between the spider fearful experimental group (1st phase = 2.056, 2nd phase = 5.408, 3rd phase = 6.899), the non spider fearful experimental group (1st phase = 3.299, 2nd phase = 6.419, 3rd phase = 7.918), the spider fearful baseline group (1st phase = 1.31, 2nd phase = 5.69, 3rd phase = 8.31) and the non spider fearful baseline group (1st phase = 2.27, 2nd phase = 5.69, 3rd phase = 8.27).

Figure 6. The average SCL for each group in each five minute phase, Experiment 4.



A 3 (Period; 1st, 2nd and 3rd) x4 (Group; spider fearful suppression, spider fearful baseline, non spider fearful suppression and non spider fearful baseline) mixed ANOVA revealed a significant effect for phase, $F\ (2,\ 120) = 121.72;\ p < 0.05$, however no interaction was found between phase and group, $F\ (6,120) = 1.270;\ p > 0.05$, suggesting that significant differences were emerging between each phase, but not between each group.

In terms of phase, paired sample t tests revealed, regardless of group, a significant main effect between the first five minute phase and the second, $t(63) = -10.007;\ p < 0.05$, between the first five minute phase and the third $t(63) = -12.336;\ p < 0.05$, and between the second five minute phase and the third, $t(63) = -7.329;\ p < 0.05$. This result suggests that all groups, whether they had received a suppression instruction or not, experienced a significant increase in their physiological arousal from the first to the second to the third five minute phase. In terms of group, however, post hoc Tukey tests revealed no significant main effect between each of the four groups for any of the three phases (see Table 8). This suggests that all groups, regardless of whether they had received a suppression instruction or not, experienced the same increase in physiological arousal.

Comparison	1st phase	2nd phase	3rd phase
Spider exp v non spider exp	*t(32) = -0.909*	*t(32) = -0.531*	*t(32) = -0.526*
Spider exp v spider base	*t(30) = 0.646*	*t(30) = -0.368*	*t(30) = -0.768*
Spider exp v non spider base	*t(29) = -0.258*	*t(29) = -0.201*	*t(29) = -0.767*
Non spider exp v spider base	*t(30) = 1.155*	*t(30) = 0.149*	*t(30) = -0.177*
Non spider exp v non spider base	*t(29) = 0.633*	*t(29) = 0.343*	*t(29) = -0.162*
Spider base v non spider base	*t(27) = -0.722*	*t(27) = -0.185*	*t(27) = 0.019*

Table 8. The difference between SCL each group across all phases. All non significant at the 0.05 level, Experiment 4.

In summary, all participants experienced a significant increase in physiological arousal from the first to the second to the third five minute phase, however no group differences emerged. The implications of this are twofold; not

only does a high valence thought not cause an increase in physiological arousal compared to a low valence thought, but additionally the act of engaging in suppression may not cause any physiological effects, when compared to a baseline group.

3.2.3. Discussion

The results of Experiment 4 revealed that a spider fearful participant suppressing thoughts of spider will think of that thought significantly more than a non spider fearful suppression participant, and a baseline group participant. Therefore, demonstrating an immediate enhancement effect and suggesting that the suppression of a high valence thought is more difficult than that of a low valence thought. In addition to this, the non spider fearful participants, who had to suppress thoughts of spider, did not have the unwanted thought come to mind any more than a non spider fearful baseline group with no suppression instruction, suggesting that suppression of a neutral thought does not result in an immediate enhancement effect. This replicates the results of Experiment 3, whilst contradicting the results of Experiment 1, which found an immediate enhancement effect whilst employing neutral thought. The finding has important implications as it suggests that the ironic effects associated with thought suppression may only be evident when the target thought is of a high valence nature to the participants. In terms of the liberal rebound phase, the result showed that those in the spider fearful groups experienced a greater amount of thought intrusions, in comparison to the non spider fearful groups, regardless of whether they had received a suppression instruction, thereby casting doubt on the idea of a 'rebound effect'. In terms of the physiological measure, the results of the study seemed to show that general suppression, whether the target thought is a high valence one or not, does not have any effect on SCL.

Of the studies which only measured thought suppression behaviourally, Kelly and Kahn (1994) and Muris et al (1997) found that suppression of a personally relevant thought did not cause an increase in intrusion rate. The current results however concur with the results of McNally and Ricciardi (1996), Muris et al (1998) and Wenzel et al (2003) who found that a high valence thought produced an increase

in reported intrusions. All of the studies that combined both behavioural and physiological measures, Wegner et al (1990), Wegner and Gold (1995) and Gross and Levenson (1993; 1997) found that participants did not differ behaviourally. There was no difference in reported intrusions between the high valence and low valence groups. However, these researchers did find a physiological effect, that is, participants in the high valence groups experienced higher physiological arousal than those in the low valence group. The results of the current study are the reverse. It was found that the high valence group reported more thought intrusions, however a difference between groups in terms of SCL did not emerge.

Muris et al (1991; 1992) found that the neutral group reported significantly more thought intrusions than the high valence group. However, in the current results the opposite pattern emerged, that is, the spider fearful participants reported more thought intrusions than the low valence groups. Muris et al (1991; 1992) did, however, show minor SCL effects for suppression and did not report any SCL effects for valence. The results of the current study are in contrast to these findings in that all participants, regardless of condition, experienced the same physiological effects. Finally, Cioffi and Hollaway (1993) found both elevated thought intrusion and SCL in the high valence group. The results partly support this in terms of the number of thought intrusions, however, the current SCL data do not support this finding. One potential reason for the contradictory results reported herein and previous experimental work might be the sub clinical nature of the population involved. Despite previous work employing similar experimental paradigms to Experiment 4, none of these studies recruited sub clinical populations and nor did they measure SCL in phobic populations, instead they manipulated valence by employing high emotional unwanted thoughts in a typical population (Muris et al., 1991; 1992; Gross & Levenson, 1993; 1997; Wegner & Gold, 1995),

Despite providing tentative support that engaging in the suppression of high valence material may produce an increased number of thought intrusions compared to the suppression of a neutral thought, the physiological results found are somewhat disappointing and warrant further discussion. First, with a lack of research studying thought suppression, SCL and spider fear, it is impossible to know the normal SCL

response that a spider fearful participant might have. And given that the spider fearful group was sub clinical, it is possible that being instructed to not think of a 'spider' was not high valence enough to cause a significant physiological response.

Second, the physiological data does show a distinct increase from baseline, to the second period and then to the third period, with no apparent difference between groups. Without the inclusion of the baseline study groups, the result would suggest that merely engaging in suppression of any type, whether high valence or not, causes an increase in physiological arousal. Interestingly, however, the baseline group experienced similar increases in SCL across each of the five minute periods. On visual inspection, the result would seem to suggest that no physiological effect was found. However, this of course raises the following question. Why then did the participants experience an increase in physiological arousal across phases? Although purely tentative, one potential explanation for this anomaly might be post experimental debriefing sessions with the baseline participants. A number of baseline participants informed the experimenter that after the liberal rebound instruction they immediately engaged in a suppression attempt. If this were the case then this would explain how the experimental and baseline groups experienced similar physiological responses. Of course, in order to support this assumption another 'baseline' group would need to be recruited in which no instruction was provided during three consecutive five minute periods.

Overall, the results of the study suggest that trying to suppress a high valence thought is more difficult than suppressing a low valence thought. The physiological results suggest that suppression, regardless of valence, has no effect on SCL. However, it is possible that participants in the baseline group engaged in suppression attempts naturally despite receiving the baseline instruction. This not only casts new light on the results of the current study, but it also casts doubt on the validity of any baseline condition included in thought suppression research. Further research is needed in order to fully explore this possibility, for example a baseline condition could be compared to a suppression condition on an implicit measure.

3.3. Concluding comments

The results of the current chapter seem to suggest that the suppression of high valence thoughts cause an immediate enhancement and rebound effects, whereas the suppression of neutral stimuli does not. This result is directly contradictory to the results of Experiment 1, which found that the suppression of neutral stimuli resulted in both effects. Although these results might, at first glance, appear disappointing, assuming that individuals do not generally engage in the suppression of neutral stimuli, the results of Chapter 3 provide strong evidence that an immediate enhancement effect and a rebound effect does exist with the most critical type of thought in this area, that is a high valence unwanted thought. This finding may have applied relevance. Specifically, it is possible that the increased intrusions rate of a high valence unwanted thought might play some part in the aetiology and maintenance of some psychopathologies.

Overall, the results of Experiments 1-4 broadly suggest that mental control via thought suppression, which has been explored via a number of distraction techniques, and over both short and longer periods of time, is futile. Chapter 4 of the current thesis aims to explore why thought suppression is so difficult by employing a novel paradigm in order to extend on Wegner's (1989) Environmental Cueing Hypothesis.

Chapter 4

A behavioural account of thought suppression

4. Introduction

Despite the prevalence of suppression as a coping strategy for unwanted thoughts, the literature suggests that it is frequently unsuccessful and indeed can be highly counterproductive (Beevers, Wenzlaff, Hayes & Scott, 1999). In order to account for the counterproductive effects of thought suppression, Wegner (1989) has proposed the 'Environmental Cueing Hypothesis' (ECH). According to ECH, suppression involves two cognitive control processes (Wegner & Erber, 1992). One process, which is not under conscious control, and is known as the automatic target search, automatically searches through consciousness for evidence of the unwanted thought. A second, intentional or consciously controlled process, referred to as the controlled distracter search, searches through memory and the environment looking for distracting information. As the automatic process does not require continuous monitoring it can detect evidence of the unwanted thought more rapidly than an individual can consciously generate distracters. As a result, the unwanted thought re-emerges into consciousness and becomes associated with the intended distracter so that henceforward the distracter may be more likely to cue the unwanted thought. Once the first distracter has thus effectively failed to divert attention from the unwanted thought other distracting thoughts are generated. However, the same process occurs and eventually a number of (intended distracter) stimuli within memory and the environment have become associated with the unwanted thought and exposure to these previously encountered distracters prompts the re-emergence of the unwanted thought into consciousness to an even greater extent. The end result is hyper-accessibility of the unwanted thought during a suppression episode, and rebound of the thought following the attempt to suppress.

To date, three principal empirical studies have examined the validity of the ECH (Wegner, Schneider, Knutson & McMahon, 1991; Wegner & Erber, 1992; Najmi & Wegner, 2008). In the first of these studies participants were exposed to three five minute periods (Wegner et al., 1991). 1) Participants were instructed to suppress a target thought (i.e., thoughts of a white bear) whilst a slideshow of neutral images was shown in the background (Slideshow A). 2) Participants were required to express thoughts of the target (i.e., white bear) whilst the second slideshow, of neutral but different content was shown in the background (i.e., Slideshow B). 3)

Participants had to express thoughts of the target whilst slideshow A was replayed in the background. The dependent measure in the study was the self reported ringing of a bell that was placed on a table in front of the participant to indicate any occurrence of the target thought. The findings from this study supported the ECH in that the thought rebounded significantly more in an expression period during which the slideshow was repeated (i.e., Slideshow A), demonstrating that the suppressed thought was triggered by cues in the environment.

In the second study, after an initial five minute suppression period, participants were instructed to continue to suppress the target word (i.e., white bear) whilst completing a concurrent task. The concurrent task involved presenting participants with one word at a time and them responding to each word by generating (i.e., by naming the word out loud) an associated word. For example, while suppressing the target item 'white bear' the participant may have been presented with the word 'dog' (i.e., word presented by experimenter) and they may have responded with the word 'cat' (i.e., associated word) Again the findings from this study provided support for the ECH. Specifically, when participants were presented with a word closely associated with the target word, they would often say the target word that they were meant to be suppressing. For example, when presented with 'dog' (i.e., word presented by experimenter) saying 'bear' (i.e., target word). According to Wegner and Erber (1992) this pattern of emergent responding occurred as the target word was being directly cued by the associated words. Najmi and Wegner (2008) replicated these effects using a lexical decision paradigm. Participants in their study were instructed to either suppress or concentrate on a target word for a five minute period. After the five minute period they were instructed to continue to suppress/concentrate on the target word whilst completing an associative priming lexical decision task. An associative priming lexical task involves the sequential presentation of word pairs, in order to determine whether the presentation of a related word will interfere with the speed at which the second item is processed. If two words closely related are presented (e.g., nurse and doctor) responding to the first item is generally faster than if two unrelated items are presented (e.g., nurse, lion). In Najmi and Wegner's (2008) study the participants were required to press the spacebar if the second word was written in English while response times were recorded. The results indicated that participants demonstrated

significantly faster response times when the first word presented in the pair (i.e., the prime) was a word closely associated with the target word. Again these findings, supported the ECH, that is, the suppressed word was cued by the closely linked (directly associated/related) words.

Together these findings lend support to Wegner's postulate that stimuli in the environment that are intentionally (directly) related to target will cue the target thus rendering suppression attempts difficult. Thus thought suppression may not work as a result of relations with intentionally sought out distracters. A behavioral paradigm known as stimulus equivalence (SE), however, suggests that if there is intentional relating of stimuli in the environment then unintentional relations may also emerge (Dymond & Roche, 2008) and these relations may make the attempt to suppress even less likely to succeed. SE is an empirically demonstrable effect in which training certain relations between arbitrary stimuli (e.g., nonsense words) leads to the derivation of several further untrained (derived) relations between those stimuli. It typically involves training a number of unidirectional relations between stimuli and testing for the emergence of derived relations. For example, a participant might be trained to choose B1 in the presence of A1 and C1 in the presence of B1. In subsequent testing (without feedback), she may reverse the taught relations by choosing A1 in presence of B1, and B1 in presence of C1 ('derived symmetry') and might also combine taught relations by choosing A1 in presence of C1 and vice versa ('derived transitivity'). The overarching response pattern is labelled 'stimulus equivalence' because it effectively represents treating the stimuli as 'equivalent' or mutually substitutable (e.g., Sidman, 1994).

Stimulus equivalence also involves a related phenomenon known as transfer of function (TOF) whereby if one member of the post-training group of 'equivalent' stimuli acquires a 'psychological function' (e.g., is established as being aversive) then other stimuli in that group acquire the same function. Transfer of function through derived equivalence may produce unintentional relational generalization of thought suppression. For example, using the example given in the introduction, imagine a child who fears spiders. At some point, she might learn that spiders (A) lay eggs (B). She might also learn that eggs are one of the ingredients of cake (C). These learned relations may allow her to derive a relation between spiders and cake without any direct association of these stimuli being necessary (see, e.g., Barnes-

Holmes, Cochrane, Barnes-Holmes, Stewart, & McHugh, 2004). The child's fear may lead to attempts to suppress thoughts of spiders. However, there might also be a transfer of functions through equivalence from spiders to cake such that being reminded of the stimulus 'cake' might also be something that cues 'spider'. Thus the unintentionally related stimulus 'cake' becomes something to be suppressed also. If two apparently unconnected stimuli such as these may be thus related then a vast array of other stimuli may be similarly implicated, making thought suppression even more futile than even the ECH might predict.

The aim of this chapter is to demonstrate the possible role that derived stimulus relations may have in aetiology and maintenance of thought suppression. Experiment 5 aims to show how directly and indirectly trained items can serve to hamper thought suppression attempts. Experiment 6(a) and 6(b) aim to show how participants may change their natural behaviour in order to avoid all contact with, not only the unwanted thought, but also directly trained and derived items.

4.1 Experiment 5

To demonstrate transfer of thought suppression / interference functions participants were first trained using a standard conditional discrimination paradigm to relate real words and non-words to one another so as to result in three emergent stimulus equivalence relations. To generate these relations, participants were trained to choose particular A stimuli (which were real words) in the presence of particular B stimuli (nonsense words) and to choose each of the B stimuli in the presence of a particular C stimuli (nonsense words). Participants were then tested, as per the typical equivalence paradigm, for derivation of predicted derived AC and CA relations. In the critical phase of the experiment, participants were then instructed to suppress one of the three (real word) A stimuli (i.e., 'Bear'), and were told that they could use the space bar to remove any of a number of words that appeared on a computer screen in front of them. Removal of the target word 'Bear' which they had been told to suppress would provide an analogue of direct thought suppression, while suppressing the nonsense word in derived relations with 'Bear' would show derived thought suppression.

Experiment 5 also examines the importance of context for the effect under consideration. One important finding from the empirical literature is that derived relational responding, including the precise pattern of derived relations themselves as well as the subsequent pattern of transfer of function, is context dependent. Wulfert and Hayes (1988), for example, used the contextual features of colour and tone as cues to determine both the content of particular equivalence relations as well as the transfer of sequential functions based on those relations. In order to begin to analyze the contextual conditions affecting thought suppression, the current experiment also included a manipulation of context. This initial manipulation was directed at demonstrating that context can determine whether or not the phenomenon actually appears. The manipulation of context involved a control group of participants who were exposed to an identical preparation and who were given no suppression instructions but were told simply to remove the word 'Bear' from the screen. If they subsequently removed the target but did not remove related words then this would constitute evidence for the context dependent nature of the transfer of suppression / interference functions.

The aim of Experiment 5 is to model the unintentional generalisation of thought suppression through equivalence class formation. Previous research has suggested that thought suppression is difficult due to the intentional distracters that the thought becomes associated with. The current experiment aims to show the extended futility of thought suppression by demonstrating that, not only words that have been intentionally associated with the target thought, but words that have never been trained (or have been derived) can also become associated with the target thought and hamper the suppression attempt.

4.1.1. Method

Participants and design

Thirty undergraduates (18 female) participated in the study in exchange for course credit. A 2 (group: suppression versus instruction) x 4 (word type: target, trained, derived and unrelated) mixed design was employed with repeated measures on the latter factor.

Screening questionnaires

Three screening measures were administered: the *Acceptance and Action Questionnaire II* (AAQ II, Bond et al, under review) the *White Bear Suppression Inventory* (Wegner & Zanakos, 1994) and the *Beck Depression Inventory II* (Beck, Steer & Brown, 1996). The purpose of these measures was to screen for pre-experimental levels of emotional avoidance, thought suppression and depression, respectively. The sample was non-clinical with all participants falling within a normal range (overall mean questionnaire scores: AAQ II = 52 (sd +/- 6.71, WBSI = 45.6 (sd +/- 8.26, BDI = 4.7 (sd +/- 2.93).

Procedure

All participants were exposed to the first four stages of the procedure: (1) relational training; (2) relational testing; (3) suppression induction; (4) cognitive load. The fifth stage of the procedure examined a between-subjects factor (suppression versus instruction), for which the participants were randomly assigned to one of two groups.

(1) Relational Training

The participant was shown into the experimental room and was seated in front of the computer. Relational training commenced with the following instructions across the middle of the computer screen:

> "*Look at the Box Above and then Click on the Box Below that GOES WITH the one at the Top. Try Your Best NOT to Make Any Mistakes.*"

This stage provided participants with match-to-sample conditional discrimination training designed to provide the basis for the following three equivalence relations: A1 (Bear)-B1 (Boceem)-C1 (Gedeer); A2 (Door)-B2 (Murben)-C2 (Remond); A3 (Shoe)-B3 (Surtel)-C3 (Sipher). Each predicted relation thus included one real word (the A stimulus) and two nonsense words (the B and C stimuli).

Training involved both A-B and B-C trial-types. In AB trial-types, participants were presented with A1, A2, or A3 as the sample stimulus and then had to choose from among the three comparison stimuli B1, B2, and B3. A correct response was B1 given A1, B2 given A2, and B3 given A3. For the three BC trial-types, participants were presented with B1, B2 or B3 as the sample stimulus and had

to choose from the three comparison stimuli C1, C2, and C3. A correct response was C1 given B1, C2 given B2, and C3 given C3. In all trials, the spatial positioning of the comparison stimuli and the correct comparison stimulus (left, middle or right) was counterbalanced. There was no time limit for responding to individual trials. If the participant responded correctly, the stimulus display cleared and the word "Correct" appeared on the screen for 3000 ms. If the participant responded incorrectly, the stimulus display cleared and the word "Wrong" appeared on the screen for 3000 ms. The 6 trial-types (3 AB and 3 BC) were presented in a repeating quasi-random cycle and the criterion for proceeding to the testing phase was 12 consecutively correct. Once the criterion had been reached, the computer automatically cycled the participant into the next phase.

(2) Relational Testing

The relational testing stage was designed to probe for derived C-A relations. For example, in the training phase participants were trained to choose B1 (i.e., boceem) in the presence of A1 (i.e., bear), and to choose C1 (i.e., gedeer) in the presence of B1 (i.e., boceem). Hence, in the testing phase, they were tested to see whether they would show derived AC relations by choosing A1 in the presence of C1.

On the first test trial, the following instructions were shown across the middle of the computer screen:

> "*Look at the Box Above and then Click on the Box Below that GOES WITH the one at the Top. Try Your Best NOT to Make Any Mistakes. DURING THESE TRIALS THE COMPUTER WILL NOT GIVE YOU ANY FEEDBACK.*"

This stage involved three CA trial-types. Participants were presented with either C1, C2, or C3 as the sample stimulus and then had to choose from among the three comparison stimuli A1, A2, and A3. A correct (equivalence) response was A1 given C1, A2 given C2, and A3 given C3. No feedback was provided on any trials. Twelve trials were presented involving four presentations of each of the three trial types. The participant was required to achieve a mastery criterion of 11/12 on this testing phase in order to be cycled into the next phase of the experiment; otherwise he or she was

recycled back through training and testing once again. All participants reached criterion after a maximum of two cycles of training and testing.

(3) Suppression Induction

For the suppression induction, participants were instructed to suppress all thoughts of the word 'bear' for a five-minute period. Each time participants had a thought of the word 'bear' they were required to press the space bar on the keyboard. The purpose of this phase, which was adopted from Wegner and Erber (1992), was to familiarise the participants with the suppression task.

(4) Cognitive Load

High cognitive load in the thought suppression literature has been demonstrated to increase the rebound effects of attempted thought suppression (Wegner & Erber, 1992). The purpose of this stage was to provide participants with a high cognitive load task in order to increase the likelihood of this effect. Immediately after the suppression stage ended, the participant was given a sheet of paper with a six-digit number on it. She was told that she had 25 seconds to commit the number to memory, and that she would have to write this number down after the experiment had finished.

(5) The Suppression versus Instruction Phase

The final stage of the experiment was the suppression versus instruction stage in which participants were randomly assigned to either the suppression or instruction condition/group. This stage was designed to (i) probe for the generalisation of thought suppression (or transfer of thought suppression functions) via derived equivalence relations in the suppression condition; and (ii) demonstrate that transfer of thought suppression functions is contextually controlled, by comparing results for the suppression condition with results for the instruction condition.

In this stage, participants in both conditions were presented with 18 words (1 target, 2 target related, 6 trained but non related and 9 novel words) 5 times each (i.e., a total of 90 word presentations) for ten seconds in a random order (see Table 9 for a list of the words and non words employed in the current experiment). Participants were required to focus on the computer screen as the words appeared.

The words on the screen could be removed by the participant at any time by pressing the spacebar. If the participant pressed the spacebar the screen would remain blank for the remainder of that ten second time slot.

Target word	**Trained Word**	**Derived Word**	**Other equivalence words**	**Control words**
Bear	Boceem	Gedeer	Shoe	Wollof
			Surtel	Sinald
			Cipher	Drager
			Door	Matser
			Murben	Desund
			Remond	Casors
				Table
				Bird
				Chair

Table 9. The Target, Trained, Derived, Other equivalence and control stimuli employed in, Experiment 5

In terms of experimenter manipulation, the critical difference between the suppression and instruction groups was with regard to the instructions provided at the beginning of the stage. Participants in the suppression group had the following instruction appear on the computer screen and subsequently read aloud to them by the experimenter:

> *"For this part of the experiment you are asked to suppress the unwanted thought whilst attending to a computer program in front of you. It is important that you continue to suppress the unwanted thought as you did in the previous part of the study. Once the program has started words will*

appear every ten seconds in the centre of the screen in front of you. However you are in control of the program, in that if you not happy with a word being on the screen then you can remove it by pressing the space bar. If you choose to remove a word the screen will remain white for the remainder of the 10 seconds at which point the next word will appear. This task will last about 5 minutes. Remember that it is vitally important that you attend to the screen but continue to suppress the unwanted thought that the researcher will provide you with."

It was predicted that these participants would remove not just the word that they had been instructed to suppress, but that, as a result of transfer of functions through derived relations, they might also remove words in derived relations with the to-be-suppressed word.

Participants in the instruction condition had the following instruction appear on the computer screen and subsequently read aloud to them by the experimenter:

"For this part of the experiment you are asked to attend to a computer program in front of you. Once the program has started a variety of words will appear every ten seconds in the centre of the screen in front of you. However you are in control of the program, in that if you not happy with a word being on the screen then you can remove it by pressing the space bar. Your task during this phase it to remove the word 'bear' every time that it appears on the screen. When you do remove the word 'bear' the screen will remain white for the remainder of the 10 seconds at which point the next word will appear. This task will last about 5 minutes".

It was predicted that these participants would remove the word they had been instructed to remove and no other word. This was intended to demonstrate that transfer of functions is a contextually determined phenomenon.

At the end of this stage, participants were required to write down the number they had been given during the previous phase (4) on a piece of paper. They were then thanked and debriefed.

4.1.2. Results

All participants passed relational training and reached the criterion of 11/12 correct responses within three cycles of the testing phase. All went on to show at least some unwanted thought intrusions (with a range of 4-11) during the 5 minutes of the suppression induction stage, thus providing evidence of the efficacy of the manipulation. In addition, all participants correctly wrote out the six digit number that they had been required to remember on a piece of paper provided by the experimenter at the end of the experimental session, thus providing evidence that the cognitive load manipulation was also effective as intended.

Suppression versus Instruction Phase: Number of Words Removed

The critical stage was the final 'suppression versus instruction' stage. On average, participants in the suppression group removed the target word ($M = 5$, sd = 0), the trained word (M = 4.2 sd = 1.32) and the derived word (M=4, sd = 1.73) more often than unrelated words (M = 1.03 sd = 1.05, see Table 10). Meanwhile, participants in the instruction group always removed the target word ($M = 5$, sd = 0), but never or seldom removed the trained word (M=0, sd = 0), the derived word (M=0.06, sd = 0.25) or unrelated words ($M = 0.55$, sd = 0.09).

In order to determine any significant differences a 2(group: suppression or instruction) x 4 (word type: target, trained, derived, and unrelated) mixed design ANOVA was conducted. This analysis revealed a significant effect for word type, $F(3, 84) = 163.543$, $p < .0001$; and a significant interaction between word type and group, $F(3, 84) = 52.699$, $p < .0001$, suggesting that the number of times target, trained, derived and unrelated words were removed from the screen differed depending on whether participants were in the suppression or instruction group.

A series of paired sample t-tests were conducted in order to determine where the significant differences between each word type emerged within each group (see Table 11). As may be seen from Table 11, participants in the suppression group removed the target word significantly more often than the trained word, the derived word and the unrelated words. In addition, they removed the trained and derived words significantly more often than the unrelated words. For the instruction group, participants were also significantly more likely to remove the target word than the trained word, the derived word and the unrelated words. However, there was no

significant difference between numbers of trained or derived words removed and unrelated words removed.

Simple effects analyses were also conducted on the data, in order to compare the groups with respect to the number of times they removed particular words. In the case of the target word, the results revealed no significant difference between the groups. In the case of the trained word, a significant difference was found between the two groups *(F (1, 29) = 151.82*, suggesting that participants in the suppression group removed the trained word significantly more often than participants in the instruction group. A similar pattern emerged in the case of the derived word also *(F (1, 29) = 75.67)*. There was also a significant difference between the two groups with respect to the removal of unrelated words *(F (1, 29 = 12.06))*, with participants in the suppression group removing unrelated words significantly more than participants in the instruction group. As may be seen from Table 10, however, the rate of removal of unrelated words was very low for both groups.

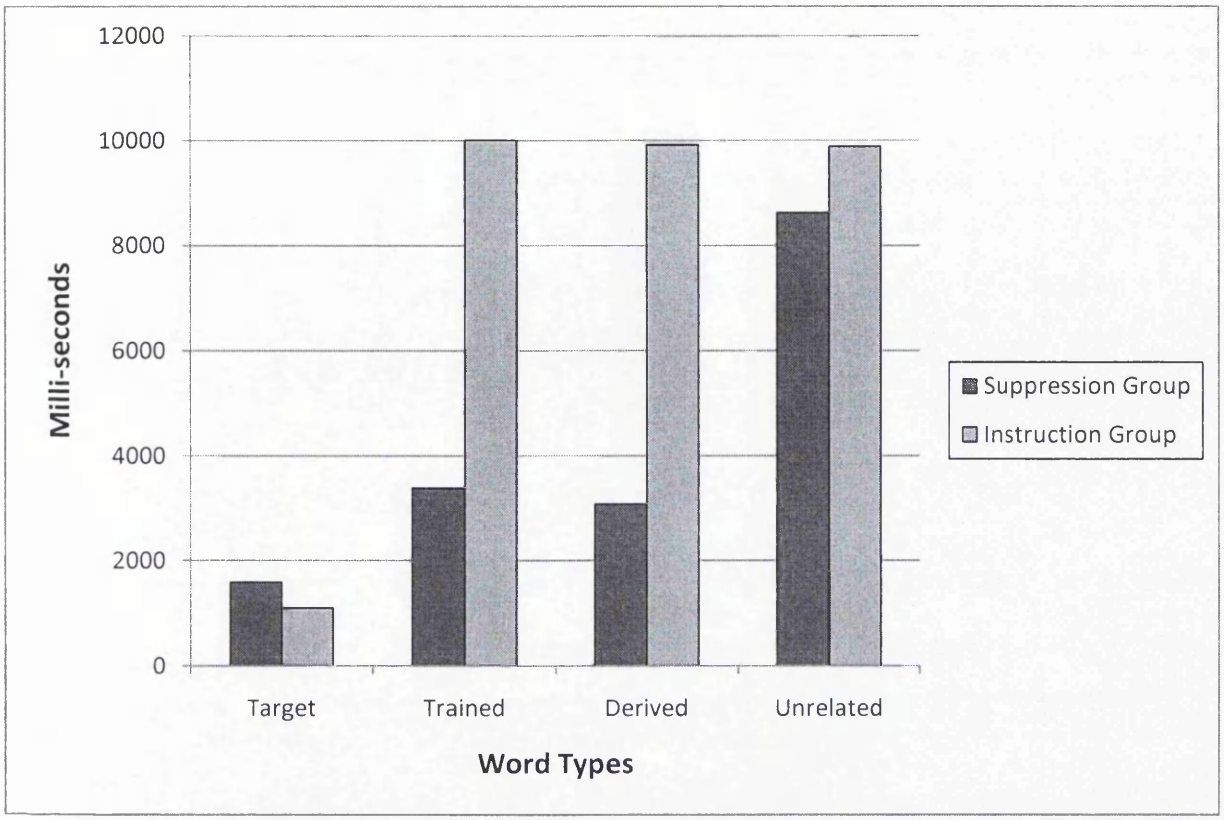
	Target	Trained	Derived	Unrelated
Suppression	5 (100%)	4.2 (84%)	4 (80%)	1.03 (20.6%)
Instruction	5 (100%)	0 (0%)	0.06 (1.2%)	0.554 (11.08%)

Table 10. Mean and percentage number of stimuli removed from the screen for the suppression and instruction groups, Experiment 5.

Suppression versus Instruction Phase: Latencies

From Figure 7 it can be seen that participants in the suppression group consistently removed the target word (M = 1.59 secs, sd = 1.03), the trained word (M=3.38 secs, sd = 2.51) and the derived word (M=3.07 secs, sd = 2.75) more quickly than the unrelated words (M = 8.63 secs, sd = 2.39). Meanwhile, participants in the instruction group often removed the target word (M = 1.11 secs, sd = 0.47) while rarely removing the trained word (M=10 secs, sd = 0), the derived word (M=9.92 secs, sd = 0.32) or the unrelated words (M = 9.88 secs, sd = 0.43).

Figure 7. Mean latencies to removal of stimuli for the suppression and instruction groups, Experiment 5.



In order to determine if the difference in mean lapsed time between the four within subjects levels - target word, trained word, derived word, and unrelated words - across the instruction and suppression groups was significant, a 2 (group: suppression versus instruction) x 4 (word type: target, trained, derived, and unrelated) mixed design ANOVA was conducted. The results revealed a significant main effect for word type $F\ (3,84) = 204.283,\ p < 0.0001$, and a significant interaction between word type and group, $F(3,84) = 68.845,\ p < 0.0001$, suggesting that the amount of lapsed time for each word type was affected by the type of group (suppression or instruction) that the participant had been assigned to.

A series of paired sample t-tests were conducted in order to determine where the significant differences between each word type emerged within each group (see Table 11 for a summary of the inferential results). As may be seen from Table 11, participants in the suppression group removed the target word significantly more quickly than the trained word, the derived word and the unrelated words. In addition, they removed the trained and derived words significantly more quickly than the unrelated words. For the instruction group, participants removed the target word

significantly more quickly than the trained word, the derived word and the unrelated words. However, for this group there was no significant difference in the latency to word removal between the trained, derived and unrelated words.

Latency

	Suppress	**Control**
Target v trained	t(14) = -3.113; p = 0.008	t(14) = -73.402; p = 0.000
Target v derived	t(14) = -2.543; p = 0.023	t(14) = -50.66; p = 0.000
Target v unrelated	t(14) = -12.117; p = 0.000	t(14) = -75.321; p = 0.000
Trained v derived	t(14) = -0.793; p = 0.441	t(14) = -1.000; p = 0.334
Trained v unrelated	t(14) = -6.777; p = 0.000	t(14) = 3.3034; p = 0.009
Derived v unrelated	t(14) = -6.420; p = 0.000	t(14) = 0.322; p = 0.753

Times Removed

	Suppress	**Control**
Target v trained	t(14) = 2.347 ; p = 0.034	No SD*
Target v derived	t(14) = 2.236 ; p = 0.042	t(14) = 74.000 ; p = 0.000
Target v unrelated	t(14) = 14.633 ; p = 0.000	t(14) = 208.144 ; p = 0.000
Trained v derived	t(14) = 0.544; p = 0.595	t(14) = -1.000 ; p = 0.334
Trained v unrelated	t(14) = 6.527 ; p = 0.000	t(14) = -3.384 ; p = 0.004
Derived v unrelated	t(14) = 6.076 ; p = 0.000	t(14) = -0.176 ; p = 0.863

* All participants in the control group removed the target word 5 times and the trained word 0 times, therefore, no standard deviation could be computed, and a t test could not be conducted.

Table 11. Significance values for the suppression versus control groups for number of times stimuli were removed and latency to stimulus removal, Experiment 5.

Simple effects analyses were also conducted on the data, in order to compare the groups with respect to latency. In the case of the target word, the results revealed no significant difference between the groups. In the case of the trained word, a significant difference was found between the two groups *(F (1, 29) = 104.06))*, suggesting that participants in the suppression group removed the trained word significantly more quickly than participants in the instruction group. A similar pattern emerged in the case of the derived word also *(F (1, 29) = 91.460)*. Finally, there was also a significant difference between the two groups with respect to the removal of unrelated words *(F (1, 29) = 11.15))*, with participants in the suppression group removing unrelated words significantly more quickly than participants in the instruction group. Again, as may be seen from Table 10, however, the number of unrelated words removed was low across both groups.

To summarise, whereas both groups removed the target / to-be-suppressed word from the screen, participants in the suppression group removed the trained and derived words from the screen as well, whereas participants in the instruction group did not. The suppression group also removed trained and derived words from the screen to a significantly greater extent as well as significantly faster than unrelated words, suggesting that the presence of words directly or indirectly trained as related to the target interfered with the suppression attempt and thus themselves became targets for removal.

4.1.3. Discussion

Previous research has indicated that an attempt to suppress a thought leads to increased later intrusions of that item into consciousness (Wegner et al, 1987). Experiment 5 aimed to model unintentional relational thought suppression / interference in which attempting to suppress a target word necessitates the additional suppression of words related to the target. Previous research (e.g., Wegner & Erber, 1992; Wegner et al, 1991; Najmi & Wegner, 2008) had demonstrated intentional relational suppression / interference in which the target of a suppression attempt becomes linked to, or 'asymmetrically primed' by environmental cues when attempting to suppress. The current experiment provides an extension of previous work by demonstrating that the suppression target can also become related to words

that were never intentionally related to the target and that people will also attempt to suppress these unintentionally related words.

One issue which may be of relevance to the current study is that participants were required to press the space bar both during the suppression phase and word removal phase. Functionally this is a different response, however formally the response is similar, which may have caused ambiguity in participant response. It must be added, however, that each participant was clearly instructed as the significance of their response in each phase. Nevertheless the current experiment demonstrated, consistent with predictions from the equivalence literature, that participants' suppression attempts of a target word generalised not alone to other words that were directly trained to this word, but also to words that were not directly trained to it but that were in equivalence relations derived by the participant. For example, in this study, a direct relation was trained between the word 'bear' (stimulus 'A' - the target word) and 'Boceem' (stimulus 'B' - non target word 1) and between the latter stimulus and 'Gedeer' (stimulus 'C' – non target word 2) but no direct training of a relation between the A and C stimuli was provided. However, as predicted, participants derived a relation between A and C, thus showing equivalence formation, and furthermore, they not only removed the to-be-suppressed A stimulus from a computer screen when given the opportunity, thus showing direct suppression / interference, they also removed the derived relational C stimulus from the screen, thus showing transformation of function and indirect relational thought suppression / interference. This empirically demonstrated phenomenon which can be referred to as transfer of suppression functions via equivalence, provides a model for generalization of thought suppression / interference via unintentional (derived) relations. The demonstration of this process supplements earlier work on thought suppression and suggests a further reason for why individuals find it difficult to suppress their thoughts and often fail to do so.

This study also supplements the literature on contextual control by demonstrating that transfer of thought suppression / interference functions occurs under contextual control. Previous studies (e.g., Auguston & Dougher, 1997) have shown the importance of contextual control in transfer of function. The current study supplemented these studies with respect to thought suppression / interference. It employed an instruction condition in which participants were not required to

suppress thoughts of the word 'bear' but were simply told to remove the same target word (i.e., 'bear') from the computer screen as the participants in the experimental group were asked to suppress. Whereas the experimental participants removed the target word as well as words related to the target word, the 'instruction' group participants only removed the target word. This showed that transfer of functions leading to removal of equivalent stimuli only occurs in particular contexts such as thought suppression and not simply in any context in which a response to a target stimulus is required. This is important not only for basic understanding of the phenomenon but also for applied interests such as psychotherapy because it shows that the phenomenon of transfer of thought suppression is not inevitable. This study thus promotes basic as well as applied understanding of thought suppression and provides additional explanation of the reasons why it is so often unsuccessful. If attempting to suppress a thought necessitates suppression of all thoughts related directly and indirectly to that thought, then this may indeed render suppression attempts virtually impossible. Nevertheless, the fact that this phenomenon is under contextual control suggests that there are circumstances in which transfer of thought suppression need not occur.

In conclusion, Experiment 5 demonstrated that one possible explanation for unsuccessful thought suppression could lie in derived stimulus relations. Specifically, the results suggest that when attempting to suppress an unwanted thought, that attempt can be interrupted by both direct and derived relations that have been established. Experiment 6 in this chapter will seek to further explore the possible connection between derived stimulus relations and thought suppression by studying avoidance behaviour.

4.2. Experiment 6(a)

There is a growing body of evidence to suggest that experiential avoidance is a key process underlying psychopathology. Thought suppression is an example of experiential avoidance. Recent third wave cognitive and behaviour therapies promote the importance of valued living and suggest the primary determinant moving people away from valued living is in fact experiential avoidance (Plumb et al., 2009). The social verbal community has established the idea that successful living will come when bad experiences are removed. Unfortunately, we cannot control our internal

events as evidenced throughout the current thesis. In the context of making choices automatic reactions (negative or positive) will occur. If we attempt to avoid these reactions (e.g. thoughts) we must also avoid certain choices. One way to model this process experimentally is to present participants with a choice that interferes with a suppression attempt. The counterproductive nature of thought suppression will become more apparent if certain choices are altered in the service of a suppression attempt. If experiential avoidance has a significant impact on an extensive range of behaviours, it is essential that the processes that are involved in the generalisation of this avoidance are understood in order to help explain and predict behaviour. The generalization of thought suppression has been modeled in Experiment 5 above and Hooper et al (in press).

The current experiment aims to extend on Hooper et al (in press) to provide an empirical model of the direct and indirect effects of thought suppression on behavioral choice. Experiment 6(a) will aim to get a basic (non equivalence related) change in a pre suppression induction choice. Participants will first be required to make a preference on a dichotomous selection task. After making their preference they will be instructed to repeat the selection task while suppressing all thoughts of a target word which will be programmed to appear each time participants select their originally preferred stimulus. It is predicted that participants will change their original choice to avoid coming into contact with the target unwanted thought.

4.2.1. Method

Participants

Thirty participants were recruited from the Swansea University subject pool system where credits were granted for participation in the study. Participants ranged in age from 18 to 35 years old (mean age = 24.5; SD = 4.12). The sample was non clinical with all participants falling within a normal range on a number of psychometric indices (see below) including the AAQ (m = 53.04 SD = 6.92) WBSI, (m = 45.52 SD = 5.24) and BDI (m = 3.38 SD = 3.27). The data of five participants was excluded as a result of no selection preference being made in the first part of the choice selection task.

Design

The study involved a within subjects experimental design in that all of the participants completed the same procedure, a 1 factor (preferred selection) 6 level (each ten trial phase from parts 1 and 2 of the choice selection task). The dependent variable was preferred selection (door chosen) in each of the ten trial phases. Specifically; it was aimed to see if preferred selection in the last five phases changed in comparison to the selection made in the ten trial phase from the first part of the choice selection task.

Measures

Participants completed the same measures as in the previous experiment (See Experiment 5).

Procedure

On arrival to the room, each participant was greeted by the researcher and was asked to complete a consent form and the aforementioned three questionnaires (AAQ-2, WBSI, BDI). The general procedure, which followed, consisted of 3 stages: (1) Suppression phase; (2) Cognitive load; (3) Choice selection task.

(1) Suppression Induction

Participants completed the same suppression induction as described in Experiment 5.

(2) Cognitive Load

Participants completed the same cognitive load as described in Experiment 5.

(3) The Choice Selection Task

The participants completed a colour choice task that consisted of two parts. In both parts the participant was instructed to choose one of two colour doors via a choice selection program created in E-Prime 2.0. A red door (approximately 14cm by 18 cm), which was situated in the centre of the left hand side of the screen (approximately half centre metre from the left hand side of the screen and approximately 1cm from the bottom, the top and the centre of the screen), had the

letter 'Q' written above it. A blue door with the exact same dimensions except in the centre of the right hand side of the screen had the letter 'P' above it. Participants throughout this phase of the experiment were required to press either the 'Q' or the 'P' buttons on the keyboard to signal that they were choosing either the red door of the blue door respectively (See illustration 1). Once they had chosen either door, that door would appear to open, under which a blank black screen would appear. Subsequently a new trial began in which both doors were again closed, so that the participant was again required to choose. During the first part of the choice selection task the participants would be presented with 10 trials, during the second part the participants would be presented with 50 trials.

Before the first part began the following instructions were displayed on the computer screen:

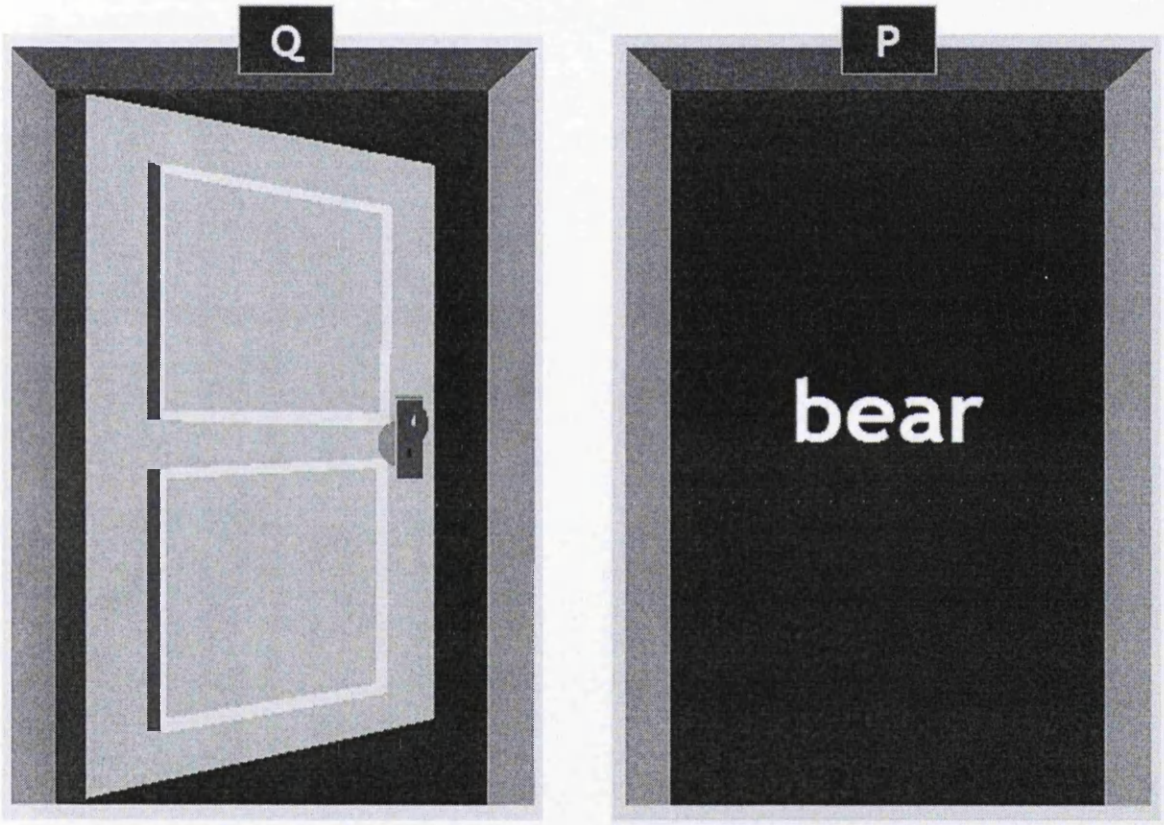
"*This segment of the experiment will consist of two parts. You will receive the instructions for the 2nd part after you have completed the 1st part of the experiment. Over the next few minutes you will see on the screen two doors. One of these doors will be a red door and one of these doors will be a blue door. You can open either door by clicking it. Your task is simply to pick a door to open in each case. You will repeat this task several times during the first part, it will take only a couple of minutes. Bear in mind there is no wrong or right answer for this study; simply click on whichever door you wish.*"

During the second part of the experiment the participant was again required to choose one of two doors. However, part 2 differed from part 1 in a two key ways. First, the participant was instructed to suppress the target thought for the duration of the second part. In this case the word 'bear' was the target. Second, when the participant opened either door, a word (in white writing against a black background approximately 2 cm high in the middle of the door), appeared behind it. Specifically, whenever participants chose the stimulus (coloured door) for which they had shown an initial preference for in part 1, the target word, or one of two control words, appeared behind that door (these words appeared quasi randomly behind the door each time it opened). For example, if, in the first part they chose the blue door predominantly, then in the second part if they chose the blue door again the word 'bear' appeared quasi randomly with the control words. Further, control non words

were displayed behind the door that was not chosen in the first part. The instructions displayed on the screen for the participants in the second part were as follows:

'*The 2nd part of this segment is very similar to the 1st part. You will have to continue to click on whichever door you wish. However, instead of a blank space appearing, when the door opens now, a word will appear behind the door. In addition to choosing doors during the experiment, you are also required to suppress (try your best not to think about) the word/thought 'bear'. Please try your best not to think about this unwanted thought. This phase will last around five minutes.*'

Illustration 1. A screenshot of the choice selection task, Experiment 6.



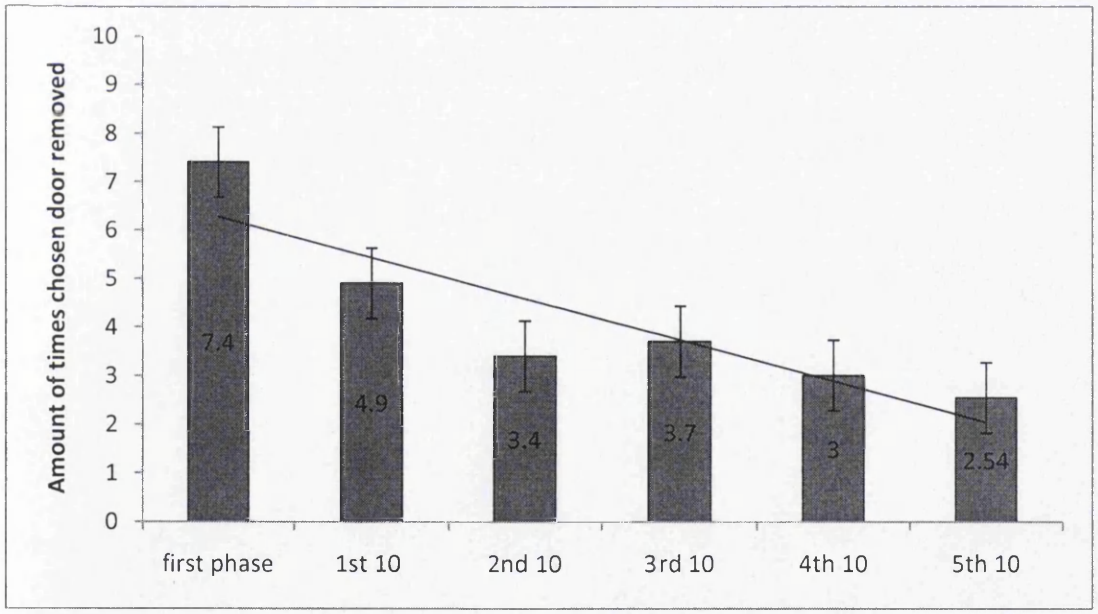
Once this final stage of the experiment was complete, the participant was thanked and debriefed.

4.2.2. Results and Discussion

The number of times participants selected a stimulus (i.e. door) in each ten trial phase across both parts was collated. In part 1 participants were instructed to make ten selections (i.e., choose a door ten times). In part 2 selections (doors chosen)

were recorded across 50 trials while participants were suppressing a target item. Figure 8 below depicts the mean number of times a door was chosen in each ten trial phase Initial door selection was divided relatively equally between red and blue preferences; of the participants included in the analysis 14 participants chose blue initially and 11 participants chose red initially. Therefore compiling the data from both into one data set was valid. This applies to both Experiments 6a and 6b. The first phase was pre-suppression induction, or part 1, whereas the following 50 trials from part 2 are broken into five 10 selection phases each in order to illustrate change in selections over time. The figure indicates that participants gradually change their initial choice from the first phase, to the last phase in part 2. Therefore, the participants by the end of the experiment are choosing their initially non preferred door.

Figure 8. Mean number of choice responses made by participants in Stage 3, Parts 1 and 2, Experiment 6a.



Statistical analysis was conducted on the data to determine if there were significant differences between the number of preferred selections (doors chosen) in each of the 6, ten trial phases of Stage 3 in the experiment. A one way ANOVA revealed a significant main effect $F\ (5,\ 105) = 26.237;\ p < 0.05$, suggesting that further analysis was warranted to explore the data in greater detail. Paired sample t-

tests were therefore carried out between each of the 6 ten trial phases in Stage 3 of the study in order to determine if there was a behavioural shift in choice.

The first batch of t tests found a significant main effect between the initial selection from the first phase in part 1, compared with the selection made in each of the subsequent five phases in part 2 (see Table 12). Participants changed their choice almost immediately after having come into contact with the unwanted thought. Additionally the t values seem to get stronger as we progress thought each of the phases suggesting that participants continued to change their initial selection more as they progressed through the program. Further t tests were conducted to determine if there were significant differences between each set of ten trials in the second part. The results showed that participants would significantly reduce the amount of times that they chose their original preferred door until the second set of ten trials at which point the participants reached a ceiling effect.

Finally, in order to ensure that the participants were not merely responding at chance level, paired sample t tests against chance were conducted. The results revealed that participants responded significantly different to chance in the first phase $t(21) = 8.056$; $p < 0.05$. By the first part of the second phase, however, participants began to respond at chance level as they began to change their preference, $t(21) = -0.339$; $p > 0.05$. For the remainder study participants again made a definite choice significantly different from chance level; second part $t(21) = -3.466$; $p < 0.05$, third part $t(21) = -3.467$; $p < 0.05$, fourth part $t(21) = -4.997$; $p < 0.05$, and fifth part $t(21) = -7.355$; $p < 0.05$.

In conclusion, the results show that the presence of the target word behind the initially preferred selection resulted in each participant gradually changing their selection so that by the end of the experiment they rarely choose their initially preferred stimulus. In terms of the current experiment the results suggested that people will often avoid doing things that they would choose to do in order to avoid the unwanted thought.

Comparison	**Statistic**
1st phase vs. first ten	*t(21) = 5.721, p < 0.05*
1st phase vs. second ten	*t(21) = 6.049, p <0.05*

1st phase vs. third ten	$t(21) = 6.067, p < 0.05$
1st phase vs. fourth ten	$t(21) = 7.604, p < 0.05$
1st phase vs. fifth ten	$t(21) = 8.880, p < 0.05$
First ten vs. second ten	$t(21) = 2.321, p < 0.05$
Second ten vs. third ten	$t(21) = -0.826, p > 0.05$
Third ten vs. fourth ten	$t(21) = 2.190, p < 0.05$
Fourth ten vs. fifth ten	$t(21) = 1.641, p > 0.05$

Table 12. The t-tests conducted on the data from each ten trial phase, Experiment 6a.

The results of Experiment 6(a) demonstrated that participants changed their initial preferred selection in order to avoid contact with an unwanted thought. This result models how thought suppression may cause constriction in one's life, as one may stop acting in a preferred manner in order to avoid unwanted thoughts. According to Hooper et al (in press), however, people may also avoid coming into contact with thoughts that are related to an unwanted thought. With this in mind Experiment 6(b) will aim to determine whether words trained as related, by both direct and indirect/derived learning, can also cause a shift in behavioural choice. If this were the case then one could assume that a transformation of suppression functions had occurred, and it would provide evidence that not only a target thought, but stimuli related to the target thought can affect the choices we make.

4.3. Experiment 6(b)

Experiment 6(b) aims to extend on Experiment 6(a) in order to determine whether the change in preference selection observed would occur not only to avoid the unwanted target thought but also to avoid stimuli related to the target. Experiment 6(b) will be identical to Experiment 6(a) with the exception that participants will be exposed to pre-selection task relational training and testing, and one stimulus from the relational training will be the designated target word. During the second part of thought suppression choice selection task only the related words and not the actual target unwanted thought will appear behind the preferred stimulus.

It is predicted that the participants will change their initially preferred selection, this time to avoid items in trained/derived relations with the target unwanted thought.

4.3.1. Method

Participants

Twenty seven participants were recruited from the Swansea University subject pool system where credits were granted for participation in the study. Participants ranged in age from 18 to 25 years old (mean age = 21.11; SD = 1.5). The sample was non clinical with all participants falling within a normal range on a number of psychometric indices (see below) including the AAQ (m = 51.25 SD = 9.64) WBSI, (m = 43.07 SD = 7.55) and BDI (m = 5.4 SD = 3.62). The data of seven participants was excluded as a result of no selection being made in the first part of the choice selection task.

Procedure

The procedure for experiment two was identical to that of experiment 6(a), bar the exception of equivalence training and testing. As such the general procedure consisted of five phases; (1) Relational training, (2) Relational testing, (3) Suppression Induction, (4) Cognitive Load, (5) Choice Selection Task.

Phases 1 – 4 in Experiment 6(b) were identical to that of Experiment 5 (see Section 4.1.1.)

(5) The Choice Selection Task

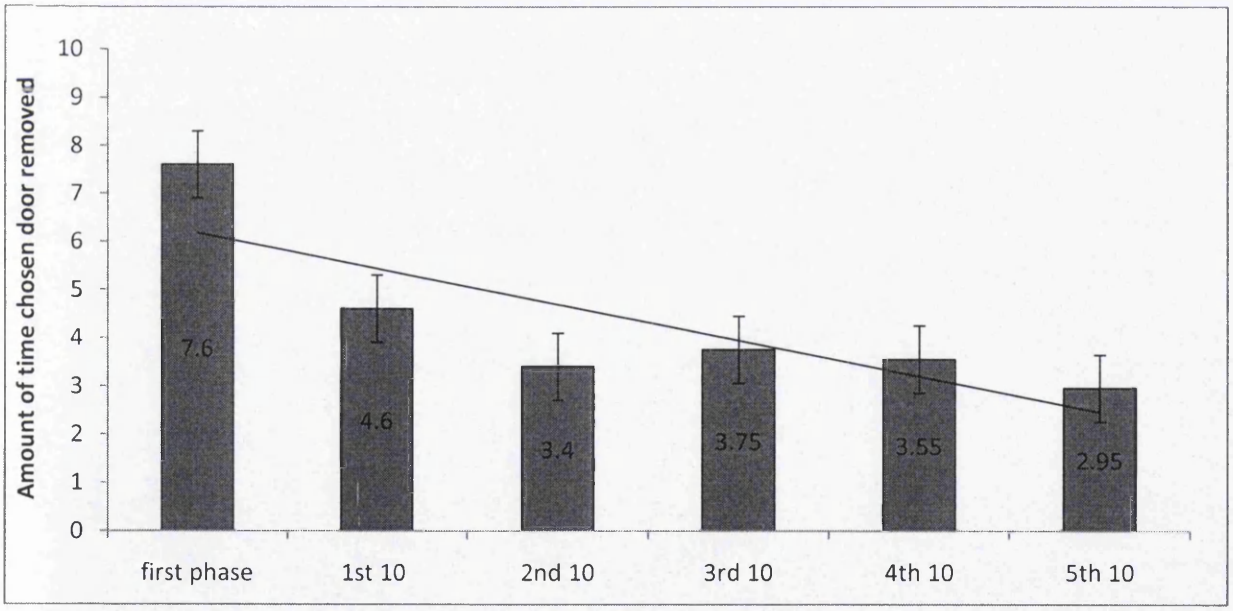
Two manipulations were made to the choice selection task. First, the target word was removed from the second part of the task and replaced with the trained and derived words; this was done to determine whether participants would change their initially preference just on the basis of words in direct/derived relations with the target word. Second, in Experiment 6(a) two control words were included with the target behind the door of original choice. However, as two words in Experiment 6(b) could now serve to remind the participant of the unwanted thought, 4 control words were included in the second part with the trained and derived word, behind the door chosen in the first part of the choice selection task. Additionally 2 control words were added to the door that was not originally chosen in the first part. This left 6

possible words appearing quasi randomly behind each door. This was done to make the participant response less obvious.

4.3.2. Results

The dependent variable was again the amount of times participants selected the pre-chosen stimulus in each ten trial phase. Figure 9 below depicts the mean number of times a selection was made in each ten trial phase, in parts 1 and 2. This figure appears to show that participants again changed their initial preferred selection from the first part, so that by the end of the second part (the 5th ten trial phase) they were choosing the door opposite to that of their initial preferred selection the majority of trials.

Figure 9. Mean number of choice responses made by participants in Stage 5, Parts 1 and 2, Experiment 6b.



Statistical analysis was conducted on the data in order to determine whether there were significant differences with respect to selection across the experimental phases. A one way ANOVA revealed a significant main effect $F\ (5, 95) = 16.041;\ p < 0.05$, suggesting that further analysis was warranted to determine where differences in the number of initially preferred selections emerged. Paired sample t-tests were conducted between each of the ten trial phases.

A series of paired samples t tests (see Table 13) revealed a significant main effect between the selection made in the first phase of ten trials (part 1), compared with the selection made in each of the ten trial phases in the second part. This result suggests that participants changed their initially preferred selection immediately after coming into contact with the items related to the unwanted thought. The increase in t values again suggests that this change in selection became stronger as the study progressed. Further t tests were conducted in order to determine if there were significant differences between each set of ten trial phases in the second part of the choice selection task. These results suggested that participants made a significant drop in the number of times they chose their pre chosen stimulus from the first ten trial phase of the second part to the second, before reaching a ceiling effect in the remainder of the ten trial phases.

Again, in order to ensure that the participants were not merely responding at chance level, paired sample t tests against chance were conducted. The results revealed that participants responded significantly different to chance in the first phase $t(21) = 6.396$; $p < 0.05$. Similarly to Experiment 6a, however, participants began to respond at chance level in the first part of the second phase as they began to change their preference, $t(21) = -0.902$; $p > 0.05$. For the remainder study participants again made a definite choice significantly different from chance level; second part $t(21) = -2.596$; $p < 0.05$, third part $t(21) = -2.222$; $p < 0.05$, fourth part $t(21) = -2.228$; $p < 0.05$, and fifth part $t(21) = -3.939$; $p < 0.05$.

Comparison	**Statistic**
1st phase vs. first ten	*t(19) = 4.433, p < 0.05*
1st phase vs. second ten	*t(19) = 5.105, p < 0.05*
1st phase vs. third ten	*t(19) = 4.513, p < 0.05*
1st phase vs. fourth ten	*t(19) = 4.613, p < 0.05*
1st phase vs. fifth ten	*t(19) = 5.796, p < 0.05*
First ten vs. second ten	*t(19) = 2.596, p < 0.05*
Second ten vs. third ten	*t(19) = -0.924, p > 0.05*

Third ten vs. fourth ten	$t(19) = 0.535, p > 0.05$
Fourth ten vs. fifth ten	$t(19) = 1.201, p > 0.05$

Table 13. The t-tests conducted on the data from each ten trial phase, Experiment 6b.

The results of Experiment 6(b) replicate and extend on Experiment 6(a). Specifically, participants in Experiment 6(a) and 6(b) significantly changed their initially preferred selection from the first part of the experiment by the first phase of the second part, participants in both experiments then continued in a significant decline in the amount of pre-chosen stimuli, before reaching a ceiling effect which lasted from the second ten trial phase to the fifth ten trial phase. In short, as in Experiment 6(a), participants in Experiment 6(b) also changed their selection to avoid coming into contact with the unwanted thought.

4.3.3. Discussion

Previous research has indicated that attempting to suppress a target word necessitates the additional suppression of words in derived relations with the target (Hooper et al, in press). The results of this study concur on this point. However, the current study extends on from the previous work, demonstrating that attempted suppression can alter pre- suppression behavioural choices in order to avoid the target item (Experiment 6a) and items related to the target (Experiment 6b). Consistent with predictions from the equivalence literature participants' suppression attempts of a target word generalised to other words that were experimentally trained as related to this word. This transfer of suppression functions across an equivalence class suggests that the equivalence phenomenon might further explain why individuals find it difficult to suppress their thoughts and how this attempted suppression can have constricting behavioural consequences.

However, both Experiments 6a and 6b could be improved. The inclusion of a control group where neutral words appear behind the door that was chosen from the 1st part would control for the appearance of words as something that might trigger change, as opposed to it being as a result of suppression of the target word per se. Such a control group would also determine whether the results, which see a gradual decline in varied responses, are due to habituation (See Chapter 2). However as the

statistical analysis found that the responses were significantly different to chance, the likelihood that habituation occurred is reduced. Finally, Experiment 6b included both trained and derived words behind the door that was previously chosen. In future these would have to be separated in order to see the effect of each word.

Nevertheless, in addition to promoting basic understanding of thought suppression in a new paradigm, the behavioural shift in choice demonstrated in the present study is of importance to understanding applied contexts, such as psychotherapy. These results inform us about problems that can occur without direct experience (e.g., a fear of flying without ever being on a plane). As is shown in this study, if suppression functions can transfer to stimuli related to the to-be-suppressed item then these items could cause a negative cascade of behavioural avoidance that would aggravate disorders such as depression or anxiety (Walther et al., 2005).

4.4. Concluding Comments

As suggested earlier, the current results may be important in terms of aiding our understanding of clinical disorders. These results inform us about the problems experienced by people that can occur without direct experience (e.g., a fear of snakes without ever being in contact with one). If thought suppression / interference can transfer to stimuli that are closely or not so closely related to the targeted stimulus, such generalization could cause a negative cascade that would aggravate disorders such as depression (Walther, Nagengast & Trasselli, 2005). In the current chapter suppression attempts were shown to generalize to related stimuli through equivalence relations, which could model processes in disorders such as obsessive compulsive disorder in which attempted suppression of certain initial thoughts eventually leads to a situation in which further thoughts indirectly related to the initial thoughts must also be suppressed. Such spreading may promote avoidance behaviors. In the current chapter participants consistently avoided stimuli related to the to-be-suppressed target as such stimuli rendered the suppression attempt more difficult. In everyday terms, avoiding thoughts of "not being good enough" could promote avoiding going for an interview as thoughts of "not being good enough" are likely to emerge if one does not get the job.

These findings may be of particular interest to researchers working in clinical areas that are linked to high levels of attempted thought suppression such as anxiety disorders, obsessive compulsive disorder and phobias (e.g., Cook & Mineka, 1990; Schell, Dawson & Marinkovic, 1991). Many researchers have argued for explanations of thought suppression that rely on cognitive processes, such as rebound and ironic thought processes (e.g., Mineka & Tomarken, 1989; Reiss, 1980). From a behaviour-analytic perspective, however, such explanations are incomplete because they leave the rebound and ironic thought processes, which are also behaviours, unexplained (Barnes, 1989; Hayes & Brownstien, 1986). If equivalence provides an adequate behavioral account of human language and cognition (e.g., Hayes, Barnes-Holmes & Roche, 2001; Sidman, 1994), then the current paradigm provides a potentially useful empirical avenue for the exploration of this phenomenon and research into thought suppression in clinically relevant populations using this paradigm might provide new insight into the role of transfer of suppression functions in the acquisition and manipulation of maladaptive behaviour. Indeed, the success of earlier programs of research that have explored human behaviour using the derived relational paradigm (e.g., Markham, Dougher, & Augustson, 2002; Roche & Barnes, 1997; Roche, Barnes-Holmes, Smeets, Barnes-Holmes, & McGeady, 2000) attest to the viability of this suggestion.

Chapter 5

Mindfulness and defusion as alternatives to thought suppression

5. Introduction

The previous chapters have demonstrated the counterproductive nature of thought suppression as a strategy in coping with unwanted neutral (Chapter 2) and high valence (Chapter 3) thoughts, whilst Chapter 4 presented a behavioural account of why thought suppression fails in terms of derived stimulus relations. One advantage of this behavioural model of thought suppression is the direct link between derived stimulus relations and emergent third wave behaviour therapies, particularly Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 1999).

In fact, possibly the most important feature of the third wave therapies is that they are grounded in basic behavioural science and the modern contextual behavioural scientific approach to language and cognition, known as Relational Frame Theory (RFT: Hayes, Barnes-Holmes & Roche, 2001). This grounding in basic theory, not only ensures that third wave therapies are coherent and evidence based, but also allows for the continued refinement of therapy at the process level thus facilitating their ongoing evolution and development. According to Relational Frame Theory (Hayes, et al., 2001) the way in which we verbally relate stimuli, and any subsequent transformation of stimulus functions (see Chapter 1 for a detailed account of this phenomenon) that occur, may be at the source of psychological suffering. RFT suggests that, via arbitrarily applicable relational responding (AARR; a process of both directly trained and derived learning), vast relational networks are established that could cause virtually any two stimuli to be related to one another. However, when two stimuli are related in such a way, a transformation of stimulus functions is possible; whereby, the functions that one stimulus has for a person, can then 'transform', or be present, in any related stimuli. However, problematic psychological issues may arise as a result of this transformation of stimulus function, for example, the functions of negative and unwanted thoughts can transform to related stimuli (Hooper, Saunders & McHugh, in press). For illustrative purposes imagine an individual who engages in experiential avoidance of one negative stimulus (i.e., an unwanted thought of a spider), avoidance of all related stimuli would have to be achieved in order to fully eradicate the unwanted thought

(i.e., thoughts of webs, insects, legs etc). In so attempting to avoid the unwanted negative thought, it is likely that previously valued behaviors will be stopped (e.g., not going into a room you have heard previously had spiders in it), causing a restriction of the person's behavioural repertoire.

In summary, RFT (Hayes et al, 2001) suggests that psychological distress arises because of the way in which we address unwanted thoughts and feelings. In particular it provides an empirical model of why attempts to experientially avoid do not work (~~Dymond et~~Dymond et al., 2008; Hooper et al., in press). Two third wave techniques that are directly opposing to experiential avoidance are mindfulness and defusion. Experiments 8, 9 and 10 of this chapter aim to directly compare thought suppression with mindfulness/defusion based strategies in the management of unwanted thoughts.

5.1. Experiment 7

One of the third wave techniques that is receiving increasing attention in the clinical literature, and is of particular relevance to the current thesis due to its appeal as an alternative for dealing with unwanted thoughts, is mindfulness (Najmi, Riemann & Wegner, 2009). Mindfulness has been described as "the awareness that emerges through paying attention on purpose, in the present moment and non-judgementally to the unfolding of experience, moment to moment" (Kabat-Zinn, 2003, p.145). It involves continuous, clear-sighted attention to ongoing subjective experience together with an attitude of acceptance towards that experience (Ortner, Kilner & Zelazo, 2007). Knowledge of mindfulness meditation has grown exponentially over the past thirty years, resulting in scientifically-backed support for mindfulness by researchers in diverse fields, including psychology, neuroscience, and philosophy, amongst others (Fletcher & Hayes, 2005). The recent development of therapies such as mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990) and mindfulness-based cognitive therapy (MBCT; Teasdale, Segal & Williams, 2000) has resulted in medical practitioners increasingly encouraging their patients to explore mindfulness meditation practices to alleviate a variety of physical and mental ailments.

However, research directly comparing the effectiveness of mindfulness versus thought suppression (i.e., the most widely employed coping strategy for negative psychological content), is scarce. Marcks & Woods (2005) compared mindful acceptance based techniques with suppression in the management of personally relevant unwanted thoughts. These researchers supplied three groups (thought suppression, acceptance and monitor only) with technique appropriate instructions. The instructions (i.e., a paragraph of text) were presented to the participants prior to a 5 minute suppression period, during which the occurrence of each unwanted thought was recorded by the participant pressing a button in front of them. Finally, upon completion of the 5 minute period the discomfort associated with the experience of personally relevant unwanted thoughts was measured via a self appraisal form. The findings indicated that no difference emerged in terms of unwanted thought intrusions during the five minute suppression period. However the results did find that those who were instructed to suppress their intrusive thoughts reported an increased level of discomfort after adhering to the suppression instruction. In comparison, those in the acceptance condition reported a decrease in discomfort. The monitor only group experienced lower frequency of thoughts and lower discomfort than the other two groups. Marcks and Woods (2005) concluded that their data provided initial evidence that acceptance may be a more effective strategy for managing personally relevant unwanted thoughts than suppression, although it must be added that the results of the monitor only group did not concur with pre experimental predictions..

In a subsequent study Najmi, Riemann and Wegner (2009) compared mindful acceptance and thought suppression in dealing with unwanted thoughts in a group of participants diagnosed with Obsessive Compulsive Disorder (OCD) and a non clinical sample. Across three separate sessions the participants in each group were exposed to one of three instructions (mindful acceptance, focused distraction or thought suppression). Again the dependent measures were identical to those used by Marcks and Woods (2005), that is, (1) the number of unwanted thoughts post instruction during a five minute period and (2) discomfort level in coping with unwanted thoughts. The results indicated there was no difference between the thought suppression and the mindfulness groups in terms of unwanted thought intrusions during the five minute period. However a post experiment treatment

adherence measure indicated that across both the OCD and control groups, the effort involved in coping with unwanted thoughts was greatest when applying the thought suppression instruction. Additionally, after the mindful acceptance instruction participants reported significantly less discomfort than during the suppression intervention. The focused distraction group reported no difference in discomfort either during or post measure while the thought suppression group indicated a higher level of discomfort post intervention compared to during. Taken together, these studies provide evidence that mindful acceptance based techniques may be more useful than thought suppression in dealing with unwanted thoughts.

However, it is hard to draw basic conclusions on the impact of mindful acceptance versus thought suppression from these studies. Firstly, Marcks and Woods (2005) employed sub clinical populations instructed to suppress high valence material. It is possible that the sub clinical nature of the group confounded the effect of the intervention techniques. Secondly, it should also be noted that neither study included an actual technique (e.g. thought suppression or acceptance) induction. Specifically, participants were simply required to read a brief paragraph before entering the suppression period.

Typically, mindfulness training is implemented over a number of sessions (Shapiro, Schwartz, & Bonner, 1998). However, even a 15-minute focused attention instruction has been shown to produce mindfulness consistent behavior on a subsequent task. For example, Arch and Craske (2006) tested the immediate effects of a 15-minute focused attention induction involving 'mindfulness' of breath instructions, which provided a short experimental analogue of mindfulness. The findings indicated that participants in the focused attention induction demonstrated more positive responses to external stimuli after the induction than an unfocused attention group. McHugh, Simpson and Reed (2010) employed a 10 minute version of the Arch and Craske (2006) focused attention induction to reduce decision making deficits in an older population. The focused attention induction in their study reduced decision making deficits on a card selection task relative to an unfocused attention control induction. The current paper will utilize a nine minute focused attention (mindfulness) induction, adapted from that used by Arch and Craske (2006) that targets focusing attention on the present moment.

The current study aims to extend on the work of Marcks and Woods (2005) and Najmi, et al., (2009) in the comparison of mindfulness (mindfulness can be operationalised in a number of ways, in the current study this was done via a focused attention exercise) versus thought suppression strategies. The two principal dependent measures are similar to those used in the aforementioned research; firstly the amount of thought intrusions will be measured during a 9 minute period, and secondly each participants' emotional state (this can be seen as a parallel to the 'discomfort' levels measured in Marcks & Woods, 2005, and Najmi et al, 2009) will be measured pre and post induction. However it also differs from those studies in a number of ways. First, the personally relevant unwanted thought will be identical across participants. Specifically, a negatively valenced picture from the International Affective Picture System will be employed. Second, the previous studies read a paragraph of technique appropriate instructions to their participants whereas the current study will expose participants to a 9 minute focused attention/thought suppression induction (adapted from Arch & Craske, 2006), during which they will be asked to signal the presence of the 'target thought'. Third, pre experimental general health will be measured using the general health questionnaire, and pre and post induction measures of psychological flexibility, anxiety and emotional state will be completed by each participant. This is an important addition to a study which compares the impact of a short induction because not only do each of those measures serve as screening measures pre induction (for example, it is important that one group is not significantly more mindful pre induction), but a post induction comparison is possible, which could display the impact of the two inductions on the self report measures.

It is predicted, in accordance with previous literature (Marcks & Woods, 2005; Najmi, et al., 2009), that participants in the focused attention group will signal the presence of the unwanted thought a similar amount of times to the thought suppression group. Additionally, the focused attention group will demonstrate a significant improvement in emotional state, when compared to the thought suppression group.

5.1.1. Method

Participants and Design

50 undergraduates (31 female, 19 male) at Swansea University were paid 4 credits for their participation in the experiment (Mean age; 22.9 years, SD; 5.98). The sample was non clinical. The study was a mixed design with induction (suppression vs. focused attention) as the between subject factor and measure (pre and post screening and emotional state questionnaires) as the within subjects factor. The number of intrusions in the 9 minute period, the difference between pre and post induction emotional state, and the difference between pre and post induction questionnaire scores will serve as the dependent measures.

Apparatus

The experiment was completed in a laboratory at the Swansea University. The laboratory was quiet and free from distraction. It contained a desk, a chair, a standard computer (Processor) with a 14-inch screen and standard computer mouse. The participant's responses were controlled by the computer program, which was created in Visual Basic TM 6.0. Participants listened to a recorded intervention (adapted from McHugh et al, in press) via the use of a Dictaphone (Olympus, digital voice recorder).

Materials

Four pre and post measures of anxiety, psychological flexibility, mindfulness and emotional state were used, using the State Trait Anxiety Inventory, Acceptance and Action Questionnaire II, the Mindful Attention Awareness Scale and an emotional rating affect scale, respectively. Finally post induction, a treatment adherence measure was administered to participants.

1). The *State Trait Anxiety Inventory* (STAI I and II, Spielberger, Gorsuch & Lushene, 1970, see appendix 6). The STAI was administered to provide a measure of participants' pre and post experimental trait and state anxiety level. The STAI is comprised of two scales, made up of 20 items each, which measure trait anxiety and state anxiety. Respondents rate each item on a scale ranging from 1 to 4, which yields an overall range 20–80 points on each subscale. Higher scores indicate higher levels of trait or state anxiety. Test–retest reliability ranges from .73 to .86 on the STAI-Trait and .16 to .54 on the STAI-State. The internal consistency of the subscales has been found to be acceptable.

2). *Acceptance and Action Questionnaire II* (Bond et al, under review). The AAQ II was employed to provide a pre and post experimental measure of psychological flexibility. The AAQ II is a 10-item revision of the original nine-item AAQ (Hayes et al., 2007) and has been shown to have good psychometric properties and good convergent, discriminant, and incremental validity. Factor analytic findings suggest the AAQ II-II is a uni-dimensional measure. Higher scores on the AAQ II indicate greater psychological flexibility.

3). *Mindful attention awareness scale* (Brown & Ryan, 2003, see appendix 7). The MAAS was administered to provide a pre and post experimental measure of mindfulness. The MAAS is a 15-item scale designed to assess a core characteristic of dispositional mindfulness, namely, open or receptive awareness of and attention to what is taking place in the present. The scale shows strong psychometric properties and has been validated.

4). *Emotional rating affect scale (see appendix 8).* The affect scale was administered to the participants both pre and post induction in order to measure the participants emotional state. The scale included one question, which measured from -50 to + 50; *'please rate how the picture made you feel on the following scale, where -50 represents a very negative emotional state, and +50 represents a very positive emotional state.'*

5). *Treatment adherence* measure (see appendix 9). The treatment adherence measure was included, post induction, to ensure that the participants understood the instructions included in the induction and also to provide a self report of the extent to which participants employed the induction when managing any unwanted intrusive thoughts that may have arisen. The first statement *'Was it easy to follow the instructions provided on the audio tape?'* was measured on a likert scale ranging from 1-7 where 1 represented 'yes' and 7 represented 'no'. The second statement *'To what extent did you implement the instructions provided on the audio tape when having thoughts about the picture you previously saw?'* was also measured on a likert scale of 1-7 where 1 was equal to 'very much so' and 7 was equal to 'not at all'.

Procedure

On each subject's arrival at the prescribed room, the participant was greeted by a male experimenter. Upon completion of the consent form the participants were randomly assigned to one of the two experimental conditions; the thought suppression group or the focused attention group. The procedure for both groups was identical except that the thought suppression group received a suppression induction, where as the focused attention group received a focused attention induction. For sake of clarity, the procedure has been split into the following sections; (1) Initial questionnaires (2) Picture rating (3) Intervention and space bar program (4) Follow up ratings/questionnaires (5) Final questionnaires.

Initial Questionnaires

The participants were firstly required to complete the initial questionnaires; AAQ II, STAI (state and trait) and MAAS. The questionnaires were dependent measures in the study, in that the same questionnaires were also completed in the final phase of the study to notice any differences within and between groups that may have occurred due to the respective inductions.

Picture Rating

After the questionnaires were completed the participants were required to look at the IAP image on the computer screen in front of them for 'as long as they felt comfortable for', (the picture came from the International Affective Picture Scale; Lang, Bradley & Cuthbert, 1999). Participants received the following instructions; '*for this phase of the study you are required to look at an aversive picture. You should try to look at this picture for as long as you can up to 20 seconds, however as soon as you want the picture removed from the screen then indicate so and the picture will be removed'*. The latency until the participants removed the picture from the screen was recorded. After looking at the picture the participant was required to fill out a single question Affect Scale (Wolpe, 1990), which asked the participants to rate their emotional state (see Appendix 8).

Intervention and Space Bar Press

Next the participants underwent the 9 minute intervention. If the participant was in the thought suppression group they would receive the following instruction before moving onto the induction;

'The picture you have just seen may have evoked in you some unwanted thoughts and feelings. Unwanted thoughts and feelings can be dealt with in different ways. Some of these strategies are helpful and some of them are not. Recently research has suggested that suppressing all negative thoughts and feelings is the best way to deal with them. Over the next 9 minute period you will undertake a popular thought suppression training task. During this task, you will be asked to suppress all unwanted thoughts and bad feelings, please when doing this apply the unwanted thoughts and feelings that were evoked in you when you looked at the picture from before. Finally, if during the 9 minute period you happen to have thoughts of the aversive picture enter your mind, then please press the space bar on the computer in front of you'

The participant received an audio technique reminder roughly every 30 seconds;

'Much of the emotional distress people experience is the result of thinking about upsetting things that have already happened or anticipating negative events that have yet to occur. Distressing emotions such as anger, anxiety, guilt and sadness are much easier to bear if you try your best not to think about them. This is an exercise to increase your ability to suppress upsetting thoughts so that you can clear away any thoughts about past and future events. Start by allowing your mind to roam. When an unwanted thought comes to mind, simply try to remove it. There is no need to focus on anything in particular. But each time any unwanted thought enters your mind continue to remove it. Try not to focus on any one thing. Just let your mind wander. Openly let your thoughts flow. Continue to let yourself think freely. But if the unwanted thought enters your mind try to put it away from your conscious awareness. Just let your mind wander. Think about whatever comes to mind, except the unwanted thought. Let your thoughts drift. Continue your flow of thoughts. But be wary of the upsetting thought, removing it each time it appears. Continue to suppress that thought until you hear the sound of the bell.'

If the participant was in the focused attention group they would receive the following instruction before moving onto the induction;

'The picture you have just seen may have evoked in you some unwanted thoughts and feelings. Unwanted thoughts and feelings can be dealt with in different ways. Some of these strategies are helpful and some of them are not. Recently research has suggested that being aware and being present with negative thoughts and feelings is the best way to deal with them. Over the next 9 minute period you will undertake a popular mindfulness training task. During this task, you will be asked to become present with all unwanted thoughts and bad feelings, please when doing this apply the unwanted thoughts and feelings that were evoked in you when you looked at the picture from before. Finally, if during the 9 minute period you happen to have thoughts of the aversive picture enter your mind, then please press the space bar on the computer in front of you'

After listening to the instruction the participant received the following induction via the dictaphone. The participant received a technique reminder roughly every 30 seconds;

'Much of the emotional distress people experience is the result of thinking about upsetting things that have already happened or anticipating negative events that have yet to occur. Distressing emotions such as anger, anxiety, guilt and sadness are much easier to bear if you only focus on the present – on each moment one at a time. This is an exercise to increase your mindfulness of the present moment so that you can clear away any thoughts about past and future events. Start by focusing on your breathing. Don't try to change anything about your breathing, just notice the air moving in and out of your body. Try to focus all your attention on your breathing. Notice the sensation of breathing air in. Notice the sensation of breathing air out. As you breathe air into your body, fill your mind with the thought "just this one breath". As you breathe air out of your body, fill your mind with the thought "just this one exhale". Focus on the actual sensation of breath entering and leaving your body. Just this one breath in. Just this one exhale out. If you notice that your awareness is no longer on your breath gently bring your awareness back. Just this one breath. Just this one exhale. Continue focusing only on each breath in and each breath out, do not anticipate anything – even your next breath. Only focus on one breath at a time. If anything else pops into your mind, push it aside and refocus your attention to each breath. Continue focusing on each breath in and each exhale out until you hear the sound of the bell.'

In summary, both groups of participants received a matched length instruction before receiving a matched length induction. Both groups were required to press the space bar each time that any thoughts of the aversive image entered their minds. This served as a dependent measure.

Follow up ratings and questionnaires

Following completion of the induction participants had to complete the treatment adherence measure (see Appendix 9) to indicate to what degree they had employed the technique from the induction phase in dealing with the negative image. Then they again had to complete the emotional state affect scale. The difference between the pre and post induction rating on this scale served as a dependent measure.

Final Questionnaires

To complete the study participants were required to fill out the post experimental measures, that is, the AAQ II, STAI (state and trait) and the MAAS. Both within and between group differences on these measures served as dependent variables..

5.1.2. Results

Treatment Adherence Measure and Seconds on the Screen

In order to avoid confounding the results the participants from the thought suppression group and the focused attention group had to perform similarly on two measures; the treatment adherence measure and the amount of time they spent looking at the aversive picture. If differences were found between these measures then it could be argued that the results of the study were due to differences on these measures and not the independent variables manipulated. Table 14 displays the mean scores of each group on these measures, and appears to show little difference between them. Indeed, independent sample t tests were conducted on the data and found no significant difference between either group on the treatment adherence rating 1, $t(48) = 0.000$; $p > 0.05$, treatment adherence rating 2, $t(48) = 0.213$; $p > 0.05$, and the amount of time the picture was looked at, $t(48) = -0.961$; $p > 0.05$.

Questionnaires

Participants from both groups (thought suppression and focused attention) had to complete three of the questionnaires on two occasions; once before the presentation of the IAP and subsequent intervention and once afterwards. These questionnaires were the AAQ II, STAI (state and trait) and the MAAS. Table 14 shows how the scores on these questionnaires differed not only between groups, but also within each group from the first time participants completed the questionnaires to the second time.

A higher score on the AAQ II indicates a higher level of psychological flexibility. The results displayed in Table 14 below indicate that both groups experienced a slight increase in acceptance from completion stage one to completion stage two. Independent sample t tests found that there was no difference between each group in either completion stage 1, $t(48) = 0.311$; $p>0.05$, or completion stage 2, $t(48) = 0.799$; $p>0.05$, suggesting that the intervention did not cause a significant difference between groups in terms of emotional acceptance. Paired sample t tests were also conducted. For the thought suppression group no significant main effect was found, $t(24) = -2.039$; $p > 0.05$, suggesting that participants in the suppression group did not become more emotionally accepting after the suppression intervention. However a significant main effect was found for the focused attention group, $t(14) = -3.294$; $p < 0.05$, suggesting that participants became more accepting after having received the focused attention intervention

A higher score on STAI I and II indicate higher levels of anxiety. The means displayed in Table 14 show how participants in both groups experienced little change in their levels of anxiety. Independent sample t tests revealed no significant difference between either group, for the STAI I, either at completion stage one $t(48) = -0.221$; $p > 0.05$ or completion stage two $t(48) = 0.833$; $p > 0.05$. Similar results were found for the STAI II; completion stage one $t(48) = -0.348$; $p > 0.05$, completion stage two $t(48) = -0.687$; $p > 0.05$. Additionally paired sample t tests also revealed no significant difference between either completion stage in the thought suppression group (STAI I $t(24) = -0.565$; $p > 0.05$, STAI II $t(24) = 1.141$; $p > 0.05$) and the focused attention group (STAI I $t(24) = 1.059$; $p > 0.05$, STAI II

$t(24) = 1.451$; $p > 0.05$). These results suggest that the induction made no difference to anxiety levels both between and within groups.

Finally, a higher score on the MAAS indicates higher levels of mindfulness. Table 14 again shows that there were little differences between each group across both completion stages. Independent sample t tests revealed no significant difference between the groups at either completion stage one, $t(48) = 0.088$; $p > 0.05$ or completion stage two $t(48) = -0.843$; $p > 0.05$. Within subject t tests also revealed no significant difference between completion stage one and two for the thought suppression group, $t(24) = 0.666$; $p > 0.05$ or the focused attention group $t(24) = -1.291$; $p > 0.05$. These results suggest that neither group experienced any changes in levels of mindfulness from pre to post induction.

Rating of Emotional State

Participants had to rate their emotional state, on a scale of -50 to +50, on two occasions; firstly after just having seen the aversive picture, and secondly after having completed the interventions. Table 14 shows how the participant's emotional state changed from rating one to rating two.

Table 14 displays that all participants regardless of group, tended to experience a negative emotional state after just having seen the picture. Additionally both groups experienced an improvement in emotional state after having completed the intervention. However the table does show that the focused attention induction produced a larger improvement in emotional state when compared to the thought suppression induction. Paired sample t tests were conducted to determine if the improvements from rating one to rating two were significant. The results revealed a significant main effect for the thought suppression group, $t(24) = -7.228$; $p < 0.05$, and the focused attention group, $t(24) = -9.229$; $p < 0.05$. Suggesting that both groups experienced significantly improved emotional states after having completed the induction.

Independent sample t tests were then conducted to determine any between group differences. The results revealed no significant main effect between groups for rating one, $t(48) = -0.403$; $p > 0.05$, this suggests that before receiving the inductions, participants from both groups reacted similarly to the aversive picture. The results

did reveal a significant main effect between both groups for rating 2, $t(48) = -3.146$; $p < 0.05$. The results suggest that, although both groups experienced improvements, the emotional state of the focused attention group improved significantly more than that of the thought suppression group.

	Suppression Group	Mindfulness Group
Treatment Adherence R1	1.96 (1.05)	1.96 (1.39)
Treatment Adherence R2	2.88 (1.26)	2.8 (1.38)
Seconds on screen	11.6 (7.01)	11.8 (7.77)
AAQ II 1	52.92 (10.64)	52.04 (9.34)
AAQ II 2	54.2 (9.08)	54.8 (9.92)
STAI I 1	33.04 (11.44)	33.72 (10.23)
STAI 1 2	34.5 (12)	32 (9.24)
STAI II 1	36.72 (11.67)	37.76 (9.31)
STAI II 2	34.9 (11.4)	36.9 (8.64)
MAAS 1	3.99 (0.91)	3.93 (0.58)
MAAS 2	4.04 (1.06)	4.15 (0.72)
Emotional State 1st Rating	-29 (17.99)	-27.2 (14.84)
Emotional State 2nd Rating	-0.68 (20.1)	15.8 (16.7)

Table 14. Pre and post induction means and standard deviations

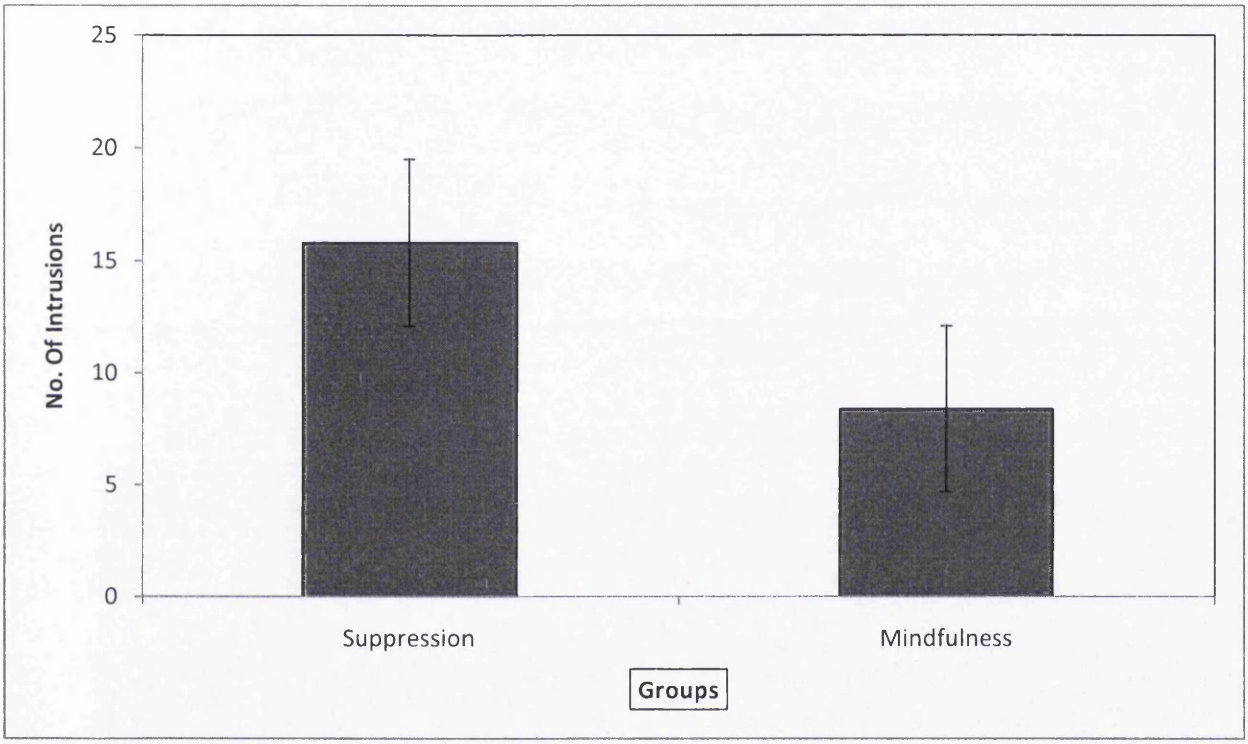
Thought intrusions, Experiment 7.

Whilst undertaking the 9 minute induction participants from both groups were asked to signal the presence of all thoughts and feelings associated with the aversive picture by pressing the space bar on the computer. Figure 10 shows the difference in space bar presses between both groups.

Figure 10 displays that those participants asked to engage in an induction which encouraged them not to think of the aversive picture (thought suppression group) indicated the presence of that thought 15.84 (SD = 7.92) times during the 9 minute period. The focused attention group had the thought come to mind 8.4 (SD =

6.46) times. This difference is statistically significant, $t(48) = 3.637$; $p < 0.05$. This result displays that those in the focused attention group experienced unwanted intrusive thoughts of the aversive picture significantly less than those who were encouraged to suppress all thought associated with it.

Figure 10. The mean amount of space bar presses recorded by each group, Experiment 7.



Summary

Participants in the focused attention group experienced a significant improvement in their emotional state compared to the thought suppression group. They also had unwanted thoughts of the aversive pictures come to mind significantly less during the induction period. Finally the various self report measures employed revealed no significant changes from pre to post induction in levels of anxiety and mindfulness. However the results did show that participants in the focused attention group experienced a small but significant improvement in psychological flexibility.

5.1.3. Discussion

It has been theorised that mindfulness could serve as an appropriate alternative to thought suppression in coping with unwanted thoughts (Marcks & Woods, 2005; Najmi et al, 2009). The aim of this present study was to assess the effectiveness of a focused attention (mindfulness) induction in coping with thoughts of high valence negative content. In accordance with previous research (Marcks & Woods, 2005; Najmi et al, 2009) two predictions were made. First, it was predicted that participants in the focused attention group would experience a similar number of thought intrusions during the induction phase when compared to the thought suppression group. The current study contradicts this prediction. It was found that participants in the thought suppression group had thoughts of the aversive picture come to mind significantly more than the focused attention group. Second, it was predicted that the focused attention group would experience a significant improvement in their emotional state (i.e., anxiety level) from pre to post induction in comparison to the thought suppression group. This prediction was confirmed by the results, participants in the focused attention group did experience a significantly greater improvement in emotional state when compared to the thought suppression group.

Marcks and Woods (2005) and Najmi et al (2009) found that participants in both the mindful acceptance and thought suppression groups experienced a similar amount of unwanted thought intrusions during a five minute period. This was a surprising finding when one considers that the majority of thought suppression studies have demonstrated that attempting not to think of a target causes the target to re-enter consciousness an escalated amount of times during a five minute period (see Chapter 2 and 3). However, these researchers reported that being mindful of a target produced a similar amount of unwanted intrusions. In fact their results could support later literature, which via the use of a baseline condition, suggests that the ironic results associated with attempted suppression may be due to the paradigm and not to thought suppression in itself (Abramowitz, Tolin & Street, 2001;Clark, Ball & Pape, 1991). Despite this, the current study concurs with studies which do find a thought suppression effect (Wegner, Schneider, Carter & White, 1987; Lavy & Van den Hout, 1990). Specifically, participants in the thought suppression group thought of the aversive picture far more than the comparable focused attention group. One potential reason for this finding might be due to subtle procedural differences, in the

current study, a 9 minute induction was used as opposed to the typical five minute suppression period. Nevertheless, the result suggests that being mindful, as opposed to attempting suppression, results in significantly less intrusions.

The results also indicated that participants in the focused attention group experienced a significantly greater improvement in emotional state when compared to the thought suppression group. This result is similar to that of Marcks and Woods (2005) and Najmi et al (2009), who found that distress levels were greater for the thought suppression group post five minute period. However, contrary to their findings it could be argued that level of emotional improvement, in the current study, is directly inverse to the amount of intrusions. This suggests a possible link between thought suppression and psychopathology, that is, more intrusions lead to more distress, which may in turn contribute to the development of psychopathologies. This finding is in line with suggestions by Purdon and Clark (2000) who suggested that the discomfort associated with suppression should be the target of inquiry rather than the frequency of thoughts *per se*. In fact these researchers have found that people who suppress personally relevant thoughts are more distressed and have higher levels of discomfort after doing so (Purdon & Clark 2000; Trinder & Salkovskis, 1994).

Finally the results of the questionnaires warrant discussion. Mindfulness is a strategy which aims at increasing psychological flexibility. The current study showed that even a minor 9 minute induction can increase psychological flexibility. Participants in the focused attention group scored significantly higher on the AAQ II post induction compared to pre induction, in comparison to the thought suppression group. However, despite finding a behavioural effect of mindfulness and despite increasing psychological flexibility, scores on the mindfulness measure (MAAS) did not change from pre to post induction. This suggests that participants did not become more mindful after having received the induction. This result could be explained by the nature of the measure, in that the MAAS is a trait measure of mindfulness, therefore it would be expected that scores would remain relatively stable across time. Perhaps in future a state measure of mindfulness would be more appropriate. Nevertheless, the main aim of mindfulness, from an ACT perspective is to increase psychological flexibility, and the increased scores on the AAQ display a slight increase in psychological flexibility. These findings therefore have large

implications as they suggest that short inductions, which are both cost and time efficient, improve psychological flexibility, which has been shown to be linked to improved psychological well being (Bond et al, under review).

In summary the results of Experiment 7 provide evidence to suggest that mindfulness is a viable alternative to thought suppression in the management of unwanted intrusive thoughts. Despite providing evidence for this advantage of mindfulness over thought suppression, the behavioural measure (i.e. the typical thought suppression paradigm), due its self report nature, may come into question. Specifically, there is no way to ensure that participants are engaging with the experiment or accurately signalling presence of the unwanted thought each time that it occurs. For this reason Experiment 8 in the thesis will provide a clear behavioural measure of the effects of both interventions.

5.2. Experiment 8

Experiment 8 will again compare the effectiveness of a thought suppression versus mindfulness intervention, however it will employ an additional behavioural measure which aims to ascertain the effectiveness of each intervention. Additionally Experiment 8 aims to extend the research conducted in Chapter 3 on the link between thought suppression and phobias, by aiming to provide an alternative dependent measure of the potential contribution thought suppression has in the maintenance of phobias. Specifically 2 groups of spider fearful individuals will receive one of the two interventions, before having to approach a real life spider. A common form of anxiety disorder is a specific phobia, with spider phobia documented as the most prevalent specific phobia in western culture (Bourdon, Boyd, Rae, Burns, Thompson & Locke, 1988). In fact, spider phobia has a prevalence rate of 3.5% amongst the general population (Fredrikson, Annas, Fischer, & Wik, 1996). When these individuals (physically or mentally) encounter a spider they often experience intense fear and consequently develop avoidance behaviours that can interfere with normal everyday functioning.

The use of spider fear, and phobias in general, in thought suppression related research is not a novel approach (see Chapter 3 for a detailed discussion on

this issue). Indeed research that has directly examined the role of thought suppression in phobias has concluded that thought suppression may play a role in their aetiology and maintenance (Wenzlaff & Wegner, 2000). Behavioural accounts of phobias have implicated the role of escape/ avoidance behaviours in the maintenance of phobias (Purdin, 1999). One such account is offered by the theory of general anxiety (Thorpe & Salkovskis, 1997). According to this theory, although phobic individuals are hyper-vigilant to threat cues, in the presence of a threat they will suppress or avoid particular aspects of the threatening stimulus. For example, phobic participants tend to report only a vague description of the stimulus that they fear, as they often avoid all contact with it. Avoidance of the stimulus is believed to be controlled by a need to reduce any anxiety that may arise from having direct contact with the stimulus thus prohibiting complete activation of fear structures and in turn habituation to the fear stimulus. Becker, Rinck, Roth and Margraf (1998) examined the effects of thought suppression in individuals suffering from Generalized Anxiety Disorder (GAD) and typical controls. Their findings suggested that GAD participants did not differ in their ability to suppress thoughts of neutral material (e.g. white bear) but were less able to suppress thoughts about emotional material (recent worries) than controls. Furthermore, GAD participants displayed an immediate enhancement effect of the unwanted thought whereas the control group did not. This led the authors to conclude that people with GAD have a higher tendency to suppress thoughts about their fears.

With research suggesting that the suppression of spider fear may serve to enhance the amount of unwanted spider related thoughts (see Chapter 3), research which shows the behavioral effects of such suppression, as well as the effects of a viable alternative, becomes necessary. The current study aims to determine whether a mindfulness (i.e., focused attention) induction compared to thought suppression and an unfocused attention control induction would reduce spider avoidance in those scoring high on a spider fearful questionnaire. To that end, participants will complete an induction procedure (either focused attention, unfocused attention or thought suppression), followed by the Behavioral Approach Test (BAT; Kindt & Brosschot, 1999). The BAT measures how close participants moved towards a real life spider. It is predicted that the focused attention (mindfulness) group will move through significantly more steps of the BAT than either the unfocused attention or thought

suppression groups. Additionally, participants' pre and post BAT anxiety levels were measured in order to determine whether the assigned induction increased or decreased anxiety level. It is predicted that those in the thought suppression group will experience an inflation in post BAT anxiety levels, in comparison to the focused attention group.

5.2.1. Method

Participants and Design

Thirty spider fearful participants (5 male, 25 female) were recruited from the Psychology Department's subject pool at Swansea University. Their mean age was twenty five years and six months (SD= 11.54, Range = 18-57 years). The selection of participants was based upon scores achieved on the Fear of Spider Questionnaire (Szymanski & O'Donohue, 1995). Participants had to score 50 or over in order to be considered spider fearful. A single factor between subjects design was employed where the scores of each group (focused attention, thought suppression and unfocussed attention) on the BAT and the STAI 1 served as the dependent measures.

Stimuli

Firstly the participants had to complete the *Fear of Spider Questionnaire* (FSQ, Szymanski & O'Donohue, 1995). The FSQ was employed to assess participants' pre-experimental level of spider fear. Participants scoring > 50 are deemed spider fearful and thus eligible to participate in the current study. Identically, to Experiment 7 then, the participants were also required to complete *State Trait Anxiety Inventory* (STAI I and II, Spielberger et al) the *Acceptance and Action Questionnaire II* (Bond et al, under review) and the *Treatment adherence.*

The Inductions

Focused Attention (Mindfulness)

The focused attention induction was a nine minute dictaphone recorded message. It was based on the induction used by Arch and Craske (2005). It included a sentence approximately every 30 seconds. The induction involved participants

being exposed to an in vivo short experiential focused attention exercise (see Experiment 7)

Thought Suppression

The thought suppression induction was a nine minute audio recording that was designed to mirror the focused attention induction in terms of sentence length and the timings at which the technique reminders occurred (every 30 seconds). This induction walked participants through the stages of thought suppression, encouraging them to remove unwanted spider related thoughts from their minds (see Experiment 7).

Unfocused Attention

The unfocused attention induction was a nine minute recording, matched in terms of sentence length and the timings at which the technique reminders occurred (every 30 seconds). The induction encouraged participants to allow their minds to wander freely through thoughts of past and future events without focusing on any one thought;

'Much of the emotional distress people experience is the result of thinking about upsetting things that have already happened or anticipating negative events that have yet to occur. Distressing emotions such as anger, anxiety, guilt and sadness are often brought to mind. With this exercise let your mind wander freely amongst thoughts about past and future events. Start by allowing your mind to roam. Don't try to focus on your thoughts, just let them drift without hesitation. There is no need to focus on anything in particular. Allow yourself to think freely. Try not to focus on any one thing. Just let your mind wander. Openly let your thoughts flow. Continue to let yourself think freely. There is no need to think of anything in particular. Just let your mind wander. Think about whatever comes to mind. Let your thoughts drift. Continue your flow of thoughts. Continue to let your thoughts flow until you hear the sound of the bell.'

The Behavioral Approach Test (BAT; Kindt & Brosschot, 1999)

Spider fearful behaviour was measured using the Behavioral Approach Test (BAT). Participants stood three metres away from a table with a glass jar on it. Inside the glass jar was a living spider which was roughly two centimetres in diameter. A lid was securely fastened on top of the jar so the spider could not escape. In this test participants are instructed to 'move through as many steps of the test as they felt comfortable doing so'.

Participants could score between 1 and 10 on the BAT. The task began with the participant positioned 3 metres from the table on which the spider was placed in a container. BAT points are earned as follows: BAT score 1: move one metre closer to the spider. BAT score 2: move another metre towards the spider. BAT score 3: move another metre towards the spider (i.e., next to the table). BAT score 4: touch the jar for ten seconds. BAT score 5: lift the jar. BAT score 6: open the lid of the jar. BAT score 7: touch the spider with a pencil for more than ten seconds. BAT score 8: remove the spider from the jar. BAT score 9: touch the spider for more than ten seconds with their finger. BAT score 10: place the spider onto their hand. Participants were allowed to terminate the test at any stage during the BAT and their last completed step was the experimental dependent measure.

Procedure

Participants were taken into a psychology laboratory and seated at a table. Before beginning the study they firstly had to complete the FSQ, the STAI Y-1, the STAI Y-2 and the AAQ II.

Participants were then required to listen to one of the three inductions (thought suppression, focused attention, unfocused attention). Subsequently, they were directed to a separate room and brought to a marker three metres away from the table, in order to begin the BAT. After the BAT, participants completed the treatment adherence measure. The session ended with participants returning to the previous room and completing the STAI Y-1 again to determine if any changes in levels of anxiety had occurred pre and post completion of the BAT.

5.2.2. Results

The current study screened participants for pre-experimental levels of spider fear (FSQ), anxiety (STAI I and II) and emotional flexibility (AAQ II). It also

compared participant compliance (treatment adherence) between each group with regards to how much the participant used their induction whilst completing the BAT. In order to retain validity the participants in each group would have to score similarly on each of these measures in order to confirm that any results obtained were due to the independent variables manipulated and not due to any individual differences between the groups (See Table 15). A series of independent sample t tests revealed that there were no significant differences between the groups at the 0.05 level, in each of the aforementioned measures.

Anxiety Measure

Participants completed the STAI I, a measure of state anxiety, pre and post BAT. The mean scores are represented in Table 15. As can be seen from the mean scores the participants in the thought suppression group (pre M = 40, post M = 58.2) reported a higher level of anxiety than those in the focused attention (mindfulness) (pre M = 38.9, post M = 45.7) and unfocussed attention groups (pre M = 43, post M = 50.3).

Measure	Thought Suppression	Focused Attention	Unfocused Attention
FSQ	95.8 (17.8)	87.8 (18.18)	91.8 (20.55)
STAI Trait	43.2 (7.43)	37.1 (9.58)	40.5 (13.38)
STAI State I	40 (10.84)	38.9 (12.04)	43 (17.43)
STAI State II	58.2 (8.25)	45.7 (11.13)	50.3 (15.1)
AAQ	50.4 (10.58)	50.7 (9.27)	53.3 (21.9)
Treatment Adherence	5.4 (2.45)	5 (2.9)	6.3 (3.52)

Table 15. The Means and Standard Deviations for the 3 groups on the FSQ, STAI State and Trait (pre and post), AAQ and treatment adherence measure, Experiment 8.

A 3 (group; focused attention, thought suppression and unfocussed attention) x 2 (time of completion; before BAT and after BAT) mixed ANOVA was conducted on the data. The results revealed a significant main effect for STAI I score, F(1,27) =

23.086; $p < 0.05$, and a near to significant interaction between STAI I score and Group, $F(1,27) = 2.755$; $p = 0.081$, suggesting that further analysis was needed.

In order to determine whether there were any differences between the three groups in pre experimental levels of anxiety (STAI I) post hoc Tukey HSD tests were conducted. Results from the tests revealed no significant difference between the thought suppression group and the focused attention group, between the focused attention group and the unfocussed attention group, or between the thought suppression group and the unfocussed attention group at the $p < 0.05$ level.. These results suggest that the groups had similar pre experimental levels of state anxiety.

Post hoc Tukey HSD tests were also conducted in order to determine whether there were any post experimental differences in anxiety from the second time the STAI I was completed. They revealed a significant main effect between the thought suppression and the focused attention groups, however, no significant differences were found between the thought suppression and the unfocussed attention group or the focused attention group and the unfocussed attention group at the $p < 0.05$ level.. This result suggests that those in the focused attention were significantly less anxious than those in the thought suppression group after having completed the BAT.

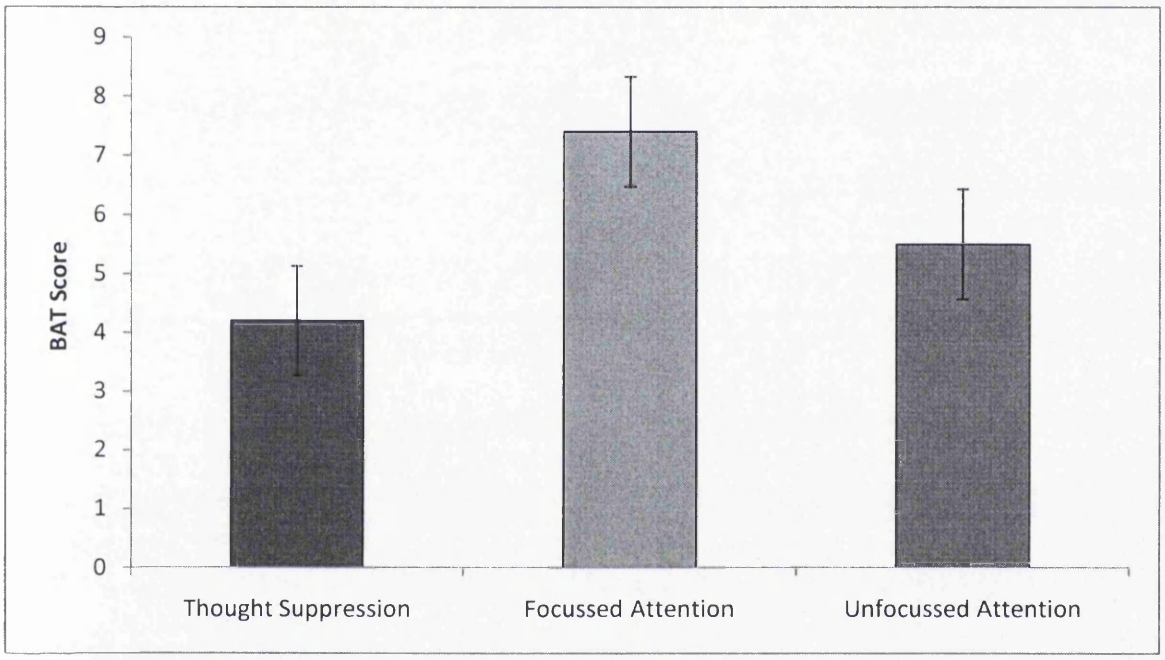
Within subject t tests were also conducted on the data, which aimed to determine if there were any significant differences within groups from the first time they completed the STAI I to the second. For the thought suppression group a significant main effect was found, t (9) = -5.355; $p < 0.05$, suggesting that participants in the thought suppression group became significantly more anxious. However no significant differences were found for the focused attention group, t (9) = -2.067; $p > 0.05$ and the unfocussed attention group, t (9) = -1.528; $p > 0.05$, suggesting that the participants from these two groups experienced similar levels of anxiety from before to after the completion of the BAT.

Behavioral Approach Test (BAT)

The average number of steps completed on the BAT by spider fearful participants with no induction is 6.1 (Kindt & Brosschot, 1999). Participants who are not spider fearful typically score 9.4. The mean point at which each participant from

each group terminated their participation in the BAT is represented in Figure 11. Figure 1 shows that the focused attention group moved through the most steps of the BAT (M = 7.4). The thought suppression group moved thought the least (M = 4.2) and the unfocussed attention scored somewhere in between (M = 5.5).

Figure 11. Mean scores on the BAT for participants in the thought suppression, focused attention and unfocused attention groups, Experiment 8.



A single factor (Group; focused attention, thought suppression and unfocussed attention) one way ANOVA revealed a significant main effect, F (2, 27) = 4.526; p <.05, suggesting that there were significant differences between the groups.

Post hoc Tukey HSD tests were additionally conducted. They revealed a significant difference between the thought suppression group and the focused attention group,, indicating that the focussed attention group moved through significantly more steps of the BAT than the thought suppression group. The results also revealed a significant difference between the focused attention group and the unfocussed attention group, suggesting that the focused attention group also

performed better than the unfocussed attention group. Finally, the results did not show a significant difference between the unfocussed attention group and the thought suppression group indicating that the thought suppression group performed similarly to the unfocussed attention group on the BAT.

Summary

Participants in the focused attention group moved through significantly more steps of the BAT than did the participants from the two other groups. In terms of anxiety levels, those participants in the focused attention and unfocussed attention groups did not experience a significant inflation in anxiety levels despite coming into closer contact with their specific fear. Those in the thought suppression group, however, despite only moving through 4.2 steps of the BAT, experienced a significant inflation in anxiety levels.

5.2.3. Discussion

It was predicted that participants in the focused attention group would display a behavioural advantage over those participants in the thought suppression group whilst also maintaining lower levels of anxiety. The results of the current study support both of these predictions, in that those in the focused attention group moved through significantly more steps of the behavioral measure than the other two groups whilst also scoring significantly lower on the state anxiety questionnaire. These results support those attained by Marcks and Woods (2005) and Najmi et al (2009) and provide further tentative support that mindfulness could be a preferred technique for dealing with unwanted thoughts. Moreover, the results also provide further evidence that thought suppression is an ineffective strategy in coping with unwanted thoughts. In summary, the results from Experiment 8 demonstrated that spider fearful participants were more likely to approach a spider, and demonstrate a reduction in post experimental anxiety after exposure to a focused attention induction relative to a thought suppression or unfocused attention group.

One notable feature of the current results is that spider fearful behavior was reduced after a relatively brief induction. This result replicates findings from Arch and Craske (2006) and McHugh, et al. (2010), that is, even a short induction phase in focused compared to unfocused attention alters post induction performance on a

subsequent task. Additionally, these results extend on previous findings with the inclusion of a brief thought suppression induction directly comparing and demonstrating the utility of focused attention over attempted suppression when coping with unwanted thoughts.

Importantly, the current findings indicated that thought suppression was ineffective as a strategy for coping with unwanted thoughts, despite its widespread adoption. The inflated behavioral avoidance in the thought suppression condition when compared to the mindfulness (focused attention) condition supports behavioral accounts of phobias which suggest that avoidance behaviors promote phobia maintenance (Purdin, 1999). Inducing a mindfulness state in participants may have circumvented attempted suppression or avoidance of the feared stimulus (Purdon, 1999). Ironically, confronting these stimuli rather than avoiding them reduced participants' anxiety levels, despite the fact that phobic individuals typically avoid their feared stimulus in order to reduce any anxiety that may arise from having direct contact with it. The current data support the behavioral theory that prohibiting complete activation of fear structures stops habituation to the fear stimulus.

Of course, there were some methodological limitations with the study. A pre induction measure of mindfulness (e.g. Kentucky Inventory of Mindfulness Skills; Baer et al., 2004; Toronto Mindfulness Scale, Anderson et al., 2007) could have assessed the two groups' pre experimental differences in mindfulness, which would rule out the possibility that results in the BAT were due to the pre experimental levels of mindfulness and not due to the induction. In this study there was no pre induction measure of mindfulness, there was, however, a pre experimental measure of psychological flexibility, a related construct, as measured by the AAQ II. Given the strong relationship between mindfulness and psychological flexibility it is unlikely that group differences in pre experimental mindfulness were responsible for the distinction in participants' behavioral performance (see Baer, Smith, et al., 2006). Additionally, the difference in approach towards the spider between the three groups suggests that the participants did adhere to the induction procedures they were assigned to. It may be useful to replicate this study using a within subjects design, which allows for the comparison of pre and post induction differences on an individual level or to provide more extensive training in mindfulness practice, rather than a short focused breathing induction, in order to determine whether participants

increase in spider approach could be maintained over time. Finally, it is possible that the thought suppression intervention served to increase the occurrence of unwanted thoughts, thereby circumventing the suppression attempt. Specifically, the reminder cues provided during the mindfulness and thought suppression inductions aimed to promote the use of the respective coping strategy. In the case of the mindfulness induction the reminder cues were likely to have facilitated the target induction. However, the reminder cues for the thought suppression induction may have served as a reminder of the unwanted thought thus rendering the induction futile.

Nevertheless, the fact that the current study demonstrates a significant result is exciting as this work has the potential to facilitate the expansion of the treatment literature for phobias in a valuable direction. Specifically, demonstrating that a short focused attention exercise can ameliorate spider fearful individuals subsequent behavior towards a spider, suggests the utility of a larger scale mindfulness based treatment package to aid remediation of phobias. This is the first study to attempt to compare mindfulness versus thought suppression as a coping strategy for spider phobia. The results are particularly noteworthy given that the study demonstrated significant effects after a short focused breathing induction with a sample that had no previous experience with mindfulness practice. In summary, the findings reported herein suggest that mindfulness may be a useful treatment for overcoming spider phobia.

5.3. Experiment 9

One potential weakness in Experiments 7 and 8 was that the reminder cues in the thought suppression induction may have hampered the suppression attempt. For this reason the current study will involve a strategy instruction as opposed to an induction with reminder cues. The aim of this methodological change is to demonstrate that it is not the reminders that caused the behavioural change in Experiments 7 and 8 but the actual suppression attempt *per se*. However, as mindfulness cannot be administered in instruction form, an alternative component of the ACT model which can be administered via an instruction is needed. Previous research has demonstrated the utility of another component of the ACT model that

may provide a useful alternative coping strategy for unwanted thoughts, namely, defusion (see Masuda et al, 2004; Masuda et al, 2009).

Cognitive defusion is a technique that aims to disrupt the transformation of functions that occur with negative unwanted stimuli (Blackledge, 2007). Specifically it aims to enable the individual to come into contact with unwanted negative thoughts, without attempting to alter the content or frequency of the thought. In clinical terms, clients are described as being 'fused' with their thoughts, meaning that they fully believe or buy into their thoughts, and thus respond to them in a relatively rigid or inflexible way. For example, if a client believes the thought: 'I am depressed', this thought, via AARR, can lead to: 'I am worthless', 'I do not deserve happiness', and this could affect behavior through thoughts such as: 'what is the point of applying for that job, everyone knows I am inept'. Believing such thoughts as ontologically true is not functional and can cause, via experiential avoidance of environmental reminders, a constriction in the way in which a life is lived. ACT clinicians aid clients to 'defuse' from their thoughts by drawing on an array of defusion techniques. It is important to note that defusion involves changing the context in which a thought occurs rather than attempting to alter (restructure) the actual content of the thought. Specifically, the defusion process involves noticing all thoughts as thoughts rather than ontologically true.

Research in the area of defusion has employed Titchener's (1910) word repetition exercise. This exercise involves repeating a word until it loses its semantic meaning (Masuda, Hayes, Sackett & Twohig, 2004). Undergraduate students were instructed to generate two self-relevant negative thoughts, and reduce them to one word. For example, the thought of: 'I am a bad person', was reduced simply to: 'bad'. Subsequently, participants had to repeat that word a number of times over a 40s period. When compared to a distraction group, and a thought control group, it was found that the defusion instruction caused a significant reduction in both the believability of the thought, and the distress levels associated with the thought. Following on from this work, Masuda, Hayes, Twohig, Drossel, Lillis and Washio (2009) investigated exactly how long the exercise needed to be completed for in order to demonstrate distress and believability reduction. Their findings indicated that distress levels were reduced after between just 3-10 seconds, and believability was reduced after between 20-30 seconds. Healy, Barnes-Holmes, Barnes Holmes,

Keogh, Luciano and Wilson (2009) investigated the impact of an alternative defusion technique on self-negative statements. Rather than employing Titchener's word repetition exercise, these researchers instructed participants to rate the believability of: "I am a bad person", compared to: "I am having the thought that I am a bad person", a strategy often used in third wave clinical settings. Findings from this study demonstrated that the defusion statements were rated as lower in believability, and in the level of distress associated with that thought, in comparison to non-defusion statements. This provides further evidence that defusion may be useful in the management of unwanted negative thoughts. While reduction in believability is an interesting dependent measure, perhaps a more interesting finding would be to demonstrate a subsequent overt behavioral change after a defusion exercise in the face of adverse conditions.

An experimental method of inducing a depressed-like state, and negative psychological content, involves exposing participants to an unsolvable task, or an uncontrollable relationship between an action and its outcome (Teasdale & Fogarty, 1979). Prior experience with uncontrollable events has been demonstrated to retard the acquisition of subsequent new responses (Overmier & Seligman, 1967; Seligman, 1975), such as response times to completion on a maze task (Reed, Frasquillo, Colkin, Liemann & Colbert, 2001), performance on discrimination (Hiroto & Seligman, 1975), and judgment of control tasks (Maldonado, Martos, & Ramírez, 1991). This effect has been termed 'learned helplessness' (Seligman, 1975). Attribution-style accounts of learned helplessness have directly linked negative self evaluations to subsequent hampered performance, thus providing theoretical support that language processes contribute to the after effects of learned helplessness in humans (Teasdale & Fogarty, 1979).

The aims of Experiment 9 are twofold. First, the study aims to model the effect of the ACT technique defusion in dealing with psychological content by providing a behavioural measure of the effectiveness of this technique. Second, the study aims to provide the first comparison of defusion (the third wave therapeutic technique), with the most commonly employed mainstream technique, that is, thought suppression in coping with a learned helplessness preparation. It is predicted that (1) participants who receive the brief defusion instruction will perform significantly faster on the maze task than those receiving the thought suppression

instruction. Specifically, the defusion process will circumvent fusion with negative content (i.e., thoughts) that would otherwise hinder maze task performance and (2) that participants who receive the thought suppression instruction will perform significantly worse than their defusion and control counterparts on the subsequent maze task as they will experience a negative thought rebound during this task.

5.3.1. Method

Participants

Forty-five students from Swansea University volunteered to participate in the study, for which they received course credit. Participants (29 female and 16 male) ranged in age from 18 to 27 years old (mean age = 20.9; SD = 2.72). The sample was non-clinical. Due to the links between learned helplessness and depression, participants were screened for depressive tendencies. Subsequently the maze scores of two participants were excluded from the study due to high scores on the depression inventory (a score of 10 or more warranted exclusion, see later).

The assignment of participants to experimental conditions was randomized. 15 participants were assigned to the defusion instruction group, 15 were assigned to the thought suppression instruction group and 15 were assigned to the control group.

Design

The study involved a between subject experimental design, with technique instruction (i.e., thought suppression, defusion, or control) as the between-subject independent variable, and time to complete the maze task as the dependent measure.

Measures and Materials

Each participant first completed three self-report questionnaires; the Acceptance and Action Questionnaire-II (AAQ-II, Bond et al, under review) was in place to measure levels of emotional avoidance, the White Bear Suppression Inventory (WBSI, Wegner & Zanakos, 1994) measures levels of thought suppression, and the Beck Depression Inventory (BDI, Beck et al, 1996) measures depressive tendencies.

The three measures were included to determine any pre-experimental differences between the three groups that may have served to confound the results. The stop watch used to measure the maze performance was a grey RS event timer. Model 235-5065. A paper and pencil maze task was employed as the dependent measure (See Illustration 2 for a schematic plan of the maze, which measured 8cm by 12 cm).

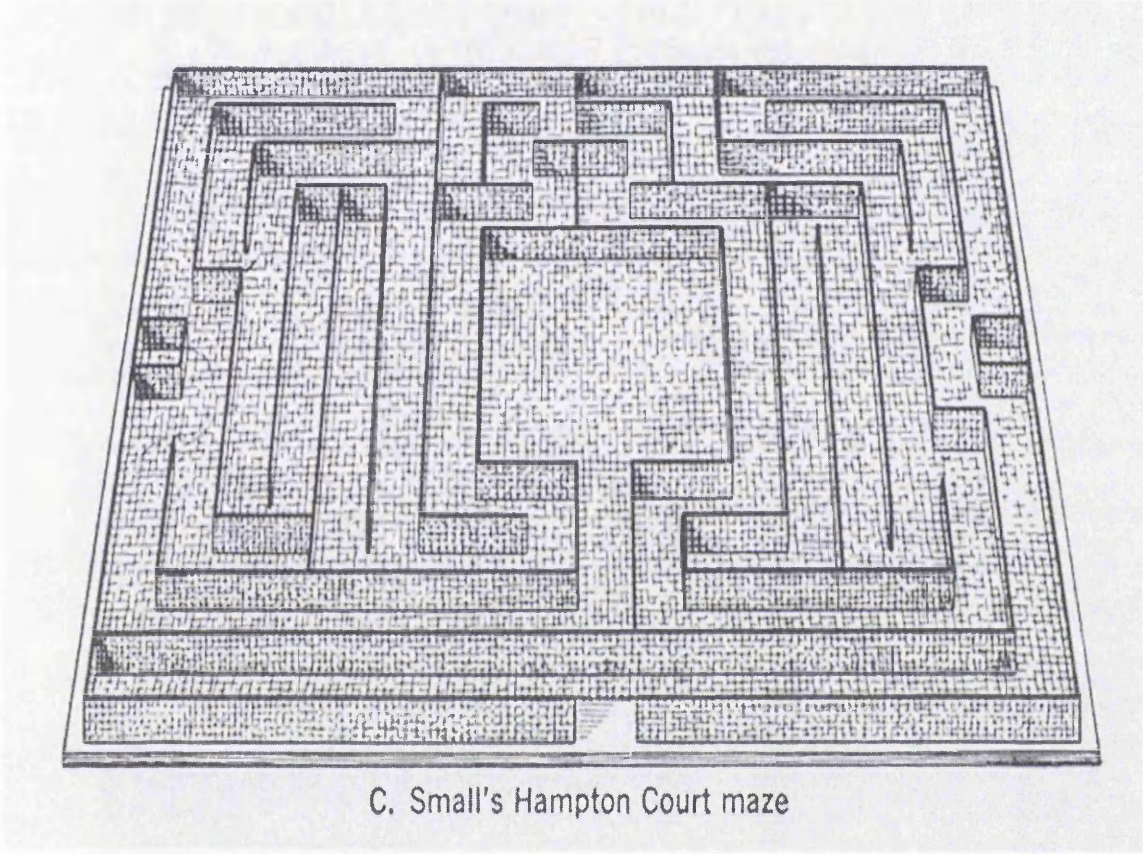


Illustration 2. Schematic representation of the maze (originally printed in Boakes, 1984, copied with permission)Experiment 9.

Procedure

On commencing the study each participant was given an information sheet outlining the broad purpose of the research. They were asked to read through it, and to sign the consent form if they were willing to proceed. All participants were then given a copy of the self report measures to complete. Upon completion of the measures each participant was assigned at random to one of the three groups (i.e., thought suppression, defusion or control).

Instruction: Participants assigned to the thought suppression group received a copy of the following instructions; *'The next task will last between 2 and 10 minutes depending on your performance. It's a simple task. Your job during this task is to notice your thoughts as they show up. As you do this do not let those thoughts affect you, simply suppress all thoughts and stay focused on the task. The exercise below will help you to do this: Think of a good thought. Keep that thought in mind. Anytime bad thoughts come into your mind immediately replace them with the good thought. Suppress all thoughts except the good thought'.*

Participants assigned to the defusion group received a copy of the following instructions; *'The next task will last between 2 and 10 minutes depending on your performance. It's a simple task. Your job during this task is to notice your thoughts as they show up. As you do this try not to get caught in believing any one of these thoughts, but just see them as thoughts and not reality. The exercise below will help you to do this: Notice each of your thoughts as they pop into your head. This thought maybe 'this is too easy', 'this is silly' or 'I don't know what I'm thinking'! One by one, notice each thought that you have and let them just pass by your consciousness. Don't try to suppress any thoughts just let them occur'.*

Participants assigned to the control group were given no instruction and proceeded directly to the next step in the experiment. After reading the instructions each participant was then instructed to complete the learned helplessness computer task whilst incorporating their respective instruction.

Learned Helplessness: Once assigned to a group the participant read through the instructions on the computer screen corresponding with the learned helplessness preparation (the preparation was a direct replication of that employed by Maldonado, Martos, & Ramirez, 1991). Only the unsolvable version of the task was employed.

The instructions were as follows: *'In this experiment you will be looking at a series of computer presented images. Each image will involve two stimulus patterns on it. One to the left and another to the right. The stimulus patterns are composed of four different dimensions, with two values associated with each dimension. For each group of the ten images I have chosen one of the eight values as being correct. For each image I want you to choose which side contains this value. To do this, you must click on one of the buttons presented underneath the image (left or right). If your*

choice is incorrect, a noise comes on through the speakers, but if you choose the correct side there will be no noise. Your task is to learn the predetermined value by your response according to whether or not the noise is heard. The current experiment is adapted from a standard intelligence test. Most people learn to respond appropriately to the task with relative ease'.

Each participant completed four sets of ten trials, where there were 8 possible values to choose from (i.e., square, circle, red, green, the letter 'G', the letter 'D). For each set of ten trials, a new value was said to be designated as the 'correct' stimulus. Therefore, each participant had to attempt to work out, via trial and error, the 'correct' value for each block of ten trials. If they chose the 'correct' value then no noise occurred, however upon choosing an 'incorrect' value, a noise was played through the speakers of the computer. Unbeknownst to the participants, however, was that they had no control over the preparation; so that in order to induce learned helplessness the 'incorrect' noise was presented on 50% of the trials regardless of the buttons they pressed.

Prior to beginning the preparation, all participants were asked if the instructions were understood, and were given time to ask questions and receive further explanation of what was necessary to conduct the task.

Maze Task (A Small's Hampton Court Maze, originally printed in Boakes, 1984): Upon completion of the learned helplessness preparation a page with a maze task was placed on the desk in front of the participant. Each participant was instructed to complete the maze and told that their completion time would be recorded. They were instructed to do so, by going from the outside entrance of the maze into the centre. The instructions were read as follows *'Please complete the maze on the table in front of you in the quickest time possible, your time will be recorded. In order to complete the maze task you have to begin at the X marked on the perimeter of the maze and work your way to the centre. As soon as you begin I will start the stop watch'.*

The time it took each participant to complete the maze was recorded by a hand held stop watch. The maze task was directly observed by the researcher to provide a precise and accurate response time. Participants were finally fully debriefed and their credit was administered.

5.3.2. Results

Questionnaires

Two participants scored highly on the BDI (A score of 10 and over warranted exclusion). The remainder of the participants fell within a normal range of the BDI. The overall mean questionnaire scores: AAQ II =51.9 (5.6), WBSI = 39.9 (5.2), BDI = 4.17 (3.1). Table 16 indicates that there were no significant differences between each of the three groups in terms of emotional flexibility as measured by the AAQ II (Defusion group M = 54.91, Thought suppression group M = 50.07, Control group M = 50.71), thought suppression tendencies as measured by the WBSI (Defusion group M = 2.46, Thought suppression group M = 4, Control group M = 6.14) and levels of depression as measured by the BDI (Defusion group M = 37.66, Thought suppression group M = 42, Control group M = 40.21).

	Defusion vs. Suppression	Suppression vs. Control	Defusion vs. Control
AAQ II	t (27) = 1.094; p > 0.05	t (27) = -0.197; p > 0.05	t (27) = 1.264; p > 0.05
WBSI	t (27) = 1.029; p > 0.05	t (27) = 0.349; p > 0.05	t (27) = -0.507; p > 0.05
BDI	t (27) = 1.237; p > 0.05	t (27) = 1.397; p > 0.05	t (27) = 1.631; p > 0.05

Table 16. The t and p values from the independent t tests comparing each of three groups, defusion, suppression and control, Experiment 9.

Maze Task

The amount of time taken to complete the maze task across the three groups was collated and are presented in Figure 12. From Figure 12 it can be seen that the defusion group (M = 39.33 seconds) took less time to complete the maze than both the thought suppression (M = 54.78 seconds) and the control groups (M = 45.85 seconds). These results suggest that the subsequent behaviour (i.e., maze completion) for participants who received the defusion instruction was least affected by the learned helplessness preparation.

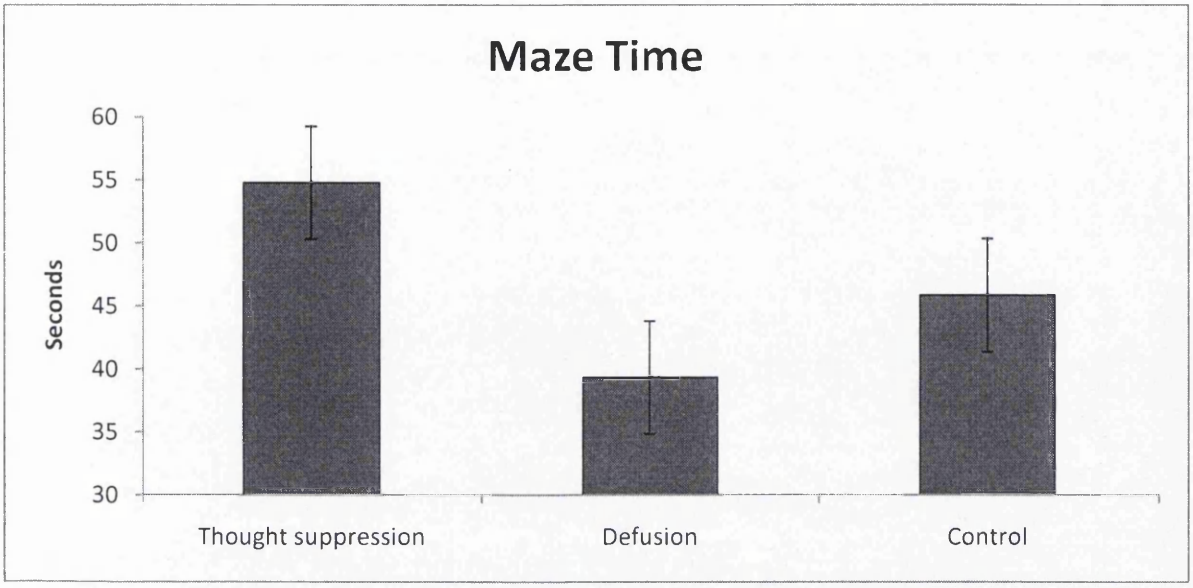


Figure 12. The amount of time each group took to complete the maze task, Experiment 9.

Statistical analyses were conducted in order to determine any differences between the three groups in maze completion time. A one-way between-subjects analysis of variance (ANOVA) revealed a statistically significant main effect for completion time, $F(2,40) = 3.78$, $p < 0.05$, suggesting that completion time differed across instruction groups. A series of Tukey post hoc tests were conducted in order to determine where these differences emerged. Results from the thought suppression versus defusion analysis revealed a significant difference ($p<0.05$) in completion time, suggesting that those in the thought suppression group completed the maze significantly slower than those in the defusion group. However no significant difference emerged between the defusion group and the control group ($p > 0.05$), suggesting that those in the defusion group completed the task no faster than those in the control group. Additionally, the thought suppression group and control group were compared, this analysis also revealed no significant difference between the two groups completion times ($p < 0.05$), again suggesting that there was no difference in maze times between the thought suppression and control groups.

These results suggest that neither of the experimental groups (thought suppression or defusion) scored significantly better or significantly worse than a control group who received no instruction. However, when directly comparing the thought suppression and the defusion groups, results reveal that the thought

suppression group provided significantly worse task performance (i.e., maze times) than those in the defusion group.

5.3.3. Discussion

Experiment 9 aimed to compare the effectiveness of defusion versus thought suppression in dealing with the negative psychological content associated with attempting to complete an unsolvable task (i.e., a learned helplessness induction). The effects of learned helplessness are demonstrated in the literature by impaired performance on a subsequent task. For example, previous research by Reed et al (2001) demonstrated significantly slower response times to completion on a post learned helplessness maze task. The results of the current study showed that participants who received a brief defusion instruction performed significantly better on the maze task, after having completed a learned helplessness preparation, when compared to those in the thought suppression group. This finding suggested that the typical effects of completing an unsolvable task on subsequent task performance were reduced by the defusion instruction, suggesting that defusion may be a valid technique for dealing with unwanted psychological content. The result also reflects previous work on defusion, which also display the possible positive effects of engaging in defusion based strategies (Masuda, Hayes, Sackett & Twohig, 2004; Masuda, Hayes, Twohig, Drossel, Lillis & Washio, 2009; Healy, Barnes-Holmes, Barnes Holmes, Keogh, Luciano & Wilson, 2009). .

Thought suppression is the most common technique used for dealing with unwanted thoughts (Rachman & Da Silva, 1978), and research within the clinical domain suggests that thought suppression plays an important role in the development and maintenance of various psychological disorders ranging from Anxiety Disorders (Freeston & Ladouceur, 1997) to Depression (Wegner, 1994; Beevers, Wenzlaff, Hayes & Scott, 1999). The results of Experiment 9 provided further support that engaging in thought suppression is a maladaptive coping strategy for dealing with unwanted negative content, as evidenced by slower maze completion latencies after the thought suppression induction when compared to defusion group.

Defusion directly challenges the believability of private events; hence, previous studies involving defusion instructions have employed thought believability measures pre and post experimentally in order to gauge the efficacy of defusion.

Furthermore, many such studies have shown predicted reductions in believability (e.g., Masuda et al. 2004; 2009). One recent example of such a study did not see such a reduction after a defusion instruction (Healy et al., 2008). In the case of the latter, however, the authors suggest that it is possible that participants may have reported high believability due to a misunderstanding of the question being asked. For example, when presenting participants with statements such as "I am having the thought that I am a bad person", a participant could report high believability, indicating that they view this as just a thought as opposed to indicating they believe that they really are a bad person.

The current study was not concerned with self reported believability of the thoughts but rather the subsequent impact of defusion on behavior. This study, therefore, did not include a believability measure of negative statements. No particular negative thought was targeted in the current study rendering a thought believability measure difficult to employ. Specifically, the design of the study aimed to target the entire class of negative content that may have shown up during the unsolvable task as opposed to individual target statements, which have previously been the target of defusion based studies.

Despite providing tentative evidence in favour of defusion the current study does have some limitations which would need to be addressed in future research. Firstly, a different dependent variable could be used to measure task performance. A task such as a maze is susceptible to individual differences that were not screened for in the current study. Prior experience of maze tasks (i.e., practice effects) may have played a role in participants' performance. Additionally, participants pre-experimental IQ was not screened for and could relate to faster maze completion times. Secondly, no treatment adherence measure on the thought suppression or defusion instructions was recorded. Future research could include a self report likert rating of how much the instruction technique was applied during the unsolvable task across participants. In fact it might be argued that the target process of defusion did not actually occur herein. Indeed, it may have been the negative effects of thought suppression rather than the beneficial nature of defusion that was reflected in the current findings. However, the intermediate mean score of the control group suggests that this is not the case. Thirdly, Experiment 9 included no control for learned helplessness i.e. there was no condition in which the maze time was recorded of a

participant who did have control over the learned helplessness program. Such a manipulation would have allowed us to ascertain whether any difference would emerge in the subsequent response (i.e., the maze task) between those with and without control of the learned helplessness program. However such a manipulation was not included as the development of learned helplessness via the Maldonado program had already been shown to retard subsequent responses in comparison to those who did have control over the program (Maldonado et al, 1991). This combined with limited participant resources diminished the need for this control group.

Finally, the first two Experiments in this Chapter use mindfulness as a technique for managing unwanted thoughts, whilst Experiment 9 compares defusion with thought suppression. The change from mindfulness to defusion occurred because only defusion and not mindfulness could be administered in the form of an instruction. However, perhaps if this study were to be repeated, then it could involve four conditions; thought suppression, control, defusion and mindfulness. The inclusion of the mindfulness condition would allow a comparison of each of the techniques described in this chapter, and would provide further knowledge of the efficacy of each technique.

5.4. Concluding Comments

Together the results of Experiments 7, 8 and 9 in the current thesis are remarkable in their own right. Even a brief instruction/ induction in mindfulness or defusion impacts on participants performance and/or distress levels. Considering the lack of research conducted on mindfulness or defusion interventions, the current results have important implications for the clinical application of third wave therapeutic techniques as alternatives to thought suppression in dealing with unwanted negative psychological content.

Chapter 6

Discussion

6. General Discussion

The purpose of Chapter 6 is to provide a brief summary of the empirical work presented in Chapters 2-5. After each chapter summary the broader theoretical issues of the respective chapters will be discussed in detail. Once the theoretical issues from the empirical work have been addressed suggestions for future directions will be proposed. The current chapter will close with a concluding commentary on the nine empirical studies that comprised the thesis.

6.1. Chapter 2: Summary

In a seminal thought suppression paper Daniel Wegner coined two processes which he suggested were central to thought suppression (Wegner et al, 1987). The first, the immediate enhancement effect, refers to the inflation of unwanted thoughts that one experiences during a suppression episode, whilst the second, the rebound effect, refers to the inflation of unwanted thoughts that one will experience immediately after the suppression episode. Together, these processes are referred to as the 'ironic effects of thought suppression'. Chapter 2 of the current thesis aimed to investigate the immediate enhancement and rebound effects in greater detail, specifically aiming to determine the effects of different distraction techniques (Experiment 1), and the effect of multiple thought suppression attempts (Experiment 2).

According to Wegner et al (1987) the default method of suppression is self distraction. Self distraction involves the unfocused manner in which one uses any number of stimuli in the environment to aid a suppression attempt. However, in consonance with the ECH, engaging in self distraction can result in environmental distracters becoming associated with the unwanted thought, which subsequently serve as reminder cues for the unwanted thought. To test this prediction Wegner et al (1987) compared self distraction to an alternative form of distraction. Focused distraction involves participants focusing their attention on one experimenter provided distracter. It was predicted that one focused distracter would limit the number of environmental cues that could remind the participant of the unwanted thought; the results reflected this prediction in that the focused distracter reduced the ironic effects of thought suppression. Experiment 1 of the current thesis aimed to test the immediate enhancement and rebound effects under the distraction techniques of

self distraction (the distraction technique that people are likely to use in everyday life), focused distraction (the distraction technique that Wegner et al, 1987, suggested would reduce the normal effects of suppression) and multiple distraction. Multiple distraction, which may be viewed as the direct opposite to focused distraction, provides the participant with a number of distracters in an attempt to divert attention away from the unwanted thought. In order compare the three distraction techniques the participants in Experiment 1 were cycled into the traditional thought suppression procedure. That is, participants had to engage in two five minute phases. In the first of these phases they were required to suppress (via whichever distraction technique was proposed to them). In the second five minute phase they were free to think of whatever they liked. In both phases the participants had to signal the presence of the unwanted thought ('white bear') by pressing the space bar. In accordance with previous literature it was predicted that self and multiple distraction techniques would cause an immediate enhancement and rebound effect, whilst focused distraction would not (Lin & Wicker, 2007; Salkovskis & Campbell, 1994) In line with these predictions those participants in the focused distraction group indicated the intrusion of the unwanted thought no more than the baseline group in either phase, thereby showing no immediate enhancement or rebound effects, whilst the multiple and self distraction group did demonstrate an inflation in unwanted thoughts, providing evidence for both.

Wegner (1989) also suggested that people do not interact with an unwanted thought once but will cycle through phases of suppression and non suppression, a process he referred to as 'an indulgence cycle'. Wegner (1989) suggested, in accordance with the ECH, that the more indulgence cycles one entered, the more pronounced /immediate enhancement and rebound effects would become due to increased environmental distracters. In order to test this prediction previous research (Hardy & Brewin, 2005; Williams & Mould, 2007) required participants to complete two suppression and non suppression phases. Experiment 2 of the Chapter 1 extends on this research by asking the participants to complete multiple indulgence cycles. Specifically Experiment 2 required two groups of participants to complete 6 five minute phases. Those in the first group (repeated suppression group) completed three indulgence cycles (a suppress phase, followed by a think free phase, repeated 3 times) whilst those in the second group (suppress think free group) completed one

suppress phase, followed by five think free phases. The aim of this study was to determine the effect of engaging in multiple indulgence cycles on the immediate enhancement and rebound effects. It was predicted, in line with the ECH, that participants would experience inflations in unwanted thought occurrence in both phases, due to the increased amount of distracters that could cue the unwanted thought. The results of Experiment 2 showed no such increase, specifically, the participants in the repeated suppression group, despite experiencing significantly more unwanted thought intrusions than those who only had to suppress once, only experienced a maintenance effect where the unwanted thought neither increased nor decreased over time. This result indicates that the immediate enhancement and rebound effects did not become more pronounced over multiple suppression attempts, suggesting that suppression does not become more difficult when repeated over time.

6.1.1. Theoretical issues

The experiments reported in Chapter 2 provided some interesting results that contribute to contemporary understanding of the immediate enhancement and rebound effects. However, a number of broader theoretical issues have arisen as a result of the research that warrants further discussion. First, problems with the definition of the rebound effect have arisen. Wegner et al (1987) suggested that if participants experienced an inflation in unwanted thought occurrence in the rebound phase, when compared to the suppression phase, then such an increase would be referred to as the rebound effect. However, as outlined in the introduction (see Section 1.2.8.) the rebound effect was defined when the concentration instruction was in place. Since then a number of researchers (Lavy & Van Den Hout, 1990; Rassin et al, 2005) have suggested that such an instruction lacks ecological validity, proposing the think free instruction instead. Despite the introduction of a new instruction during the rebound phase, no re-definition of rebound has been proposed. With this in mind, the results of Experiment 1, strictly speaking, do not find a rebound effect, as has been the case with many published thought suppression studies (Liberman & Forster, 2000; Merkelback et al, 1991; Rutledge et al, 1993 and Nixon, Flood & Jackson, 2006) which employed the think free instruction. In light of this procedural change this result is not surprising, participants receiving a think free instruction are unlikely to indicate the presence of an unwanted thought the same

amount of times as participants actively instructed to concentrate on it. Given that the rebound effect refers to the re-emergence of the unwanted thought after a suppression attempt, it seems prudent, to redefine the rebound effect in line with the procedural change in the literature. Specifically, perhaps, as with the immediate enhancement effect, a rebound effect could be defined as a significant difference in unwanted thought intrusions between a suppression group and a baseline group. Experiment 2 found that those participants in the think free phase had the unwanted thought intrude significantly more than the baseline participants did in the same phase, thus, demonstrating a 'rebound effect' according to the new definition.

Furthermore, Experiment 2 of the current thesis raised a novel and interesting issue in relation to the ecological validity of the rebound phase more generally. Specifically, in everyday life, it is unlikely that people will go through specific phases where they 'think free'. Instead it is more likely that as soon as the unwanted thought rebounds once in a think free phase, that people will immediately make further attempts to suppress. Such logic suggests that the first time the thought rebounds is the only intrusion of interest. The novel analysis of Experiment 2 found that participants who repeatedly suppressed experienced the first intrusion significantly more quickly in the rebound phases than those in the suppress think free group. Such a result could reflect how thought suppression occurs in everyday life; the more one engages in thought suppression, the more quickly the unwanted thought subsequently intrudes. This result questions both the original definition of the rebound effect and the definition proposed above. Both definitions define rebound as multiple intrusions during the phase after suppression. However, it is likely that in everyday life, no such phase exists. Instead participants only need the unwanted thought to rebound once before they again make a suppression attempt. In short, this suggests that a new definition of the rebound effect may be more appropriate; where only one intrusion of the unwanted thought is needed for the effect to exist.

The second issue which warrants discussion is the inclusion of the baseline condition. The baseline condition aims to determine the amount of times a target will enter one's mind when no suppression instruction is in place, specifically aiming to determine if the results of the typical thought suppression study are due to the experimental paradigm rather than as a result of attempted suppression *per se*. Two

issues can be raised which question the validity of the inclusion of a baseline condition. First, if a participant indicates the occurrence of the unwanted thought a similar amount of times in a baseline condition as they do during a suppression condition, then it has been broadly suggested that such a result demonstrates that thought suppression is possible (Muris et al, 1993; Roemer & Borkovec, 1994). However, no experiment to date that has employed a five minute 5 minute phase reported that participants did not report the occurrence of the unwanted thought. If such a finding existed then this would provide evidence that suppression can work. However, showing that a baseline condition experienced a similar amount of thought intrusions to a suppression group does not show that participants suppressed their thoughts, it shows that the experimental paradigm is promoting participant reactivity (Purdon & Clark 2000). Incidentally the results of Experiment 1 found that those in a suppression condition experienced more unwanted thought intrusions than those in the baseline condition. Second, during post experiment debriefing sessions with participants in the baseline condition they suggested that the baseline instruction cued a suppression attempt, i.e. participants said that after having received a baseline think free instruction, they attempted to suppress the target thought anyway. This indicates that the number of thought intrusions during the baseline condition could be directly reflective of the amount of intrusions experienced in a suppression condition. In all, despite being prevalent within thought suppression literature, the validity of the baseline condition seems questionable, and discounting the ironic effects of thought suppression on the basis of this condition may be a mistake. Unfortunately, finding an experimental paradigm which accurately measures the participant's thoughts will always be an issue, perhaps the development of implicit measures could by-pass the problems associated with the self report paradigm. However as the current thesis was interested in modelling why suppression does not work and providing an alternative, the need to provide an alternative to the baseline condition was circumvented by measuring the post suppression behavioural impact of a suppression attempt (see Chapter 5)

Third, the ecological validity of the distraction techniques employed in Experiment 1 is questionable. Wegner et al (1987) suggested that the use of a focused distracter would by-pass the effects of suppression. And indeed, in accordance with the ECH, the results of Experiment 1 found that participants in the

focused distraction condition pressed the space bar less than those in the other distraction conditions. However, despite providing evidence which supports the predictions of the ECH, the usefulness of the focused distraction technique as a strategy for dealing with unwanted thought in everyday life can be brought into question. In a laboratory setting the use of focused distraction may reduce the immediate enhancement and rebound effects, however in everyday life, due to the amount of environmental stimuli which surround us, it is unlikely that engaging in focused distraction will provide an effective alternative.

Fourth, Experiment 2 did not find results which were consistent with the experimental predictions or with the ECH, such a finding could bring into question the validity of the ECH, which suggests that thought suppression might be ineffective due to the environmental reminders. According to these theories the more one engages in thought suppression, the more pronounced the emergent immediate enhancement and rebound effects should be due to the increased amount of distracters that the participant will draw upon. However, the results of Experiment 2 only found a maintenance effect and not the expected increase in unwanted thought intrusions. One potential reason for such a finding may be the experimental setting in which the study was conducted. Specifically, a laboratory setting lacks possible distracters and thus limits the amount of environmental cues available to the participant. As such, it is likely that a ceiling effect emerged, in terms of unwanted thoughts experienced by the participants, that is, with a limited amount of possible distracters it is likely that only a certain number of unwanted thought intrusions are achievable within the five minute phase. Additionally, it must be added that participants' motivation levels in Experiment 2 may have been low. It is likely that the 30 minute thought monitoring phase, that participant levels of fatigue and boredom gradually grew. It is therefore possible, by the end of experiment, that participants were not engaging in the study with the same intensity that that they were at the beginning. This effect might have been more pronounced in the think free phases when there were less specific requirements on the participants. Finally, the effects in Experiment 2 might have been stronger with more participants. With only 15 participants in each condition the trends are in place and the effects are existent, but perhaps more participants would have produced more pronounced results.

6.1.2. Future Research

Future research to test the utility of focused distraction in a real life setting would address whether this could be effectively used as a coping strategy for unwanted thoughts. Specifically, although theoretically it seems that such a technique would be continually undermined by multiple cues in the environment this hypothesis could be directly tested. Another fruitful avenue of future research might involve the type of distracter employed; previous research has suggested that distracters which are absorbing (distracters that are subjectively and successfully engaging to the person) may make thought suppression more possible (Brucato, 1978; Corah et al, 1979; McCaul & Mallot, 1984; see Section 1.2.4.). It would be interesting to conduct research which tests the assertion; perhaps by employing a post suppression measure which measures how 'absorbing' each participant found the distracter, a relationship between the amount of unwanted thought intrusions and the absorption of the distraction could be found. Furthermore a study which investigates the effects of engaging in more, but possibly shorter, indulgence cycles could be of use, specifically aiming to determine whether the occurrence of the unwanted thought can be put into extinction, or whether the repeated suppression attempt would maintain its intrusion rate.

6.2. Chapter 3: Summary

Thought suppression research involving neutral target thoughts is important as it provides a model of the basic suppression effect. However, during the course of everyday life it is unlikely that people will engage in the suppression of neutral thoughts (Rachman & Hodgson, 1980). A more ecologically valid way to study thought suppression might incorporate high valence personally relevant thought items. Indeed a number of studies have employed high valence thought items, providing mixed evidence in terms of their impact on immediate enhancement and rebound effects (Davies & Clark, 1998; Harvey & Bryant, 1998; Roemer & Borkevec, 1994, see Section 1.2.6.). Chapter 3 of the current thesis aimed to determine the effect of valence on the immediate enhancement and rebound effects across different distraction techniques (Experiment 3), and subsequently to

determine the effect of valence on a participant's physiology during and after attempted suppression (Experiment 4).

Experiment 3 employed a similar experimental design to that of Experiment 1. The study aimed to determine the effect of different distraction techniques (self distraction, focused distraction and multiple distraction) on unwanted thought occurrence in both the suppression and think free phases, for both spider fearful (high valence) and non spider fearful (low valence) participants. To this end, all participants were cycled through two five minute phases. During the first phase they were required to suppress via a distraction technique, and during the second phase they were free to think of whatever they liked. In both phases the participants had to signal the presence of the unwanted thought by pressing the space bar, this served as the dependent variable in the study. All participants, in both the spider fearful and non spider fearful groups, had to suppress the unwanted thought 'spider', for those that were spider fearful, this unwanted thought was seen as high valence, whereas for the non spider fearful participants, the unwanted thought was low valence. Eight experimental groups participated; a self distraction spider fearful and non spider fearful group, a multiple distraction spider fearful and non spider fearful group, a focused distraction spider fearful and non spider fearful group, and a baseline spider fearful and non spider fearful group. Two experimental predictions were made 1). that the spider fearful groups would experience an increased inflation of unwanted thoughts compared to non spider fearful groups and 2). that both focused distraction groups would experience less unwanted thought intrusions. As predicted, in both the suppression and think free phases, spider fearful participants tended to press the space bar more than non spider fearful participants. Second, contradicting the pre experimental predictions, the focused distraction group experienced a similar amount of unwanted thoughts as the other distraction groups. Finally, in contradiction to the results of Experiment 1 which found immediate enhancement and rebound effects with a low valence neutral thought, only participants in the high valence groups experienced both effects in Experiment 3. These results broadly suggest three things, high valence thought items cause stronger immediate enhancement and rebound effects, focused distraction is also futile when high valence thoughts are used, and immediate enhancement and rebound effects only exist under high valence conditions.

One possible criticism of Experiments 1, 2 and 3 is that the dependent variable in each study involves self report. The explicit nature of the task renders it easy to administer, however, the direct self reporting style of the task renders it prone to weaknesses that are inherent with all explicit measures (Roche, Ruiz, O'Riordan & Hand, 2005; Tierney & McCabe, 2001; Ward, Hudson, Johnston, & Marshall, 1995). For example, it has been found that self-report measures are affected by factors such as the immediate mood of the respondent and their physical surroundings (Schwarz & Clore, 1983; Schwarz, Strack & Mai, 1991). In order to overcome this difficulty, some researchers have begun to employ physiological measures of thought suppression. A number of studies (Petrie et al, 1998; Gross and Levenson, 1993; Wegner et al, 1990, see Section 1.2.7.) have aimed to determine the physiological effects of engaging in the thought suppression of both low and high valence thoughts. The rationale for employing such dependent measures arose from existent links between thought suppression, physiology and psychological dysfunction (Rassin, 2005). For these reasons Experiment 4 aimed to determine the physiological effects of thought suppression, when both high valence and low valence thoughts were employed. Skin Conductance Levels (SCL), a technique which has found strong suppression related effects in previous thought suppression related research (Wegner & Gold, 1995; Muris et al, 1991; 1992) was measured throughout the experiment. To that end, four groups of participants were attached to SCL electrodes before completing three five minute phases. Two groups, the spider fearful experimental group and non spider fearful experimental group, were instructed to think of anything for a five minute phase (i.e., to gage a within participant baseline SCL reading), following this participants were instructed to suppress thoughts of a 'spider' for the second five minute phase. Finally, participants were cycled into five minute a think free phase. Whereas the spider fearful and non spider fearful baseline groups had to think of anything for the first five minutes, before engaging in two subsequent think free phases. During the second and third phases, all participants were required to signal the presence of the target thought ('spider') by pressing the spacebar, this served as the behavioural dependent variable. The second dependent variable was the participants SCL reading in each of the three phases. It was predicted that the spider fearful group would signal the most unwanted intrusions behaviourally. Second, it was predicted that a difference in SCL

would emerge between groups. With such mixed research findings on thought suppression and physiology, a more specific hypothesis on physiology was difficult. The results showed that spider fearful participants did indeed signal the highest occurrence of the unwanted thought, demonstrating the existence of an immediate enhancement with a high valence thought. However, in agreement with Experiment 3, but contradictory to Experiment 1, no immediate enhancement or rebound effect emerged for the low valence group. Second, in terms of SCL, not only was there was no difference between high and low valence groups, but there was also no difference between the thought suppression and baseline groups, thereby finding no physiological effects of thought suppression.

6.2.1. Theoretical issues

The first issue worth noting from Chapter 3 was that participants in all non spider fearful groups, from both Experiment 3 and 4, did not experience an immediate enhancement effect or a subsequent rebound effect. This contrasts with previous research, which has suggested that low valence thoughts can cause such ironic thought suppression effects (Salkovskis & Campbell, 1994; Lavy & Van Den Hout, 1990), and also directly contradicts the results of Experiment 1, which found both the immediate enhancement and rebound effects with the use of a neutral low valence thought. The reason for this is unclear. One potential explanation might be that a demand characteristic caused the participants to behave in such a way, for example perhaps those in the non spider fearful group thought they would be required to press the space bar less than their spider fearful counterparts. Although this seems unlikely as it would have been impossible for the participants to know what the 'right' amount of space bar presses would have been. Despite the reason for such a result remaining unknown, the Chapter 3 found that high valence personally relevant thoughts produced a more pronounced immediate enhancement and rebound effects than neutral thoughts. This finding is important as high valence personally relevant thoughts are more likely to necessitate attempted suppression.

Second, unlike Experiment 1, Experiment 3 found that the focused distraction condition was ineffective when the unwanted thought was high in valence. The reason for such a finding is again unclear, as according to previous research and the ECH, those in the focused distraction condition should have

experienced less unwanted thought intrusions. One reason why this might have occurred might be the lack of motivation for the suppression attempt when a neutral thought is employed. It is possible that the more determined one is to get rid of an unwanted thought, the more emotionally engaged one will become with the suppression attempt, therefore the more distracters one will seek (Harvey & Bryant, 1998). It is likely that the high valence nature of the unwanted thought caused participants to try harder to rid themselves of it, thereby increasing the amount of environmental distracters and reminder cues. This would suggest that the suppression of high valence stimuli is harder than the suppression of low valence stimuli, as not even those participants in the focused distraction condition, a technique which has been shown to reduce the effects of suppression, could succeed in reducing the amount of unwanted thought intrusions when a high valence thought was employed. This lends support to the suggestion that thought suppression and clinical disorders may be linked, due to the inflated amount of unwanted intrusions that result from suppressing a high valence unwanted thought.

Third, some physiological effects of thought suppression were expected. However, not only was there no difference between the high valence and low valence groups, but there was also no difference between the thought suppression and baseline groups. Although this finding was not predicted there are theoretical reasons to support why this pattern of results emerged. First, it is possible that the high valence nature of the unwanted thought was not high valence enough to produce physiological results. For example, there was no spider, nor any threat of an actual spider present during the experiment. Perhaps someone suppressing a higher valence thought, i.e. the recent death of a loved one, might have produced increased physiological responses. Second, all participants, regardless of whether they received a thought suppression or baseline instruction, experienced the same increases in SCL across the three five minute phases. This finding warrants discussion as it suggests that thought suppression has no physiological effects at all. It remains totally uncertain why all participants experienced jumps from their initial baseline SCL measurement across the three phases. One possible explanation for this, which was discussed in Section 6.1.1., is that participants in the baseline condition also engaged in the suppression of the target item when exposed to the baseline instruction. This would account for the similar physiological reactions that all groups experienced

across the three five minute phases. Thus, participants who engage in general suppression might experience a heightened SCL level in both the suppression and the think free phases.

Finally and briefly, as Chapter 2 of the current thesis employed the neutral thought of 'white bear' at all times, Chapter 3 manipulated valence by asking all participants to suppress thoughts of a 'spider' only. Although it was assumed that the thought 'spider' to a non spider fearful participant would serve as a neutral stimulus, it is possible that participants are generally more reactive when suppressing 'spider' than when suppressing the obviously neutral stimuli of 'white bear'. Perhaps a more viable neutral condition would have been the inclusion of 'white bear' as the stimulus for the neutral group in valence concerned experiments.

6.2.2. Future Research

Future research in the area of valence should include unwanted thoughts that are higher in valence and personally relevant. For example, it seems unlikely that participants suppressing thoughts of a dead loved one will experience the same amount of unwanted thoughts and the same physiological reactions as a subclinical spider fearful participant. One could increase the valence in a laboratory setting in a number of ways. One example of this might involve instructing participants to suppress all 'pain' related thoughts while exposing them to a pain induction (e.g., cold pressor task) in order to determine what effect this would have on unwanted thought occurrence and physiology (Salkovskis & Reynolds, 1994; Cioffi & Hollaway, 1993). Additionally, a few studies have investigated thought suppression and valence by introducing behavioural dependent measures. For example, how much of a certain food would a dieter eat when instructed to suppress all thoughts of food. For example Herman & Mack (1975) asked dieting participants to suppress all thoughts of ice cream before engaging in a milkshake ice cream test. Results showed that those in the experimental group ate significantly more ice cream than controls. Finally, the effects of suppressing high valence thoughts that mirror everyday problems, over a longer time phase in the real world, would be informative. For example, participants could be required to fill out a form indicating personally relevant content that would be subsequently employed as the target content to be suppressed. Recording instances of the unwanted target could be measured via a self

report form at the end of each day in order to determine the amount of unwanted thought intrusions participants would experience in the real world and over a longer period of time, when the suppression target is personally relevant.

6.3. Chapter 4: Summary

Chapters 2 and 3 of the thesis repeatedly demonstrated the unsuccessful nature of attempted thought suppression. Chapter 4 of the current thesis aimed to determine why such attempts were futile, whilst providing additional non self report measures of thought suppression. Theoretical accounts of thought suppression / the unsuccessful nature of thought suppression are scarce. The most widely accepted account in the literature is the Environmental Cueing Hypothesis (ECH: Wegner, 1989). According to the ECH people naturally engage in unfocused distraction when suppressing. However, once the suppression attempt has failed, due to the automatic distracter search making the unwanted thought hyper-accessible (see Section 1.2.1.1.), the distracters that were used in the suppression attempt will become associated with the unwanted thought. This process will continue in cyclical fashion until a number of intended distracter stimuli serve to actually remind the person of the unwanted thought. However, a behavioural phenomenon, stimulus equivalence, might be able to account for the unintentional as well as intentional relating between stimuli. The primary aim of Chapter 4 was to determine if the stimulus equivalence phenomena could build on Wegner's ECH and account for the futile nature of attempted thought suppression.

To that end, Experiment 5 of the current thesis involved a novel procedure and paradigm. Participants were randomly assigned to one of two groups (suppression versus control). First, all participants were required to complete a 3 class by 3 member equivalence training and testing procedure. One member from one of the classes was the target item to be suppressed. Subsequently all participants had to complete the typical five minute suppression phase where they were required to suppress all thoughts of the target item. The difference in procedure between the suppression and control groups involved the final phase experimental instruction. In this phase, all participants were required to attend to a computer screen which presented one word (i.e., stimuli from the three trained equivalence classes and 9

novel stimuli) every ten seconds. Participants were instructed that they could remove any word from the screen by pressing the space bar. Participants in the suppression group were directly instructed to suppress all thoughts of the target word whereas those in the control group received no suppression instruction. It was predicted, in accordance with the stimulus equivalence literature, that participants in the suppression group would remove not only the target word from the screen, but also the target related class members (both directly trained and derived as related). Results showed that in the suppression group, the target, trained and derived words were removed from the screen significantly more than any other, suggesting that the target word, the trained word and the derived word all served to hamper the suppression attempt. No such effects were found in the control group, suggesting that it was the thought suppression instruction which caused the interference.

Recent third wave behavioural therapies have highlighted the importance of valued living (Plumb et al, 2009). Values, which can be defined as "freely chosen, verbally constructed consequences of ongoing, dynamic, evolving patterns of activity, which establish predominant reinforcers for that activity that are intrinsic in engagement in the valued behavioral pattern itself" (Wilson & Dufrene, in press), are the guidelines by which each individual lives their lives; every day we make choices which are either consistent or inconsistent with our values. However, it has been suggested that experiential avoidance, of which thought suppression is one form, can affect the choices that we make, thereby facilitating the avoidance of living in a value consistent way. The aim of Experiments 6(a) and 6(b) of the current thesis was to provide the first experimental demonstration of how thought suppression can alter personal choices. Specifically aiming to demonstrate how a transformation of suppression functions across directly trained and derived stimuli could model the affect that engaging in thought suppression has on behavioural choice. Experiment 6(a) required participants to complete the traditional five minute suppression phase, before entering a dichotomous choice task. Participants were instructed to choose either a red door or a blue door for a ten trial phase, subsequently participants recycled into the dichotomous choice task. Prior to completion of the second choice task the participants were instructed to suppress all thoughts of a target word ('BEAR'). During the second choice task the target word and other novel words appeared behind their previously chosen door. It was predicted that if attempted

thought suppression alters choices, a gradual change in a participant's original choice would emerge in order to avoid contact with the unwanted thought. Experiment 6 (a) found that participants altered their choices in order to avoid the unwanted thought. Experiment 6(b) extended Experiment 6(a) by demonstrating that stimuli related to the target unwanted thought can also produce a gradual change in participants' choices.

6.3.1. Theoretical issues

One issue that emerged from the results of Experiment 5 was that participants in the suppression group on average removed more unrelated words and removed them faster than participants in the control group.. It is possible that unrelated words may have been removed by both groups as a result of the process of generalization, and this effect may have been more pronounced in the case of participants in the experimental group as they were removing more words and at a faster rate than the control group. In addition, as indicated earlier, the rate of removal of unrelated words was very low for both groups; however, it was particularly close to zero in the control group for both quantity and latency indices and thus, even a relatively small difference between the groups might have resulted in significance.

A second criticism of Experiment 5 is the lack of analyses conducted on the data from the five minute suppression phase. For example, it is possible that participants, who were more successful at suppressing their thoughts in the five minute suppression phase, were either more successful at not having the various words interfere, or parenthetically, they might have experienced some sort of rebound effect which gave them a pronounced bias to avoiding the target, trained and derived words. However, unfortunately this data was lost whilst the study was being conducted due to faults in the computer program so such an analysis was impossible to perform. Future research should further explore this issue.

One potential weakness of the Experiment 6(a) and 6(b) might that the study did not include a control group. However, this issue has been previously controlled for by Hooper et al. (in press). These researchers included a control condition in their study (as in Experiment 5) that directly instructed participants to remove a target after equivalence and then tested to see whether the functions would transfer to other members of the equivalence class. Findings from this work indicated that after an instruction to remove a target, participants did not remove other class members.

One interesting point that emerged from Experiments 6(a) and (b) was the possible effects of thought suppression on valued living. Derived stimulus relations (DSR) are said to underpin the ACT model of psychopathology (Hayes et al., 1999). Values are a critical component of the ACT model (Plumb et al, in press). However, there is a lack of basic research linking DSR and valued living, the current experiments provided the first demonstration of how thought suppression and DSR can alter behavioural choices. Experiments 6(a) and 6(b) model how people may restrict their behaviour, in response to relations among stimuli, in attempts to avoid unwanted thoughts.

6.3.2. Future Research

The current studies are the first to successfully model the transfer of suppression functions via equivalence. Furthermore, these findings suggest a useful avenue for future research in the area of derived relational responding and thought suppression. Transfer of function has often been demonstrated in the absence of an explicit equivalence test (e.g., Barnes, Browne, Smeets and Roche, 1995). Demonstrating transfer of function in the absence of an equivalence test would, arguably, provide an even more subtle example the transfer of suppression functions. In the current experiments, even though participants are not directly trained to relate the A and C stimuli they do still relate them in the context of the equivalence test. Showing that transfer of function might still occur even in the absence of the relating of these stimuli required by such a test would constitute an even better or stronger model of derived suppression as at no point before the avoidance phase would the participants have made the connection between the A and C stimuli..

It is also possible that the derived transfer of suppression functions would not happen without an equivalence test. Barnes and Browne (1995) found that participants produced a correct derived performance, following repeated failures, when they were exposed to an equivalence testing procedure. The authors suggested that this provided evidence that testing procedures may sometimes facilitate derived behaviour (see Barnes & Keenan, 1993, p.78). Specifically, equivalence testing procedures expose participants to trials that pair the derived C-A stimuli together. It will be informative to investigate whether the derived thought suppression effect will be seen in the absence of an equivalence test. To that end, participants could be

exposed to the test for emergent relations at the end of the experimental session, as opposed to directly after training as in previous research (Staunton & Barnes-Holmes, 2004).

The current study showed transfer of suppression / interference via equivalence; however, the derived relations literature has demonstrated responding in accordance with many patterns of relations in addition to equivalence. For example, studies have demonstrated responding in accordance with comparison, distinction, hierarchy, temporal and spatial relations, conditionality, causality, opposition and deictic (or perspective taking) relations (Dymond & Barnes, 1995; McHugh et al, 2004; Roche, et al., 2000; Steele & Hayes, 1991). One example that may be particularly interesting for future investigation in the area of thought suppression is the relation of 'opposition'. Typically when we try not to think of something we try to distract ourselves by thinking about something very different or opposite from the original stimulus. For example, in order to forget about the recent death of a loved one we may try to think of something contrasted with or opposite in important respects from death. Thus, whereas death is unknown and frightening, a person might choose to think about something familiar and comforting such as walking on the beach. Despite the fact that the distracting stimulus is seen as opposite, however, there may still be transfer of function in that the person is reminded of death by the 'opposite' stimulus. Given the potential importance of this phenomenon in which relations of opposition may be implicated in the derived transfer of function, it may be useful for future research to attempt to model 'derived suppression' based on relations of opposition.

Several studies have demonstrated a transformation of functions in accordance with relations of opposition. Such studies have examined avoidance (Dymond et al, 2007), self discriminative (Dymond & Barnes, 1996), sexual arousal (Roche & Barnes, 1997) and consequential (Whelan & Barnes-Holmes, 2004) functions. Therefore a natural extension of the current work would be to test for the transformation of suppression functions across opposition relations. What is particularly interesting in this respect is that in previous work, relations of opposition have produced a transformation of functions in which the relation of opposition produced the 'opposite' functions from those inhering in the original stimulus. For example, if a stimulus 'X' had punishing functions then the stimulus in opposition

with 'X' had reinforcing functions. However, in the context of thought suppression, a different pattern of transformation of functions may be seen in which stimuli ostensibly designated as 'opposite' to the original stimulus acquire the same function (i.e., suppression /interference). Further research will be needed to explore this issue.

6.4. Chapter 5: Summary

Chapter 4 of the current thesis suggests that one possible explanation for the counterproductive nature of thought suppression is directly and indirectly trained relations within the environment that serve to remind us of the unwanted thought. The experiments reported in Chapter 4 promoted a basic understanding of thought suppression, and provided additional explanation of the reasons why suppression attempts generalise readily to many different stimuli and circumstances. Such findings may be of particular interest to researchers working in clinical areas that are linked to high levels of thought suppression, such as depression, anxiety disorders, obsessive compulsive disorder, and phobias (e.g., Cook & Mineka, 1990; Schell et al, 1991). Many researchers have argued for explanations of thought suppression that rely on cognitive processes, such as the ECH (e.g., Wegner et al, 1987).

From a behaviour-analytic perspective, however, such explanations are incomplete, because they leave thought suppression, which is also behaviour, unexplained (Barnes, 1989; Hayes & Brownstein, 1986). If equivalence provides an adequate behavioural account of human language and cognition (e.g., Hayes et al, 2001; Sidman, 1994), then the paradigm in Chapter 4 provides a potentially useful empirical avenue for the exploration of this phenomenon. Specifically, research into thought suppression in clinically relevant populations might provide new insight into the role of thought suppression in the acquisition, and maintenance, of maladaptive behaviour (see Section 1.3). Indeed, the success of earlier programs of research that have explored human behaviour using the derived relational paradigm (e.g., Markham et al, 2002; Roche & Barnes, 1997; Roche et al, 2000) attest to the viability of this suggestion.

The literature on thought suppression and emotional avoidance may help to explain how this might occur. For example, if a person believes that certain thoughts and feelings explain certain behaviours (e.g., 'I'm not going to try a new activity

because I will be no good at it') they may attempt to suppress these thoughts. However, data from thought suppression studies have shown that when participants were told to suppress a particular thought, they subsequently showed an increase in that suppressed thought, in contrast to subjects who were not given suppression instructions (Gold & Wegner, 1995; Wenzlaff et al, 1991; see Section 1.2.8). Attempts to suppress thoughts such as 'I am not good enough', 'I am not capable enough', or 'I'll never be able to do this', may, in fact, increase their functional importance, because suppression produces an increase in their significance for the person when they occur (i.e. 'I shouldn't be having that thought'), and also by actively trying to avoid certain thoughts, this behaviour in itself is linked verbally through derived relations to the thoughts that are being avoided.

For Hayes et al (1999) the negative effects of suppressed thoughts and feelings are evident in what has been termed "experiential/emotional avoidance." Such avoidance occurs when an individual is "unwilling to remain in contact with particular private experiences (e.g., bodily sensations, thoughts, memories and behavioural dispositions), and takes steps to alter the form or frequency of these events and the contexts that occasion them" (Hayes et al, 1996, p. 1154). These steps could include actions such as thought suppression, and social withdrawal. For instance a patient with depression might decide to stay home from work because they believe the responsibilities at work are too great, and that they do not have the capabilities to live up to them. Avoiding work will likely be reinforced in the short term (by avoiding feelings of low efficacy). Consequently, this individual's behaviour may become increasingly governed by this avoidance rule, to the extent that he or she remains increasingly reclusive.

Relational Frame Theory (RFT) provides a behavioural account of how language and cognitions are learnt behaviour, and, as seen from the example above, how these processes can lead to experiential avoidance. The findings from Chapter 4 modelled how thought suppression attempts can generalise through derived stimulus relations (DSR) providing support for this account. Traditionally, cognitive treatments have included techniques designed to alter the structure of thoughts with the assumption that this will lead to changes in emotional response (e.g. Persons, 1989). Alternatively acceptance-based approaches, in particular acceptance and commitment therapy (ACT), which is based on RFT principles (Hayes et al., 2001),

assume that the psychopathology results from unhealthy methods of experiential avoidance as described above. These treatments encourage patients to behave effectively, and in accordance with valued life directions, which requires active contact with naturally occurring, sometimes aversive, private experiences (Hayes et al., 1996). Techniques such as acceptance, mindfulness, cognitive defusion, values, and committed action are used to help disrupt the relationship between cognitions and behaviour, rather than alter the cognition *per se*.

Chapter 5 of the current thesis aimed to directly test the relative effectiveness of components of the ACT model to thought suppression as coping strategies for unwanted thoughts. The first of these was Experiment 7 which compared mindfulness versus thought suppression in the management of unwanted thoughts. Participants were randomly assigned to one of two groups (mindfulness or thought suppression). Both experimental groups were exposed to an identical procedure with the exception of the induction. In the first phase of the experiment participants were required to view a disturbing image for a 20 second phase. Then they were instructed to complete a negative affect scale which measured their general emotional state. Next the participants had to complete a nine minute thought suppression/mindfulness induction whilst signalling the presence of unwanted thoughts by pressing the space bar, upon completion of the induction participants had to again complete the same negative affect scale. There were two dependent variables in the study 1). The number of space bar presses recorded during the induction phase and 2). The difference in negative affect scale score pre and post induction. It was predicted that participants in the mindfulness group would experience less unwanted thoughts during the induction, whilst also experiencing a greater increase in positive affect from pre to post induction. The findings reflected these predictions.

In order to avoid the self report nature of Experiment 7, Experiment 8 involved a behavioural dependent measure in comparing mindfulness versus thought suppression. Experiment 3 of the current thesis successfully demonstrated inflated self report of spider related thoughts for spider fearful participants demonstrating how thought suppression might contribute to the maintenance of phobia's/ fearful behaviour. However, in Experiment 4 no physiological effects of the increased occurrence of spider related thoughts emerged, thus, raising a question over whether thought suppression does in fact contribute to phobia maintenance. Having modelled

thought suppression in terms of DSR in Chapter 4 and provided an alternative strategy in Experiment 7 (mindfulness), Experiment 8 was designed to provide an alternative dependent measure of the potential contribution thought suppression has in the maintenance of phobias. To that end, spider fearful participants were randomly assigned to one of three groups (i.e., thought suppression, mindfulness and unfocussed attention). An unfocussed attention induction was also included in Experiment 8 in response to a criticism made of Experiment 7 (see Section 6.4.2), namely that without a control group it is impossible to ascertain the success of either technique. All participants received their induction prior to completing the Behavioural Approach Test (BAT), which is a ten step test of how close a participant is willing to get to a real life spider (Kindt & Brosschot, 1999). Participants also completed a state anxiety scale pre induction and post BAT in order to determine pre- and post experimental differences in anxiety levels. There were two dependent variables in Experiment 8, 1). The number of steps spider fearful participants would progress through on the BAT after each induction and 2). The difference in anxiety levels between groups pre induction and post BAT. It was predicted that those exposed to the mindfulness induction would move through significantly more steps of the BAT than the thought suppression and unfocused attention groups whilst experiencing less anxiety post BAT. Results were again in line with experimental predictions.

Together, Experiments 7 and 8 found evidence to suggest that mindfulness was a viable alternative to thought suppression in the management of unwanted thoughts. However, Experiments 7 and 8 of the current thesis could be criticized for including strategy reminders during the thought suppression inductions (see Section 6.4.1.). Mindfulness is intrinsically experiential in nature and even short mindfulness analogue studies have involved inductions of nine to ten minutes in length (see McHugh & Reed, 2010), Another component of the ACT model has been previously delivered in a simple pre-experimental instruction and has been demonstrated to provide behavioural gains on subsequent tasks (Masuda, Fendell, Feinstein & Sheehan, 2010). Although these authors have demonstrated stronger behavioural gains after more extensive defusion instructions, defusion may be a useful technique in comparing an instruction rather than induction based comparison with thought suppression. Defusion aims to enable the individual to come into contact with a self

relevant unwanted thought, by training the individual to be less 'fused' with the thought; this provides stark contrast to a thought suppression attempt, which aims to reduce unwanted thought occurrence.

Given this definition, although mindfulness appeared like a meaningful strategy in coping with negatively affective external content (Experiment 7) and also for phobic related content (Experiment 8), the negative effects of other forms of unwanted thoughts, such as thoughts that are self relevant to the participant (e.g., thoughts of not being good enough) may be more usefully circumvented by defusion (Masuda, et al 2004; Masuda, et al, 2009). Experiment 9 was conducted in order to determine whether it was the cue reminders during the thought suppression induction than rendered the suppression attempt in Experiments 7 and 8 futile. Additionally, Experiment 9 aimed to determine whether defusion could reduce the impact of negative content during a learned helplessness induction relative to thought suppression.

Experiment 9 of the current thesis involved randomly assigning participants to a thought suppression, defusion or control group. All groups completed an identical procedure with the exception of the induction they received. First, participants received their respective inductions (the thought suppression group received a thought suppression induction, the defusion group received a defusion induction and the control group received no induction). Second, all participants completed a learned helplessness induction (i.e., were exposed to an unsolvable task). Such inductions have been demonstrated to weaken participant's performance on subsequent tasks due to the negative self attributions generated by participants during the task (Teasdale & Fogarty, 1979). When instructed to complete the task the participants were encouraged to use their coping strategy induction with any unwanted thoughts that they might have during the learned helplessness program. Finally, all participants were required to complete a maze task in as little time as possible, which served as the dependent variable.

The experiment aimed to determine if the inductions served to alleviate the effects of learned helplessness on the subsequent experimental task. In accordance with ACT, it was predicted that those in the defusion group would not let their self generated negative unwanted thoughts affect their task performance, as the defusion

instruction would destabilise the verbal coherence of the negative relational networks associated with participants weak performance by providing them with comprehensive distance from these negative self attributional thoughts (Masuda, et al 2009). Therefore it was predicted that the defusion group would demonstrate significantly quicker times on the maze task than those in the thought suppression group and control group, whilst it was predicted that the thought suppression group would demonstrate significantly slower response times than the control group. The results, in line with the pre-experimental predictions, showed that the defusion group completed the maze task in significantly less time than the thought suppression group. However, contrary to the predictions, the defusion group and the thought suppression group did not score significantly less/more than the control group on the maze task. Therefore, although the negative effects of thought suppression were again apparent the utility of defusion warrants future research.

6.4.1. Theoretical issues

The results from the experiments in Chapter 5 provide some interesting results which give evidence to the efficacy of ACT based components over thought suppression in the management of unwanted thoughts. However, there are a number of issues which warrant discussion. Firstly, some discussion is needed as to why a shift was made from mindfulness to defusion in the last Experiment of the Chapter. For the most part this was done as a necessity; the thought suppression intervention which was used in Experiments 7 and 8 had come under some scrutiny, therefore we opted to use an instruction instead of an induction. However, as mindfulness is experiential in essence, giving a mindfulness instruction is not possible. Therefore, another technique, which could be administered via an instruction, was needed. It was for this reason that defusion was chosen. This shift could be seen as a large one as mindfulness and defusion are very different, however from an ACT perspective they both seek to disturb normal language processes (Hayes et al, 1999). Mindfulness, via attention, attempts to seek comprehensive distance from language. Defusion also attempts to seek this distance, however not via attention, instead by attacking the literal quality of language.

Second, it could be argued that the focused breathing/mindfulness induction used in Experiments 7 and 8 could act as a form of distraction, thus a sophisticated

form of thought suppression rather than a mindfulness induction. Previous research that has employed the focused distraction induction suggests this is not the case (McHugh et al., 2010). Specifically, in their study they exposed older participants to a card selection task that has been demonstrated to be impacted on by attentional deficits. Distraction leads to a higher cognitive load which should in practice hamper further performance on the card selection task. However, findings from this work indicated that the older participants in the focused attention induction demonstrated less decision making deficits in the task following this induction.

Third, the thought suppression induction used in Experiments 7 and 8, involved a strategy reminder every 30 seconds (i.e., not to think of the unwanted thought). It could be argued that the inclusion of such a reminder actually circumvents the thought suppression attempt. This procedural artifact rather than the thought suppression attempt *per se* could be what is mediating the inflated number of intrusions for this group. Future research should recruit a control group that receives the suppression instruction at the beginning of the suppression phase and no subsequent strategy reminders. However, the experimental findings of Chapter 4, that stimuli both directly and indirectly related to target remind us of the to-be-suppressed item, and Chapter 3, that repeated suppression attempts maintain the occurrence of the unwanted thought, reduce the plausibility of this argument. It is likely from the former that the thought suppression induction has ecological validity and from the latter that the resultant negative behaviour was still the direct by product of attempted thought suppression and thus exactly what the study aimed to model.

Fourth, In Experiment 7, the mindfulness group displayed a significantly improved positive affect, from pre to post induction, when compared to the thought suppression group. However, the thought suppression group also significantly improved in positive affect from pre to post induction (se Section 5.1.2.). According to the thought suppression literature, attempts at suppressing unwanted thoughts should make those thoughts more salient within consciousness, in the current example one would have expected the thought suppression group to remain at a similar emotional level from pre to post induction. One potential reason for such a finding might lie in the personally relevant nature of the unwanted thought. Specifically, immediately after having to suppress the thoughts associated with the

gruesome picture of a dead person, it is unsurprising that participants had a low negative affect. However, due to the fact that the unwanted thoughts associated with that picture may not be of a personally relevant nature, it is not surprising that the participant's emotional state improved over time. Perhaps a gruesome picture that held personal relevance would not cause the increase in positive affect found in the current experiment. Fifth, in Experiment 7, the addition of a control group, who received a control/unfocused attention induction might have shed more light on the experimental results. It is possible, for example, that participants will naturally improve in their emotional state without any induction. This could have shed light on the efficacy of the mindfulness and thought suppression inductions, as it is broadly possible that participants in a control group could have experienced an improved positive affect to a similar degree as those in the mindfulness group, thereby questioning whether mindfulness is an effective technique in the management of unwanted thoughts.

Finally, in Experiment 9, despite the defusion group completing the maze task in significantly less time than the thought suppression group, the expected differences between both groups and the control group were not found. Specifically, the defusion group did not complete the maze in significantly less time than the control group, and the thought suppression group did not complete the maze in significantly more time than the control group. There are a number of potential reasons for this finding. First, in the current study, both defusion and thought suppression groups were only provided with a strategy instruction (i.e., no induction was provided as in Experiments 7 and 8). Perhaps the inclusion of an induction would have strengthened the differences between groups. Indeed recent research by Masuda et al (2010) details a two experiment study on defusion, in the first of these experiments the authors found that a defusion instruction made a marked difference in the management of unwanted self negative referential thoughts. However, in their second experiment the authors included a defusion induction. The results showed that the participants who received the defusion induction experienced significantly less emotional discomfort and believability than those who received the defusion instruction. Second, despite the fact that the there was a low n in the study, the general predicted trend still emerged, with the defusion group completing the task with the fastest response speed and the thought suppression group completing the

task with the slowest response speed. Future studies should increase the n of the study in order to determine whether this would strengthen the distinction between the two groups performance. Additionally, future studies should also include post maze self report measures where participants are asked how each technique affected their maze performance. For example, it is possible that thought suppression hampered maze performance due to the fact that interfering thoughts such as 'I am probably not going to be very good at this' kept rebounding. However, without such a measure this information is unknown.

Penultimately, previous defusion based research (Healy et al, 2009; Masuda et al, 2004; Masuda et al, 2009, Masuda et al, 2010) has all included believability measures. The primary aim of defusion is to enable the individual to become less fused with their thoughts, or to lessen their believability. However without any believability measure in place, it is impossible to determine if participants became less fused as a result of the instruction, or more importantly, if the results of the maze task occurred because the participants had engaged with their instruction. And finally, the use of a maze task in the current setting may have provided an unreliable dependent measure which may have affected results, specifically maze tasks are susceptible to individual differences, i.e. some people are more practised at maze tasks than other. Therefore the inclusion of another dependent measure may be advantageous in future research.

6.4.2. Future Research

The three experiments reported in Chapter 5 compare the effectiveness of thought suppression versus the two ACT components, mindfulness and defusion. What is particularly important about this work is that it isolated two components of the act model and directly tested their effectiveness as alternatives to thought suppression for coping with unwanted thoughts. Research on individual components of the ACT model is an important endeavour (Hayes et al, 2006). Specifically, as mentioned in Section 1.3.2.2., component research lends to the development of accurate and functional therapeutic techniques that can be continually refined in accordance with their empirically demonstrated efficacy. Future research should build on the current studies to facilitate our understanding of the individual

components of the ACT model by systematically testing the relative contribution of each in alleviating clinical problems.

6.5. Concluding Comments

The current thesis aimed to demonstrate why and how thought suppression is an ineffective coping strategy for unwanted thoughts and to model effective alternatives. The first two empirical chapters of the thesis aimed to answer the basic question 'is it possible to suppress our thoughts?' The general conclusion was that thought suppression is difficult. Participants, when asked not to think of a certain 'unwanted thought' for a five minute period, would experience that exact thought around 7 times. Chapters 2 and 3 also raised some interesting issues which will warrant further research, specifically the validity of the rebound phase and baseline thought suppression conditions. After having determined that engaging in thought suppression as a technique for managing unwanted thoughts may be a futile activity, Chapter 4 of the thesis aimed to provide a behavioural explanation as to why thought suppression is difficult.

Chapter 4, via two novel thought suppression paradigms, showed that attempts to suppress one target thought were found to transfer to many other related stimuli, which may lead to maladaptive behaviours, such as avoiding situations where contact with these stimuli might arise. Although the current thesis was conducted entirely on a non-clinical population, it did model how suppression attempts might be produced and spread to stimuli that have not been directly related to the target unwanted thought. This improves upon previous cognitive and psychoanalytic models, which have difficulties in explaining why thought suppression is ineffective and counterproductive, and the precise mechanisms that cause suppression attempts to transfer across a wide range of seemingly unrelated areas of a person's life. Thus, this work in particular may be of specific significance to the development of treatment programmes within clinical populations where such experiential avoidance causes problems for patients. While this type of direct application was not the primary purpose of the current work, its use in this regard would certainly indicate yet another advantage of this avenue of research.

Having provided a language based interpretation as to why thought suppression is futile, Chapter 5 of the current thesis aimed to explore alternative strategies for managing unwanted thoughts. The two strategies, mindfulness and defusion, both aimed to destabilize normal language processes, allowing a slightly different interaction with unwanted thoughts than avoidance techniques like thought suppression. The three studies in Chapter 5 displayed the efficacy of these techniques over thought suppression on three different behavioural measures. These results suggest that more research of this kind is needed in attempting to provide people from both the clinical and the sub-clinical realm different techniques for dealing with their unwanted psychological content.

Overall, the importance of the current work is exemplified in the fact that thought suppression is linked to many clinical disorders, such as depression and phobias, and the results of the current thesis can be applied to these clinical areas. However, it must be re-iterated that the studies presented in this thesis are basic analogue studies aimed to investigate the phenomena at the most basic level. Therefore any generalisation made to clinical populations must be made with caution. Indeed research which repeats the Experiments presented in this thesis, but with higher valence unwanted thoughts as found in clinical populations would be a useful addition to this body of research. Nevertheless, as a starting point, this thesis presents a clear picture of the maladaptive nature of thought suppression, and provides alternative techniques which are theory and research consistent.

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Appendices

Appendix 1

AAQ-2

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true

1.	Its OK if I remember something unpleasant.	1	2	3	4	5	6	7
2.	My painful experiences and memories make it difficult for me to live a life that I would value.	1	2	3	4	5	6	7
3.	I'm afraid of my feelings.	1	2	3	4	5	6	7
4.	I worry about not being able to control my worries and feelings.	1	2	3	4	5	6	7
5.	My painful memories prevent me from having a fulfilling life.	1	2	3	4	5	6	7
6.	I am in control of my life.	1	2	3	4	5	6	7
7.	Emotions cause problems in my life.	1	2	3	4	5	6	7
8.	It seems like most people are handling their lives better than I am.	1	2	3	4	5	6	7
9.	Worries get in the way of my success.	1	2	3	4	5	6	7
10.	My thoughts and feelings do not get in the way of how I want to live my life.	1	2	3	4	5	6	7

Appendix 2

WBSI

This survey is about thoughts. There are no right or wrong answers, so please respond honestly to each of the items below. Be sure to answer every item by circling the appropriate letter beside each.

A = Strongly disagree

B = Disagree

C = Neutral or don't know

D = Agree

E = Strongly agree

1.	There are things I prefer not to think about.	A	B	C	D	E
2.	Sometimes I wonder why I have the thoughts I do.	A	B	C	D	E
3.	I have thoughts that I cannot stop.	A	B	C	D	E
4.	There are images that come to mind that I cannot erase.	A	B	C	D	E
5.	My thoughts frequently return to one idea.	A	B	C	D	E
6.	I wish I could stop thinking of certain things.	A	B	C	D	E
7.	Sometimes my mind races so fast I wish I could stop it.	A	B	C	D	E
8.	I always try to put problems out of mind.	A	B	C	D	E
9.	There are thoughts that keep jumping into my head.	A	B	C	D	E
10.	There are things that I try not to think about.	A	B	C	D	E
11.	Sometimes I really wish I could stop thinking.	A	B	C	D	E
12.	I often do things to distract myself from my thoughts.	A	B	C	D	E
13.	I have thoughts that I try to avoid.	A	B	C	D	E
14.	There are many thoughts that I have that I don't tell anyone.	A	B	C	D	E
15.	Sometimes I stay busy just to keep thoughts from intruding on my mind.	A	B	C	D	E

Appendix 3

BDI-II

This questionnaire consists of 21 statements. Please read each group of statements carefully, and then pick out the **one statement** that best describes the way you have been feeling during **the past two weeks, including today.** Circle the number beside the statement you have picked. If several statements in the group seem to apply well equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including item 16 (Changes in Sleeping Pattern) or item 18 (Changes in Appetite).

1. Sadness

0	I do not feel sad
1	I feel sad much of the time
2	I am sad all of the time
3	I am so sad or unhappy that I can't stand it

2. Pessimism

0	I am not discouraged by my future
1	I feel more discouraged by my future than I used to be
2	I do not expect things to work out for me
3	I feel my future is hopeless and will only get worse

3. Past failure

0	I do not feel like a failure
1	I have failed more than I should have
2	As I look back, I see a lot of failures
3	I feel I am a total failure as a person

4. Loss of pleasure

0	I get as much pleasure as I ever did from the things I enjoy
1	I don't enjoy things as much as I used to
2	I get very little pleasure from the things I used to enjoy
3	I can't get any pleasure from the things I used to enjoy

5. Guilty Feelings

0	I don't feel particularly guilty

1	I feel guilty over many things I have done or should have done
2	I feel guilty most of the time
3	I feel guilty most of the time

6. Punishment Feelings

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. Self-dislike

0	I feel the same about myself as ever
1	I have lost confidence in myself
2	I am disappointed in myself
3	I dislike myself

8. Self-Criticalness

0	I don't criticise or blame myself more than usual
1	I am more critical of myself than I used to be
2	I criticise myself for all my failures
3	I blame myself for everything bad that happens

9. Suicidal Thoughts or Wishes

0	I don't have any thought 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. Crying

0	I don't cry anymore than I used to
1	I cry more than I used to
2	I cry over every little thing
3	I feel like crying, but I can't

11. Agitation

0	I am no more restless or wound up than usual
1	I feel more restless or wound up than usual
2	I am so restless or agitated that it's hard to stay still
3	I am so restless or agitated that I have to keep moving or doing something

12. Loss of interest

0	I have not lost interest in people or activities
1	I am less interested in other people or things than before
2	I have lost most of my interest in other people or things
3	It's hard to get interested in anything

13. Indecisiveness

0	I make decisions about as well as ever
1	I find it more difficult to make decisions than usual
2	I have much greater difficulty in making decisions than usual
3	I have trouble making any decisions

14. Worthlessness

0	I do not feel I am worthless
1	I don't consider myself as worthwhile and useful as I used to
2	I feel more worthless as compared to other people
3	I feel utterly worthless

15. Loss of Energy

0	I have as much energy as ever
1	I have less energy than I used to have
2	I don't have enough energy to do very much
3	I don't have enough energy to do anything

16. Changes in Sleeping pattern

0	I have not experienced any changes in my sleeping pattern
1a 1b	I sleep somewhat more than usual I sleep somewhat less than usual
2a	I sleep a lot more than usual

2b	I sleep a lot less than usual
3a	I sleep most of the day
3b	I wake up 1-2 hours early and can't get back to sleep

17. Irritability

0	I am no more irritable than usual
1	I am more irritable than usual
2	I am much more irritable than usual
3	I am irritable all the time

18. Changes in Appetite

0	I have not experienced any changes in my appetite
1a	My appetite is somewhat less than usual
1b	My appetite is somewhat greater than usual
2a	My appetite is much less than before
2b	My appetite is much greater than usual
3a	I have no appetite at all
3b	I crave food all the time

19. Concentration Difficulty

0	I can concentrate as well as ever
1	I can't concentrate as well as usual
2	It's hard to keep my mind on anything for very long
3	I find I can't concentrate on anything

20. Tiredness or Fatigue

0	I am no more tired or fatigued than usual
1	I get more tired or fatigued than usual
2	I am to tired or fatigued to do a lot of the things I used to do
3	I am to tired or fatigued to do most of the things I used to do

21. Loss of Interest in Sex

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

Appendix 4

60 words

Bottle

Desk

Boat

Mobile phone

Windows

Trees

Football

Sand

Television

Map

Offices

Buildings

Cars

Waves

Socks

Leather

Pizza

Ice cream

Wine

Walls

Piercings

David Beckham

Swimming

Your house

A friend

This room

Rock climbing

Holidays

Tony Blair

The newspaper

Birds

Cactus

Americans

A clock

Wardrobe

Helicopter

Mickey Mouse

An Actor

A bridge

A nose

Doctors

Lights

The stars

A plate

Puppies

Fireworks

Magazines

Juice

Concert

Parents

Teachers

Pipes

Guitar

Pencil

Coat

Mirror

Library

Mud

Birthday party

Keys

Books

Appendix 5

Fear of spider questionnaire

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following scale to make your choice.

1 = never true

2 = very seldom true

3 = seldom true

4 = sometimes true

5 = frequently true

6 = almost always true

7 = Always true

1. If I came across a spider now,
   I would get help from someone else to remove it --------
2. Currently, I am sometimes on the look out for spiders --------
3. If I saw a spider now, I would think it would harm me --------
4. I now think a lot about spiders --------
5. I would be somewhat afraid to enter a room now,
   where I have seen a spider before --------
6. I now would do anything to try to avoid a spider --------
7. Currently, I sometimes think about getting bit by a spider ---------
8. If I encountered a spider now
   I would be able to deal with it effectively ---------
9. If I encountered a spider now,
   it would take a long time to get it out of my mind. ---------
10. If I came across a spider now,
    I would leave the room ---------
11. If I saw a spider now,

I would think it will try to jump on me --------

12. If I saw a spider now
I would ask someone else to kill it ---------

13. If I saw a spider now
I would have images of it trying to get me ---------

14. If I saw a spider now, I would be afraid of it ---------

15. If I saw a spider now I would feel very panicky ---------

16. Spiders are one of my worst fears ---------

17. I would feel very nervous if I saw a spider now ---------

18. If I saw a spider now, I would probably break out
in a sweat and my heart would beat faster ---------

Total ---------

Appendix 6

State Trait Anxiety Inventory –*S*

STAI Form y-1

A number of statements which people have used to describe themselves are given below:

> Read each statement and then decide whether the statement is:

How you feel *right now,* that is, *at this moment.* There are no right or wrong answers.

> Then indicate your response by circling one of the numbers to the right of the statement.

NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1	2	3	4

1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4

14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

Appendix 6

State Trait Anxiety Inventory –*S*

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.

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 'cool calm 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 head and bother me 1 2 3 4

38. I take disappointment 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

Appendix 7

Mindful, Awareness Attention Scale (MAAS)

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6

It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6
I drive places on 'automatic pilot' and then wonder why I went there.	1	2	3	4	5	6
I find myself preoccupied with the future or the past.	1	2	3	4	5	6
I find myself doing things without paying attention.	1	2	3	4	5	6
I snack without being aware that I'm eating.	1	2	3	4	5	6

Appendix8

Please rate your emotional state after having seen the picture by circling one of the number below, with -50 signalling that the picture makes you feel very negative, and +50 signalling that the picture made u feel very positive.

-50 -40 -30 -20 -10 0 10 20 30 40 50

Appendix 9

Treatment adherence scale

Was it easy to follow the instructions provided on the audio tape?

YES 1 2 3 4 5 6 7 NO

To what extent did you implement the instructions provided on the audio tape when having thoughts about the picture you previously saw?

VERY MUCH 1 2 3 4 5 6 7 NOT AT ALL