

**How Paradoxical are the Effects of Thought
Suppression? The Nature of Mental Control and
the Factors that Influence it.**

James Anthony Keith Erskine

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ABSTRACT

This thesis attempted to expand knowledge of intentional thought control in several directions. The primary aim was to provide an account of intentional thought suppression by relating the phenomenon to the methods used to assess the rebound effect, internal personality factors and psychopathology. An additional aim was to examine the rebound effect from the broader perspective of relating thought suppression to aging, the perception of volitional control and memory for future intentions.

The results indicate that the method used to index the rebound effect may have a large impact on whether the effect is found or not. The rebound effect was obtained with the original method of assessment (Wegner, 1987) but not with the modified method that is currently used in the research. More importantly, the rebound effect was affected by the personality variable of state vs. action orientation (Kuhl & Beckmann, 1994b). State oriented participants demonstrated the rebound effect, whereas action oriented participants did not, irrespective of the method used to assess the effect. This finding provides support for the new intentional account of the rebound effect proposed in the thesis that is based on the Intention Superiority Effect (Kuhl, 1994) and the theory of action control (Kuhl & Beckmann, 1994b). The results also showed that suppression and expression performance in the laboratory did not have a common underlying mechanism. Successful expression performance was related to poorer suppression performance and *visa versa*.

The results of the thesis also question the validity of the White Bear Suppression Inventory (Wegner and Zanakos, 1994) as a measure of the tendency to suppress thoughts in everyday life. In young adults, apart from thought suppression, it also appears to measure the tendency to experience thought intrusions (rumination). Moreover, there was no relationship between the use of thought suppression in everyday life and actual suppression performance in the laboratory. A different pattern of results were obtained in a group of older adults (over 65 years). In addition, older adults reported using thought

suppression reliably less frequently than young adults (i.e. had lower WBSI scores), and displayed much higher levels of repressive coping style than young people, 37% (old) vs. 9.5% (young).

Finally, the results showed that thought suppression can also have other ironic effects on behaviour and perception. Participants attempting to complete an action while suppressing thoughts of the intention to perform this action came to feel as if the act was less intentionally performed. In contrast, participants completing actions under thought expression instructions rated the actions as more intentional. Furthermore, suppressing or expressing thoughts of an upcoming intention did not help one to remember to enact the intention with an enhanced frequency relative to thinking about a completely unrelated intention.

Taken together, the findings have important implications for research on thought suppression and mental control by showing that the rebound effect is less robust than suggested by previous research. Thus, some of the controversy surrounding the rebound effect can be explained on the basis of individual differences in personality type (state vs. action orientation) as well as the methods used to index the effect. The results also raise several important questions for future research in this area (e.g. the validity of WBSI, effects of age on thought suppression and repression).

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To all who have struggled with themselves

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CHAPTER ONE

Current research on thought suppression and mental control: A review

“What constitutes the difficulty for a man labouring under an unwise passion of acting as if the passion were unwise? Certainly there is no physical difficulty. It is as easy physically to avoid a fight as to begin one, to pocket one’s money as to squander it on one’s cupidity’s, to walk away from as towards a coquettes door. The difficulty is mental; It is that of getting the idea of the wise action to stay before our mind at all.”

William James 1890

The above quote from James (1890) reminds us of our own internal struggles. We have all, at times, struggled to control our minds. Who has not had the experience of a thought occurring to them that is at once both an affront to themselves but worse suggests a course of action that one deems instantly abhorrent? One labours against it, suppressing the thought in an effort to avoid the associated discomfort but more so in an effort to avoid the suggested action. Yet, the thought seems to have a life of its own. It seems imbued with a strange power that compels us towards the suggested action in a way that seems to negate our own will to resist. Suppression is effective at times, but in moments of distraction, the thought returns an unwelcome but familiar occurrence. This may continue for minutes, days or even a lifetime.

This thesis investigates thought suppression from a wide variety of perspectives. The starting point lies in the verbally reported consequences of experimenter directed intentional suppression with the now classic “white bear” paradigm of Wenger, Schneider, Carter & White et al., (1987). Numerous experiments have demonstrated that intentional thought-suppression is at best an ineffective method of thought control but at worst can bring the very contents one is seeking to avoid to mind with a greatly enhanced frequency (Wenzlaff & Wegner 2000). These paradoxical effects of intentional thought-suppression have been labelled the rebound effect. At present, the research on mental control is in a somewhat confused state. The phenomenon of the rebound effect has been

demonstrated on many occasions (Clarke, Ball & Pape, 1991; Roemer & Borkovec, 1994; Salkovskis & Campbell, 1994; Wegner, Schneider, Carter & White 1987) yet other studies using similar methodologies have consistently failed to replicate the effect (LoSchiavo & Yurak, 1995; Merckelbach, Muris, Van den Hout & de Jong, 1991; Rutledge, Hollenberg & Hancock, 1993). Many suggestions have been made as to why these discrepancies may exist but, to date, no satisfactory explanation exists. We are left with a paradox of paradoxical effects. Sometimes one finds them sometimes one does not.

This chapter first outlines the main aims of the thesis, then briefly covers the main relevant literature, and finally outlines the empirical programme of research as reported in subsequent chapters.

I. Aims

This thesis aims to expand knowledge of intentional thought control in several directions. The primary aim is to provide an account of intentional thought suppression, relating the phenomenon to internal personality factors and psychopathology, and external factors such as the nature of the target and conditions in which suppression occurs. An additional aim was to examine the rebound effect from a broader perspective by relating conscious thought suppression to unconscious repression, one's perception of volitional control and memory for future intentions.

(1) Factors affecting the rebound effect in the laboratory

The rebound effect occurs when a person or group experiences a heightened frequency of thought after prior suppression. Therefore, this thesis aimed to examine the conditions under which the rebound effect is found in an attempt to clearly delineate the phenomenon's boundary conditions (see Chapter 3). It was also hypothesised that the rebound effect may be mediated by individual differences such as personality or ability that will affect when and where the rebound effect is found (Chapter 3). An innovation in research methodology was made by moving away from using self-report measures of assessing the rebound effect and to investigate the phenomenon more thoroughly using

implicit measures such as reaction time to recognise stimuli (Chapter 6). The advantage of implicit measures is that they are not susceptible to interference from the participant's own theories of mental control or their attempts to withhold the relevant information from the experimenter.

(2) The Tendency to Suppress Thoughts and Measures of Individual Difference

Another aim was to examine a wide variety of those personality and individual difference measures that have been theoretically related to the frequency of using thought-suppression in everyday life as measured by the White Bear Suppression Inventory (WBSI). This is a questionnaire developed by Wegner and Zanakos (1994) to assess people's tendency to suppress thoughts in everyday life. The rationale for using this questionnaire was to try and understand whether there is a certain type of individual who uses these strategies more than others and what their characteristics are (Chapters 4,7 & 8). This issue was investigated in normal young adults and a sample of older people. The work with the older adults represents one of the first investigations into the mental control strategies for this age group (Chapter 8).

(3) Relation of Thought Suppression to Repression and Volition

The thesis also examined the nature of repression (unconscious avoidance) and how it relates to the use of thought suppression in everyday life, as assessed by the WBSI (Chapter 9). The final aim was to broaden the field of mental control by investigating the effects of thought-suppression on perception of participants' own will (volition) when carrying out a range of simple tasks under different mental control instructions. Chapter 10 reports the effect of trying to focus on the task vs. trying not to think about the task. Chapter 11 reports on memory for intentions one wants to enact.

The thesis touches on a number of areas within psychology and therefore, the introduction to the literature is wide ranging. The review starts with a general introduction to research on mental control. The original thought suppression paradigm is described, followed by more recent advances using modified versions of this paradigm. Theoretical accounts of the rebound effect are then discussed. Later sections deal with

the possible role of several individual difference variables in rebound effects and the tendency to suppress thoughts in everyday life, as well as measures specifically designed to measure repressive coping style. Finally, more global issues for thought suppression are addressed: the relation of suppression (conscious) to repression (unconscious); the relation between mental control and conscious will; and the role of goals and intentions.

II. Experimental Studies of Mental Control and the Rebound Effect

The current project focuses on the area of conscious mental control. As a topic of psychological investigation interest in the area of mental control has developed only recently. Indeed, as pointed out by Wegner and Pennebaker (1993) references to mental control do not appear in the literature on cognitive psychology prior to 1987.

The simplest definition of mental control is that it is a process that occurs when people attempt to influence their own mental states. For example, suppressing unwanted thoughts, inhibiting an emotion, or concentrating on a sensation (Wegner, 1989).

These strategies may be conscious and implemented through a force of will or unconscious and represent a pre-conscious aversion to negative information. The current thesis focuses mainly on changing one's thoughts through the use of conscious strategies. This can involve two distinct processes. One is the expulsion of thoughts one does not wish to have, known as thought-suppression; the other is consciously bringing to mind desired thoughts and maintaining these, known as thought-expression. For reasons of its direct relevance to everyday life, the research on mental control has focused almost exclusively on suppressive forms of mental control. Consequently, the present literature-review also focuses mainly on the suppressive side of control. However, one must bear in mind that mental control involves expressive forms as well.

(1) Unwanted Thoughts and Thought Suppression

How do people cope with their unwanted thoughts? Freud (1915/1917) was one of the first to recognise that the strategies people employ to cope with unwanted thoughts may be both conscious and unconscious. In an article written in 1915, Freud defines the term

repression. According to him “the essence of repression lies simply in the function of rejecting and keeping something out of consciousness” (p. 147). This function could be carried out both consciously and unconsciously and it seems Freud did not concentrate on differentiating between the two at that stage. However, it is well known he went on to focus more on the unconscious side of the divide.

It is generally accepted that conscious suppression of thought is no longer called repression but thought-suppression. It is also generally agreed that conscious thought avoidance is not automatic but represents a controlled (conscious) process (Schiffman & Schneider, 1977). In contrast, suppression that is carried out unconsciously is known as repression (Erdelyi, 1993; Wegner, 1989). The process of repression is presumed to be automatic and therefore might occur without consuming mental resources. Repression, being unconscious, is much more difficult to study in the laboratory. This has led some to suggest there is no evidence for repression at all. Holmes (1990) states that “despite over sixty years of research involving numerous approaches by many thoughtful and clever investigators, at the present time, there is no controlled laboratory evidence supporting the concept of repression” (p. 96). Whilst not necessarily agreeing with Holme’s conclusion, this thesis acknowledges that providing evidence of repression is indeed much more difficult than providing evidence of conscious thought-suppression.

Consequently, the main focus of this project will be on the intentional employment of conscious strategies to change one’s mental contents, in short, thought-suppression or expression. However, the thesis also investigates repression through methods developed by Weinberger, Schwartz and Davidson (1979) for identifying individuals with a repressive coping style. This style is characterised by using a number of strategies to avoid experiencing negative emotions (Myers, 2000). There is also evidence that repressors are unaware that they are being avoidant (Derakshan & Eysenck, 1998). This provides support for the notion that repression is an unconscious process. The ideas of repression are revisited later in this review. For now it is enough to realise that mental control as a field encompasses both unconscious (automatic) processes and more deliberate conscious strategies (controlled processes).

Unwanted thoughts are remarkably common. Rachmann and De Silva (1978), for example, argue that most normal people have “obsessions” that closely parallel those “abnormal” obsessions seen in clinical populations. In a similar vein, Schackelford and Wegner (1985) asked 180 people to write down an unwanted thought. Almost the entire sample had one or more of these to write down. Table 1.1 below shows a list of commonly suppressed thoughts (Wegner 1989). Indeed, as much as 80 % of the general population report experiencing negative intrusive thoughts which are highly likely to be suppressed (Salkovskis & Harrison, 1984). In line with this, Erdelyi and Goldberg (1979) informally surveyed college students and found that 99% reported having tried to exclude disturbing thoughts from consciousness to avoid discomfort. In addition, recent research suggests thought-suppression is a strategy that virtually everyone uses at times (Wegner & Zanakos, 1994)

TABLE 1.1 – THOUGHTS PEOPLE MOST OFTEN SUPPRESS – FROM THE MOST OFTEN SUPPRESSED TO LEAST SUPPRESSED

position	Thought
1	Relationship problems (jealousy, arguing, loneliness)
2	College worries (failing, not getting enough done)
3	General worries (future and life)
4	Death of loved ones
5	Fear of attack (rape, robbery)
6	Lack of money
7	Physical appearance
8	Sexual impulses
9	Health
10	Food / eating
11	Repeating songs

Source Wegner (1989)

It appears that unwanted thoughts are ubiquitous and that mental control (especially thought suppression) is equally prevalent. Moreover, numerous correlational and experimental studies have consistently demonstrated an association between thought suppression and various measures of psychopathology (Purdon, 1999; Rassin et al., 2000; Wenzlaf & Wegner, 2000). This has led some researchers to suggest that thought suppression may be involved in the aetiology of such conditions as Post Traumatic Stress Disorder, anxiety and depression (Purdon, 1999; Rassin et al., 2000; Wegner et al., 1987). There is also some evidence that thought suppression can depress the normal functioning of the immune system (Petrie et al., 1998). Most importantly, however, thought suppression may result in a rebound effect, i.e. when one becomes preoccupied with the very material one wishes to avoid.

(2) Methods of Indexing The Rebound Effect

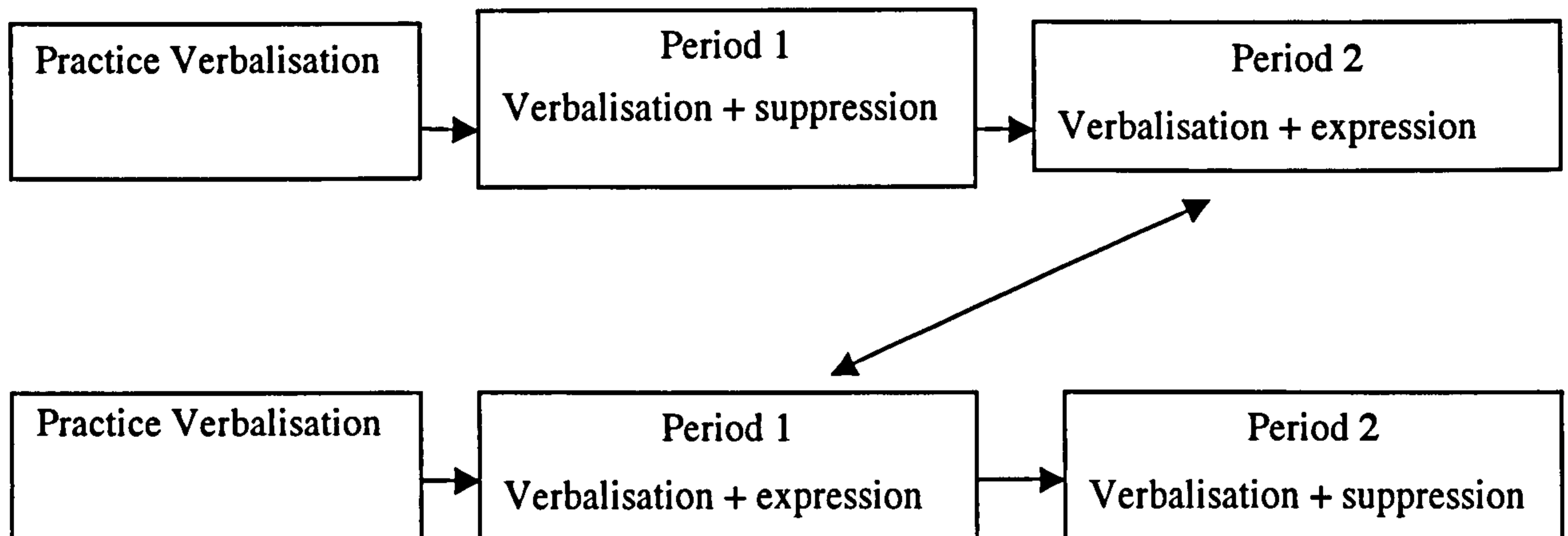
Wegner et al.'s (1987) original study, which first demonstrated the rebound effect, led to many further investigations. Initially, these early experiments viewed successful suppression as totally emptying the conscious mind of all instances of the target thought. Thus, when asked to suppress a thought such as "white bear" for a five minute period it was thought that successful suppression meant no instances of the thought should be reported in this period (Wegner, 1989; Wenzlaff & Wegner, 2000). However, these early experiments demonstrated conclusively that virtually all participants still reported some thoughts of the target (white bear) during the suppression period (Wenzlaff & Wegner, 2000). Thus, the original ideas of suppression have been revised to take account of the fact that an idealised total suppression seems virtually impossible. Most researchers now view successful suppression as maintaining a low number of thoughts of the target in the suppression period.

Most experimental investigations into thought-suppression have used a standardised think aloud procedure. Participants are encouraged to verbalise their thoughts during short successive periods of time. It is customary to leave the participants alone during these periods and record their thought verbalisations on a tape recorder. After a practice period, in which all participants attempt the task the experimenter provides instructions for the

participant to continue verbalising their thoughts but now to either express or suppress a certain concept such as “white bear” (the most commonly used target in thought-suppression studies). During this period (usually referred to as period 1), the participants are also asked to press a buzzer if they happen to think of or mention the to-be-suppressed or expressed concept. These buzzer presses are an index of how many times the participant has thought of the concept during the suppression or expression period. In the majority of the studies reviewed in this chapter the number of buzzer presses recorded for each participant is the dependent variable.

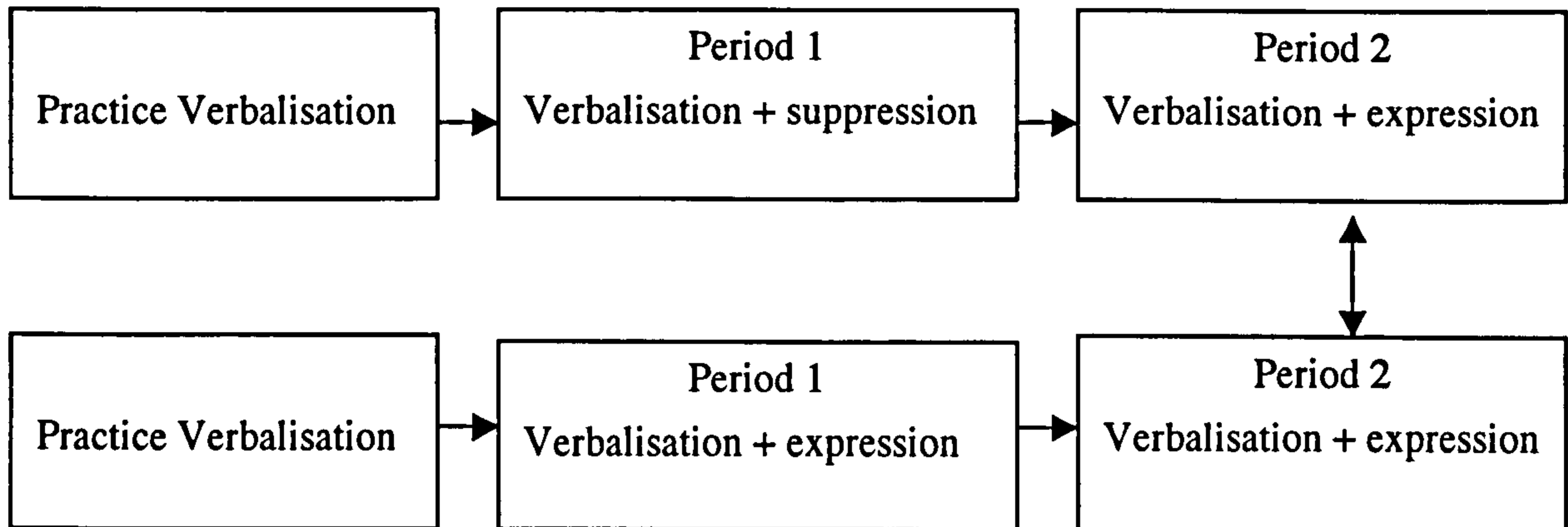
The paradigm used in the original Wegner et al. (1987) study, denoted here the “original method” is as follows. An initial 3-minute practice thought verbalisation period was followed by two five-minute verbalisation periods. In the first of these 5-minute periods (period 1) participants were divided into two groups, an initial expression condition and an initial suppression condition. The target thought for expression or suppression was “white bear”. In period 2 (the second thought verbalisation period) participants were asked to undertake the opposite form of mental control to the previous period. Thus, if they had been suppressing white bear in period 1 they were now asked to express white bear. If they had been expressing white bear in period 1 they were now asked to suppress white bear. Results showed that participants expressing white bear in period 2, after prior suppression demonstrated a significantly higher number of white bear thoughts in comparison to a group that expressed white bear thoughts in period 1 without prior suppression. Wegner et al. (1987) called this a rebound effect. Thus, according to “original method” the rebound effect is assessed by comparing the number of buzzer presses in the suppression group during period 2 and those of the expression group in period 1. This is schematically depicted in Figure 1.1 below.

FIGURE 1.1 - THE ORIGINAL 1987 METHOD, USED IN THOUGHT-SUPPRESSION EXPERIMENTS - SINGLE SIDED
ARROWS INDICATE THE TEMPORAL FLOW OF THE EXPERIMENT. THE DOUBLE SIDED ARROW SHOWS
WHICH TWO GROUPS ARE COMPARED ON THEIR MEAN NUMBER OF BUZZER PRESSES IN ORDER TO
ASSESS THE REBOUND EFFECT.



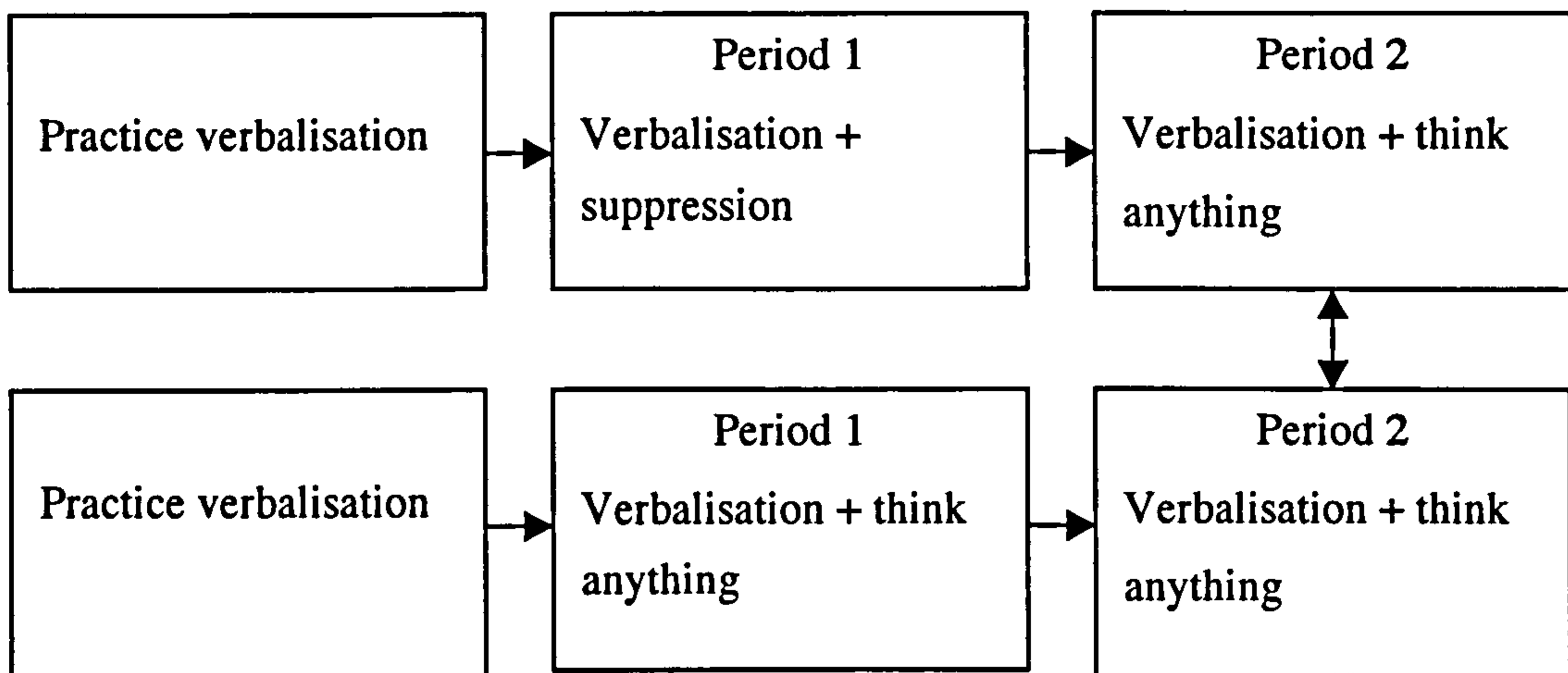
Although this method of assessing the rebound effect was used in some of the subsequent studies, it has also been criticised. Therefore, several modifications of the original method became more widely used in the following years. For example, according to Clark et al. (1991) one problem that the original method has is that participants who express in period 2 after previous suppression have had more practice at thought verbalisation than participants who express in period 1, and this factor alone may be responsible for the rise in thoughts seen after prior suppression. This criticism led to the introduction of another design which will be termed the “modified method” of assessing the rebound throughout this thesis. In this design following an initial period of expression or suppression in period 1, both groups engage in expression during period 2. Here, the rebound effect is indexed by comparing the number of buzzer presses between the two expression groups in period 2 (see Figure 1.2 for a schematic depiction of the modified method).

FIGURE 1.2 - A LATER REFINEMENT TO THE ORIGINAL THOUGHT-SUPPRESSION PARADIGM (DENOTED THROUGHOUT AS THE MODIFIED METHOD). SINGLE SIDED ARROWS INDICATE THE TEMPORAL FLOW OF THE EXPERIMENT. THE DOUBLE SIDED ARROW SHOWS WHICH TWO GROUPS ARE COMPARED ON THEIR MEAN NUMBER OF BUZZER PRESSES IN ORDER TO ASSESS THE REBOUND EFFECT.



A third paradigm for indexing the rebound effect also exists and has now come to be the most widely used method in thought suppression experiments. This will be referred to as the “standard method” throughout this thesis. In this paradigm, expression conditions are replaced by a think anything instruction (see Figure 1.3 below).

FIGURE 1.3 – ANOTHER MODIFICATION OF THE ORIGINAL THOUGHT SUPPRESSION PARADIGM REFERRED TO AS THE STANDARD METHOD IN THIS THESIS. SINGLE SIDED ARROWS INDICATE THE TEMPORAL FLOW OF THE EXPERIMENT. THE DOUBLE SIDED ARROW SHOWS WHICH TWO GROUPS ARE COMPARED ON THEIR MEAN NUMBER OF BUZZER PRESSES IN ORDER TO ASSESS THE REBOUND EFFECT.



All three paradigms outlined above (original, modified and standard methods) and their various derivatives have been used in thought suppression research with various success. With all these methods the rebound effect has been demonstrated in some studies but not in others (Clark et al., 1991, 1993; Harvey & Bryant, 1998a, 1998b; Wegner et al., 1991; Wegner and Gold, 1995). Reasons for these discrepant findings will be discussed in subsequent sections. At this point, however, it is important to mention that all of these methods have one thing in common, namely conscious thought verbalisations (usually tape recorded) and a reliance on self reported measures of target thought frequency (i.e. number of buzzer presses). However, self-report measures are known to be unreliable in certain situations (but see Ericsson & Simon, 1980; 1984). In the case of thought suppression, one could suggest that some participants may avoid mentioning the to be suppressed thought not because they are successfully avoiding it but because they want to appear good at the task. As a direct result some researchers have suggested using implicit measures, such as reaction times to recognise previously expressed or suppressed stimuli, as the dependent variables (Wegner, 1992).

(3) Studies that have deviated from the traditional paradigms

Studies that have employed paradigms that are different from the “original method” of assessing the rebound effect provide further evidence of the phenomenon of the post-suppression rebound and increase the generality of the findings. The majority of these studies have been conducted in the laboratory using a variety of implicit and/or behavioural measures of the rebound effect. There are very few studies that have examined the rebound effect with naturalistic methods.

(1) Laboratory studies

Wenzlaff and Bates (1999) had participants suppress/express positive thoughts or suppress/express negative thoughts during period 1. Then instead of having all groups express the formerly manipulated thoughts in period 2, they asked all participants to form sentences out of mixed up words with the first sentence that came to mind. These jumbled sentences could be formed into either a positive or a negative sentence. Rebound effects were observed in that: (a) the positive suppression group later produced more positive sentences than the positive expression group; and (b) the negative suppression group later produced more negative sentences than the negative expression group.

Macrae et al. (1994) also used a non-standard paradigm. In their study, participants had to examine a photograph of a male skinhead and all participants were then told to write about a typical day in his life. Half of the participants were additionally told to avoid thinking about the target (the skinhead) in a stereotypical fashion (they were suppressing stereotypes); the other half received no such instructions. Following these manipulations, the participants were told they were going to be taken next door to meet the person they had been describing. However, on entering the room the participant was not confronted with the skinhead but with empty seats. On one seat was a denim jacket (allegedly belonging to the skinhead). Each participant was instructed to take a seat on one of the empty chairs. The results showed that stereotype suppressors showed a rebound effect by

choosing a seat at a significantly greater distance from the skinhead's seat than participants in the control group.

Sullivan et al. (1997) had participants immerse their hands in ice water - a procedure they were told would be mildly uncomfortable. Prior to immersion, half of the participants were asked to suppress procedure-related thoughts and the other half were merely told to express their thoughts. The results showed that suppression was associated with heightened pain experience.

Another study to examine the rebound effect by using a different paradigm was the study of Wegner and Erber (1992). In this study Wegner and Erber were trying to test their theory that the rebound effect occurs due to heightened activation that the constructs accrue as a result of being suppressed. Participants were instructed to either suppress or express thoughts of the target word, "house". Simultaneous to this task, participants completed a two colour Stroop Task. The words used in the Stroop Task included target words, non-target words and target related words. Half of the participants completed this task under high load condition (simultaneously rehearsing a 9 digit number) and the others were in a low load condition (rehearsing a 1 digit number). The results showed that participants in the suppression condition were slower to indicate colours of all words in comparison to participants in the expression conditions. This may be due to the fact that suppressing thoughts requires greater cognitive resources than active expression. Reaction times to target-unrelated, target-related and target words were all similar in the low load condition, this was the case for participants in both the suppression and expression groups. However, in the high load conditions latencies were significantly longer for target words, compared to target-related or target-unrelated words, but only in the suppression group. This interaction between load (high vs. low) and group (suppression vs. expression) was explained with reference to Wegner's (1994) ironic process theory of mental control (see page 41).

(2) Naturalistic studies of thought suppression

A study by Trinder and Salkovskis (1994) investigated the rebound effect in everyday life by using a diary method. In this study, participants identified a negative intrusive thought and were then told to record its occurrence over the next 4 days. One third of the participants were told simply to monitor its occurrence, one third were told to suppress the thought whenever it occurred and the final third were told to think about the thought whenever it occurred. Results indicated that participants in the suppression group experienced significantly more of the unwanted thoughts than the other 2 groups and additionally they rated these thoughts as more uncomfortable than the other two groups.

(4) Factors Influencing the Rebound Effect

Although the rebound effect has been demonstrated on many occasions using different methods of assessment the field, as a whole, is beset by controversy due to many studies using similar paradigms but failing to demonstrate the basic effect (Merckelbach et al., 1991; Muris et al 1992,1993; Roemer and Borkovec, 1994). In addition, several researchers in the field have acknowledged informally that demonstrating the rebound effect is not an easy enterprise (Ellis, personal communication; Wegner, personal communication). In view of these mixed findings from the thought suppression literature the possible explanations for these discrepancies will now be examined. The reasons that several studies have failed to replicate the rebound effect may be due to the methods used to investigate the effect (e.g. the paradigm used) or methodological problems such as insufficient power (Wenzlaff and Wegner, 2000). Others have suggested that it may be the type of thought that is suppressed that leads to the different results (Kelly & Kahn, 1994). It has also been proposed that individual differences in participants may be responsible for when and where the rebound effect is obtained (Rutledge et al., 1993).

(1) Methods of Assessing The Rebound Effect

One factor that has not been systematically examined and that can potentially result in conflicting findings is the variety of different methods used to assess the rebound effect.

As pointed out earlier in this chapter there are now three methods (original, modified and standard) of rebound effect assessment all of which are in current use. The standard method was developed mainly by clinically oriented researchers who wanted to investigate thought suppression by using negative thoughts or indeed participants' own intrusive thoughts. As a direct result it was felt that asking distressed participants or clinical participants to actively think about (express) their own intrusive thoughts or distressing thoughts might be unethical. Therefore, the standard method whereby participants are asked to either suppress the thoughts or merely think about anything (including the distressing thoughts if they wished) was believed to be a better and more ethical control.

Despite the widespread uptake of the standard method over the original or modified methods it was decided not to use this method in the current thesis and instead to concentrate on contrasting the original and modified methods of assessing the rebound effect. There were several reasons for not using the standard method. Firstly, was the ambiguity of instructions asking participants to: "think about anything, you may think about a white bear but you do not have to". Previous research has shown that variability in participants' suppression and expression performance is very high. Thus, some participants in suppression conditions buzz as many as 20 times, whereas others may buzz only 2-3 times in a 5-minute period. In the expression group, the variance is even greater with some participants buzzing 50 times in the 5 minutes and others buzzing just 3 times. The instructions used in the standard method can only serve to increase this variability as they introduce ambiguity and participants may be confused by the mention of the target wondering exactly what they have to do with this target.

Crucially in this thesis another criticism of the standard method is the issue of the artificiality of these new instructions (think anything, you may think of a white bear but you do not have to). In many experiments that use the standard method participants first view a film or listen to a taped story and then half are asked to suppress their thoughts about the story and the other half are asked to think anything. Under these circumstances the instructions of the standard method make sense, but in studies where participants do

not first view a film or listen to a taped story and are just provided with a target for suppression the alternative group may find these instructions highly artificial.

A final criticism concerns the fact that expression itself is a form of mental control and if investigators want to understand the mechanisms of mental control, then it is necessary to understand the mechanisms underlying expression of thought as well as suppression. For these reasons in all of the research reported in this thesis thought expression was used as the control condition.

Therefore, the two methods of rebound effect assessment that will be contrasted in this thesis are the original and modified methods. The modified method depicted in Figure 1.2 (page 26) is currently believed to provide a better method of assessment than the original method, because it assesses the rebound effect by making a comparison between two groups that have both had equal practice at thought verbalisation. However, there are also reasons to believe that there may be some problems with the modified method itself. For example, a recent study by Erskine and Kvavilashvili (2002) has shown that using the modified method may result in a rise in reported thought during the second expression period for the participants who express twice (express during period 1 and 2). This may well be due to the effects of either practice or priming. However, the fact that this rise can occur when using the modified method means that the first period of expression is affecting the second and may not provide a clean comparison for indexing the rebound. This possible rise in reported thought in the group that expresses their thoughts twice may diminish the chances of demonstrating a rebound effect. Therefore, there are reasons to suggest the original Wegner et al. (1987) method of assessing the rebound might avoid these complications. The current thesis will systematically investigate these two different methods of assessing the rebound within the same studies.

(2) Role of Type of Thought Used in Suppression Experiments

Another variable which has been manipulated in thought-suppression experiments with very mixed results is the type of thought to be suppressed. Recent studies have started to investigate the suppression of both positive and negative thoughts and additionally to

look at the effect of the personal relevance of the to be suppressed thought. Of great importance to the research on thought suppression is the almost uniform finding that emotional material is more difficult to suppress than neutral information (Wenzlaff & Wegner, 2000). This can exacerbate the difficulty of experimental investigations because if the thought is so difficult to suppress then the rebound effect may not occur. Some of the research which has failed to demonstrate rebound effects using emotional material may be due to the suppression group failing to suppress the thought from the outset, thus representing a failure of the experimental manipulation.

(1) Research using personally relevant thoughts

Kelly and Kahn (1994) failed to demonstrate a rebound effect when using peoples' own intrusive thoughts. However, they did demonstrate the rebound effect using the traditional target thought - white bear. This study makes a very important point, in that most of the experimental investigations of the rebound effect have used neutral words which have little personal relevance, like "white bear" or "vehicles". Another study by McNally and Ricciardi (1996) also looked at the effects of suppressing a personally relevant intrusive thought and compared this to suppression of a neutral and not personally relevant thought (white bear). The post-suppression rebound was observed for the personally relevant thoughts, but not for white bear thoughts. Thus, the results of this study directly contradict the results of Kelly and Kahn (1994). Rutledge (1998) and Smari et al (1995) both failed to find a post-suppression rebound for naturally occurring thoughts. However, Salkovskis & Campbell (1994) did find suppression related enhancements occurring with naturally occurring intrusive thoughts.

Wegner and Gold (1995) have suggested that participants may expend greater energy in the suppression of naturally occurring thoughts and may never completely relinquish suppression as instructed to in period 2 due to the nature of such thoughts in many cases. Of critical importance is the demonstration by Trindler and Salkovskis (1994) that suppression of naturally occurring thoughts does lead to more intrusive thoughts in real world settings.

Wenzlaff and Wegner (2000) suggest that results from experiments using naturally occurring intrusive thoughts as targets for suppression, despite being mixed are suggestive of the idea that personally relevant thoughts may be less susceptible to suppression enhancement effects observed in the laboratory.

(2) Research using negative or positive thoughts as targets for suppression

Davies and Clark (1998) using the thought-suppression paradigm displayed in Figure 1.3 on page 27, with two groups (one suppressing and one thinking anything including the target) found that a film with negative and distressing content produced a post-suppression rebound, whereas, a film about white bears did not. Roemer and Berkovec (1994) found that participants suppressing a depressing (i.e. negative) thought later expressed more depression-relevant thoughts than did individuals who suppressed neutral or anxious thoughts. However, Harvey and Bryant (1998b) showed 3 different films (neutral, positive and negative) and found a post-suppression rebound effect in all conditions irrespective of the valence of the film.

In another study, Harvey and Bryant (1999) showed two films to two groups of participants (neutral and distressing) and had participants suppress or express thoughts of the film they had seen. Results indicated that a rebound effect occurred but that it was mediated by anxiety. In particular, a rebound effect was obtained in the low trait anxiety group where prior suppressers reported more film-related thoughts than non-suppressers in the final thought verbalisation task in period 2 where they were allowed to think about anything. However, this difference was not significant for high Trait Anxiety subjects. Interestingly, high anxiety non-suppressors stated they had been using suppression but low anxiety non-suppressors did not use suppression; this effect was found in both experimental periods. Therefore, it is possible that the spontaneous suppression (during period 1) exhibited by highly anxious participants who did not receive suppression instructions lead to the insignificant differences.

Wegner and Gold (1995) also observed that highly anxious participants spontaneously suppressed thoughts irrespective of experimental condition. Additionally, these high anxious participants were observed to naturally suppress unwanted thoughts and did not display a rebound effect.

Possible reasons for these mixed findings, in addition to anxiety, centre on the effects of practice. Participants are likely to have much experience with suppressing naturally occurring negative thoughts and perhaps this experience may have allowed the person to develop better strategies or distracters for suppressing them. Wegner (1994) has also suggested that practice with suppressing certain thoughts may lead to the process becoming more automatic. Additionally, these experiments were all carried out in the laboratory despite using thoughts classed as intrusive in daily life. It is possible that different results would have been obtained if these same thoughts were suppressed in the same environment that they were deemed intrusive in the first place (see Trinder & Salkovskis, 1994).

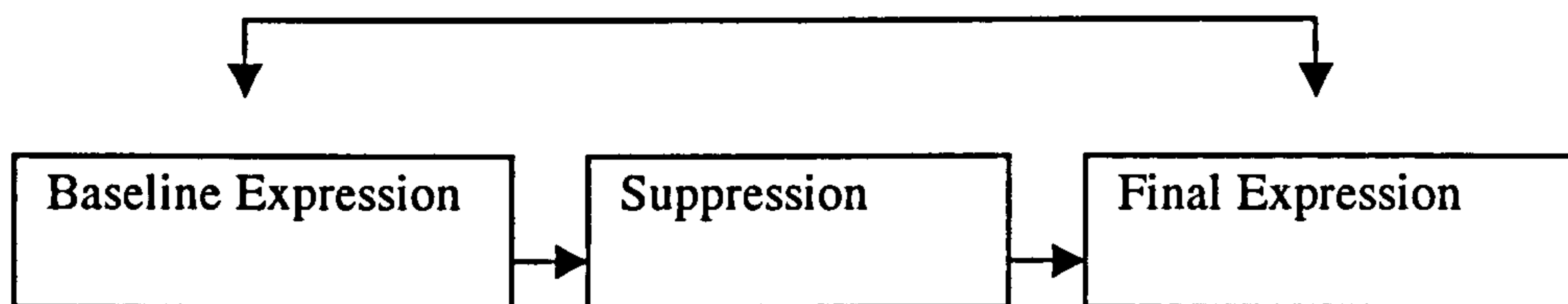
(3) Individual Differences in Thought-suppression and The Rebound Effect

The research described above on the methods used to investigate the rebound effect and on the type of thought used in these experiment does not completely account for the discrepant findings. This has lead to the suggestion that there may be individual difference factors at work that affect when and where rebound effects will be found.

Rutledge et al. (1993) and Rutledge et al. (1996) provide evidence that certain individual difference variables may affect whether a rebound effect is obtained or not in a particular study. For example, in their first study on thought suppression Rutledge et al. (1993) failed to replicate the Wegner et al. (1987) findings. However, they suggested this could have been due to such variables as ability. The participants in the studies of Wegner and his colleagues were all students at selective universities where the average American college testing score was above average, whereas the participants tested by Rutledge and her colleagues came from an open admissions university where the American college

testing scores were average. To test this hypothesis, the participants from the Rutledge et al. (1993; 1996) studies were re-examined and classed as rebounders or non-rebounders. Rutledge et al. used a within subjects design as shown below in Figure 1.4. Rebounders were defined as those participants who experienced an increase in the number of white bear thoughts (during expression) after suppression compared to expression prior to suppression. These groups were then compared on their American college testing scores. In line with predictions, the few participants who did experience the rebound effect had higher American college testing scores than the non-rebounders.

FIGURE 1.4 - A WITHIN SUBJECTS DESIGN FOR ASSESSING THE REBOUND EFFECT. SINGLE SIDED ARROWS INDICATE THE TEMPORAL FLOW OF THE EXPERIMENT. THE DOUBLE SIDED ARROW SHOWS WHICH TWO GROUPS ARE COMPARED ON THEIR MEAN NUMBER OF BUZZER PRESSES IN ORDER TO ASSESS THE REBOUND EFFECT.



In another study, Rutledge et al. (1996) provided further evidence that individual differences may play a role in the contradictory findings about the rebound effect. Once again the repeated measures design was used as shown in Figure 1.4. Participants were first asked to express thoughts of a “white bear”, then to suppress thoughts of the white bear and then finally to again express thoughts of the white bear. All thought verbalisation periods lasted 9 minutes. The results indicated that 36.4 % of the sample experienced a rebound effect (an increase in white bear thoughts following suppression). Thus, 63.6 % showed no evidence of increased thinking about white bears after suppression. A regression model was created predicting thought rebound. The significant predictors were American college testing score (higher scores predicted greater rebound

effects), gender interacted with thought intrusion (more thought intrusions during suppression predicted more rebound for males only), obsessionality (less obsessionality predicted more rebound), trait anxiety (less anxiety predicted more rebound), race (whites rebounded more than blacks).

These findings suggest that certain variables may mediate or modify possible relationships between thought-suppression and a post-suppression rebound effect. However, there are several problems with the studies of Rutledge and her colleagues. For example, they took measures of crystallized and fluid intelligence (Horn 1975) in the second experiment, yet do not refer to these in the results section other than to say there was a significant correlation between thought rebound and crystallized intelligence. This is an important point because Rutledge et al. (1996) are keen to point out that higher American college testing scores predict greater thought rebound. However, one would think that intelligence may well mediate this effect. Another confusing aspect concerning the studies of Rutledge et al. (1993; 1996) is that they found negative correlations between the rebound effect and obsessionality and negative correlations between the rebound effect and anxiety. These findings are somewhat puzzling because there is now much evidence to suggest that there is a high and stable correlation between the extent to which one uses thought-suppression in daily life and trait anxiety (Muris et al. 1996; Wegner & Zanakos, 1994).

Perhaps the most important problem with the research reported by Rutledge et al. is that they always used a within subjects design (see Figure 1.4). This is quite different from the methods used by virtually all other researchers. One could question the effect of having all participants express their thoughts at the outset, then suppress and then express again. In a personal communication Daniel Wegner has expressed doubts about the suitability of the within participants design to measure the rebound, as there is no comparison group and one does not know the possible effects of the initial expression period. In addition in the studies of Rutledge and her colleagues each verbalisation session was for 9 minutes which seems a very long time, especially in view of the fact that simply by introducing the repeated measures design they are also introducing another

verbalisation period. Thus, by the time participants engage in the final verbalisation session they have been verbalising for 27 minutes. In the original Wegner et al. (1987) studies verbalisation was for 5 minutes with two verbalisation periods. The effects of 27 minutes of verbalisation might well make one less likely to find rebound effects as a result of habituation or exhaustion simply as a result of the large amount of time spent on thought verbalisation. Taken together, these problems indicate that much more research is needed before one can make firm conclusions regarding the effects of individual differences on the rebound effect.

The only other study to examine the effects of individual differences on thought suppression was Brewin and Beaton (2002). They looked at the relationship between thought-suppression, intelligence and working memory capacity. Brewin and Beaton (2002) had participants perform a thought-suppression task and also tests of working memory capacity, fluid and crystallised intelligence. They found that more effective thought-suppression was related to both higher working memory capacity and higher fluid intelligence, but was not related to crystallised intelligence. This suggests therefore that higher fluid IQ may make one a more effective suppressor. The current thesis also directly investigates this question (Chapter 4).

Finally, one additional but important reason for believing that individual differences may play a role in rebound effects was highlighted by Rassin et al. (2000). They refer to a study conducted by Merckelbach et al. (1991) where a positive relationship was found between the number of target thoughts during active suppression and the number of thoughts during the post-suppression period. Therefore, the participants who were less successful at thought suppression and reported a high frequency of thoughts during suppression also reported more thoughts in the post-suppression period. This suggests there may be individual difference factors at work which may make people a poor or good suppressor and in addition may affect their propensity to experience rebound effects. This will be directly examined in the current thesis, where we will examine a range of individual difference variables and relate this to participants "ability" at

suppression or expression and their propensity to experience the rebound effect in the laboratory (Chapters 3 and 4).

(5) Summary of Experimental Studies of Mental Control and Rebound Effect

This section has reviewed the possible reasons for the controversy in the thought suppression literature over the rebound effect. Of the studies that failed to find a rebound effect, many introduced procedures that may have led to the rebound effect not occurring. One possible source of confusion in the literature is the wide variety of paradigms used to index the rebound effect. However, it must be borne in mind that even when rebound effects are found they tend to be weak to medium, thereby necessitating large samples (Amramowitz et al., 2001). The situation is further complicated by individual differences that may make people more or less susceptible to the rebound effect. It seems people of higher ability, as measured by their university entrance exams and intelligence tests, may be more likely to demonstrate the rebound effect (Rutledge et al., 1996). The type of thought that is to be suppressed is also influential in the outcome of these studies. One point of agreement in the literature is that negative or positive thoughts are consistently rated as harder to suppress than neutral thoughts (Petrie et al., 1998). The same is true of personally relevant thoughts, which are again harder to suppress than neutral thoughts. Some of the studies failed to demonstrate a rebound effect precisely because the suppression group could not successfully suppress the thought at all (Davies & Clark, 1998).

III. Theoretical Accounts of The Rebound Effect

Several theoretical explanations have been put forward by various researchers to explain the rebound effect. These explanations will now be examined together with some new theoretical ideas about the nature and mechanism of the rebound effect proposed in this thesis.

(1) Distracter Association Theory

The earliest suggestion of a mechanism underlying the rebound effect was the distracter association theory (Wegner et al., 1987). This theory is based on the observation that when people want to suppress a thought they try to distract themselves by thinking about many other things. This is well documented in virtually all thought-suppression experiments and can be easily verified by listening to the taped thought verbalisations. According to the distracter association theory it could be the use of many varied distracters that is responsible for the rebound effect. For example, most of the self-generated distracters used by the participants were from the immediate environment, yet most of these did not hold the participant's attention for long, and attention soon drifted back to the to-be-suppressed thought. At this point, another distracter was found and the cycle repeated. The result of this cycle is that associations are created between the distracters and the unwanted thought. Thus, when suppression efforts are stopped, all of the distracters can potentially serve as reminders of the suppressed target, producing the rebound effect.

This account has support from experiments which have shown that use of a single (experimenter generated) distracter reduces the rebound effect (Wegner et al. 1987). For example, Wegner et al. (1987) ran an experiment where participants were asked to suppress thoughts of a "white bear" by focusing on a red Volkswagen. In this experiment no rebound effect was found. Additionally, if the environment is changed during the post-suppression expression period (period 2), the rebound effect is either greatly diminished or does not occur at all (Muris et al., 1993; Wegner et al., 1991). However, the rebound effect is not always totally eliminated by using these manipulations (Macrae et al., 1994).

Furthermore, the distracter association theory may account for the findings that suppressing personally relevant intrusive thoughts in a laboratory does not always lead to a rebound effect. This could be due to the environment being different from the environment in which the same thoughts are traditionally suppressed (i.e., the home environment).

However, the distracter-association account has problems accounting for the finding that under high cognitive load participants who actively suppress the target thought end up having more thoughts of the target than a group of participants intentionally expressing the target. This effect has been termed the immediate enhancement effect and is distinct from the rebound effect (Wegner & Erber 1992; Wenzlaff & Wegner 2000).

(2) The Ironic Process Theory

The Ironic Process Theory was introduced by Wegner and colleagues (1992; 1994).

Broadly, this theory suggests that suppressing thoughts requires the involvement of two distinct mechanisms. One is an *intentional operating process* that seeks distracters and thoughts designed to maintain the desired state, i.e. not thinking about the suppressed thought. This process is effortful and designed to maintain a distracter in consciousness (this process has also been termed the controlled distracter search). The other mechanism is an *ironic monitoring process* that continually searches for instances of the to-be-suppressed thought in consciousness which will signal a failure of suppression. This ironic monitoring process is thought to be an automatic process and therefore not consumptive of cognitive resources (this process is sometimes referred to as the automatic target search). In the course of thought suppression these two processes are proposed to operate together as a feedback mechanism aimed at controlling thought.

In addition, Wegner and his colleagues (1992; 1994; 1997) have suggested that the controlled distracter search, being a controlled process is more susceptible to interference than the automatic ironic monitoring process. For example, if a person attempting mental control is under high load or in a dual task situation the resultant lack of cognitive resources will have a detrimental effect on the controlled distracter search leaving the ironic monitor relatively untouched. The effect would be that the very thought one was attempting to avoid would spring to mind with greatly increased frequency. This is exactly what has been found where participants have been put under high load during active suppression (Wegner & Erber, 1992). Thus, this theory can account for the immediate enhancement effect.

This theory is currently the most comprehensive explanation of the rebound effect. In support of this position, thought-suppression has been shown to enhance the accessibility of suppressed targets both during active suppression (Wegner and Erber, 1992) and subsequent to active suppression (Macrae, et al 1994). However, this account is not without some limitations. One of these is that the mechanism by which the ironic monitor raises the activation level of suppressed thoughts relative to expressed thoughts is not made explicit. This issue will be raised in more depth in Chapter 6 where the activation levels of previously suppressed and expressed thoughts will be examined in an experiment.

(3) The Goal Interruption Theory

Another theory which may in part explain why the rebound effect occurs is that of Goal Interruption. Martin and Tesser (1996) propose a model of ruminative thought in which rumination (repetitive thought on one topic similar to preoccupation) occurs as a direct result of failure to accomplish one's goals. According to this position, the rebound effect may reflect rumination as a result of having failed to attain the recent goal of successfully suppressing a thought (Martin & Tesser, 1996). Indeed, suppression is rarely, if ever, totally successful and it is natural for people to ruminate about their unsuccessful (or interrupted) goals.

Support for this notion comes from a study by Martin et al. (1993). They had participants either express or suppress thoughts of a white bear prior to undertaking a word recognition task designed to assess the activation level of the target (white bear). However, before presenting the word recognition task, half of the suppression participants received feedback suggesting they were very good at suppressing thoughts. This success feedback was designed to eliminate the sense of goal tension. In contrast, the other suppression participants received no feedback. After these manipulations, all participants were presented with the word recognition task. This word recognition task included words related to the target (polar bear, iceberg), words relating to the experimental setting which were distracter words (experiment, psychologist) and unrelated control words (electricity). The rebound effect was assessed via reaction times

to each of these stimuli, under the assumption that if the rebound effect was in operation reaction times to recognising target related words would be reliably faster than the times to recognise unrelated or distracter words. The success feedback eliminated the rebound effect that was still evident in the no feedback condition (i.e. faster reaction times to the target related words than to the distracter or control words). This study suggests that the success feedback eliminated the rebound effect because it took away the participants need to ruminate about the failure of the previous task of suppressing a thought.

Although this suggests another way of looking at the rebound effect it has not been systematically evaluated other than by the study by Martin et al. (1993). Therefore, prior to evaluating the theory, more research designed to verify or refute the premises of this theory is needed.

(4) Intentional explanation of the rebound effect.

In this thesis a new and different account of the rebound effect is proposed. This account is based on the concept of intention and the so-called Intention Superiority Effect (see below). Wegner (1996) admits that thought suppression is preceded by an intention not to think about certain constructs. However, it is known that formulating an intention leads to the intention being stored at a heightened activation level (heightened readiness for use) (Kuhl 1994). Goschke and Kuhl (1993) demonstrated, by using implicit tests, that intention-related information is recognised reliably faster than unrelated information. In their experiments participants had to learn two scripts describing simple actions (e.g. setting the table, clearing a desk). After learning both action scripts participants were informed that one of these scripts would have to be performed later in the experiment, the other would not have to be performed. Before performance of the action script all participants completed a recognition test where it was found that words from the to be performed script were recognised significantly faster than words from the alternative not to be performed script. It is important to note that this effect is shown in implicit tests that are not subject to conscious interference. The reaction times used in this paradigm make it highly unlikely that participants consciously altered their strategies when faced with intention related information. Thus, it seems these effects are likely to be automatic. This

automatic advantage for intentional information in one's declarative memory has been labelled the Intention Superiority Effect and has been replicated and extended by other researchers (e.g. Marsh, Hicks & Bink, 1998; Marsh, Hicks & Bryan, 1999). Marsh et al. (1998) examined the activation levels of various intentions and whether they changed depending on the intentions status as fulfilled or unfulfilled. They found that information relating to uncompleted intentions was recognised faster (had higher activation status) than control material with no associated intention. In addition, they found that the recognition latencies of completed intentions were slower than that of control material (no associated intention). Marsh et al. (1998) go on to suggest this could represent active inhibition of completed intentions.

However, of greater relevance to the current thesis is that Goschke and Kuhl (1994) and Kuhl (1994) have consistently argued that the Intention Superiority Effect is affected by personality factors. This contention was largely ignored by the later researchers who replicated the effect (Marsh, Hicks & Bink, 1998; Marsh, Hicks & Bryan, 1999). Kuhl (1994) showed that intention superiority effects are mediated by a particular personality dimension which they call state vs. action orientation. State orientation is characterised by a persisting activation of intentions and a conscious rumination on them irrespective of whether they have to be carried out promptly or not. State orientation is also characterised by a tendency to have involuntary intrusion about future goals or previous failed goals. Thus, state orientated individuals will continue to ruminate even on completed intentions (Kuhl, 1994; Kuhl & Beckmann, 1994).

According to Kuhl (1994), state orientated individuals do not show a deactivation of intentions after successful completion. In contrast, action oriented participants do deactivate intentions after formulation and are therefore not so prone to intention related intrusive thoughts. Indeed, Goschke and Kuhl (1994) provide evidence that the Intention Superiority Effect is stronger for state orientated participants than for action oriented participants. They suggest that in "state orientated subjects the explicit, episodic representation of a postponed intention persisted in an active state even if external cues

were available and active maintenance of the intention was not necessary.” (Goschke & Kuhl, 1993, p.74).

At present state and action oriented individuals are identified through a dual response format questionnaire designed by Kuhl (1994). This questionnaire is comprised of three sub-scales each assessing a slightly different aspect of the global dimension of state vs. action orientation. The first sub-scale “action orientation subsequent to failure vs. preoccupation” (AOF) assesses a person’s reaction to failure and contrasts a ruminative or preoccupied style of information processing (indicative of State orientation) with a style characterised by lack of rumination and easy adaptation to the experience of failure (Action orientation). The second sub-scale “perspective and decision-related action orientation vs. hesitation” (AOD) assesses a person’s ability to initiate intended actions and contrasts a hesitant style (indicative of state orientation) with a style characterised by an appropriate initiation of intentions at the desired moment (indicative of action orientation). The third and final sub-scale “performance-related action orientation vs. volatility” (AOP) assesses the ability to stay within self-initiated desirable activities without shifting attention prematurely to alternative activities. The premature shift away from desirable activities would represent state orientation whereas continuing with the desirable activity would represent action orientation.

The intention superiority account offers an alternative explanation for the rebound effect. The rebound effect is based on the fact that when the decision to suppress is made the person formulates an intention to suppress a thought, which then leads to all the suppressed content having heightened levels of activation as a result of its intentional status. Although Marsh et al. (1998; 1999) have shown that completed intentions are deactivated and inhibited, it is likely that suppressed thoughts can never be properly deactivated as one is never fully successful at thought-suppression (i.e. one has formulated an intention which is impossible to fulfil or complete), unless one adopts a relatively lenient criterion of what counts as successful thought suppression (e.g. three thoughts an hour). Most importantly, this theory can be tested directly. In particular, if the intentional theory of thought suppression is plausible one would expect to find a much

weaker rebound effect (or none at all) in action orientated participants and a much stronger rebound effect in state orientated participants. This prediction was tested in Study 1 described in Chapter 3.

(5) Summary of Theoretical Accounts of Mental Control and the Rebound Effect

The previous section reviewed various theoretical models of the mechanisms underlying the rebound effect. Currently the Ironic Process Theory (Wegner 1992; 1994) is the most widely accepted explanation of the rebound effect. However, despite its acceptance the ironic process theory proposes that an unconscious search operates continually in the background looking for failures of thought suppression. The mechanisms that underlie this continuous automatic search process are ill-defined and subject to different interpretations (e.g., Macrae et al., 1994; Wegner, 1994). The current thesis puts forward an alternative intentional explanation of the rebound effect that does not hypothesise an unconscious search process but explains the rebound as a function of the activation of intentional representations. This seems to provide a more parsimonious explanation of the processes involved in the rebound effect.

IV. The tendency to Use Thought Suppression In Everyday Life and Personality

Research on thought suppression has evolved into two separate areas of investigation. One is represented by the experimental research reviewed in depth above. Another is based on correlations of questionnaire data collected via various instruments. These two methods of investigating mental control (experimental manipulation and correlation methods) have to an extent remained separate with few studies using both methods within the same study. The current thesis will employ both methods in an effort to increase the generality of findings, but also in an effort to increase convergent validity by examining the effects of thought suppression from multiple angles.

One questionnaire, designed by Wegner and Zanakos (1994), is known as the White Bear Suppression Inventory (WBSI). It was designed to assess the frequency with which a

person uses thought suppression in everyday life. This measure is often used to examine correlations between the tendency to use thought suppression in everyday life and other individual difference measures and psychopathological indices.

Another instrument used is the Thought Control Questionnaire (TCQ - Wells & Davies 1994). The Thought Control Questionnaire was developed to assess the tendency to control thoughts in everyday life by varied means (Wells & Davies, 1994). The Thought Control Questionnaire assesses peoples' preferred methods of thought control (for example, avoidance by distraction, social methods, worrying, self punishment and reappraisal of the thoughts). However, despite the usefulness of this scale it has remained little used in thought suppression research relative to the WBSI. Only a few clinically oriented studies have reported using it to assess relations between thought suppression tendencies and psychopathology (Myers, 1998; Purdon, 1999). To date only one study has examined the relations between the WBSI and the Thought Control Questionnaire (Muris et al. 1996). They found a weak positive correlation between the total TCQ score and the WBSI ($r(172) = .22$ $p < .01$).

(1) Psychometric Properties of the White Bear Suppression Inventory

In the original development of the WBSI, Wegner and Zanakos (1994) set out to examine not only the factor structure of the WBSI, but also its stability over a three month period. The correlation between WBSI scores at test and retest after 3 months was .69. Wegner and Zanakos (1994) therefore argue that the WBSI measures a tendency that can be regarded as a stable personality trait.

Muris et al. (1996) also examined the psychometric properties of the WBSI. Using a sample of 172 participants, they found it to be a reliable instrument, Chronbach's alpha was 0.89 and a 12 week test retest correlation was 0.80. In addition, this study was in agreement with the original Wegner and Zanakos study which reported a one factor solution. A more recent investigation of the psychometric properties of this scale (Blumberg, 2000) used a much larger sample than the Muris et al. (1996) study ($N = 935$). Here, three factors were found and labelled unwanted intrusive thoughts, thought-

suppression and self-distraction. In addition, it was found that the second and third factors were more likely to be endorsed by women. In other words, women were more likely to report these avoidant strategies.

The most recent investigation of the psychometric properties of the WBSI was conducted by Höping and Jong-Meyer (2002). These researchers factor analysed the scale in a sample of 276 non-clinical participants. Using orthogonal rotation a two-factor solution was arrived at. The factors were labelled as “Unwanted intrusive thoughts” and “thought-suppression”. The authors noted that the correlations with psychopathological measures were due almost exclusively to the factor of unwanted intrusive thoughts and not thought-suppression. They suggest it is doubtful that the full scale primarily assesses a disposition to suppress unwanted thoughts.

It would seem therefore, that there is sufficient doubt to question whether the WBSI only measures the tendency to suppress thoughts in everyday life. The two studies that found more than one dimension underlying the scale (Blumberg, 2000; Höping and Jong-Meyer, 2002) both suggest that one further dimension it assesses is “unwanted intrusive thoughts”. In addition, the items they list as falling under this factor are similar. When examining the scale itself one often feels that some of the items do seem to assess something more like unwanted intrusion than the tendency to suppress thoughts. For example item 3 of the scale is “I have thoughts I can not stop”, and item 9 is “there are thoughts that keep jumping into my head”. Both of these items seem intuitively to be related to intrusive thought and not necessarily to the use of thought suppression. Perhaps it is not surprising that both Blumberg (2000) and Hoping and Jong-Meyer (2002) found these items to load on the unwanted intrusions factor.

Studies using this measure and relating it to performance during a suppression task in the laboratory have demonstrated that participants with high WBSI scores (i.e. a high tendency to use thought-suppression in everyday life) demonstrate more intrusions during active suppression, but also during expression after previous suppression (Muris, Merckelbach & Horselenberg, 1996; Van den Hout et al., 1996). This interesting and

somewhat counterintuitive finding seems to provide additional evidence in support of the idea that the WBSI is measuring something akin to proneness to experiencing thought intrusions in addition to thought suppression.

(2) The Relationship of The WBSI with other individual difference measures and psychopathological indices

The original paper by Wegner and Zanakos (1994) found that the WBSI correlated positively and strongly with several measures of psychopathology. This paper had the advantage of using very large samples, often with 600 participants. Thus, the correlation between the WBSI and Beck Depression Inventory and the Maudsley Obsessive Compulsive Inventory (MOCI) was .45 and .40, respectively in a sample of 609 students. The correlation with the State-Trait Anxiety Inventory was .53 in a sample of 199. Finally, the correlation with the Anxiety Sensitivity Inventory was .49 in a sample of 133.

These correlations between the propensity to use thought suppression in everyday life and various indices of psychopathology have been replicated by other researchers. For example, Muris et al. (1996) found the following correlations between the WBSI and various measures of psychopathology in a sample of 172 university undergraduates: Trait Anxiety Inventory (.57), Eysenck Personality Inventory Neuroticism scale (.46), Student Worry Scale (.38), Beck Depression Inventory (.54), Maudsley Obsessive Compulsive Inventory (.35) and the Unwanted Intrusions Questionnaire (.40).

Thus, if one accepts that the WBSI is measuring the tendency to suppress thoughts in everyday life then there is clear evidence that this is linked to increased psychopathology. These findings have been replicated by other researchers (Muris & Merckelbach, 1997; Van den Hout et al., 1996). However due to the correlational nature of these studies direct statements about possible causality can not be made. It could be that greater use of thought suppression may lead to greater psychopathology or it could be that greater psychopathology leads to heightened use of thought suppression. In addition, there always exists a possibility that some other (currently unknown) variable causes both the elevated psychopathology and thought suppression.

(3) WBSI and Dissociation

Further research has investigated possible links between thought-suppression and the phenomenon of dissociation. Dissociation has been defined as a “breakdown in the usually integrated functions of consciousness, memory, perception of self or the environment” (p.755 American Psychiatric Association, 1994). Dissociation is conceptualised as a non-conscious process in that the person is unaware that they use this strategy. Research by Van den Hout et al. (1996) found that scores on the WBSI and the Dissociative Experiences Scale (DES) correlated significantly and positively $r = .52$. A later study by Muris and Merckelbach (1997) also found a positive correlation between WBSI scores and DES scores ($r = .35$). The most recent study by Spinhoven and van der Does (1999) examined the WBSI in a clinical sample. The WBSI was found to correlate positively with all dimensions of psychopathology measured by the Symptom Checklist-90 and was not found to differ between patients with affective disorder, anxiety disorder or no psychiatric diagnosis. However, the WBSI scores were found to be unrelated to measures of dissociation when controlling for level of psychopathology. Thus, it appears that although both thought-suppression and dissociation are associated with psychopathology, they are relatively independent.

(4) The WBSI and Thought Action Fusion

Thought Action Fusion (TAF) refers to a cognitive bias whereby a person has an inflated sense of responsibility for their thoughts. In everyday terms people with high scores on TAF scales believe that thinking of an act is as bad as actually carrying out that act. For example, they would view thinking of murdering a colleague to be almost as bad as actually murdering the colleague. Conceptually, this has been linked to greater thought-intrusion, just as thought-suppression has (Shafran et al., 1996).

Rassin and his colleagues have conducted several studies looking into possible relations between thought-suppression and TAF (Rassin, 2001; Rassin et al., 1999, 2000, 2001). In the first study, Rassin et al. (1999) tried deliberately to manipulate people’s sense of responsibility for their thoughts. In a decisive experiment, Rassin et al. (1999) made

participants believe that their thoughts could be recorded by an EEG machine. Specifically, participants were told that every time they thought of the word “apple” the machine would pick this up and give a small electric shock to a participant in an adjacent room. Control participants were not informed about shocks being administered but were still under the assumption that their thoughts could be known from the EEG machine. Rassin et al. (1999) found that experimentally induced thought action fusion resulted in more thought-intrusion, and greater discomfort. Thus, they concluded that TAF may contribute to the transformation of normal intrusions into obsessive intrusions.

As a direct result of this study, Rassin et al. (2000) went on to investigate in more depth the relations between thought-control and TAF. In particular they investigated the possible relations between scores on TAF and thought-suppression as measured by the WBSI. Their rationale was that TAF and thought-suppression may well interact or work synergistically to create extreme intrusions. They administered questionnaire measures of TAF, and the WBSI and the Maudsley Obsessive Compulsive Inventory to 173 undergraduates. A structural equation modelling approach was used to examine which of the hypothesised models best fitted the data. The results indicated that TAF was indeed a precursor to thought-suppression and thought-suppression was a precursor to greater levels of obsessionality. A model with a direct path from WBSI scores to obsession scores did not fit the data well. This suggests that the role of thought-suppression is a mediational one coming between TAF and obsessions in the causal chain.

Unfortunately, these encouraging findings were not replicated in the later studies of Rassin and his colleagues (Rassin 2001; Rassin et al., 2001). It is possible that results were not replicated due to using clinical samples in these studies. Another possible reason is that there is now evidence that TAF scores are not stable over time and therefore do not display trait like qualities. Thus, in the Rassin et al. (2000) study TAF scores of students significantly dropped after 3 months. In contrast there is evidence that scores on the WBSI do not vary much over time (Wegner and Zanakos, 1994).

(5) Summary of Questionnaire Measures of Thought Control

The WBSI has been shown to be a reliable instrument for measuring a person's tendency to use thought suppression in everyday life. In addition, the research discussed above has consistently demonstrated large associations between the tendency to use thought suppression and various indices of psychopathology, most notably, anxiety, depression and obsessive compulsive disorder. The current thesis examined in detail the relationship between a range of psychopathology indices and both the WBSI and the TCQ. These were examined in two samples, one of young adults and one of older adults. The work focusing on older adults is important as to date all of the studies investigating the relations between use of thought suppression and psychopathology have used young samples. Thus, almost nothing is known about the prevalence or the use of thought suppression and its effectiveness in old age. The current thesis examined the tendency to suppress thoughts and the mental control strategies used by older adults (over 65 years of age) by administering the WBSI and TCQ to a sample of healthy older adults and will attempt to assess the amount they use thought suppression in everyday life compared to a sample of undergraduate students (Chapter 8).

V. Thought-suppression, Rumination and Repression

Two variables that have both been linked to various psychopathologies but also to thought suppression are rumination and repression. The relevant research on these phenomena and their possible relation to thought suppression will now be examined.

(1) Rumination and Thought Suppression

Rumination has been defined as a class of conscious thoughts that revolve around a certain theme and recur frequently for an extended period of time, often in the absence of immediate environmental demands requiring the thought (Martin & Tesser 1989; 1996). Content wise, ruminative thoughts may be neutral, positive or negative. Examples of rumination include day-dreaming, reliving successes and anticipating pleasures as well as disasters. As such, rumination could be conceptualised as the antithesis of thought-

suppression. However, there are various theoretical positions which suggest these two processes may well have great impact on each other.

Broadly speaking there are two main positions as regards rumination and its possible relation to thought suppression. The first was advanced by Martin and Tesser (1989; 1996). They suggest that rumination or repetitive thought is related to unattained goals and that unexpected progress towards goals (either approaching one's goal too fast or not fast enough) will instigate rumination. Once instigated, rumination can interfere with other processing and can be aversive (Nolen-Hoeksema, 1991; 1994). As a result, people may attempt to suppress the ruminative intrusions in an effort to restore mental balance. However, Martin and Tesser (1996) go further in suggesting that rumination may be the mechanism underlying paradoxical effects often found with thought suppression. Thus, a person attempting thought suppression has a goal not to think about a certain topic, but as this is a difficult, if not impossible task they do think about the to-be-avoided thought even during active suppression. As they are having problems approaching the goal of not thinking about X they begin to ruminate on why they can not avoid these thoughts, resulting in a paradoxical increase in thinking of the very thought they were trying to avoid.

The second position regarding the relation of rumination to thought suppression has been advanced by Erber and Wegner (1996). Whilst accepting that blocked goals may in some cases lead to rumination they suggest that the main cause of rumination is thought suppression itself. Erber and Wegner (1996) state that people try to suppress thoughts that are unwanted. The act of suppression then paradoxically increases the accessibility of the suppressed thought via the ironic process theory (see page 41) leading to the return of the previously suppressed thought and rumination on it. Once again Erber and Wegner (1996) also postulate a cyclical process where thought suppression leads to rumination which may again instigate more suppression and so on.

Both Martin and Tesser (1996) and Erber and Wegner (1996) accept that thought suppression can lead to rumination, but they explain this process through the operation of

different mechanisms. For Martin and Tesser (1996) it is the failure of thought suppression (i.e. the goal not being realised) that “causes” thought rebound or rumination. For Erber and Wegner (1996) it is the operation of the ironic monitoring process that leads to thought rebound and rumination not because the goal of successful suppression had not been realised.

Despite the importance of the concept of rumination to thought suppression and the theoretical views of Martin and Tesser (1996) and Erber and Wegner (1996) there remains virtually no research looking into the possible relation between rumination and thought suppression.

The current thesis will investigate the possible relations between rumination and the use of thought suppression in everyday life. In addition this thesis will also examine whether the rebound effect itself is affected by participants tendency to ruminate a lot in everyday life as assessed by the Rumination Inventory (McIntosh and Martin, 1992).

(2) Repression and Thought Suppression

Repression represents a particular style of interacting with the world whereby negative information is automatically avoided by the repressive person. One way to view the concept of repression is as a form of unconscious avoidance, or an unconscious (and automatised) thought suppression. Repression is now mainly treated as a trait-like variable (a relatively stable individual difference between people). Weinberger et al. (1979) were the first to formulate a reliable questionnaire method of identifying repressors or people with a repressive coping style. The Weinberger et al. (1979) method identifies repressors on the basis of participants’ scores on questionnaires measuring anxiety and defensiveness. The table below clarifies the four-fold classification system they developed for this purpose.

TABLE 1.2 – THE CLASSIFICATION SYSTEM OF WEINBERGER ET AL. 1979 FOR REPRESSIVE COPING STYLE

		Defensiveness (Marlowe-Crowne Social Desirability)	
		Low	High
Trait Anxiety (Spielberger Inventory)	Low	Low anxious	Repressors
	High	Non defensive high anxious	Defensive high anxious

Table 1.2 shows that repressors are people who show low anxiety (usually defined as below the normative median on an anxiety inventory such as the Taylor Manifest Anxiety Inventory (1983) or the Trait Anxiety Inventory by Spielberger et al., 1983) whilst at the same time scoring high on measures of defensiveness (usually defined as participants scoring above the upper quartile of the normative values for the Marlowe Crowne scale of Social Desirability, 1964). Most studies using the Weinberger et al. (1979) method of identifying repressors have shown about 10 to 20 % of their samples to be repressors (Myers, 2000). However, these percentages have been mainly established in samples of young participants (usually undergraduate students).

Many studies have now shown that when placed in stressful situations people with a repressive coping style report no anxiety yet show high levels of physiological reactivity as assessed by heart rate and blood pressure (Asendorpf & Scherer, 1983). What makes this finding interesting is that non-repressive individuals with low self-reported anxiety do not show this physiological reactivity to anxiety provoking stimuli. In other words, in people with a repressive coping style there is a discrepancy between self-reported anxiety and physiological indices of anxiety.

Derakshan and Eysenck (1998, 1999) provide evidence that repressors are truly unaware of their own repressiveness (avoidance). They asked repressors and non-repressors to

complete anxiety inventories and measures of defensiveness. They then asked participants to complete the same questionnaires whilst being connected via electrodes to a machine which resembled a lie detector. In addition, participants were informed that this machine was able to tell if they were telling the truth. This procedure is known as the “bogus pipeline”. The scores of repressors did not change over the two time periods suggesting that repressors are self deceivers.

There are theoretical reasons to believe that thought suppression and repression may be related. It is well known that over time routine behaviours become automatised to the extent that they can be performed whilst consuming minimal cognitive resources. A prime example of this would be driving. When one first attempts to drive it is almost an impossible task but, after a few months of practice, it becomes a skill one can perform whilst simultaneously having a complicated and detailed conversation with a passenger. In relation to thought suppression, Singer and Sincoff (1990) have raised an interesting question as to whether repeated efforts at conscious suppression may lead to a gradual automatisation of the process. They suggest that “repression may develop after a series of conscious suppressions, and the two processes may not be that different after all” (p. 477). To date, only one study has attempted to look at the effects of repeated practice on a suppression task. This study (Jordan & Wegner, 2003), had participants practise thought-suppression over four experimental sessions, one week apart. Somewhat surprisingly, despite using the same target over the first three weeks and then switching to a new target in week 4, participants displayed no improvement in suppression performance relative to a control group. The main message from the above preliminary study is that in this case practise at thought-suppression did not lead to the participants being any more successful over repeated suppression trials with the same target. With the above example, one could question whether four practice sessions are enough. It seems likely that in a naturalistic setting, a person may suppress the same construct hundreds, if not thousands, of times. This could then possibly become automatised.

In one of the only studies to directly examine the effects of repressive coping style on conscious mental control abilities, Champion (1998) found that repressors were much

more successful at thought-suppression than non-repressors. However, this evidence must be viewed with caution, as it is known that repressors score very high on scales of social desirability. Therefore, the low number of thoughts they report during suppression may merely reflect that they do not wish to report truthfully the accurate number of conscious intrusions. Of course, it may also show they are genuinely better at thought-suppression, but future research needs to untangle this question.

In conclusion, it seems that being a 'repressor' is an individual difference variable with 10 to 20 % of young undergraduate samples being classified as repressors. Repressors are claimed to display an automatic tendency to avoid negative or threatening information (Dawkins & Furnham, 1989; Myers & McKenna, 1996). They also report, and indeed the evidence suggests, that they have little awareness that this is the case. More importantly for this thesis is that whatever methods repressors are using, they appear to be successful at avoiding, or claiming to avoid their unwanted thoughts, something where more conscious suppression is not successful. It seems to truly avoid thoughts one does not like, one needs to eliminate the thoughts themselves, but in addition one also needs to drive out the very idea that anything has been dispelled.

The following new classification system may help to clarify some of the issues that have been discussed in this section. The system classifies mental control operations according to two dimensions. The first dimension refers to a distinction between conscious and unconscious mental processes. The second is the distinction between the suppressive (avoidant) and expressive forms of mental control. This leads to the four fold classification of mental control operations presented in table 1.3 below.

TABLE 1.3 – A NEW 2 (UNCONSCIOUS VS. CONSCIOUS) X 2 (AVOIDANT VS. EXPRESSIVE) CLASSIFICATION SYSTEM OF MENTAL OPERATIONS

	Unconscious	Conscious
Avoidant	Repression	Thought Suppression
Expressive / focusing	Automatic noticing of threatening information	Focusing, thought expression

The current thesis will examine the rates of repressors and non-repressors in a sample of young adults, but also in a sample of older adults (over 60 years). The rates of repression (proportion of older and younger participants who are repressors) in the two samples are directly compared in Chapter 9.

VI. Goals, Intentions and Conscious Will

The final two sections of the literature review examine mental control from the broader perspective of intentional behaviour and volition. The necessity for this is based on the basic assumption of the thesis that a decision to suppress a thought is an intention. If this is so then one needs to examine the relation of thought suppression to intentional action, memory, and the perception of one's own intentionality in goal-directed behaviour.

(1) Goals and Intentions

It is now widely accepted that human behaviour is goal directed (Latham & Locke, 1991). According to Latham and Locke purposeful action in humans is volitional and consists of processes of discovering and choosing what is beneficial to one's welfare and then setting goals to achieve it. Goal setting is one of the major methods of self-

regulation as by defining a goal the person is saying what they are (or are not) willing to do.

It is also important to distinguish goals from desires and intentions. Desires are tendencies to want various things. The important feature of desires is that when someone has a desire it does not yet mean they have decided to do anything about it (Malle & Knobe, 2001). In direct contrast, when a person formulates an intention they are actively planning to carry out a specific action. The concept of goals is more ambiguous and, in the literature the constructs of goals and intentions are sometimes used interchangeably. However, the difference between goals and intentions is that goals can be vague for example, the goal to be liked. In this instance, there can be many associated actions that would fulfil this goal, but the goal itself has no associated action as opposed to the intention to pay one's electricity bill. This has led Malle and Knobe (2001) to suggest that unlike goals "intentions always have as their content an action performed by the person who holds that intention" (p. 47).

Carver and Scheier (2000) propose that goals are stored hierarchically, (i.e. they differ in their level of abstraction). For example, a person might have the goal of being a likable person, but she could also have the goal of smiling at her friend and offering them a drink when she sees them. The first goal relates to being a certain type of person, but the second goal relates to a type of action. From the foregoing analysis of the differentiation of goals from desires and intentions, one may well choose to label the second specified goal an intention. Carver and Scheier (1998; 1999; 2000) choose to label this as a goal.

Like Latham and Locke (1991), Carver and Scheier (2000) also adopt the view that human behaviour is goal directed and purposeful. The distinct part of their theory is that they specify theoretically how goals impact on behaviour. They propose that goals function as reference values for feedback loops. The notion of feedback loops was introduced by Miller, Galanter and Pribram (1960) and suggests that a self regulatory system needs an input function, a reference value, a mechanism of comparison and an output. Importantly, Carver and Scheier have also been instrumental in suggesting that

feedback mechanisms of control can work on two principles. These are discrepancy reducing loops and discrepancy enlarging loops. These operate to different extents depending on the exact goal being pursued. Thus, negative feedback loops work to reduce discrepancies between the input function and the reference value. In this formulation behaviour consists of trying to approach desired goals. If the output function detects discrepancies between actual output and the reference value, behaviour is altered to try and reduce these discrepancies thereby leading one towards one's goals. With positive feedback loops the function is more one of avoidance. Thus, these loops seek to avoid unwanted goals. Here the feedback loop compares present conditions with goals one does not want and attempts to distance oneself from the unwanted conditions thus increasing the discrepancy.

This analysis of goals also suggests an interesting function of affect. Carver and Scheier (1998; 1999; 2000) suggest that affect arises in part from the comparison process operating in the feedback loops, where for example, the rate of progress is not right and adjustment is necessary. Moreover, Carver and Scheier (2000) state that "although the organism tries to minimise pain, it does not, in general, try to maximise pleasure." (p. 55). Conceptually, this is similar to Martin and Tesser's (1996) analysis of rumination where they clearly suggest that rumination (which often produces negative affect) occurs when the rate of progress towards one's goals is either too fast or too slow. Martin and Tesser (1996) also suggest that goal blockage (not being able to attain one's goal) leads to the greatest levels of both rumination and negative affect.

Carver and Scheier (2000) argue that the process of minimising pain is relatively straightforward and consists of noticing negative feelings (arising due to not approaching goals fast enough) and altering behaviour, for example, by putting in more effort. However, they are left with a difficulty when it comes to maximising pleasure, as both Carver and Scheier (2000) and Martin and Tesser (1996) have suggested people also experience enhanced affect when they are approaching their goals too fast! Yet the system we have described seeks to reduce discrepancies, therefore this enhanced positive affect leads to behavioural changes which seek to reduce this discrepancy. This thesis

proposes a new model of why rebound effects may occur after intentional thought suppression (see page 43). Central to this model is the notion that avoidant goals may be more highly active in the cognitive system or more primary. The above analysis lends some support to this contention.

Thus, intentions and goals may serve to help people control their behaviour. One question of interest concerns the impact goals and intentions and thinking about them or not thinking about them can have on one's sense of willing various actions. The next section will explore how mental control and intentions may, under certain conditions, alter one's perception of intentionality for simple actions carried out under different mental control (suppression vs. expression) instructions.

(2) Mental Control and Conscious Will

Although consciously enacted actions and behaviours appear to be preceded by goals and intentions, a recent literature review and meta analysis of the intention behaviour relationship concluded that intentions explain only about 28% of the variance in human behaviour (Sheeran, 2002). Thus, people do not always carry out the intentions they say they will. Moreover, sometimes people even carry out actions that are direct opposites of their initial intentions. Indeed, there are numerous everyday examples of people seemingly acting against their own consciously formulated intentions. For example, in a Dostoyevskian sense his protagonists often find themselves in situations where they feel compelled to act in a way they believe is contrary to their best interests. In many of his classical passages one finds his protagonists formulating a conscious intention not to perform the compelling action or not to think about it, yet only moments later one finds his protagonist engaging in the very same activity. When the protagonist realises they have acted in a counter intentional way they are aggrieved and feel that they have not completed this action themselves, there is a sense of the action having been externally impelled and beyond personal control.

Where does this leave one with regards to one's own sense of conscious will? Research on the topic of conscious will is again a relatively new area, despite William James being

instrumental in bringing this field to our attention more than 100 years ago. This section will attempt to delineate the processes by which thought is vital in giving us the sense that we have willed our actions and that when such thoughts are lacking or inconsistent with the action that arises we experience little sense of having willed the ensuing actions.

The theory of apparent mental causation recently proposed by Wegner (2000, see also Wegner & Wheatley, 1999) suggests that the experience we have of causing actions arises whenever we draw a causal inference linking our thought to our action. When thought seems to initiate action, we experience will. Principles guiding such inferences can be drawn from principles of attribution and inference that govern cause perception more generally (Gilbert, 1995; Heider, 1958; Kelley, 1972; Michotte, 1963). However, the sense of having caused the action in this framework is dissociated from the actual causes of the action. According to this theory, when a thought appears in consciousness just prior to an action, is consistent with the action, and is not accompanied by salient alternative causes of the action, we experience conscious will and ascribe authorship to ourselves for the action. In contrast, when thoughts do not arise with such priority, consistency, and exclusivity, we experience the ensuing actions as less willed or voluntary.

In essence, this theory suggests that voluntariness is experienced primarily when thought about action is the primary candidate for having caused the action that is observed. The application of these principles of inference suggests that experiences of voluntariness or involuntariness are guided by perceptions of mental causation, not by actual mental causation. In addition, this theory suggests that one's sense of will can be altered by environmental circumstances such that sometimes one can be lead to feel their actions are "happening" to them rather than that they are "doing it". For example, experiences of involuntariness regularly occur in hypnosis (Kihlstrom, 1985; Lynn, Rhue & Weekes, 1990). In addition there are also circumstances where people come to experience enhanced conscious will for events over which they have no demonstrable control (Langer, 1975; Taylor & Brown, 1988; Wegner & Wheatley, 1999).

The current thesis is predicated on the view that thought suppression may be an ideal vehicle for further testing Wegners theory (i.e. that the sense of will can be manipulated by changing the contents of thought prior to acting). Suppressing or expressing intentions may be particularly interesting as it may be directly related to one's sense of will and causation.

For example, if a person is attempting mental control via thought suppression and is suppressing the urge to undertake an action, but nevertheless does perform the action they should not experience a sense of having willed the action. This is because they would not experience a sense of having thought about the action just prior to its enactment (priority). Additionally, they would certainly not experience consistency, they are trying not to think about doing something but do it anyway. In contrast, if someone is attempting expressive mental control and thinking a lot of an upcoming action for example, thinking of an action they are really looking forward to and then do it, they should experience a greater sense of having willed the action due to the priority of thought, its consistency and its exclusivity. These hypotheses will be directly tested in Chapter 10 of this thesis.

Another interesting question regarding mental control and intentions concerns the function of conscious mental control in helping us to enact our intentions and reach more of our goals. Will suppressing or maintaining intentions in mind help us to enact them with more success? The next section will explore these issues further.

(3) Mental control and remembering future intentions

Most prior investigations have focused on possible negative consequences of thought suppression and the rebound effect. Thus, thought suppression has been shown to induce not only a preoccupation with previously suppressed material, but also to have negative effects at a behavioural and even purely physiological level. For example, thought suppression can result in increased likelihood of a stereotypic behaviour (Macrae et al.,

1994), increased perception of pain (Sullivan, Rouse, Bishop, & Johnson, 1997), or decreased immunological functioning (Petrie, Booth, & Pennebaker, 1998).

However, there are several reasons why one could challenge this widespread assumption of the effects of thought suppression (and the rebound) always being negative. For example, if thought suppression enhances accessibility (i.e., the activation levels) of the suppressed thought and leads to subsequent unwanted (and recurring) intrusions of this thought then it is possible that this situation may have a favourable outcome for some mental processes in certain situations. One of the most likely candidates that could benefit from this hyperaccessibility is memory processing. Thus, one could suggest that perhaps suppression can improve memory for a previously suppressed target item (see Wegner, Quillian, & Houston, 1996; Wenzlaff, & Wegner, 2000). This contention has been shown to work for stereotypic information by Macrae et al. (1997) who demonstrated that previously suppressed stereotypic information was subsequently recalled with greater accuracy than other non-suppressed information.

Of particular interest and relevance to the thesis would be to extend the study of the effects of thought suppression on memory to the area of prospective memory. The latter refers to remembering to perform an intended action at a particular moment in the future (for example, remembering to make a phone call, take a medication or post a letter), and is usually distinguished from retrospective memory or remembering past information (see Brandimonte, Einstein & McDaniel, 1996; Meacham & Leiman, 1982).

In everyday life prospective memory failures appear to be more common, and are perceived by people as more frustrating than retrospective memory failures (See e.g. Smith, Della Sala, Logie, & Maylor, 2000; Terry, 1988). In addition, prospective memory skills are vital for maintaining independent and successful functioning in everyday life, especially in those populations that may be more susceptible to failures, for example, older adults, people with traumatic brain injury or those with Alzheimer's disease. It is therefore important to study practical ways in which prospective memory can be improved.

Apart from these practical considerations there are valid theoretical reasons for combining research in the areas of thought suppression and prospective memory. For example, successful prospective memory involves encoding an intention which may refer to an activity one can only carry out in 2 hours time. During this retention interval the intention has been shown to be held at a heightened level of activation, the so called Intention-Superiority Effect as pointed out earlier (Goshke & Kuhl, 1993; Marsh, Hicks, & Bink, 1998; Marsh, Hicks, & Bryan, 1999). This heightened activation increases the likelihood that these intentions will become conscious during the retention interval and perhaps most importantly they increase the likelihood of one recognising an opportunity to carry out the intention. Thus, when the intention can be successfully completed (i.e. in the presence of the right cues) the intention suddenly “pops” back into one’s mind (see Freud, 1901/1960). Similarly, in thought suppression research, suppression of a thought has also been shown to enhance the activation level of the suppressed thought and has been linked to the spontaneous “popping” back into mind of the previously suppressed thought (Muris, & Merckelbach, 1991, cited in Rassin et al., 2000; Trinder, & Salkovskis, 1994). It is therefore not difficult to see how theoretically the enhanced accessibility and intrusion of a suppressed thought might represent a simple method of enhancing prospective memory, by suppressing an intention during the retention interval.

Suppression may enhance prospective memory through two related routes. Firstly, as mentioned above, suppression has been shown to enhance the activation level of the formerly suppressed concept. This increased activation of the suppressed construct will make it more likely to intrude on consciousness, and these intrusions can be construed as rehearsal opportunities for a prospective memory task. In addition, the heightened activation will also increase the likelihood with which suppressed constructs will be noticed if they occur in the surrounding environment as prospective memory target events (cf. Higgins, 1989).

In order to test the effectiveness of this simple technique on prospective remembering Erskine and Kvavilashvili (2000) combined the two most common paradigms within the

thought suppression and prospective memory research. Thus, participants were given standard prospective memory instructions to remember to press the space bar every time they saw the word “white bear” in the context of a later sentence verification task. Next, in order to provide a delay between the encoding of these instructions and their execution, the first stage of the classical thought suppression paradigm was employed. Specifically half of the participants were given instructions to suppress a certain thought during a five minute period of verbalisation (i.e. thinking aloud). The other half of the participants was required to express this thought (i.e. actively rehearse) during a five minute period. Within each of these groups, half of the participants were manipulating (suppressing or expressing) the prospective memory target “white bear” and half were manipulating an irrelevant target “brown sugar”. After this period all participants were introduced to the sentence verification task with no mention of the prospective memory component. There were 4 prospective memory targets (white bears) embedded in the sentence verification task. The dependent variable was a number of times participants remembered to press the space bar when seeing the prospective memory target of any animal word.

The results of this experiment showed that prior suppression of prospective memory target did not result in enhanced prospective memory performance in comparison to a group that was suppressing the unrelated target. However, somewhat counter-intuitively even conscious thinking about the prospective memory target in expression condition did not result in enhanced performance relative to a condition in which participants were expressing thoughts about completely unrelated target. This failure of even overt rehearsal to enhance prospective memory suggests that the results may not reflect a failure of thought suppression, but may reflect the fact that perhaps suppression or expression of the prospective memory target only is simply not sufficient to result in enhanced prospective memory. For example, Guynn et al. (1998) reported similar results in their study which specifically focused on the effects of rehearsal (i.e. active expression) on prospective memory performance. In their study they demonstrated that target only reminders during the retention interval did not serve to enhance prospective memory performance. However, they did show that thinking about the whole intention,

i.e. the prospective memory target as well as the associated action did enhance prospective memory performance. Guynn et al. (1998) therefore suggest that one needs to activate the link between the prospective memory target and the associated action in order to benefit from potential effects of rehearsal on prospective memory performance.

If Guynn et al.'s (1998) suggestions are valid then one needs to examine whether suppressing a whole intention (i.e. a prospective memory target and associated action) during the retention interval could subsequently enhance prospective memory performance. Accordingly, Chapter 11 describes an experiment where people formulated an intention (to remember to press the space bar whenever they saw an animal word in a computerised word association task) and then either suppressed or expressed this intention or an irrelevant intention (to eat later on) during the retention interval. If maintaining the intention in consciousness is helpful then the group expressing the relevant intention should show better prospective memory performance than the group expressing or suppressing an irrelevant intention. In addition, if thought suppression raises the constructs activation levels to beyond that of conscious thought expression then the group suppressing the relevant intention should demonstrate the best memory performance.

VII. Summary of Review

As this review has shown thought suppression is intrinsically related to the concept of intention and volitional behaviour. This has been largely ignored in previous research as usually the focus has been on suppressing or expressing a discreet simple target thought (e.g. white bear). In this thesis, thought suppression research is expanded by examining the effects of suppressing or expressing one's intentions and how this may affect one's perception of their own conscious will and prospective memory (remembering one's future intentions).

VII. Empirical Studies

The aim of the experiments that will now be reported was to delineate how mental control processes operate and how individual differences between people act to alter these processes. The experiments looked at mechanisms underlying the rebound effect, individual differences in both conscious and unconscious mental control strategies, how the perception of causality for one's own actions is affected by the suppression / expression of one's intentions, and finally, how mental control impacts on the ability to enact intentions. In addition, methods of indexing the rebound effect (the original method versus the modified method) were directly contrasted in order to assess their relative merits.

The first three studies mark a direct effort to try and design a series of studies to answer some of the unresolved questions outlined above, whilst taking into account the methodological inadequacies of previous research. The first study (Chapter 3) attempted to replicate the original rebound effect after a time delay using two neutral words as the target thoughts. In addition, several individual difference variables were collected in order to see if any of them mediated the rebound effect. Of particular interest were State vs. Action orientation and fluid intelligence. It was hypothesised that perhaps only people with high IQ would display the rebound effect as suggested by Rutledge et al. (1996) or that only State-oriented individuals would display the effect as predicted by our intentional model of the rebound effect (see page 43).

The second study (Chapter 4) used the same data obtained from participants in Study 1 but addressed a different set of research questions. In particular, this study examined the relationship if any, between a wide variety of individual difference variables and one's performance on both a suppression and expression task as measured by the number of buzzer presses made by participants in period 1 in Study 1. If a person is a good suppressor they should report a low number of buzzer presses during suppression relative to other participants who are also suppressing. In other words, the study sought to

determine which individual differences account for whether a person is a good or poor suppressor or expresser. It also sought to determine the relationship between expressive and suppressive forms of mental control.

Study 3 (Chapter 5) attempted to replicate the findings from Studies 1 and 2 by re-testing the same sample of participants after a one week delay. All participants who completed Study 1 were asked to return to the laboratory one week later to take part in Study 3. In Study 3 those participants who had previously suppressed their thoughts in Study 1 had to now express a different thought and participants who had previously expressed a thought were now asked to suppress a different thought. Apart from attempting to replicate findings from Study 1 (and Study 2) this methodology allowed us to examine the relationship between suppressive and expressive forms of mental control within the same participants across week 1 and week 2 of testing.

Study 4 (Chapter 6) attempted to move away from the problems associated with self-report data by examining the rebound effect with implicit measures (reaction time). The activation level of previously expressed or suppressed thoughts was examined via reaction time to recognise the target as a word or non-word in a Lexical Decision Task. This Study examined the construct accessibility in the crucial period after suppression or expression has been discontinued, i.e. the period in which the rebound effect is assumed to occur. Previous work in this area (Wegner & Erber 1992) examined construct activation during active suppression and not during the post-suppression period.

Study 5 (Chapter 7) examined a sample of 97 young adults on a wide variety of individual difference and ability measures and attempted to relate these to their self reported use of thought suppression in everyday life as assessed by the White Bear Suppression Inventory and the Thought Control Questionnaire. Since these two questionnaires are both assumed to measure thought suppression in everyday life the relationship between the scores on these questionnaires was also examined.

Study 6 (Chapter 8) was a replication of study 5 using a sample of 64 older community dwelling adults aged over 65. This study also provided a unique opportunity to examine the psychological well-being in older adults by comparing the young and the old adult samples on their mean scores on a wide variety of individual difference variables, including such measures of psychopathology as anxiety, depression and neuroticism.

Study 7 (Chapter 9) examined the same data collected in Studies 5 and 6 but divided the two samples into repressors and non-repressors on the basis of a method developed by Weinberger et al. (1979). The prevalence of repression in both samples was then directly compared. In addition, the relationship of repression and the tendency to suppress thoughts in everyday life as measured by the WBSI was also examined.

Study 8 (Chapter 10) was designed to extend the thought suppression research by examining the effect of suppressing / expressing one's intentions on one's perceptions of their own will in carrying out simple intended activities. The main idea behind this study was that actions carried out whilst suppressing thoughts about the action should, as a result, feel less willed and more as if they just occurred. In contrast, actions carried out whilst thinking of the action itself should feel more willed and intentional.

Study 9 (Chapter 11) was designed to examine whether prospective memory performance could be improved by suppressing or expressing relevant intention during the retention interval relative to the suppression or expression of a completely unrelated intention.

TABLE 1.4 - CHAPTER TITLES AND THE MAPPING BETWEEN EACH CHAPTER AND THE RESPECTIVE STUDY.

Chapter	Study	Title	N
1	Introduction	Current research on thought suppression and mental control: A review	
2	Method	Overview of the experimental method used in studies 1, 2 & 3	
3	Study 1	The rebound effect: Methods of assessment and individual differences	94
4	Study 2	The role of individual differences in suppression and expression performance in the laboratory	94
5	Study 3	Replication of Study 1 and assessing the rebound via a within subject design	84
6	Study 4	Assessing the rebound effect with an implicit method: Reaction times to previously suppressed and expressed targets in a lexical decision task	97
7	Study 5	Individual differences and the use of thought suppression in everyday life in a sample of young adults	97
8	Study 6	Individual differences and the use of thought suppression in everyday life in a sample of old adults	65
9	Study 7	Psychological well-being and repressive coping style in young and old adults	97 + 65
10	Study 8	The role of thought suppression / expression in the perception of intentionality of completed actions	24
11	Study 9	The role of thought suppression / expression in remembering one's future intentions	88
12	Discussion	General discussion	

CHAPTER TWO

Overview of the experimental method used in studies 1, 2 & 3

All the data for Studies 1, 2, 3, 4 and 5 outlined in the previous chapter were collected in one large-scale study that consisted of two 1-hour long sessions conducted on the same participants one week apart. In order to avoid any confusion with respect to the method and design used in this initial large-scale study this Chapter will provide a brief outline of the methods used in week 1 and week 2 of the study. This should provide a general framework that should facilitate the understanding of the method sections of each subsequent chapter.

I. Week 1

Participants were tested individually. After being introduced to the aims of the study and the tasks they would have to complete participants had some initial practice with a couple of the tasks they had to carry out later (i.e., lexical decision task and the think aloud task). This was followed by the thought verbalisation (think aloud) procedure used in thought suppression experiments. During period one half of the participants were asked to think aloud while trying to suppress any thoughts about the target word, and the other half was asked to try to deliberately express (think about) the target word. Half of the participants within each group were asked to suppress/express thoughts about a “chair” and the other half to suppress/express “ocean”. In addition, all participants had to press a buzzer every time they happened to think or mention aloud the target word. In Period 2 all participants had to deliberately express (think about) their period 1 target word irrespective of the condition (suppression vs. expression) they were in during Period 1 of the experiment.

However, the crucial difference between the present experiment and any other paradigm in thought suppression research was a 15-minute delay introduced between Period 1 and Period 2 of the thought suppression paradigm. During this delay participants completed a

Lexical Decision Task in this task participants had to rate whether the words that they were presented with were real words or non-words.

At the end of the experiment participants filled in several questionnaires in the order presented below:

1. **The Spielberger Trait and State anxiety inventory** (Spielberger et al., 1983). This questionnaire has two subscales measuring Trait and State anxiety respectively. Trait anxiety is conceptualised as a relatively stable individual difference in anxiety proneness, whereas state anxiety refers more to individual differences in reactions to currently experienced stimuli (See Appendix A for a copy of this questionnaire).

2. **The White Bear Suppression Inventory (WBSI)** – (Wegner & Zanakos, 1994). This 15 item questionnaire measures the propensity to use thought suppression in everyday life, and contains statements like “I have thoughts I cannot stop” or “ I always try to put problems out of mind”. Ratings are made on a five point scale ranging from strongly disagree to strongly agree (See appendix B for a copy of this questionnaire).

3. **The Marlowe Crowne Scale** – (Crowne & Marlowe, 1964). This questionnaire was designed to measure social desirability, or the tendency to avoid disapproval and seek approval. However, Crowne and Marlowe (1964) have suggested that this scale is more likely to measure affect inhibition, defensiveness and the protection of one’s self esteem. Many others have also suggested that the Marlowe Crowne scale indeed seems to assess the need to avoid social disapproval and protect one’s self esteem (Evans 1979). Therefore it is perhaps not surprising that the Marlowe Crowne scale, in conjunction with the Spielberger Trait Anxiety Inventory is used to assess a Repressive coping style (Weinberger et al 1979) (See appendix C for a copy of this questionnaire).

4. **The Thought Control Questionnaire (TCQ)**– (Wells & Davies, 1994). This questionnaire has 5 subscales designed to assess peoples’ tendency to use a variety of

thought suppression strategies in everyday life such as self punishment, re-appraisal, distraction, worrying, and social methods. A total TCQ score can be computed by summing the scores on the individual subscales. Higher scores indicate a greater variety of mental control strategies being used (See appendix D for a copy of this questionnaire).

5. The Eysenck Personality Questionnaire Revised version (EPQ-R) – (Eysenck, Eysenck, & Barrett, 1985). This scale has four sub scales each containing 12 items, measuring the personality dimensions of introversion / extraversion, neuroticism, psychoticism and also includes a lie scale (See appendix E for a copy of this questionnaire).

6. The Beck Depression Inventory – (Beck, Rush, Shaw, & Emery, 1979) This scale measures a person's level of depression. The person reads a series of statements and is asked to circle any they feel apply to them (e.g. "I feel discouraged about the future" or, "I don't feel disappointed in myself") (See appendix F for a copy of this questionnaire).

7. The Need For Cognition Scale – (Cacioppo & Petty, 1982) The need for cognition scale assesses the extent to which people report liking to engage in thinking. It contains items like "I tend to set goals that can be accomplished only by expending considerable mental effort". Answers are made on a 9 point scale ranging from very strongly disagree to very strongly agree (See appendix G for a copy of this questionnaire).

8. The State / Action Orientation Questionnaire – (Kuhl, 1993). Assesses the global personality attributes of state orientation and action orientation. It comprises three separate subscales (a) Action orientation subsequent to failure vs. preoccupation (AOF), (b) Prospective and decision-related action orientation vs. hesitation (AOD), (c) Action orientation during (successful) performance of activities (intrinsic orientation) vs. volatility (APO). Each of these subscales contains 12 items which describe particular life situations. For each item there are two answers, one of which represents state orientation and one which is indicative of action orientation. An example of an item from the AOF subscale is: When I have lost something that is very valuable to me and I can't find it

anywhere: (A) I have a hard time concentrating on something else, (B) I put it out of my mind after a little while. The three subscales assess different aspects of state / action orientation and therefore an overall score is not created (See appendix H for a copy of this questionnaire).

II. Week 2

After exactly one week participants returned for their second one hour experimental session. Once again all participants were tested individually. After being reminded of the aims of the study, it was explained to participants that the tasks and procedures for week 2 would be very similar to the first week, albeit with different stimuli. Thus, participants had some initial practice with a couple of tasks they had to carry out later (i.e., lexical decision task and the think aloud task).

As in week 1, this was followed by the usual procedure used in thought suppression experiments. Half of the participants were asked to think aloud while trying to suppress any thoughts about the target word, and the other half was asked to try to deliberately express (think about) the target word. Additionally in order to systematically evaluate the relationship between suppressive and expressive forms of mental control within the same participants, those participants who had been asked to suppress thoughts in period 1 of week 1 were now asked to express their thoughts. Those who had been asked to express thoughts in period 1 of week 1 were now asked to suppress their thoughts. In week 2 the targets chosen for suppression or expression were changed to Eagle and Carpet.

Thus, half of the participants within each group were asked to suppress/express a thought about “Eagle” and the other half about “Carpet”. In addition, all participants had to press a buzzer every time they happened to think or mention aloud the target word.

In Period 2 all participants had to deliberately express (think about) the target word irrespective of the condition (suppression vs. expression) they were in during Period 1 of the experiment. However, as on week 1, participants had to undertake a Lexical Decision

Task between the two verbalisation periods. In this task participants had to rate words half of which were real words and half of which were non-words.

After this part of the experiment had been completed all participants were asked to complete the short form (Scale 2 form A) of the Cattell and Cattell Culture Fair Intelligence Test (1960).

Finally all participants filled in several questionnaires in the order presented below:

1. The Linking Questionnaire – (McIntosh & Martin, 1992) assesses the extent to which an individual views goal attainment as central to their overall happiness. It uses a forced choice format and asks participants questions about the way in which specific occurrences would affect their happiness. For example one question was “Do you get more happiness out of pursuing your goals or as a result of reaching them?” the two possible responses to this item were:

- a. I get more happiness out of striving for my goals; reaching them is just icing on the cake.
- b. My happiness comes primarily from reaching my goal.

Here response (a) would represent a non-linking perspective. Option (b) would represent a linking perspective where one views the outcome of being happy on being contingent on attaining ones goals (See appendix I for a copy of this questionnaire).

2. The Thought Action Fusion Questionnaire – (Shafran, Thordarson, & Rachman, 1996) measures a participant’s tendency to over evaluate the significance and consequences of intrusive thought. This scale has three subscales which all assess slightly different cognitive biases. For the purposes of this thesis only the first subscale will be used, this is known as TAF moral and includes items like “Thinking of making an extremely critical remark to a friend is almost as unacceptable to me as actually saying it”. This sub-scale measures the extent to which as person views thinking about an act to be as bad as actually engaging in that act (See appendix J for a copy of this questionnaire).

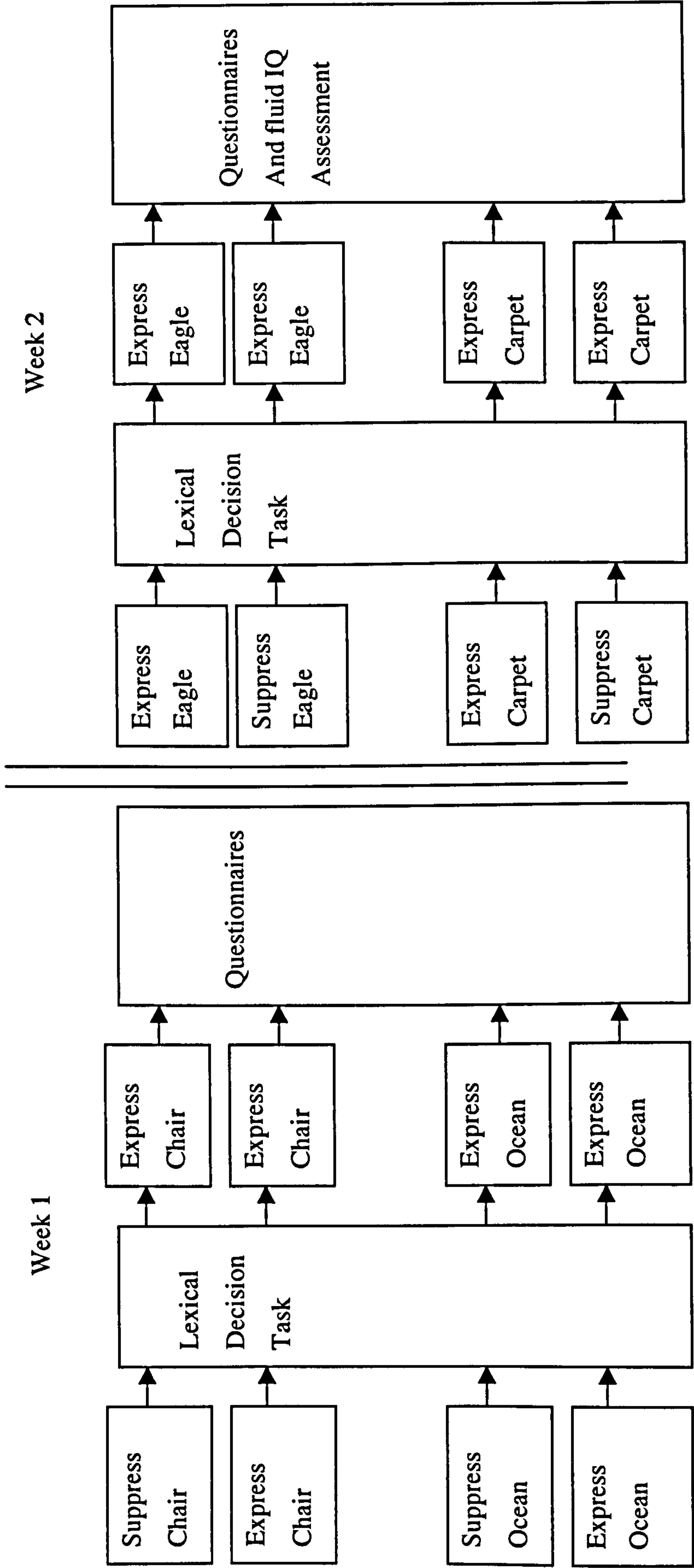
3. Ruminative Inventory (McIntosh & Martin, 1992). This inventory was designed to measure a person's tendency to ruminate in everyday life. Higher scores would indicate a greater tendency towards rumination. It is a unidimensional scale with no subscales. It contains items such as "When I have a problem, I tend to think about it a lot of the time". Answers are made on a 7-point scale ranging from "does not describe me well" to "describes me well" (See appendix K for a copy of this questionnaire).

4. Fordyce Unhappiness Rating (Fordyce, 1988). This scale asks participants to rate the percentage of time in everyday life that they feel happy, sad and neutral with the constraint that the percentages must add up to 100% (See appendix L for a copy of this questionnaire).

5. The Schizotypal Personality Questionnaire SPQ (Raine, 1991). This 74 item scale was designed to assess schizotypal personality as defined by DSM III-R. It comprises 9 subscales assessing various schizotypal traits, such as; ideas of reference, excessive social anxiety, unusual perceptual experiences, odd beliefs or magical thinking, odd or eccentric behaviour, absence of close friends, odd speech, constricted affect and suspiciousness. An overall SPQ score is computed by summing the subscale values. The scale contains items like "I tend to avoid eye contact when conversing with others" responses are either yes or no (See appendix M for a copy of this questionnaire).

Figure 2.1 shows a diagrammatic representation of the whole experimental design over both weeks.

FIGURE 2.1 – THE EXPERIMENTAL METHOD FOR STUDIES 1 TO 5 IS SHOWN BELOW. WEEK 2 DATA COLLECTION FOLLOWED WEEK 1 DATA COLLECTION AFTER EXACTLY 7 DAYS.



CHAPTER THREE

The rebound effect: Methods of assessment and individual differences

Many studies have demonstrated the rebound effect (Roemer & Borkovec, 1994; Salkovskis & Campbell, 1994; Wegner et al., 1987). However, others using similar methods have failed to replicate it (LoSchiavo & Yurak, 1995; Merckelbach, Muris, Van den Hout & de Jong, 1991). Possible explanations for the failure to replicate the rebound effect in these studies have centred on issues of methodology, types of thoughts used and individual differences.

Study 1 aimed to resolve some of these controversies by introducing several new modifications into the classic “white bear “ paradigm. One innovation is the introduction of a time delay between two periods of verbalisation. The second innovation is to examine systematically the effects of individual differences in personality and ability on people’s experience of the rebound effects. Fluid intelligence, state vs. action orientation, the tendency to suppress thoughts in everyday life (as measured by the WBSI), rumination and Trait Anxiety were all evaluated in this study. Type of target was also investigated using two neutral targets, one with, and one without, environmental cues. Finally the current study was also designed so that the two methods of indexing the rebound effect, the original method (Wegner et al., 1987) and the modified method could be compared and contrasted within the same study.

(1) Time Delay

Virtually all previous investigations of the rebound effect have examined the rebound phenomenon immediately after a period of suppression. Participants suppress a thought and then, in a subsequent expression period (which immediately follows the suppression period), they demonstrate a higher frequency of thought when compared to a group that expresses the same thought in period 2 after expression. The current study aimed to replicate the original rebound effect with a delay period of 15 minutes between the initial period of suppression/expression and later expression. If the rebound effect can be shown to occur after a delay this would increase both the phenomenon’s robustness and its

relevance to everyday thought suppression which is known to occur over prolonged periods of time.

However, there are reasons to suggest the rebound effect may not occur after such a delay. According to Wegner (1994) the mechanism underlying the rebound effect is one of enhanced activation of the previously suppressed thought. Yet, Higgins (1989) has repeatedly demonstrated that over time the activation accrued by constructs (mainly as a function of earlier priming) decays. For example, the effects of primes that are seen with short delays often disappear at longer intervals (Bargh & Chartrand, 2000). Moreover, there is currently only one study (Hodson & Dovidio, 2001) that has investigated the rebound effect and included a delay between suppression / expression (period 1) and final expression (period 2). The findings demonstrated that suppressed stereotypic information was remembered better than non-stereotypic control words with no delay (a rebound effect), but there was no rebound effect after a 10-minute delay. It should be pointed out, however, that in this study the rebound effect was not measured by a final expression period but by performance on a memory recall task. Therefore, the question about the time delay between initial thought suppression and the subsequent rebound remains open.

(2) Individual Differences

The current study also aimed to examine the effects of individual differences in personality and ability on one's propensity to experience the rebound effect. In line with this aim, several personality and ability measures were collected in order to see if any of these variables mediated the rebound effect. All of the individual difference variables examined were chosen on the basis of their theoretical relation to mental control and were taken from the thought suppression literature. The main variables of interest were: Fluid intelligence, state vs. action orientation, scores on the WBSI, Trait Anxiety and Rumination.

One of the factors that has been reported to have an impact on whether the rebound effect is found is fluid intelligence (Rutledge et al., 1993, 1996; Brewin & Beaton, 2002).

Rutledge et al. (1993) suggest that participants of higher ability (assessed in this case by

college entrance exam scores) may be more likely to display the rebound effect. In addition, Rutledge et al. (1996) found significant positive correlations between thought rebound and a measure of crystallized intelligence (Horn, 1975). The current study will attempt to replicate the traditional rebound effect whilst taking measures of fluid intelligence and observing how these relate to a person's propensity to experience the rebound effect.

Another variable of high theoretical interest was the construct of state vs. action orientation proposed by Kuhl and Beckman (1994). This variable has not previously been examined in the thought suppression research. However, there are good theoretical reasons to believe it may have a large impact on when and where the rebound effects are seen. Thus, Goschke and Kuhl (1993) have shown that intentions have a privileged status in memory. When an intention is formulated this information is stored at a heightened activation level. In addition, Kuhl (1994) has shown that this Intention Superiority Effect is stronger in certain individuals, with a particular personality style known as state orientation (measured via a self report questionnaire). According to the alternative explanation of the rebound effect proposed in this thesis (see page 43 of Chapter 1), the rebound effects may occur because a decision to suppress results in the formulation of an intention not to think about something and this fact alone may result in increased accessibility of the to be avoided thought.

Kuhl and Beckman (1994) discuss the theory behind their twofold classification system (state vs. action orientation) and link it very closely with volition by arguing that state-orientated individuals show reduced volitional abilities to plan, initiate and complete intended activities. What is interesting from the present perspective is the reason behind this reduced volitional capacity. State-orientated people are reported to have intrusive and perseverating thoughts which fill one's cognitive capacity, these thoughts may perseverate even when a goal has been fulfilled (Kuhl, 1994). In addition, state orientated individuals show a tendency to over-control their thoughts. Therefore, it may be that it is the state orientated individuals who employ intentional thought suppression on mass. In contrast, action orientated people are not prone to intrusive and perseverating

thoughts as they deactivate intentions after they are formulated. Thus, after formulating an intention state oriented people will continue to keep the intention active in working memory and think about it often, whereas action oriented people will deactivate the intention and only begin to think about it when the time for its completion is close.

Therefore, Kuhl's Action Control Scale was used to measure state vs. action orientation as a means of assessing its impact on the rebound effect. It must be noted, however, that there are three separate subscales which assess different aspects of state vs. action orientation. It was decided that the best subscale to use was the preoccupation subscale as this most closely approximated the construct of interest in the present studies, thought suppression and subsequent intrusion. Kuhl and Beckman (1994) refer to this subscale as AOF (action orientation subsequent to failure vs. preoccupation). Using this sub scale it was possible to test the idea that it is indeed the state orientated participants who are most likely to demonstrate rebound effects after intentional thought suppression.

A further variable that may be related to the rebound effect is the tendency to use thought suppression in everyday life as measured by the White Bear Suppression Inventory (Wegner & Zanakos, 1994). As pointed out in the literature review (Chapter 1) research using this questionnaire has been conducted largely independently from laboratory research on thought suppression. There is to date only one study that has examined the relationship between participants' performance in laboratory tasks of thought suppression and expression and their scores on the WBSI (Muris, Mercklebach and Horselenberg, 1996). The results of this study showed that participants with high scores on the WBSI reported significantly more target thoughts (i.e. intrusions) in the laboratory task of thought suppression during period 1 than participants who scored low on the WBSI. However, the problem with this study is that it did not find a rebound effect after intentional thought suppression and therefore could not assess the impact of WBSI scores on the rebound effect. It is possible the failure to find a rebound in this study occurred because they used participants' own intrusive thoughts and not neutral thoughts. In addition, the comparison group for thought suppression was a "think anything" group, not an expression group (see Figure 1.3, chapter 1, page 27 depicting this paradigm). The

current study will evaluate the effects of WBSI scores on the rebound effect using neutral thoughts and an expression group as a control. At present this seems to be the method most likely to result in the rebound effect. Two predictions can be made. Firstly, one might expect that high scorers on the WBSI would have more practice with thought suppression and may well have developed better strategies for successfully suppressing thoughts. As a result they may not display a rebound effect. However, if one regards high WBSI scorers as people who are particularly prone to intrusive thoughts and use thought suppression as a means of dealing with these intrusions then an alternative prediction would be that high WBSI scorers would demonstrate a greater rebound effect.

Another variable of interest in relation to its effects on the rebound effect is trait anxiety. Anxiety has been linked with thought suppression numerous times in the literature and therefore warrants more indepth investigation (Harvey & Bryant, 1999; Purdon, 1999; Rassin et al., 2000; Wenzlaff & Wegner, 2000). The study of Harvey and Bryant (1999) deserves further mention as they systematically investigated the impact of anxiety on the rebound effect. Specifically, after having watched either a neutral or a distressing film, half of the participants were asked to suppress thoughts of the film whereas the other half were asked to monitor their thoughts for film related intrusions without suppression (period 1). During a later thought verbalisation period (period 2) participants were then asked to think about anything whilst monitoring their thoughts for film related intrusions. Results indicated that there was an anxiety by suppression interaction, such that high anxiety participants demonstrated no rebound effect but low anxiety participants demonstrated a clear rebound.

A final variable of interest was rumination. The current study employed a rumination inventory developed by McIntosh and Martin (1992) to measure one's tendency to ruminate in everyday life. Rumination has been theoretically linked to thought suppression several times (Martin & Tesser, 1996, Erber & Wegner, 1996), but any relations between thought suppression and rumination or any impact of rumination on the rebound effect awaits empirical verification. Because the use of thought suppression being heavily linked to the tendency to ruminate in the thought suppression literature, the

specific prediction made here is that people with a tendency to ruminate will be more likely to experience the rebound effect.

(3) Type of Thought

The effects of the type of thought on thought suppression was examined by having two discrete thoughts to suppress (although as stated earlier both were neutral thoughts and not personally relevant). One would refer to an object present in the experimental room and another to an object that is not in the room. In addition to increasing the generality of findings this manipulation also allowed for an examination of the impact of subtle environmental cues in thought suppression. This is an important question as in everyday life one may often try to suppress a thought which has many visual cues in the environment prompting its return. For example trying to suppress thoughts of death when in a graveyard may be harder than suppressing thoughts of death when in the supermarket. To our knowledge no previous study has investigated this important question.

(4) Methods of Indexing the Rebound Effect

Finally, the current study also systematically examined two different methods of assessing the rebound effect to see whether this might explain some of the controversy reported in the literature. The first method, which is referred to as the “original method” throughout the thesis, was used by Wegner and his colleagues (Wegner et al., 1987). This method assesses the rebound effect by comparing an expression group after prior suppression (in period 2) to a group which expresses in period 1. The second method, which is referred to in this thesis as the “modified method”, compares two expression groups (in period 2), one after prior suppression and one after prior expression. (See Figures 1.1 and 1.2 on pages 25 and 26 of the introduction for a diagrammatic representation of these two assessment methods). The rationale for comparing these two methods of assessing the rebound effect concerns the finding in previous research (Erskine and Kvavilashvili, 2002) that having a comparison group that expresses thoughts in period 1 and then again expresses thoughts in period 2 can result in an increase in expressed thoughts during the second expression period. This increase in thoughts from

period 1 to period 2 most probably represents the effects of practice or possibly priming. Crucially if period 2 expression group means are being affected by the prior expression during period 1 then practice and expression are confounded. The overall net effect of this rise is to make it harder to demonstrate a rebound effect. Therefore the current study sought to investigate the two methods of assessing the rebound effect within the same study.

In summary, this study examines whether the rebound effect is still found with a delay between the two thought verbalisation periods; whether personality and ability influence the probability of experiencing the rebound effect and which method of assessing the rebound effect is most likely to produce the effect.

In order to investigate these issues participants took part in an hour long experimental session in which they were asked to either suppress or express a certain target thought during period 1. To evaluate the effect of the type of target on the rebound effect half of the participants received a target word for suppression or expression depicting an object that was in the room (chair) and the other half received a target depicting an object that was not present in the room (ocean). After period 1 verbalisation participants completed a lexical decision task to provide the 15-minute delay between verbalisation periods. After the lexical decision task participants then completed the period 2 verbalisation where all participants were asked to express the thought they had manipulated (suppressed or expressed) in period 1. Finally, questionnaire measures of personality and ability were completed by all participants.

II. Method

(1) Participants

94 University of Hertfordshire undergraduates (74 Females and 20 Males) volunteered to take part in return for course credit. The age range was from 18 to 60 years. The mean age was 23 years.

(2) Design

The experimental design was a 2 group (suppression vs. expression) x 2 target thought (chair vs. ocean) between subjects design.

(3) Materials and Apparatus

Every time participants thought about or mentioned the target word they had to press a buzzer. The buzzer was a small box 6 cm x 6cm x 4cm which had been stuck to the underside of the experimental table so it was not visible to participants, it made an audible noise when pressed. A standard tape recorder was used to record participant's thought verbalisations. The filler task (15 minute task between period 1 and period 2 verbalisations) consisted of a computerised Lexical Decision Task written using Superlab.

The two target words for suppression and expression were taken from Postman and Keppel (1970) (the English sample). Targets were chosen to all have 5 or 6 letters and to be totally semantically unrelated to each other. They were also chosen to be of similar frequency of use in the English language, based on the norms provided by Toggia and Battig (1978).

(4) Procedure

All participants were tested individually. On their arrival at the laboratory participants were informed that they had to come back for a second experimental session exactly one week after the first session. Participants were informed that the aim of the study was to investigate how certain personality variables may be related to their ability to control their thoughts. It was explained that thought control involves both thought suppression (the active suppression of thoughts one does not want to have) and thought expression (the focusing and maintaining in consciousness of desired contents). It was also explained that in addition to suppressing and expressing thoughts in several think aloud periods and filling in various questionnaires they would be asked to do a computerised task measuring their linguistic ability to read and process words (i.e., the Lexical Decision Task).

After signing a consent form the experimenter introduced the Lexical Decision Task. Participants were informed that their task was to decide as quickly and as accurately as possible whether the letter string appearing on screen is a word or a non-word. If the stimulus was a word they were asked to press the A key, if it was a non-word to press they B key (using the specially adapted keyboards). If it was clear that participants understood the instructions they were asked to complete a short practice task. This practice task consisted of 5 nonwords and 5 words which were not to appear in the later task.

After the practice task participants were informed that the task they had just practiced would come again later in the course of the experiment. Meanwhile, however, they had to complete a couple of tasks involving thinking aloud. Participants were informed that for the next three minutes they would be left alone in the experimental room and their task was to verbalise aloud into the tape recorder all the thoughts that came to mind. They could think about anything and were not required to explain or justify the thoughts at all. If the participant understood the instructions the tape recorder was started and the experimenter left the room.

After exactly 3 minutes the experimenter returned and asked each participant how they had found the task. If there were no reported problems the experimenter provided the following set of instructions. Half of the participants received suppression instructions and half expression instructions.

Suppression Instructions

“I would like you to continue verbalising your thoughts, but I would like you to try not to think about a chair (or ocean). Thus, your task is to verbalise all of your thoughts whilst trying to suppress any thoughts of a chair (or ocean). Every time you say, or have “chair” (or ocean) come to mind though, please, ring this buzzer.”

Expression Instructions

“I would like you to continue verbalising your thoughts, but I would like you to try and think about a chair (or ocean). Thus, your task is to verbalise all of your thoughts whilst trying to concentrate on thoughts of a chair (or ocean). Every time you say, or have “chair” (or ocean) come to mind though, please, ring this buzzer.”

The experimenter then started the tape recorder and left the room. After 5 minutes the experimenter returned and asked the participant to perform the lexical decision task which lasted for 15 minutes.

After the lexical decision task, it was explained to participants that there would be one more 5 minute verbalisation period. All participants were asked to express whichever construct they had manipulated (suppressed or expressed) during the previous 5 minute verbalisation period. Verbatim instruction were as follows :

“Now, once again I will leave the room and your task is to think aloud again for 5 minutes. This time, I would like you to try and think about a chair (ocean). Thus, your task is to verbalise all of your thoughts whilst trying to concentrate on thoughts of a chair (ocean). Every time you say, or have “chair” (ocean) come to mind though, please, ring this buzzer.”

After this final 5 minute thought verbalisation period the experimenter returned to the room and asked the participant to fill out the first set of questionnaires. Participants then completed questionnaires 1 – 9 (see Chapter 2 for a full description of these questionnaires in week 1). After these questionnaires had been completed participants were reminded to come back for a second experimental session one week later, and a time was set up. Additionally they were informed that a full debrief would be provided at the end of the second session.

III. Results

While thinking aloud participants had to press a buzzer every time they thought about or mentioned the to be suppressed or expressed construct. The taped thought verbalisations were coded for the number of buzzer presses. However, participants sometimes mentioned the target thought without buzzing, these were also counted as thoughts and added to the total number of buzzer presses.

Initial screening of the data revealed that the number of buzzes made by participants during expression or suppression were not normally distributed. Square root transformations were performed on the number of buzzes during periods 1 and 2 in an effort to normalise the data. After transformation, boxplots revealed only two remaining outliers. One of these was in the suppression condition and buzzed 31 times. The other was in the expression condition and buzzed 202 times. These participants were removed from the analyses. For the sake of clarity results are reported on untransformed means, but all inferential analyses were conducted using the transformed values. All analyses were conducted at 95% confidence level.

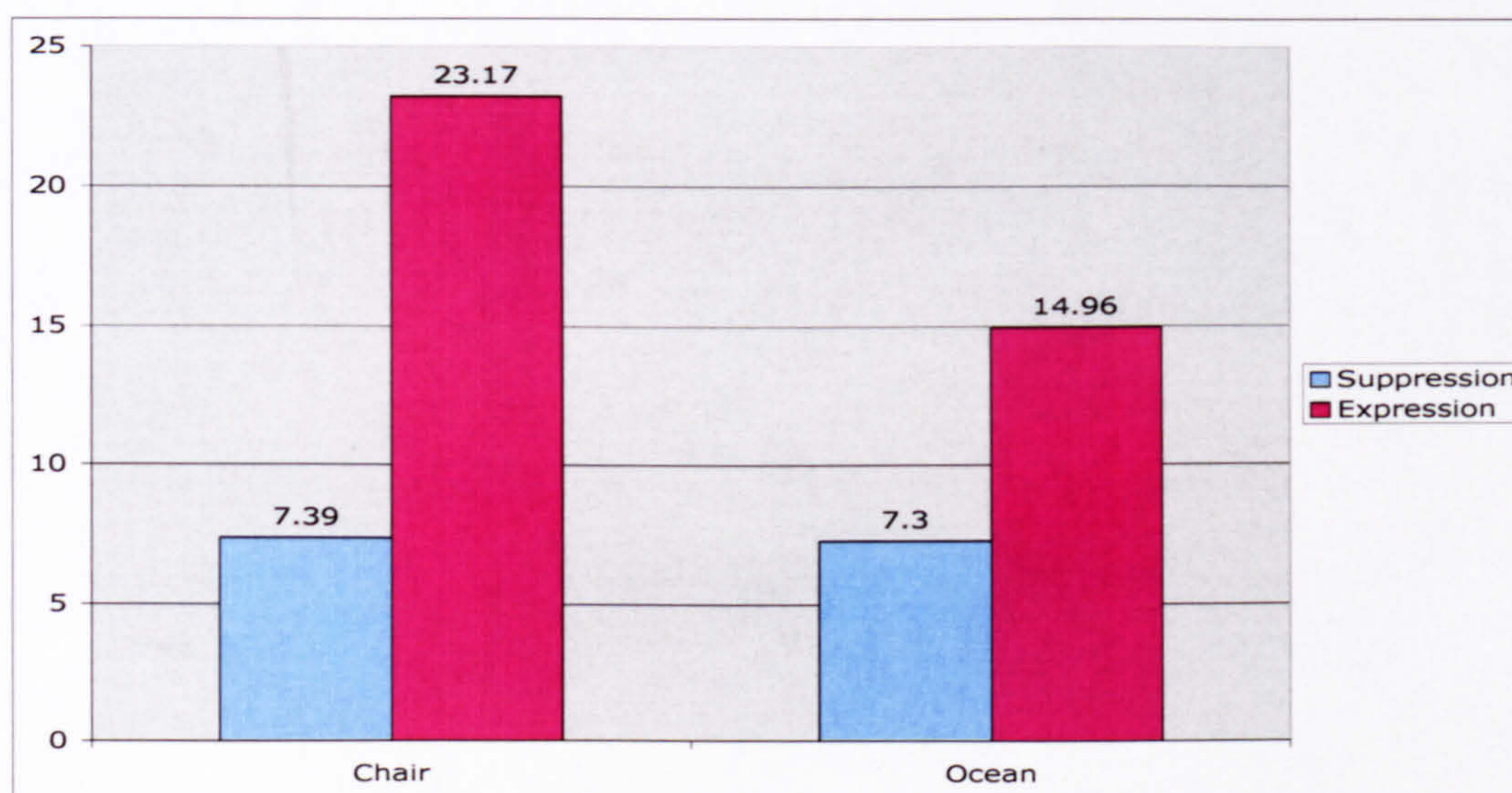
In this section the number of buzzer presses is examined first in period 1, in order to ascertain whether participants in suppression and expression conditions correctly followed the instructions. This is followed by the analysis of buzzer presses in period 2, in order to assess the occurrence of the rebound effect. The rebound effect is first examined using the modified method and then using the original method. Within each of these methods the role of individual difference variables is evaluated one at a time.

(1) Buzzer presses in period 1

The mean (square root transformed) buzzer presses in period 1 were entered into a 2 group (suppression vs. expression) by 2 target thought (chair vs. ocean) between subjects ANOVA. This analysis revealed a main effect of group $F(1, 88) = 43.39$, $p = .0001$, $\eta^2 = .33$. Participants in the expression group had a reliably higher number of buzzer presses ($M = 19.06$), than those in the suppression group ($M = 7.35$), as shown in

Figure 3.1. The main effect of target thought was marginally significant, $F(1,88) = 3.83, p=.05, \eta\text{-squared} = .04$. Participants manipulating chair had a higher number of thoughts ($M=15.28$) than participants manipulating ocean ($M=11.13$). The interaction was not significant $F(1,88) = 1.88, p= .17$.

FIGURE 3.1 - MEAN NUMBER OF BUZZER PRESSES AS A FUNCTION OF INSTRUCTION GROUP IN PERIOD 1 (EXPRESSION VS. SUPPRESSION) AND THE TARGET THOUGHT (CHAIR VS. OCEAN)



These results indicate that participants did follow the experimental instructions, those asked to express had a significantly higher number of thoughts than those asked to suppress. In addition, the rates of buzzing found in the current study are similar to rates reported in the thought suppression literature (Wegner et al., 1987).

(2) The Rebound Effect

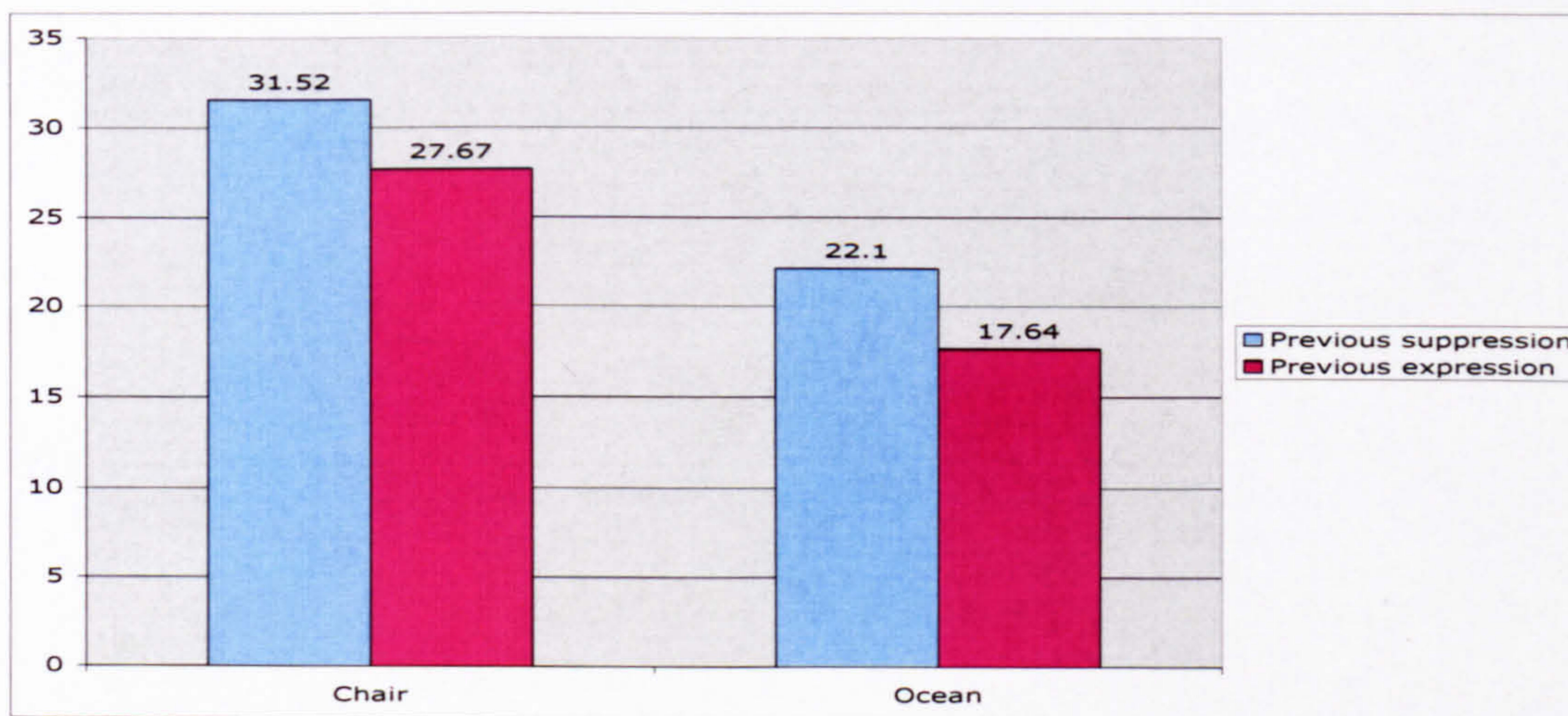
The next set of analyses were performed on buzzer presses in period 2 when all participants were expressing the construct they had previously been manipulating (suppressing or expressing). The rebound effect was assessed by using first the modified method and then the original method of assessing the rebound effect. In the modified method the rebound effect is assessed by comparing the number of buzzer presses in

period 2, when all participants are expressing thoughts, as a function of whether they suppressed or expressed in period 1 (between group design).

(3) The modified method of assessing the rebound effect

The mean (square root transformed) buzzer presses in period 2 were entered into a 2 group (period 1 suppression vs. expression) by 2 target thought (chair vs. ocean) between subjects ANOVA. Although the means are in the expected direction for the rebound effect, results revealed no significant effect of group $F(1,86) = 2.189, p = .14$ (see figure 3.2). There was, however, a main effect of target thought $F(1,86) = 8.41, p = .005, \eta^2 = .09$, with more buzzes for Chair ($M = 29.95$) than for Ocean ($M = 19.81$). There was no significant interaction $F < 1$. Thus, using the modified method of assessing the rebound did not result in a rebound effect in the present experiment where there was 15-minute delay between the two thought verbalisation periods.

FIGURE 3.2 - MEAN NUMBER OF BUZZER PASSES IN PERIOD 2 AS A FUNCTION OF PREVIOUS GROUP (EXPRESSION VS. SUPPRESSION) AND TARGET THOUGHT (CHAIR VS. OCEAN)

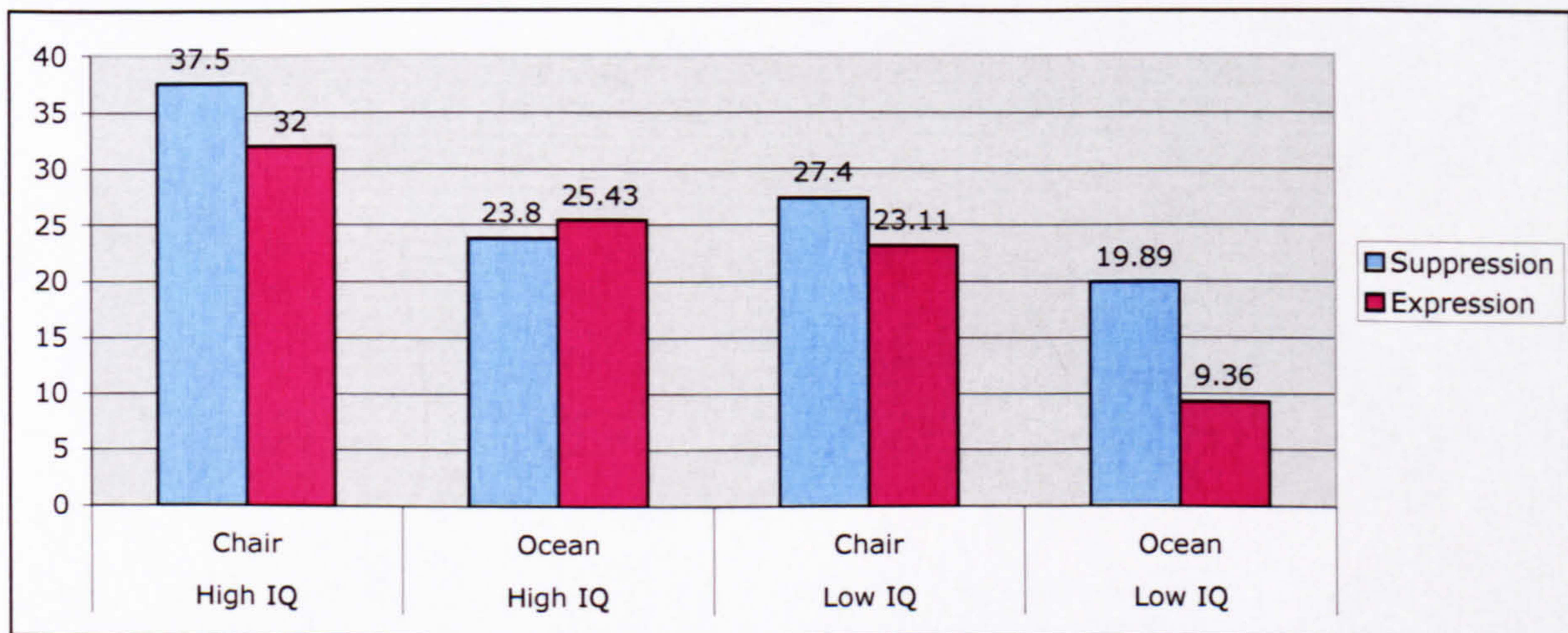


The next aim was to look at the effects of various personality and ability measures on the rebound effect using the same modified method of assessment.

(1) The role of fluid intelligence on the rebound effect

The effect of fluid intelligence on the rebound was examined by dichotomising the sample into high and low IQ participants (via a median split, median = 106) and then conducting the 2(group) by 2(target thought) ANOVAs for both samples on the number of buzzer presses in period 2. For low IQ participants there was no main effect of group $F(1,35) = 3.02$ $p = .082$, indicating that a rebound effect was not present. There was, however, a main effect of target thought $F(1,35) = 5.8$ $p = .02$, $\eta^2 = .14$. The presence of the object in the room seemed to help the low IQ group to express their thoughts about the object (mean buzzes for chair was 25.37, and for ocean 14.10). The interaction was not significant $F < 1$. In contrast, when the same 2 (group) x 2 (target thought) ANOVA was conducted on a group of participants with high IQ none of the main effects or interaction proved significant. (F was only greater than 1 for the main effect of target construct, but remained insignificant). Thus, dichotomising the sample into participants with high or low IQ did not reveal a rebound effect in any of these sub groups.

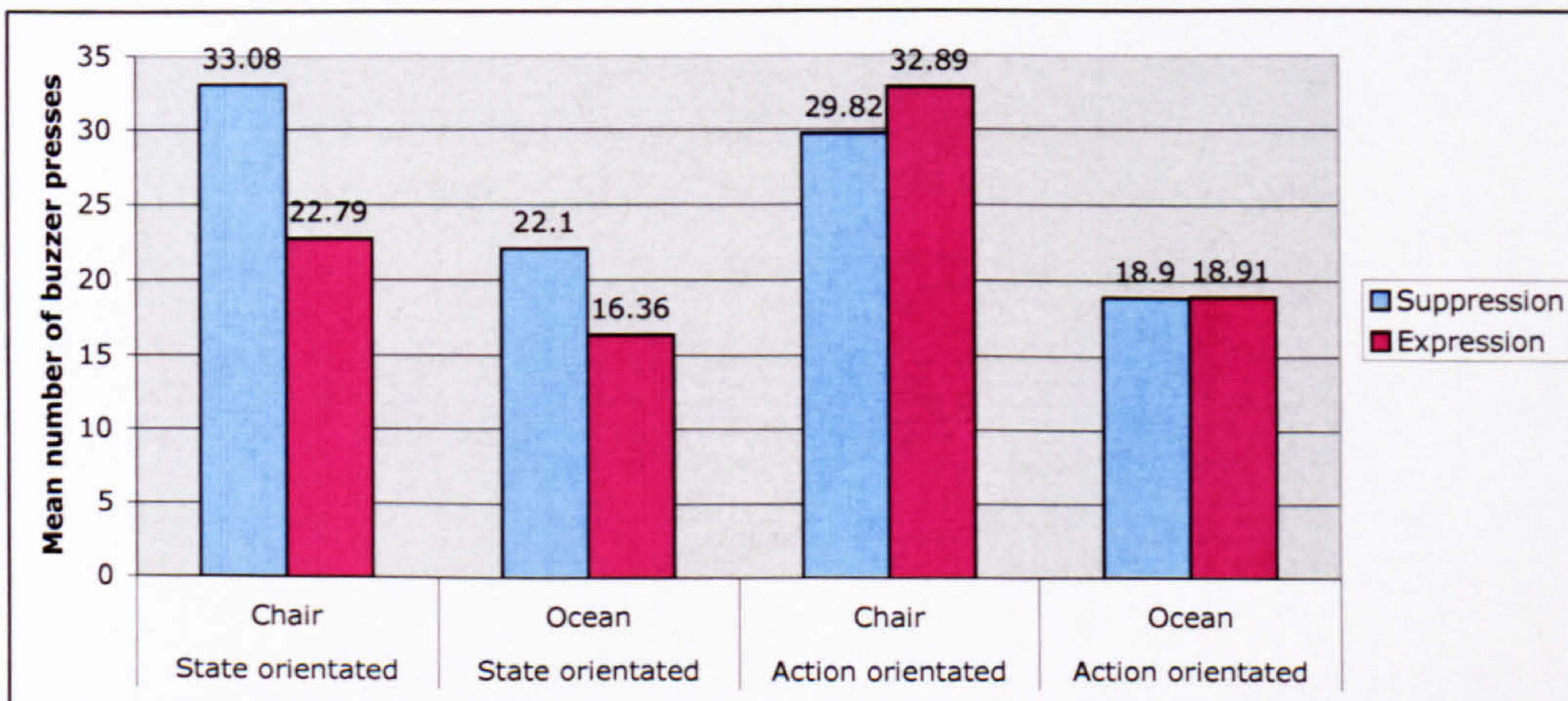
FIGURE 3.3 - THE MEAN NUMBER OF BETWEEN BUZZER PRESSING (PERIOD 2) IN HIGH AND LOW FLUID IQ PARTICIPANTS AS A FUNCTION OF GROUP (EXPRESSION VS. SUPPRESSION) AND TARGET THOUGHT (CHAIR VS. OCEAN).



(2) The role of state vs. action orientation on the rebound effect

Next, the sample was dichotomised according to state vs. action orientation (median split using the AOF subscale) and the 2 group (suppression vs. expression) by 2 target thought (chair vs. ocean) ANOVA was first conducted for the state oriented group. This analysis revealed a significant main effect of group $F(1,43) = 4.77, p=.03, \eta^2 = .10$. The mean number of buzzes in the former suppression group was significantly higher (27.59) than in the former expression group (19.57). There was also a main effect of target thought $F(1,43)=5.31, p=.03, \eta^2 = .11$. The target that was in the room (i.e. chair) was mentioned much more frequently ($M = 27.54$) than the target “ocean” that was not in the room ($M = 19.10$). The interaction was not significant ($F < 1$). Thus, state orientated participants demonstrated a clear rebound, something that was not significant when the whole sample was examined (see Figure 3.4). In contrast, when the same analysis was conducted in a group of action oriented participants no rebound effect was obtained ($F < 1$). The former suppression group did not buzz more frequently than the former expression group (means were 24.62 and 25.2 respectively). However, as in the state oriented group, there was a main effect of target thought $F(1,37)=4.17, p = .048, \eta^2 = .10$, (mean buzzes for chair was 31.20 and for ocean 18.90). There was no interaction $F < 1$. Figure 3.4 below shows the exact means for this comparison.

FIGURE 3.4 - THE MEAN NUMBER OF BUZZER PRESSES (PERIOD 2) AS A FUNCTION OF PERSONALITY (STATE VS. ACTION ORIENTATION), GROUP (SUPPRESSION VS. EXPRESSION) AND TARGET THOUGHT (CHAIR VS. OCEAN).



(3) The role of WBSI scores, anxiety and rumination on the rebound effect

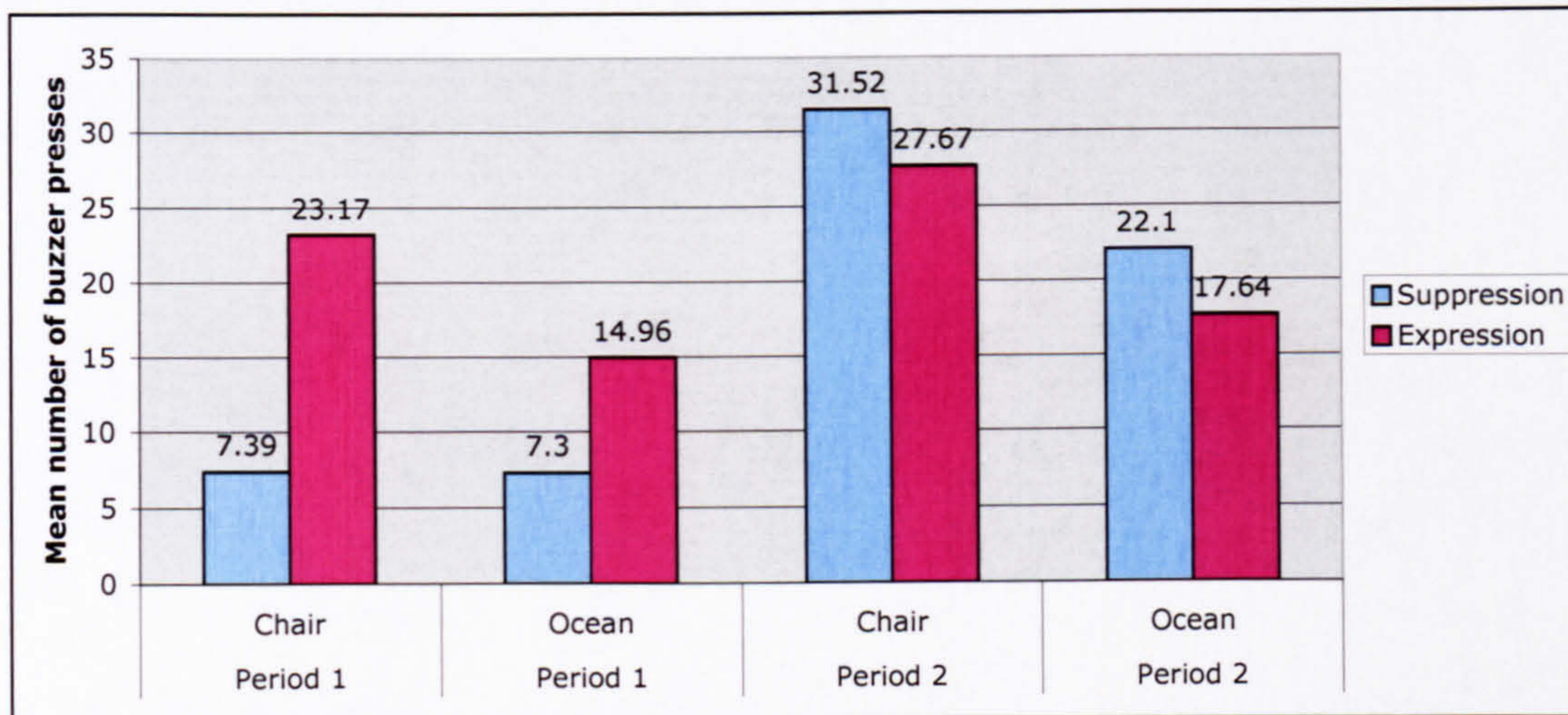
The next series of analyses examined the effects of participants' WBSI scores, anxiety scores and rumination scores on the rebound effect. For each of these variables the sample was first dichotomised into high and low scorers. After dichotomisation, the mean number of buzzer presses were entered into a 2 group (suppression vs. expression) by 2 target thought (chair vs. ocean) ANOVA separately for participants with high and low scores on each of the measures of interest. The results showed that participants' scores on the WBSI, anxiety inventory and rumination inventory had no impact on the propensity to experience the rebound effect (modified version).

In summary, when using the modified method of assessment no rebound effect was obtained in the whole sample. However, when the sample was dichotomised into state and action oriented groups a clear rebound effect occurred in state oriented participants but not in action oriented participants. None of the other personality or ability variables produced a similar effect.

(4) Original method of assessing the rebound effect.

The mean number of buzzer presses in period 1 and 2 as a function of group and target are presented in Figure 3.5 below. A careful examination of the means in this figure shows that there may be some methodological problems in the modified procedure for assessing the rebound effect. Thus, the mean number of thoughts during expression group in period 1 was 23.17 for the target word chair and 14.96 for the target word ocean. In period 2 when these period 1 expression participants are again asked to express, they think about chair 27.67 times and ocean 17.64 times. Thus, in both of the groups that expressed twice (chair and ocean) there is a rise in the number of reported thoughts from period 1 to period 2. This was supported by a 2 target (chair vs. ocean, between group) x 2 period (period 1 vs. period 2, repeated measures) mixed ANOVA, on expression group (period 1) only. Results indicated a main effect of period $F(1,44) = 5.1$ $p = .03$, eta-squared = .10, a main effect of targets $F(1,44) = 5.31$ $P = .026$, eta-squared = .11, and no interaction $F = 1.00$.

FIGURE 3.5 – THE MEAN NUMBER OF BUZZER PRESSES IN PERIOD 1 AND PERIOD 2 AS A FUNCTION OF TARGET THOUGHT (CHAIR VS. OCEAN).

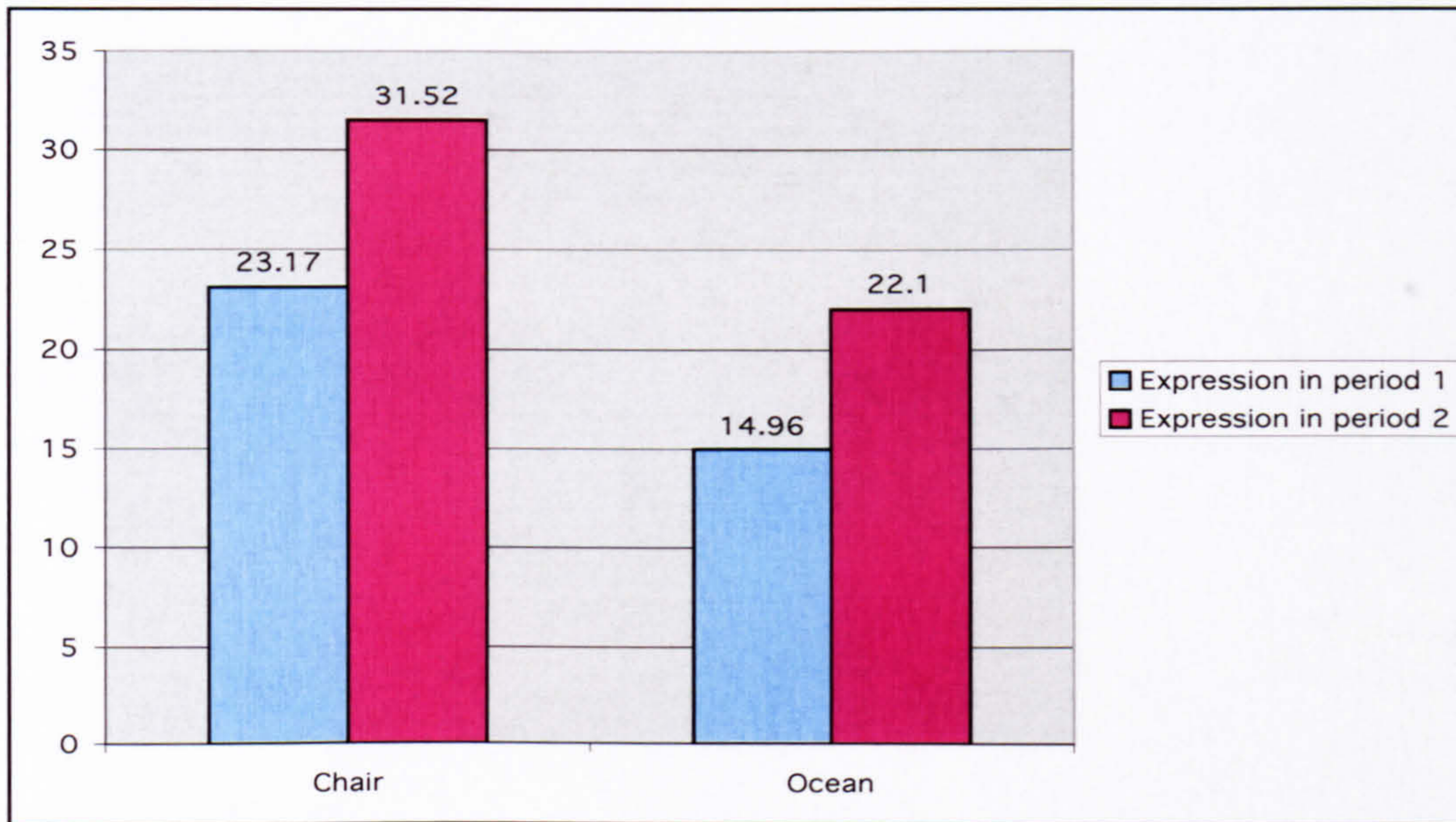


This rise in reported thought in the groups who express twice suggests that the original method of assessing the rebound (Wegner et al., 1987) may well represent a “cleaner” method as it avoids the practice effect in the expression group that inevitably diminishes the chances of obtaining the rebound effect with the modified method. Indeed, in the original method the rebound is assessed by comparing the buzzer presses in the expression group in period 1 with the buzzer presses of the suppression group in period 2. In this way neither group has had previous practice at expressing the construct.

In order to assess the rebound effect with the original method, the mean number of buzzer presses (square root transformed) were entered into a 2 group (expression in period 1 vs. expression after suppression in period 2) by 2 target thought (chair vs. ocean) ANOVA. Results revealed a main effect of group $F(1,87) = 7.01$ $p = .01$, eta-squared = .075. Participants expressing in period 2, after prior suppression had a reliably higher number of buzzer presses ($M = 26.81$) than participants expressing in period 1 ($M = 19.06$). There was also a main effect of target thought $F(1,87) = 8.9$ $p < .004$, eta-squared = .09. Participants manipulating the construct that was present in the experimental room reporting more thoughts ($M = 27.35$) than participants manipulating the construct not

present in the experimental room ($M = 18.53$). There was no interaction ($F < 1$). Using this method of assessment the rebound effect is clearly present and strongly, whereas it was not present when using the modified method of assessment.

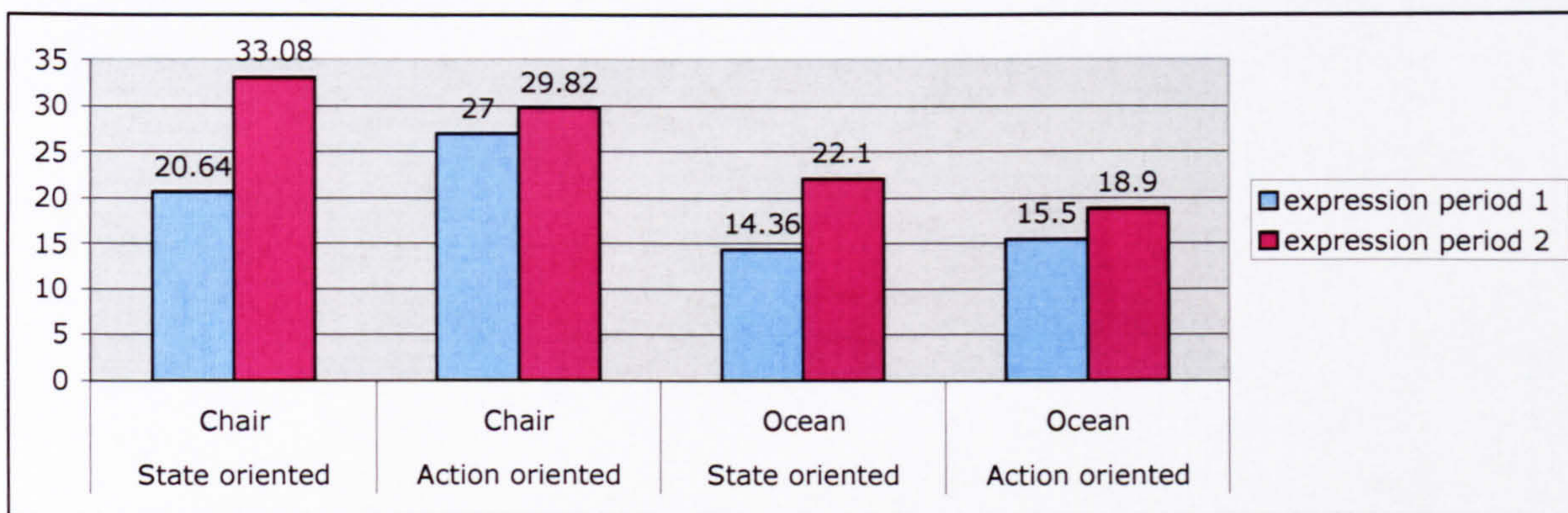
FIGURE 3.6 - MEAN NUMBER OF BUZZER PRESSES IN EXPRESSION GROUP IN PERIOD 1 AND OF SUPPRESSION GROUP IN PERIOD 2 AS A FUNCTION OF TARGET THOUGHT (CHAIR VS. OCEAN).



Next, using this original method of assessment the role of the same individual difference variables in the rebound effect were assessed, as they were in the case of the modified method. Out of all the variables only state vs. action orientation and anxiety produced significant results. Thus, when the sample was divided into action and state oriented groups a rebound effect was only obtained in the state oriented group. As one can see from Figure 3.7 the prior suppression group expressed more target thought during period 2 than the group expressing in period 1 ($F(3,43) = 14.37$, $p = .008$, $\eta^2 = .15$). There was also the main effect of target thought $F(3,43) = 8.45$, $p = .038$, $\eta^2 = .10$, and no interaction between the independent variables ($F < 1$). In contrast, there was no rebound effect in the action oriented participants ($F < 1$). However, a main effect of target thought was significant $F(3,38) = 14$, $p = .01$, $\eta^2 = .14$. Participants thought

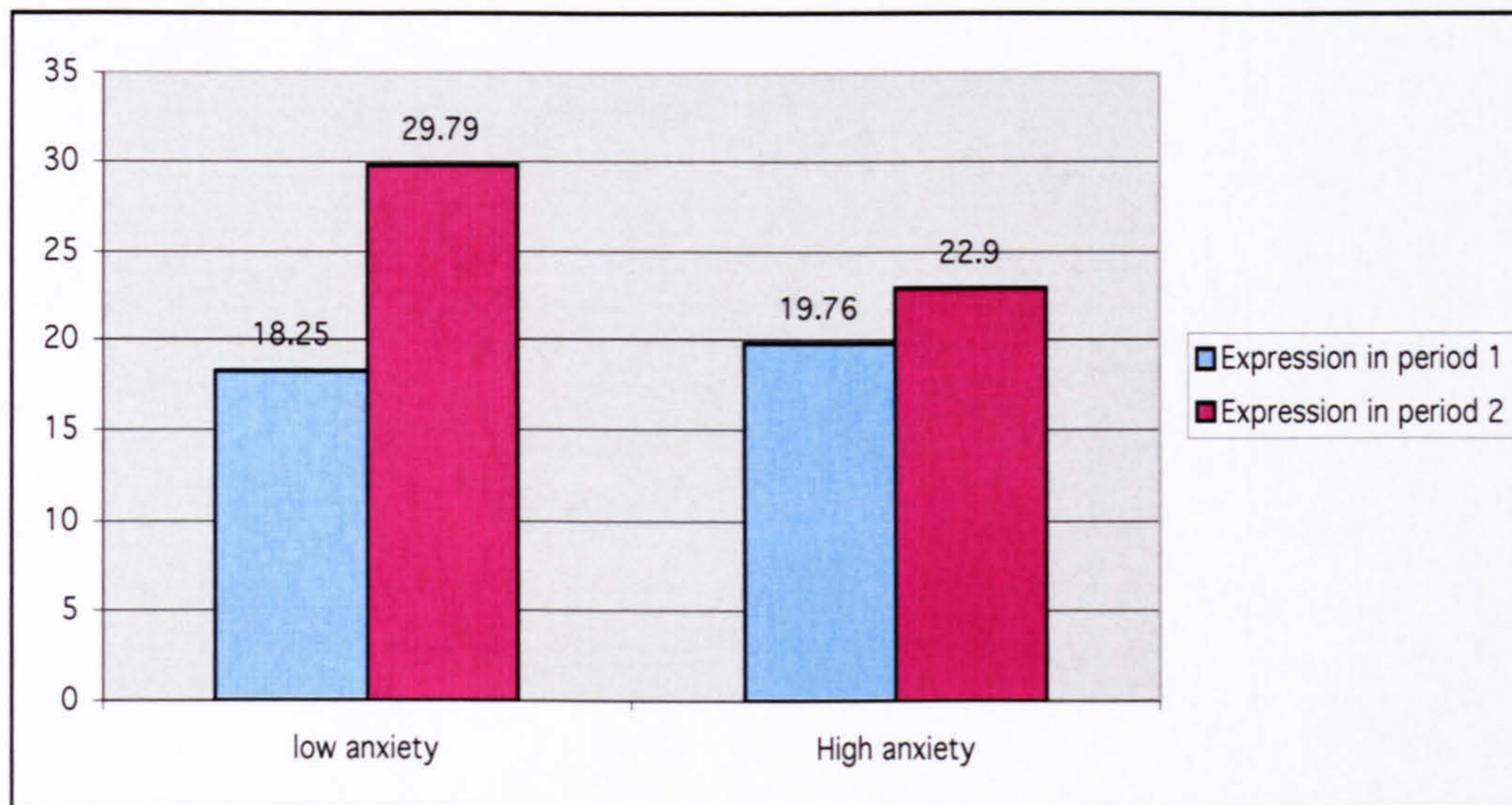
about chair more frequently than ocean (means = 33.08 and 22.10 respectively). There was no interaction ($F < 1$). Thus, it appears that unlike action-oriented participants, state-oriented individuals display a rebound effect whichever method is used to assess the rebound effect.

FIGURE 3.7 – MEAN NUMBER OF BUZZER PRESSES IN STATE AND ACTION ORIENTED PARTICIPANTS AS A FUNCTION OF GROUP (EXPRESSION IN PERIOD 1 VS. EXPRESSION IN PERIOD 2 AFTER PRIOR SUPPRESSION).



The next analysis was conducted on groups who had high or low anxiety scores. In the low anxiety group there was a main effect of group $F(3,43) = 7.3$ $p = .01$, eta-squared = .14. However, this effect was absent in the high anxiety group ($F < 1$). Thus, Figure 3.8 below shows how the rebound effect is present in low anxiety participants but not in high anxiety participants. Note that when using the modified method of assessment neither group displayed a rebound effect.

FIGURE 3.8 - MEAN NUMBER OF BUZZER PRESSES COMPARING EXPRESSION IN PERIOD 1 WITH EXPRESSION AFTER PRIOR SUPPRESSION IN PERIOD 2 FOR HIGH AND LOW ANXIETY PARTICIPANTS.



IV. Discussion

One aim of this study was to demonstrate the rebound effect with a 15-minute delay between the two verbalisation periods. An additional aim was to collect individual difference data on personality and ability from each participant in an effort to examine which individual difference variables affect when and where the rebound effect is found. A further aim was to systematically examine and compare the outcomes of using two different methods of assessing the rebound effect.

The results demonstrate that using the modified method the rebound effect was not found using two different targets (Chair and Ocean) with an intervening 15-minute delay. However, the effect was strong when the original method of assessing rebound was used. This highlights the need for further investigation of the procedures used to assess the rebound itself. In addition, it suggests that the modified method of assessing the rebound

may be more conservative and this may be directly responsible for some of the failures to replicate the rebound effect reported in the literature. The present study therefore represents the first preliminary evidence that rebound effects can still occur after a delay of 15 minutes, even when the intervening tasks are quite demanding. This lends some robustness to the phenomenon.

The study also examined the effect of fluid intelligence on the rebound effect. Previous work has shown that the rebound effect may be stronger in people with higher IQ (Rutledge et al., 1993, 1996). The current study did not provide any support for this conclusion and found that rebound effects were no more likely in high than low IQ participants irrespective of the method of assessment of the rebound effect.

Perhaps most significantly, the data reported here fully supports the alternative model of the rebound effect proposed in this thesis. Thus, when the sample is dichotomised according to the global personality attributes of state vs. action orientation the state oriented participants demonstrated a rebound effect irrespective of whether the original or modified methods of assessing the rebound were being used. In contrast action oriented participants did not show a rebound effect with either method of assessment. Studies have shown that state orientated individuals have a personal style which means they do not deactivate intentions easily (Kuhl, 1994; Goschke and Kuhl, 1993). It is interesting therefore that it is also state orientated individuals who demonstrate the rebound effect. It has been our theoretical contention that the rebound effect may occur precisely because one formulates an intention to suppress, thus heightening the activation levels of all the suppressed concepts.

The results with respect to the WBSI are clear. Using both the modified method and original method of rebound effect assessment, both high and low WBSI scoring groups failed to show a rebound effect. These results suggest that WBSI scores do not directly influence one's propensity to display rebound effects.

The findings with regards to anxiety are less certain. Using the modified method of assessment both low and high anxiety groups fail to demonstrate rebound effects. However, when using the original method of assessment the low anxiety group demonstrated a clear rebound effect that was completely absent in the high anxiety group. Although this finding was not found using the modified method, this result has support in the thought suppression literature. Thus, Harvey and Bryant (1999) also found that rebound effects only occurred in their low anxiety participants and were absent in their high anxiety participants. One explanation for this finding is that high anxiety participants have a tendency to suppress, both Harvey and Bryant (1999) and Gold and Wegner (1995) have suggested this argument. However it is unclear why participants who are anxious would have an automatic tendency to suppress neutral thoughts such as ocean or chair.

Another variable that was examined was rumination. However, when the sample was dichotomised according to the McIntosh and Martin (1992) rumination inventory neither high or low ruminators displayed a rebound effect with either assessment method. Thus, of all the individual difference variables examined in this study only the dimension of action vs. state orientation was consistently found to influence the rebound effect.

The current study also examined the effect of the object being represented by the target thought being present in the experimental room. The findings were clear. The presence of the to be suppressed or expressed item in the room did lead to more reported thoughts of the item, than when the item was not present in the experimental environment. However, in terms of suppression it seems that the object being present in the experimental room may not make suppression any more difficult than if it were not present in the experimental room. Thus, the mean number of reported thoughts for suppressing an item in the immediate environment was almost identical to the mean number of reported thoughts for suppressing an item not in the immediate environment. This finding may suggest that the mere presence of an item in the immediate environment may subtly activate the construct.

The findings presented in this Chapter lead to some important conclusions. First it seems that the method one uses to assess the rebound effect can determine whether or not rebound effects are found. In this study power for the original and modified methods were identical by design. This may help explain some of the failures to replicate the effect reported in the literature. The results suggest that the modified method of assessing the rebound effect may not be the best method of assessing the effect. Indeed on the basis of these results it would seem that the original method is subject to less interference from practice effects and therefore may at present represent the best method of assessing the rebound effect.

Using the original method it seems the rebound effect can occur even with a 15-minute intervening gap between the two verbalisation periods. In addition, the effect of AOF (state vs. action orientation) is robust and provides support for the alternative intentional model of rebound effects outlined in this thesis.

CHAPTER FOUR

The role of individual differences in suppression and expression performance in the laboratory

One issue that has largely been overlooked in research on mental control and especially on thought suppression concerns whether performance on a suppression or expression task in the laboratory can be conceptualised as an ability. This is an important question given that in thought suppression experiments participants display large variability in the number of times they think about the target thought during expression and suppression tasks in period 1. For example in Study 1, reported in Chapter 3, one participant buzzed as many as 27 times and another only once in period 1 despite the fact that both were in the suppression group (overall $M= 7.35$). Similarly, one participant buzzed 56 times and another only 6 times in the same period 1, despite the fact that both were in the expression group (overall $M= 19.15$).

Clearly, a person's frequency of buzzing during active suppression or expression in period 1 may be conceptualised as a measure of suppression or expression ability. A low frequency of buzzing during suppression would represent a high suppression ability relative to another participant who buzzes more during active suppression. Conversely, a high frequency of buzzing during active expression in period 1 would represent a high thought expression (concentration) ability relative to another participant who buzzes only a few times during active expression.

Two main issues arise from the conceptualisation of suppression or expression performance in the laboratory as an ability. The first issue concerns whether there is a unitary mechanism underlying mental control performance. In short, are those people who appear good on a suppression task also good at an expression task and visa versa? The second issue concerns which individual difference variables relate to suppression and expression ability. If suppression and expression are related abilities they should correlate with the same set of individual difference variables. If they are dissociated abilities they may be related to a different set of individual difference variables. The aim of the present

study was to address these two issues by examining the correlations between the number of buzzer presses in period 1 and 2 by participants in suppression and expression groups, and how various individual difference factors such as fluid intelligence, state vs action orientation, anxiety and several other variables are related to participants' suppression and expression performance in the laboratory.

(1) Relationship between suppression and expression performance

If suppression and expression performance represent unitary abilities one would expect a negative correlation between buzzing during active suppression and active expression. Thus, participants who are poor at suppression (i.e. high number of buzzer presses during suppression) should be poor at thought expression (i.e. low number of buzzer presses during expression). In contrast, if suppression and expression are dissociated one would expect either no correlation or a positive correlation between performance during suppression and expression.

The previous findings of Merckelbach et al. (1991) suggest mental control performance may not be a unitary ability. They found positive correlations between the number of thoughts during the suppression phase (period 1) and the later expression period (period 2). Thus, participants demonstrating many failures during suppression subsequently went on to display the highest levels of thought during the expressive phase. Merckelbach et al. (1991) and Rassin et al. (2000) state this suggests individual difference factors are at work. However, in addition it also suggests that suppression and expression performance may be dissociated, i.e. uncorrelated.

(2) Relationship of suppression and expression performance to individual difference variables

Research on fluid intelligence suggests that higher levels of intelligence are in some cases positively related to performance in tasks requiring focussed attention (Engle et al. ,1992, 1999b; Crawford, 1991). Furthermore conscious inhibition has also been found to be related to greater intelligence (Heaton, 1981). However, not all experiments have validated these relationships (Fogarty & Stankov, 1988; Dempster, 1991). In line with

this, Brewin and Beaton (2002) found that participants with higher working memory capacity and higher fluid intelligence buzzed reliably fewer times in period 1 in suppression condition than participants with low fluid intelligence. This suggests that people with high fluid intelligence may be better at suppressing their thoughts than those with low fluid intelligence. Brewin and Beaton (2002) also investigated the relationship between fluid intelligence and number of buzzer presses in expression condition but, somewhat surprisingly, did not find any significant correlation between the two. However, their experimental design meant that the expression scores used for calculating the correlation between fluid intelligence and expression were all collected from an expression period that followed a suppression period and was therefore possibly affected by a rebound effect. It is obvious that more research needs to be done to address the issue of relationship between fluid intelligence and suppression and expression performance. In the present study fluid intelligence was assessed by the short form (Scale 2 form A) of the Cattell and Cattell Culture Fair Intelligence Test (1960). Fluid intelligence was then correlated with the number of buzzer presses in period 1 separately for suppression and expression groups.

Due to a lack of research in this area, it is uncertain how personality factors may be related to suppression (or expression) performance. As an initial attempt to fill in this gap the current study examines how various individual difference measures are related, if at all, to suppression and expression performance in period 1. One of the variables of interest was the White Bear Suppression Inventory (WBSI) that assesses the tendency to use thought suppression in everyday life. The current study will examine whether people with high scores on the WBSI (who suppress a lot) are better at a suppression task in the laboratory as a result of practice. If thought suppression is an ability that improves with practice then people with high scores on the WBSI should demonstrate better suppression ability in the laboratory. However, there is some experimental evidence that suggests the relationship may not be so simple. For example, some preliminary findings indicate that participants with high WBSI scores not only experience more target thoughts during active suppression, but also during expression after previous suppression (Muris, Merckelbach & Horselenberg, 1996; Van den Hout et al., 1996). This indicates that

people with high scores on WBSI may actually be worse at suppression task and suggests that suppression performance may not be subject to practice effects.

Another variable of interest in the current study was state vs. action orientation due to its direct relevance to the alternative theory of the mechanisms behind the rebound effect put forward in this thesis (the intentional explanation). In Chapter 3 it was demonstrated that state vs. action orientation had a strong impact on whether the rebound effect was found. Thus, action oriented participants displayed no rebound effect and state oriented participants showed a strong rebound effect. As to the impact of state vs. action orientation on suppression performance in the laboratory one would expect state oriented participants to demonstrate worse suppression performance as Kuhl and Beckmann (1994) have consistently argued that state oriented people are susceptible to intrusive thoughts, especially intrusions relevant to a current goal (and thought suppression can be conceptualised as a current goal). In contrast, it is expected that action oriented participants will be able to suppress their thoughts more successfully than state oriented individuals. It is more difficult to make specific predictions about the relationship between expression performance and state vs. action orientation. It is possible that there will be no reliable correlation between this scale and the number of buzzer presses in period 1 in expression condition.

Another variable investigated in the current study was how ability at thought suppression or expression would relate to personality. As such, the Eysenck personality inventory (Eysenck et al., 1985) was also included mainly for exploratory purposes, no specific predictions were made as to the possible relationship of personality to suppression or expression performance.

Several other individual difference measures were also collected during this study. As stated earlier very little research has examined the issue of factors affecting ones performance on a suppression or expression task, therefore the following list of variables were included in an exploratory capacity. Specific predictions as to whether or how these variables may relate to suppression or expression performance were avoided.

These other variables collected included: Thought Action Fusion, tendency to ruminate, State and Trait Anxiety, Marlowe Crowne scale, Thought Control Questionnaire, Beck Depression Inventory, Need for Cognition scale, state vs. action orientation, Linking, Unhappiness, and Schizotypal Personality.

(2) Summary

Overall this study addresses the question of how much control people have over their thoughts. In particular it will examine whether suppression and expression performance are underpinned by similar cognitive mechanisms, and which personality variables are related to being a successful suppressor and expresser in the laboratory. In order to address these issues the data from Study 1 (described in Chapter 2 and 3) were used. In particular, the number of buzzer presses made by the participants in suppression and expression groups in period 1 was used as well as participants' scores on various individual difference measures collected during two sessions of Study 1.

II. Method

(1) Participants

94 University of Hertfordshire undergraduates (74 Females and 20 Males) volunteered to take part in return for course credit. The age range was from 18 to 60 years. The mean age was 23 years. The same participants as in chapter 3.

(2) Materials and Procedure

Participants completed a standard thought verbalisation session where half of the participants were asked to suppress and half asked to express (period 1). In period 2 all participants were asked to express the previously manipulated construct (suppressed or expressed). Finally all participants completed a series of self-report personality and ability inventories.

III. Results

Results are analysed in two sections. The first analysis examines the relationship between suppression and expression performance; the second explores the relationship between suppression/expression performance in period 1 and several individual difference variables.

(1) Relationship between suppression and expression performance

The first analysis performed examined the correlation between buzzing during period 1 and buzzing during period 2. Two correlations were computed, one for the suppression group (period 1) and one for the expression group (period 1). For the group of participants suppressing in period 1 and then expressing in period 2 the correlation between the number of buzzer presses in the two periods was $r(44) = .51$ $p = .001$. This correlation is positive and highly significant suggesting that those participants who buzz frequently during a thought suppression task (task failure) subsequently buzz frequently during a thought expression task (task success), and vice versa. The correlation between buzzer presses in the group expressing during period 1 and then again expressing during period 2 is $r(46) = .85$ $p = .0001$. Thus, those participants asked to express in period 1 who buzz frequently, subsequently buzz frequently during period 2 expression as well. The difference between these two correlations is significant at the 95% confidence level, z score for difference in Fisher's z for probabilities = 3.35, $p = 0.0008$.

Out of all the individual difference variables only two are significantly correlated with suppression performance in Period 1 (see Table 4). These variables were extraversion $r(45) = -.29$, $p = .05$, and state vs. action orientation $r(44) = -.295$ $p = .05$. The correlations are both negative. The negative correlation with extraversion suggests that more extravert participants make fewer buzzer presses in the laboratory suppression task.

TABLE 4.1 - CORRELATIONS BETWEEN THE MEAN NUMBER OF BUZZER PRESSES IN PERIOD 1 AND INDIVIDUAL DIFFERENCE MEASURES

	Buzz Week 1 Period 1	Buzz Week 1 Period 2	Trait Anxiety	WBSI	MarC	TCQ	EPQ-P	EPQ-E	EPQ-N	BDI	Ruminate	AOF	F-IQ	TAF	SPQ	
Suppress Week 1 Group																
Period 1	r	1.00	.510	.001	-.018	-.102	.008	-.252	-.293	.041	.110	.025	-.295	.108	-.067	.207
Buzzes	p		.0004	.997	.907	.505	.958	.095	.051	.789	.477	.877	.052	.507	.677	.321
	N	44	44	45	45	45	45	45	45	45	44	41	44	40	41	25
Period 2	r	.510	1.00	-.190	.180	-.110	-.150	-.170	-.030	-.290	-.210	-.153	-.010	.270	-.150	-.470
Buzzes	p	.0004		.217	.242	.477	.331	.270	.847	.056	.171	.346	.949	.076	.356	.018
	N	44	44	44	44	44	44	44	44	44	44	40	43	44	40	25
Express Week 1 Group																
Period 1	r	1.00	.850	.084	-.070	-.170	.120	-.050	-.300	.110	.110	.050	.130	.350	-.270	.030
Buzzes	p		<.0005	.575	.640	.253	.422	.739	.040	.462	.467	.756	.389	.031	.088	.880
	N	47	46	47	47	47	47	47	47	47	46	41	46	38	41	28
Period 2	r	.850	1.00	-.028	-.245	-.113	.180	-.061	-.179	.001	.037	.047	.160	.362	-.208	-.120
Buzzes	p	<.0005		.853	.101	.455	.231	.687	.234	.995	.807	.770	.288	.028	.198	.551
	N	46	46	46	46	46	46	46	46	46	46	41	46	37	40	27

p ≤ .05. bold; .10 > p > 0.05 italic

Key

WBSI = White Bear Suppression Inventory

MarC = Marlowe Crowne Scale

TCQ = Thought Control Questionnaire

EPQ – P = Eysenck Personality Questionnaire – Psychoticism

EPQ – E = Eysenck Personality Questionnaire – Extraversion

EPQ – N = Eysenck Personality Questionnaire – Neuroticism

BDI = Beck Depression Inventory

Ruminate = McIntosh & Martin Rumination Inventory

AOF = state vs. action orientation – preoccupation subscale

F-IQ = Fluid Intelligence

TAF – Moral = Thought Action Fusion – Moral subscale

SPQ = Schizotypal Personality Questionnaire

The negative correlation with state vs. action orientation suggests that as one's scores on the state vs. action scale rise (representing greater action orientation) one's buzzes during laboratory suppression fall. In contrast, low scores on the state vs. action scale (representing greater state orientation) relate to a high number of buzzes during laboratory suppression. Thus, the more action oriented participants appear to suppress better.

Similarly, out of all the individual difference variables only two variables significantly correlated with expression performance in Period 1 (see Table 4.2). These were extraversion $r(47) = -.30$ $p = .04$, and Fluid intelligence $r(38) = .35$ $p = .03$. The negative correlation with extraversion is suggesting that as one's scores on an extraversion scale rise the number of buzzer presses during a laboratory thought expression task falls. In other words, introverts are more successful at expression task (buzz more) than extroverts. The positive correlation between buzzer pressing during thought expression and fluid intelligence suggests more intelligent people buzz more during expression.

Finally, two regression models were computed predicting successful suppression and expression performance from all of their significant correlates. The first model attempted to predict the number of buzzer presses in period 1 (suppression group) from extraversion and state vs. action orientation. A regression model containing these predictors was significant, $F(2,43)=4.1$, $p=.023$, and explained 16.8% of variance in the dependant variable. Thus, both extraversion and state vs. action orientation significantly predict suppression performance. When a stepwise regression procedure was used the same model was accepted. A model with only state vs action orientation resulted in an R^2 of .087.

The second model attempted to predict the number of buzzer presses in period 1 from extraversion and fluid intelligence. However this model did not prove reliable, due to extraversion not significantly predicting expression buzzing, over and above the effect of fluid intelligence. A model with just fluid intelligence predicting expression buzzing was

significant $F(1,37) = 5.10$ $p = .03$ and explained 12% of the variance in the dependent variable, a stepwise regression procedure resulted in the same model.

IV. Discussion

Two major findings emerged from this study. The first finding is that thought intrusion during suppression (as assessed by buzzer pressing) was positively correlated with later thought expression. The second finding was that suppression performance is best predicted by extraversion and state vs. action orientation whereas expression performance is best predicted by fluid intelligence.

The first finding has support in the thought suppression literature. Thus, Merckelbach et al. (1991) found that there was a positive correlation between buzzer pressing during suppression and expression. This finding suggests that those participants who were successful suppressors and only buzzed a few times during active suppression went on to be poor expressors and only buzz a few times during expression. Taken together the results of this study and Merckelbach et al. (1991) suggest that suppressive and expressive forms of mental control may not be based on similar mechanisms. This result implies that being good at one form of mental control (suppression or expression) suggests one will be poor at the alternative form.

This study also found that buzzing in the initial expression group during two periods of thought expression were highly positively correlated. This suggests an individual difference factor may be at work that makes some individuals better expressors than others and some less good at expression than others.

The second finding further supports the first in that suppression and expression performance were found to be predicted by a different set of individual difference variables. Thought suppression performance was predicted by extroversion and state vs. action orientation. In contrast, expression performance was predicted by only fluid intelligence. Thus, successful suppression performance (i.e. low number of buzzer

presses) is related to being an extrovert and action oriented, and unsuccessful suppression performance (i.e. high number of buzzer presses) is related to being an introvert and state oriented. The finding relating unsuccessful thought suppression performance to state orientation is particularly important as it suggests we have found an individual difference variable that not only affects the rebound effect (see Chapter 3) but also affects one's performance during the suppression task. This pattern was expected on the basis of Kuhl and Beckmann's (1994) theory of state vs. action orientation where state orientation is related to intrusive thoughts and lack of control over one's thoughts, whereas action orientation is related to less thoughts intrusion and a greater degree of control. Therefore state vs. action orientation is a variable that deserves much greater emphasis in future thought suppression studies.

In contrast, the correlation between expression performance and fluid intelligence is positive suggesting that as fluid intelligence increases one's performance on thought expression also improves (higher number of buzzer presses). High fluid intelligence is therefore clearly helpful to thought expression. Thus, it seems intelligence is assessing something akin to ease of construct activation and intelligence is unrelated to suppression performance. This finding is in direct contrast with the findings of Brewin and Beaton (2002) who showed that higher fluid intelligence was related to better suppression ability. However, there are some reasons this discrepancy may have occurred. Brewin and Beaton's frequency of intrusion during active thought suppression is very high, thus they report that in a 5-minute suppression period the average number of white bear mentions was 15.43. This is very high as the acknowledged average number of intrusions in thought suppression experiments using neutral thoughts is about 1 intrusion per minute (Wegner et al., 1987; Wenzlaff and Wegner, 2000). This would put the average figure at 5 intrusions for a 5-minute suppression period. It is therefore not clear why Brewin and Beaton have 15 intrusions in their suppression condition. It is possible that this represents an immediate enhancement effect, but whatever the reason it is clear that this figure is somewhat inflated, indeed in the expression condition the mean number of reported thoughts is 18.5, only slightly higher.

Somewhat surprisingly, the results also showed that there was no correlation between participant's scores on the WBSI and the number of buzzer presses in the suppression condition in period 1. Thus, it appears a person who suppresses thoughts every day of their life is no better at a new suppression task in the laboratory than a person who has suppressed thoughts only a few times in their life. This suggests that thought suppression is not an ability that gets better with practice. Overall the same results were obtained with the TCQ which represents another questionnaire method of assessing the tendency to use thought suppression, once again the TCQ did not correlate with the number of buzzer presses during suppression or expression.

One criticism of the methods used in this study concerns the reliability of the measures of suppression and expression performance. In the thought suppression literature there has been broad discussion over the reliability and validity of using self reported thought measures. However despite discussion no study has yet set out to determine the reliability of suppression or expression performance as currently conceptualised in this chapter. Indeed, this study was designed to be exploratory and represents a new research direction in thought suppression experiments. This issue of the reliability of measures of suppression and expression performance will be more fully discussed in chapter 12.

In summary, very few personality variables appear related to successful suppression or expression performance in the laboratory and those that have been identified explain only about 10% (on the basis of adjusted R^2) of the variance in suppression or expression performance. However, with 45 participants power to detect a 'medium' effect of $r = 0.30$ is only just over half, and any small effect would be unlikely to be detected.

It would seem thoughts are relatively uncontrollable. Thus, no personality variable predicts success at both suppression and expression. Action orientation goes with effective suppression; while fluid intelligence goes with effective expression.

Extraversion predicts success at suppression, but failure at expression. In addition, the evidence that thought suppression performance may not improve with practice is also suggestive of the fact that thoughts may be relatively uncontrollable (Logan, 1983).

CHAPTER FIVE

Replication of Study 1 and assessing the rebound via a within subject design

In Chapter 3 a study was reported that investigated the rebound effect and the possible role of individual difference variables. This study was conducted during the week 1 session of a larger scale study. The design and procedures of this large-scale study were described briefly in Chapter 2, where it was noted that all participants were tested again after one week. The experimental session in week 2 was an exact replication of week 1 session except that at the end of the experiment in week 2 participants completed the Culture Fair Intelligence Test (Cattell & Cattell, 1960) and a different set of questionnaires (for details see Chapter 2). In addition, as illustrated at the end of Chapter 2 in Figure 2.1, those participants who were in the suppression group in week 1 had to express a thought in week 2 and vice versa. The target thought was also different in week 2. Those who suppressed or expressed the target word 'chair' in week 1 had to manipulate the target word 'eagle' in week 2 and those who suppressed or expressed the target word 'ocean' had to manipulate 'carpet' in week 2.

Conducting this study in week 2 had three objectives. First was to try and replicate the pattern of findings obtained in week 1 (Chapter 3). A second novel objective was to try and assess the rebound effect within subjects across the two weeks. The final aim was to further examine the relationship between the suppressive and expressive forms of mental control in a situation where suppression and expression performance are assessed on two separate occasions, one week apart, instead of following each other closely in time as was the case in week 1 (Chapter 4).

(1) Replication of results obtained in week 1

The first objective of this study was to assess the rebound effect via the conventional between subject comparisons, in order to see if the pattern of results obtained in week 1 (see Chapter 3) could be replicated in week 2. If the findings replicate across the two sessions this would speak in favour of robustness of the rebound effect. However, there

are reasons to believe that demonstrating a rebound effect on a second experimental testing session may not provide significant results. This is mainly due to the possible effects of practice from the first session of testing. Thus, results from week 1 suppression (see Chapter 3) showed that there was a significant rise in reported thought in the group that expressed their thoughts in both period 1 and period 2. If this practice effect also continues across weeks it might make it harder to demonstrate the rebound effect in week 2 after participants have already taken part in a thought suppression experiment in week 1.

In order to minimise possible practice effects the current study was designed to have a one week gap between experimental sessions. The targets used for suppression and expression were also changed from week 1 to week 2 testing. Thus, on week 1 participants were manipulating (suppressing or expressing) “chair” or “ocean”. On week 2 participants were asked to manipulate “eagle” or “carpet”. All target words were matched for their frequency of use in the English language (see method section). In addition, as in week 1, two of the targets chosen for week 2 were either representing an object in the experimental environment (carpet) or an object not in the experimental room (eagle). It was not anticipated that the target being present or absent in the room would have a direct effect on suppression or expression performance. Therefore, for counterbalancing purposes, participants who manipulated a target in week 1 which was present in the experimental environment manipulated a target not present in the experimental room on week 2 and visa versa. Finally participants who had been suppressing in week 1 period 1 were asked to express during week 2 period 1 and visa versa.

(2) Assessing a rebound effect using a within subjects design

An additional reason for conducting a similar study in week 2 on the same participants was to assess the rebound effect within subjects instead of using the between group comparisons that has been customary in thought suppression research. Indeed, most methods of assessing the rebound effect (i.e., original, modified and standard) described in the introduction (Chapter 1) have been comparing the number of target thoughts

between two different groups of participants. In view of large individual differences displayed by participants in both suppression and expression conditions one may question whether using between subjects comparisons is the best possible way of assessing the rebound effect. Perhaps using within subjects comparisons could provide a more robust way of assessing the rebound and be able to produce stronger effects.

Rutledge et al. (1993; 1993) have previously investigated the rebound effect using a within participants design (see figure 1.4 page 36 in Chapter 1). However, the design used by Rutledge and colleagues was conducted within one testing session, by asking participants first to express a thought, then suppress it, and finally to express it again in three consecutive 9-minute long thought verbalisation periods. The rebound effect was assessed by comparing the number of target thoughts in the first expression period with the second expression period (after suppression). However, there are two problems with using a within subjects design in one experimental session. First is that the number of buzzer presses may decrease over the long thought verbalisation sessions irrespective of type of instructions due to fatigue. The second and more likely problem emerged from the results in Chapter 3 where it was shown that the group expressing twice, in both period 1 and period 2 demonstrated a significant increase in target thought, most probably representing an effect of practice with the task in the former expression period.

The current study used within participants comparisons across two weeks of testing. Testing participants twice in a thought suppression experiment by assigning them to different experimental groups (expression vs. suppression) in week 1 and week 2 will allow for an assessment the rebound effect within participants whilst seeking to minimise the effects of fatigue or previous practice.

Figures 5.1 and 5.2 show how the rebound can be assessed within participants across the two weeks using both modified and original methods of assessment. Figure 5.1 represents this for participants who were in suppression group in week 1 (initial suppression group) and Figure 5.2 for participants who were in expression group in week 1 (initial expression group). These two figures illustrate that the rebound effect can be assessed

within subjects with the modified method if one compares the number of buzzer presses in period 2 (when all participants are expressing the target thought) across the two weeks (week 1 and week 2). Using these comparisons the rebound effect should be present in both initial expression and initial suppression groups if the number of buzzer presses is higher in period 2 after initial suppression than after initial expression irrespective of week of testing.

As to the original method, Figure 5.1 shows that for the initial suppression group the rebound can be assessed by comparing the number of buzzer presses in period 2 in week 1 (expression after suppression) with those of period 1 in week 2 (expression without prior suppression). The rebound effect would be present if the number of buzzer presses in period 2 (in week 1) is higher than in period 1 (in week 2). Alternatively, for the initial expression group the original method involves comparing the number of buzzer presses in period 1 in week 1 (expression without prior suppression) with those of period 2 in week 2 (expression after suppression) (see Figure 5.2). In this condition the rebound effect would be present if the number of buzzes is higher in the period 2 (week 2) after initial expression than in the group expressing in period 1 of week 1.

FIGURE 5.1 – METHODS OF ASSESSING THE REBOUND EFFECT WITHIN SUBJECTS FOR THE INITIAL SUPPRESSION GROUP OF WEEK 1. THE MODIFIED METHOD ASSESSES THE REBOUND EFFECT BY COMPARING TWO EXPRESSION CONDITIONS IN PERIOD 2 ACROSS THE TWO WEEKS (SEE VERTICAL ARROW). THE ORIGINAL METHOD ASSESSES THE REBOUND EFFECT BY COMPARING TWO EXPRESSION CONDITIONS ONE IN PERIOD 2 AND ONE IN PERIOD 1 FOR WEEKS 1 AND 2, RESPECTIVELY (SEE DIAGONAL ARROW).

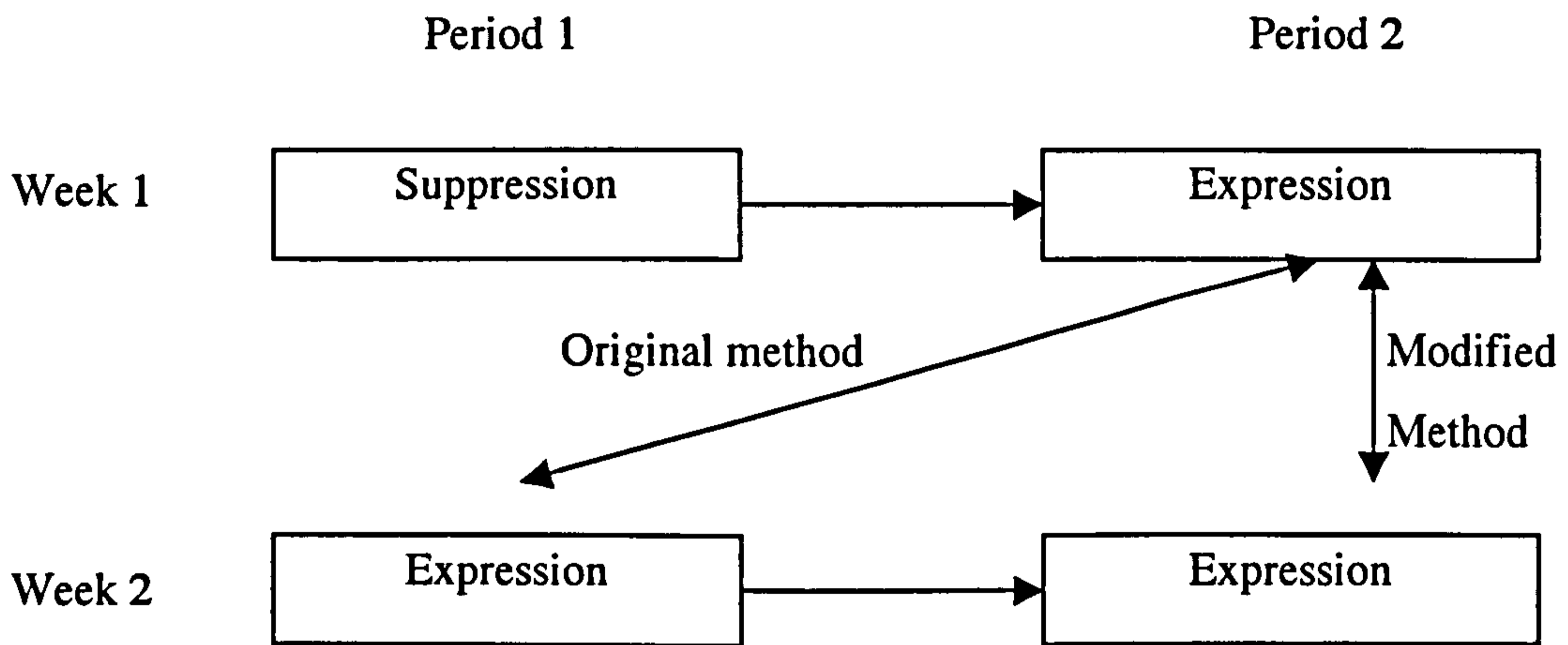
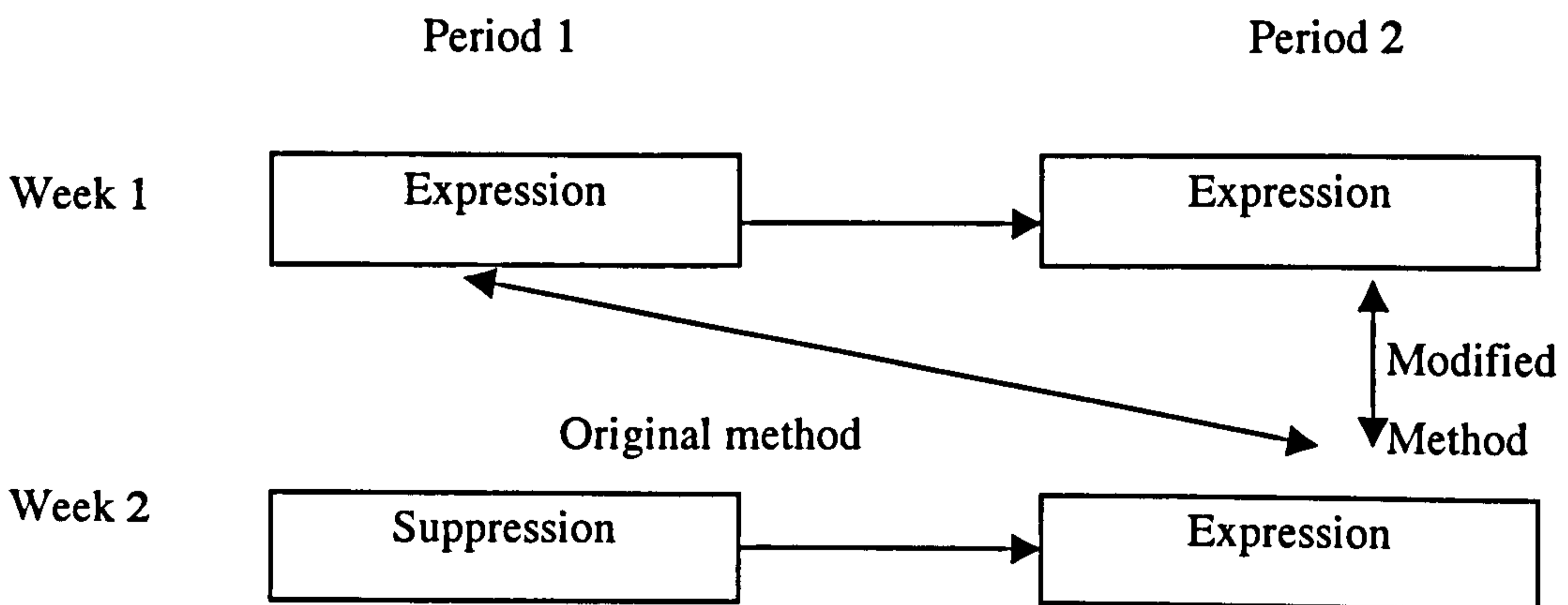


FIGURE 5.2 – METHODS OF ASSESSING THE REBOUND EFFECT WITHIN SUBJECTS FOR THE INITIAL EXPRESSION GROUP OF WEEK 1. THE MODIFIED METHOD ASSESSES THE REBOUND EFFECT BY COMPARING TWO EXPRESSION CONDITIONS IN PERIOD 2 ACROSS THE TWO WEEKS (SEE VERTICAL ARROW). THE ORIGINAL METHOD ASSESSES THE REBOUND EFFECT BY COMPARING TWO EXPRESSION CONDITIONS ONE IN PERIOD 1 AND ONE IN PERIOD 2 FOR WEEKS 1 AND 2, RESPECTIVELY (SEE DIAGONAL ARROW).



(3) Relationship between suppression and expression performance

The final aim of the study was to examine the relationship between suppression and expression performance across two sessions occurring one week apart. In Chapter 4 this relationship was examined between the buzzer presses in two 5-minute periods of thought verbalisations which followed each other fairly closely in time (there was only a 15-minute interval between them). A positive correlation was obtained between the number of buzzer presses in period 1 and period 2 in the initial suppression group. This correlation suggests a negative relationship between suppressive and expressive forms of control.

However, it is possible that in the initial suppression group the number of buzzer presses in period 2 was influenced by the rebound effect (see Chapter 3). It is therefore desirable to assess this correlation on the basis of participants' performance that is not potentially confounded by this effect. One way of achieving this is to have participants suppress and express their thoughts in 5-minute verbalisation periods that have a substantial time delay, instead of following each other within a short space of time. Given that participants who were in suppression group in week 1 were in expression group in week 2 and vice versa it was possible to examine the number of buzzer presses in period 1 across the two weeks within the same participants.

II. Method

(1) Participants

All 94 participants who completed the study in week 1 were asked to return for the second session in week 2. However, 10 participants did not return for the second experimental session in week 2 and therefore the analyses reported below are based on the data of 84 participants whose mean age was 23.27 years (SD=7.4).

(2) Method and Procedure

The method employed in the current study was identical to the method used in week 1 of the study described in Chapters 2 and 3. The detailed procedure and design is described

in Chapter 2 and is depicted in Figure 2.1 (page 78). As one can see in Figure 2.1, in week 2 of the study instead of suppressing or expressing Ocean or Chair the targets were now changed to Eagle or Carpet. All four targets were chosen to be of similar familiarity and frequency of use in everyday life using Toggia and Battig's word norms (1978). In addition, all were chosen to be of similar length, 5 or 6 letters.

III. Results

The results will be presented in three subsections representing the three objectives of the study. First, the rebound effect will be assessed using the conventional between subject method of comparison in an attempt to replicate the pattern of results obtained in week 1 described in Chapter 3. This will be followed by the analyses of data with a novel way of assessing the rebound effect by within subjects comparisons. Finally, the correlation between suppression and expression performance in week 1 and week 2 will be examined.

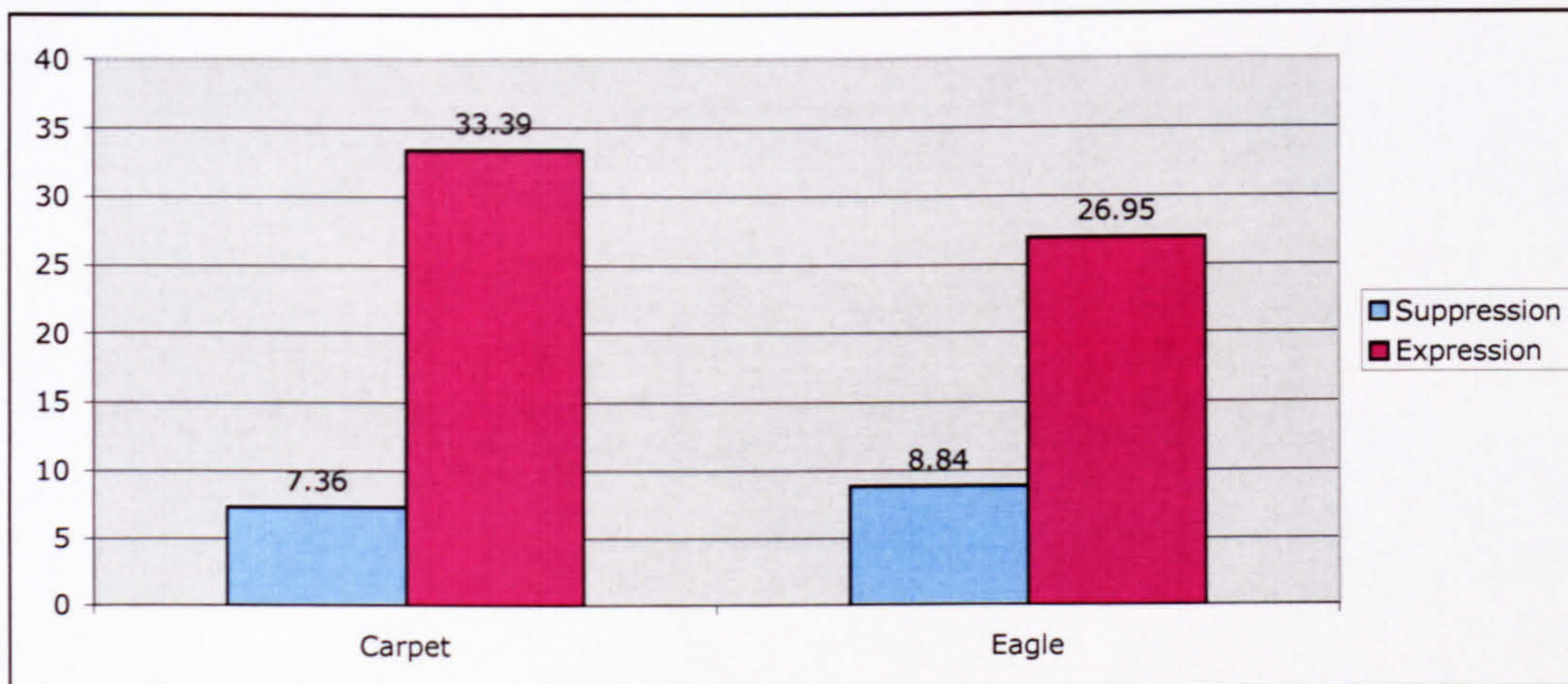
(1) Replication of results obtained in week 1

Initial screening of the buzzer presses in week 2 revealed that the number of reported thoughts in periods 1 and 2 were not normally distributed. Therefore, square root transformations were performed on the number of buzzes during periods 1 and 2 in an effort to normalise these distributions. After transformation, boxplots revealed 2 remaining outliers. These participants were removed from all analyses involving buzzer presses. For the sake of clarity results are reported on untransformed means, but all analyses were conducted using the transformed variables.

In order to check whether participants correctly followed the instructions for suppression and expression in period 1, the mean number of square root transformed buzzer presses during period 1 was entered into a 2 group (suppression vs. expression) by 2 target thought (carpet vs. eagle) between subjects ANOVA. This analysis revealed a main effect of group, $F(1, 78) = 71.77$, $p < .001$, eta-squared = .49. Participants expressing their thoughts in period 1 buzzed significantly more ($M = 30.17$) than participants suppressing

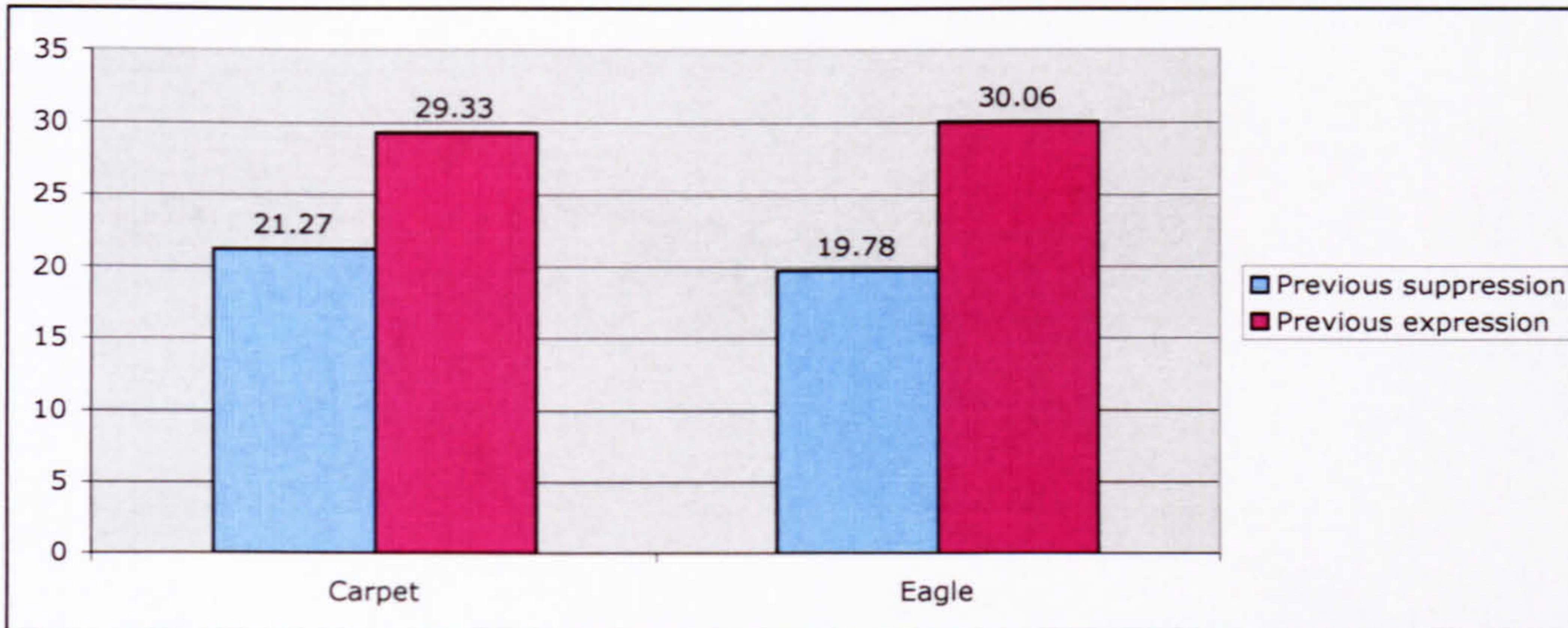
their thoughts ($M = 7.9$). It is therefore evident that participants complied with the experimental instructions. However, unlike the results of week 1, the effect of target thought was not significant ($F < 1$). Participants who manipulated target word Carpet, representing an object in the room, did not buzz more ($M = 20.37$) than those who manipulated the word Eagle ($M = 17.90$). The interaction was also not significant, $F(1,78) = 1.33$, $p = .25$.

FIGURE 5.3 - MEAN NUMBER OF BUZZER PRESSES AS A FUNCTION OF INSTRUCTION GROUP IN PERIOD 1 (SUPPRESSION VS. EXPRESSION) AND TARGET THOUGHT (CARPET VS. EAGLE) IN WEEK 2.



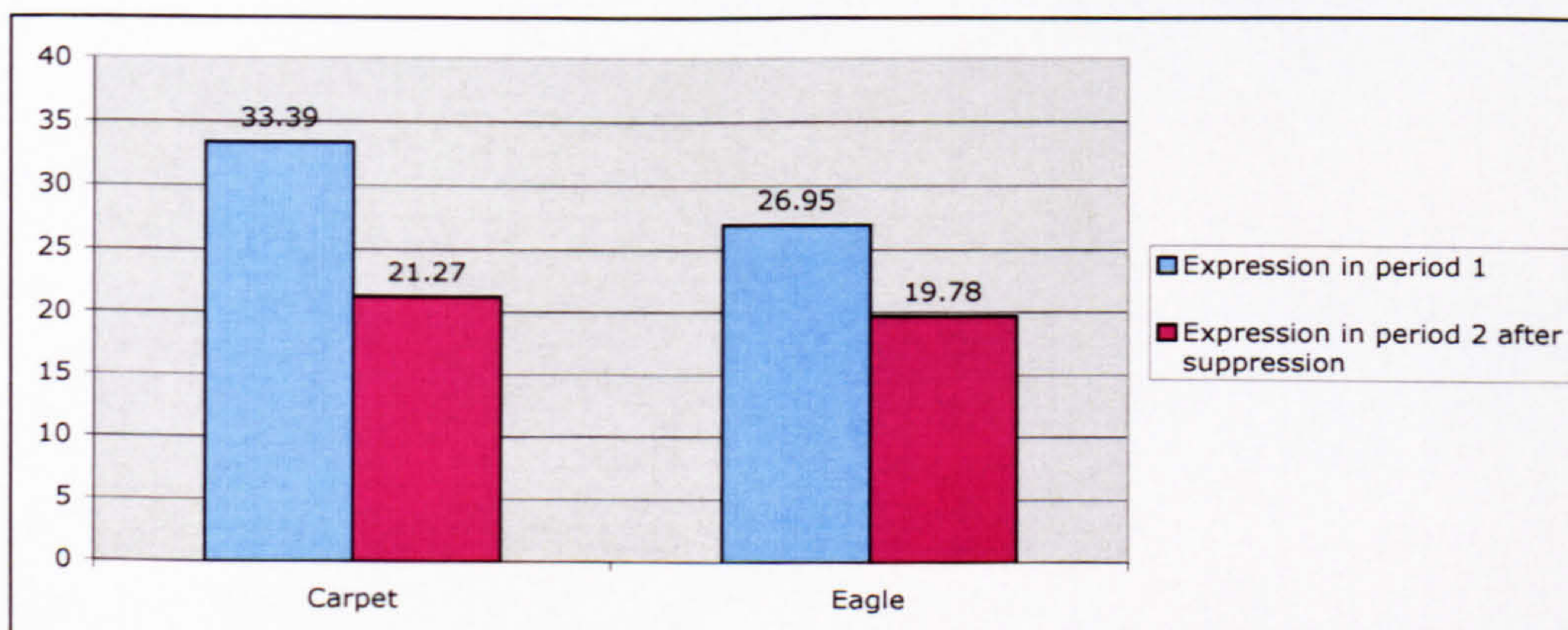
The next analysis was performed on the number of buzzer presses in period 2 in order to assess the rebound effect using a modified method of assessment. The mean number of (square root transformed) buzzer presses in period 2 were entered into a 2 group (suppression vs. expression) by 2 target thought (carpet vs. eagle) between subjects ANOVA. Results revealed a main effect of group, $F(1,76) = 6.94$, $p = .01$, eta-squared = .09, no main effect of target thought ($F < 1$) and no interaction ($F < 1$) (for means see Figure 5.4 below). The main effect of group shows that in period 2 those participants who previously suppressed buzzed reliably fewer times ($M = 20.52$) than those who previously expressed ($M = 29.69$). Thus, in week 2 there is a clear effect of previous expression or suppression but it is in the opposite direction to a rebound effect.

FIGURE 5.4 - MEAN NUMBER OF BUZZER PRESSES IN PERIOD 2 AS A FUNCTION OF PREVIOUS GROUP (SUPPRESSION VS. EXPRESSION) AND TARGET THOUGHT (CARPET VS. EAGLE)



Similar results were obtained when the original method of assessing the rebound was used (see Figure 5.5). For this method, the mean number of square root transformed buzzer presses were entered into a 2 group (expression in period 1 vs. expression in period 2 after prior suppression) by 2 target thought (carpet vs. eagle) between subject ANOVA. Results revealed a main effect of group $F(3,72) = 7.64, p=.007, \eta\text{-squared} = .09$. Participants expressing in period 1 displayed reliably higher number of buzzer presses ($M=30.19$) than those who expressed in period 2 after prior suppression ($M = 20.6$). There was no effect of target thought and no interaction ($F_s < 1$).

FIGURE 5.5 – MEAN NUMBER OF BUZZER PRESSES AS A FUNCTION OF GROUP (EXPRESSION IN PERIOD 1 VS. EXPRESSION IN PERIOD 2 AFTER SUPPRESSION) AND TARGET THOUGHT (CARPET VS. EAGLE).

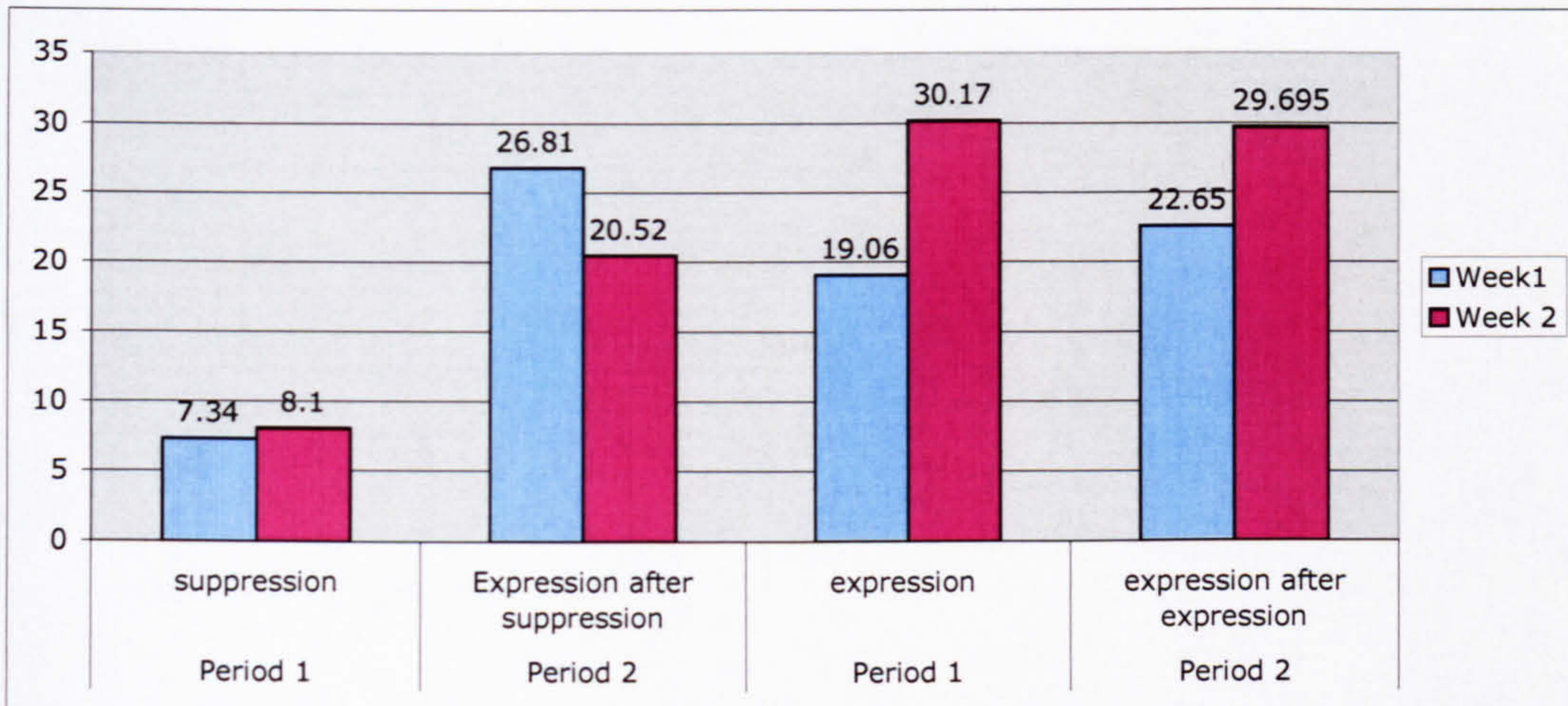


In summary, in week 2, the group expressing after prior suppression is clearly not demonstrating a rebound effect, whether the analysis is performed using the original method or the modified method. If anything, participants expressing without prior suppression or after prior expression have reliably higher number of target thoughts (See Figures 5.3 and Figure 5.2 respectively).

A possible reason for this failure to replicate the rebound effect in week 2 becomes apparent when one examines the mean number of buzzer presses in the initial expression and suppression conditions across week 1 and week 2 (see Figure 5.6 for means).

If one examines the left hand panel of Figure 5.6 showing the data of participants who were in suppression groups then one can see there is no difference in the amount of buzzer presses across the weeks in period 1 when participants suppressed and period 2 when these participants expressed after prior suppression. In contrast, when one examines the right hand panel of Figure 5.4 showing the data of participants in expression groups a different picture emerges. Thus, in week 2 participants in the expression condition had a significantly higher number of buzzer presses than in week 1 both in period 1 ($M = 30.17$ and $M = 19.06$) and in period 2 ($M = 29.70$ and $M = 22.65$).

FIGURE 5.6 - MEAN NUMBER OF BUZZER PRESSES IN WEEK 1 AND WEEK 2 FOR BOTH EXPERIMENTAL PERIODS (PERIOD 1 AND PERIOD 2)



Thus, due to this large increase in buzzing in the expression conditions (possibly due to the former practice with expression) the rebound effect can not be obtained with either the modified or original method of assessment. Moreover, unlike the results from week 1 testing, the rebound effect was not obtained when participants' action vs. state orientation was taken into account.

(2) Assessing a rebound effect with a within subjects design

The results of the analysis reported in the previous section are indicative that due to possible practice effects in expression performance across the weeks it is less likely that the rebound effect will be obtained when using the within subjects comparisons outlined in Figures 5.1 and 5.2. An additional complication was that there was a main effect of type of thought in that participants consistently buzzed more in the expression conditions when the construct was in the experimental environment compared to when the expression target was not in the immediate environment.

As a result of these complications, when the analyses depicted in Figures 5.1 and 5.2 were undertaken the results did not support a straightforward explanation. In some cases a rebound effect was found, in others no rebound was found and in some a reverse

rebound effect was demonstrated. It seems therefore that these unexpected findings arose due to the large rise in expression group performance in week 2, and the significant effect of the presence of the to be expressed stimulus in the experimental environment. Thus, once again the effects of practice from week 1 on expression buzzing in week 2 and the type of target thought preclude firm conclusions from being made.

(3) The relationship between suppression and expression performance across the weeks

In order to examine the relationship between suppression and expression performance across the two weeks the correlations between participants buzzing in period 1 of week 1 and period 1 of week 2 were calculated. Due to the fact that whatever form of mental control participants were undertaking in period 1 of week 1 they then undertook the opposite form in period 1 of week 2 this meant that correlations between performance during suppression and expression periods could be calculated within the same participants.

The correlation for participants suppressing in period 1 of week 1 and then expressing in period 1 of week 2 was positive, $r(37) = .342$ $p = .038$. The correlation for participants expressing in period 1 of week 1 and then suppressing in period 1 of week 2 was also positive, $r(40) = .483$ $p = .002$.

IV. Discussion

One of the main findings of the present study is that it failed to replicate the rebound effect obtained in Study 1 (Chapter 3). However, the results also showed quite clearly that this was primarily due to carry over effects in practice with an expression task across two weeks. Thus, participants who were expressing their thoughts in week 2 either without prior expression/suppression demonstrated a large rise in the number of reported thoughts during expression which may have lead to the failure to demonstrate any rebound effect using week 2 data. The results suggest that expression is highly sensitive

to the previous effects of practice both within the same experimental session and across two weeks. These findings provide additional support for an idea suggested in Chapter 3 that using the modified method of assessing the rebound effect may be more problematic in comparison to the original (Wegner et al., 1987) method.

Unfortunately the present study did not allow for an assessment of whether practice effects may exist in suppression performance. Although the level of thought in the suppression groups across both weeks was fairly constant, one must remember the experimental design meant that participants expressing in week 2 had previous practice with thought expression whereas participants suppressing in week 2 had no previous suppression practice.

As a direct result of the carry over effects demonstrated in expression performance across the weeks, the within subjects comparisons of the rebound effect were not investigated further.

This study demonstrated a positive correlation between buzzing during period 1 week 1 and period 1 week 2 for both suppression and expression groups. Therefore, the results together with those reported in Chapter 4 provide strong evidence of a dissociation between suppressive and expressive forms of mental control. Thus, in spite of the difficulties present in this replication study, it is clear that there is much evidence for the position that being a successful suppressor means one will be a poor expresser and being an unsuccessful suppressor means one will be a better expresser. This pattern of results may suggest that it is not necessarily mental control that is of most interest, but one's proneness to intrusion, which seems to vary intra-individually.

In summary, the results from the data of week 2 testing do not replicate the rebound effect obtained in week 1 of testing (see Chapter 3). In future explorations of the rebound effect and the nature of individual differences in mental control, much greater emphasis needs to be made of the possible effects of practice on expression performance. Whilst negative, the results of the present study have important methodological implications for

thought suppression research. In particular the results strongly suggest that once participants have taken part in a thought suppression experiment they should not participate in other thought suppression experiments as even one week later their performance on the second experiment could be strongly effected by the prior study they took part in.

At the conceptual level, these results imply that the rebound effect as currently demonstrated in the laboratory may not be as robust as previously suggested by some researchers (Wegner et al., 1987; Wenzlaff and Wegner, 2000).

CHAPTER SIX

Assessing the rebound effect with an implicit method: Reaction times to previously suppressed and expressed targets in a lexical decision task

The large-scale study described in Chapter 2 examined the rebound effect in week 1 (see Chapter 3) and week 2 (Chapter 5) as well as the role of individual differences in performance on laboratory suppression and expression tasks (Chapter 4). One criticism of all these studies is their reliance on self reported thought (i.e. the number buzzer presses) during suppression or expression as the dependent variable. This criticism is widely acknowledged in thought suppression research and has lead many to advocate a greater use of implicit measures (e.g. Wenzlaff & Wegner, 2000). In view of this criticism one of the aims of the thesis was to try to assess the rebound effect with an implicit method. This involved measuring the reaction times to previously suppressed or expressed target words that were presented in a Lexical Decision Task immediately following the suppression or expression in period 1. The data reported in this chapter was collected in week 1 of the large-scale study described in Chapter 2. Thus, the Lexical Decision Task that was included to provide a short 15-minute delay between period 1 and period 2 of thought verbalisation was also a method of implicitly measuring the rebound effect. If the rebound effect occurs as a result of heightened activation of the previously suppressed thought then participants should respond faster to previously suppressed than expressed targets in the Lexical Decision Task (cf. Erber & Wegner 1992).

Apart from methodological considerations the current study also used implicit measures for important theoretical reasons. As pointed out in the introduction, Wegner's ironic process theory (Wegner et al., 1992; 1994) postulates two distinct mechanisms in thought suppression. An *intentional operating process* (sometimes called the controlled distracter search) seeks distracters and thoughts designed to maintain the desired state, i.e. not to think about the suppressed thought. In contrast, an *ironic monitoring process* (sometimes referred to as the automatic target search) continually searches for instances of the to-be-suppressed thought in consciousness which will signal a failure of suppression. While the intentional search for distracters is a consciously controlled process affected by the

amount of available attentional resources, the ironic monitoring process operates automatically without one's conscious awareness and does not consume cognitive resources.

In the course of thought suppression these two processes are proposed to operate together as a feedback mechanism aimed at controlling thought. Wegner and colleagues (1992; 1994) have pointed out that the operation of the automatic ironic monitor raises the activation levels of the to be avoided thought making it highly likely to intrude once the controlled distracter search is abandoned (i.e., a post-suppression rebound) or disrupted by the secondary task depleting one's attentional resources (i.e., the immediate enhancement effect).

Despite the usefulness of this theory Wegner and his colleagues have not explicitly indicated exactly how the operation of the ironic monitor causes the raised activation levels. Wegner and Erber (1992) state that "the automatic target search should act in much the same way as an externally encountered prime to make the unwanted thought highly accessible" (p. 904). However, they do not develop this argument any further.

In a further development of this model, Macrae et al. (1994) did suggest a mechanism by which the operation of the ironic monitor may raise the activation levels of the to-be avoided thought. Thus, Macrae et al. (1994) argue that when someone suppresses a thought, the operation of the ironic monitoring process will activate the unwanted thought continuously, albeit at low levels. In comparison, people who express the same thought will activate it periodically each time it comes to mind. Referring to Higgins (1989) synapse model of construct activation which suggests that the more frequently a construct is primed the more likely it is to have an effect on one's future judgments and behaviour (Higgins & Bargh, 1992; Higgins, 1989; Higgins & King, 1981). Macrae et al. (1994) argue that the activation accrued in this way will be slow to dissipate, and much slower to decay than activation resulting from construct use. Thus, accessibility resulting from suppression may be greater than accessibility resulting from thought expression.

There are very few studies that have attempted to directly measure the activation levels of suppressed thoughts with such precise implicit measures as reaction times to target stimuli. An exception is Wegner and Erber (1992), who were first to demonstrate that thought suppression can raise a construct's activation level, even to a level beyond that of conscious thought expression. However, in the Wegner and Erber (1992) study the activation levels were measured in the course of the process of actively suppressing a target thought during active suppression. Thus, Wegner and Erber (1992) had participants generate associates to words presented on screen whilst suppressing or expressing a certain construct, in this case "house". Some of the words presented in the task were associated to the to-be-suppressed / expressed word, for example "home". Construct activation was assessed by the number of house related words a participant produced in response to the house related prompts for both suppression and expression groups. This however is problematic as the rebound effect occurs after active suppression has been discontinued. Therefore, the key point at which studies need to measure construct accessibility is not during active suppression but in the period after suppression and expression during the period when the rebound effect is supposed to be occurring.

The study conducted by Macrae et al. (1994) is the only study so far that has examined construct accessibility (of formerly suppressed or expressed thoughts) in the critical post suppression period. They used a lexical decision task and reasoned that if thought suppression elevates thought activation to levels higher than even thought expression then these effects should result in faster recognition times for previously suppressed thoughts relative to previously expressed thoughts, and that both previously suppressed and expressed thoughts should be recognised faster than matched distracters. This was exactly the pattern of results they found.

However, there are a number of problems with the study of Macrae et al. (1994) that prevent one from drawing firm conclusions. The main problem is that in this experiment participants were not explicitly asked to suppress or express their thoughts. Thus, participants were shown a photo of a male skinhead and asked to write a short passage about a typical day in his life. Half of the participants were asked to do this without

thinking about the target in a stereotypical manner (intended to automatically instigate stereotype suppression), the other half were given no instructions (it was assumed that they would use stereotypes in their descriptions). Thus, there is a degree of ambiguity as to whether participants were indeed deliberately suppressing or expressing. In addition, the thoughts they were using for suppression or expression were both personally relevant and negative in valence (stereotypes) which, as has already been shown (see Chapter 1), can often result in contradictory findings with respect to the rebound effect. As a result of these criticisms the key study examining the impact of thought suppression and expression on construct accessibility in the post suppression period still remains to be carried out.

An important issue in designing the present key study relates to the choice of an appropriate implicit measure. For example, Wegner and his colleagues have mostly used the Stroop task (Wegner & Erber, 1992). However, there are reasons to believe that better methods of assessing construct activation exist. Indeed, in the Stroop task the construct activation is measured indirectly. Thus, if a word printed in green ink captures attention by virtue of it being highly accessible there will be a slowing on this trial relative to non-accessible words also printed in green ink. In other words, the word's activation level interferes with colour naming. However, Marsh and Hicks (1998) have suggested that a direct measure of thought activation such as the time taken to say whether a string of letters is a word or not (Lexical Decision Task) would be a more reliable method of assessing construct activation (See also Marsh & Landau, 1995). In the Lexical Decision Task one would expect no interference but would expect highly active and accessible words merely to be verified as words more quickly relative to less accessible words.

The current study therefore aims to examine activation levels of previously suppressed or expressed thoughts in the post suppression period using a more reliable index of construct activation by having all participants complete a lexical decision task immediately after a suppression or expression task. The lexical decision task that was used in the current study contained 6 repetitions of a target word (previously suppressed or expressed

construct), 6 repetitions of a matched distracter word (matched to the target for frequency of use and familiarity), 24 unrepeated filler words and 48 non-words.

Mental load was another variable that was manipulated in this study. Wegner and colleagues have repeatedly shown that load during active suppression can lead to immediate enhancement effects. This is claimed to be due to a differential effect of load on the two processes thought to be in operation when a thought is being suppressed. Thus, load makes the controlled distracter search almost impossible as this is a resource demanding process, however, it has little effect on the ironic monitor which is thought to be automatic. In contrast, there should be no effect of load in the post suppression period. This is due to the fact that the dual processes operating during active suppression will have been terminated. In other words, any residual activation that the previously suppressed thought has accrued should not vary as a function of load because accessibility effects seen in implicit paradigms are thought to be heavily automatised and insensitive to the disruptive effects of load (Bargh 1989; 1994; 1996).

One final reason for conducting the current study is that it also allows for another important test of the new intentional model of rebound effects, advanced in this thesis (Chapter 1). In Study 1 (chapter 3) it was demonstrated that more state orientated participants displayed rebound effects but more action oriented participants did not. This was to be expected on the basis of the model advanced in this thesis, and suggests that the rebound effect may represent an intention superiority effect. With regards to the present study, if the intentional explanation of the rebound effect is valid, one would expect state oriented participants to display faster reaction times to targets than distracter words in the lexical decision task. However, action oriented participants should not show faster reaction times to targets than distracters.

Therefore, the current study will also allow for a contrast between the model of Macrae and our own intentional model of rebound effects. Thus, on the basis of the Macrae et al. (1994) model we expect to find a positive correlation between buzzer pressing during expression and reaction times to targets in the lexical decision task. However, in the

suppression group we expect no correlation between buzzing during suppression and later reaction time to targets in the lexical decision task as here priming is not a function of the number of times the person has directly mentioned the target, but is a function of the ironic activation accrued from the ironic monitor.

In contrast our own intentional model of rebound effects predicts that any enhancement effects of previous suppression on construct accessibility in the post suppression period will be stronger in state oriented individuals when compared to action oriented participants.

II. Method

(1) Participants

This study represents data collected during the Lexical Decision Task phase of study 1 (See Chapter 3). Therefore the same 94 participants were used. However, 6 of these were removed as their scores on the reaction time measures were very extreme and remained so after transformation. A further 5 participants were lost due to missing data points.

(2) Materials

A total of 84 words and non-words were selected for a 15-minute Lexical Decision. Four different types of stimuli were used in this task, these were, six previously suppressed or expressed target words, six matched distracter words, 24 unrepeated filler words, and 48 non-words. Due to the design of this study (see Chapter 2) on week 1 half of the participants were manipulating (suppressing or expressing) the target word “chair” and the other half of the participants were asked to manipulate “ocean”. Therefore, the target word that participants did not see became the distracter word in the Lexical decision task. For example, the half of the participants manipulating “chair” did not encounter the alternative target “ocean” in the suppression or expression phase of this experiment, it was therefore used as the matched distracter in the Lexical Decision Task and visa versa.

All of the words used in the Lexical Decision Task (targets, distracters and filler words) were chosen to be of roughly equal word length, of similar frequency of use in the English language from Toglia and Battigs word norms (1978). In addition, all targets, distracters and filler words were chosen to be unrelated semantically to each other. This was done by examining lists of associates for each word chosen using the MRC Psycholinguistic Database, and discounting any word which was associated to any other word contained in the final Lexical Decision Task.

The order of words for this task was fixed with the constraint that a target or distracter word could not appear in the first 10 words displayed. Another constraint was that two targets, two distracters or a distracter and a target could not follow each other without any intervening items. Two versions of the lexical decision task were employed to control for any effects of word presentation order.

(3) Procedure

The overall procedure of the large-scale study into which the Lexical Decision Task was included is described in Chapter 2. Here, only the details concerning the Lexical Decision Task will be described. Thus, after receiving general instructions about the aims of the study and tasks involved participants were introduced to a Lexical Decision Task.

Participants were informed that in the Lexical Decision Task the computer would display a string of letters on screen and their task was to press a key identifying which of the stimuli on screen were words and which were non-words as quickly and accurately as possible. Half of the participants had to press the “A” key if the stimulus was a word and the “L” key if it was a non-word. For the other half of the participants the keys were reversed to fully counterbalance for handedness.

After these instructions all participants had the opportunity to undertake a practice version of the Lexical Decision Task. This practice task was similar in nature to the actual Lexical Decision Task that was presented later, but the words and non-words used in the practice task were not to appear in the main task. In addition, the words used in the

practice task were chosen to be semantically unrelated to any of the words used in the subsequent task. The practice task commenced with an audible beep of one second duration alerting the participant that the Lexical Decision Task was about to start. After the beep a fixation cross “X” appeared in the centre of the screen for 1500 milliseconds (ms) showing participants the location where the first word or non-word was to be displayed. The fixation cross then disappeared and was replaced by the first word or non-word stimulus. This letter string remained on screen until the participant made their response by pressing either the “L” key or the “A” key. The word disappeared immediately after the response was made and was replaced by a 500 ms inter-stimulus interval. During this inter-stimulus interval the screen was blank. After exactly 500 ms the next word or non-word was displayed and again remained on screen until the participant made their response. This sequence was repeated for all 10 of the practice items (5 words, 5-non-words).

After the practice Lexical Decision Task participants were informed that during the actual later Lexical Decision Task they would have to perform this task with an additional secondary task, which was to remember a number during the task and to repeat it back to the experimenter at the end of all the trials. All participants were informed that they would have 30 seconds to memorise this number before the start of the later Lexical Decision Task. The importance of this second memory task was stressed by making it clear that if the participant could not recall this number after the task their data would be unusable.

At this stage, if the participant had no problems with the practice Lexical Decision Task they undertook the first 3-minute practice thought verbalisation session. After this half of the participants were asked to suppress a certain thought for 5 minutes (half of the suppression participants suppressed chair half suppressed ocean), the remaining half of the participants were asked to express a certain thought (half of the expression participants expressed chair half expressed ocean).

Immediately after this thought verbalisation period all participants were informed that the Lexical Decision Task would soon begin but first they had to memorise a number to be repeated back to the experimenter at the end of the Lexical Decision Task. For half of the participants this secondary task consisted of remembering a 9 digit number (high load condition); for the remaining half of the participants this secondary task consisted of remembering a 1 digit number (low load condition). In all cases the numbers given to participants were completely random number strings which were generated individually for each participant. Therefore, prior to commencement of the Lexical Decision Task participants were given a typed copy of the number for 30 seconds and asked to memorise it. After the 30 seconds the number was taken away and the Lexical Decision Task started. At the end of the LDT all participants were tested for their memory of the digit(s) they learned as part of the cognitive load manipulation.

(4) Design

The experimental design was a 2 group (suppression vs. expression) x 2 type of target thought (chair vs. ocean) x 2 load (high vs. low) x 4 type of word (target, distracter, filler word, non-words) mixed ANOVA with the repeated measures on the last factor.

If the predictions of this study are correct, the results should demonstrate a main effect of load and type of word. In addition, it was expected that previously manipulated (suppressed or expressed) targets would be reacted to faster than matched distracter words in the Lexical Decision Task. Furthermore it was expected that this effect would be stronger for previously suppressed constructs as suppression is thought to result in greater construct activation than thought expression. As a result the expectation was of a main effect of type of word (target vs. distracter vs. filler words vs. non-words) but also of a significant interaction between group (suppression vs. expression) and type of word.

III. Results

The dependent variable was the reaction time to the stimuli presented in the Lexical Decision Task. Initial inspection of participants mean reaction times showed that the data was not normally distributed. In an effort to normalise the distribution all reaction times were transformed using the simple formula of $1/RT$. This method was chosen on the basis of recommendations by Ratcliff (1993), showing that this transformation resulted in the fewest outliers after transformation. After transformation boxplots revealed 6 outliers. These were removed from all further analyses. An additional 4 participants were lost due to missing data points. Therefore, the analyses presented below are based on the data of 84 participants.

The load manipulation used in the present study appears to have worked in that participants in both low and high load conditions successfully recalled all digits at the end of the Lexical Decision Task. Two participants in the high load condition did not recall all 9 digits correctly but were retained in all analyses because they only misremembered one of the 9 digits.

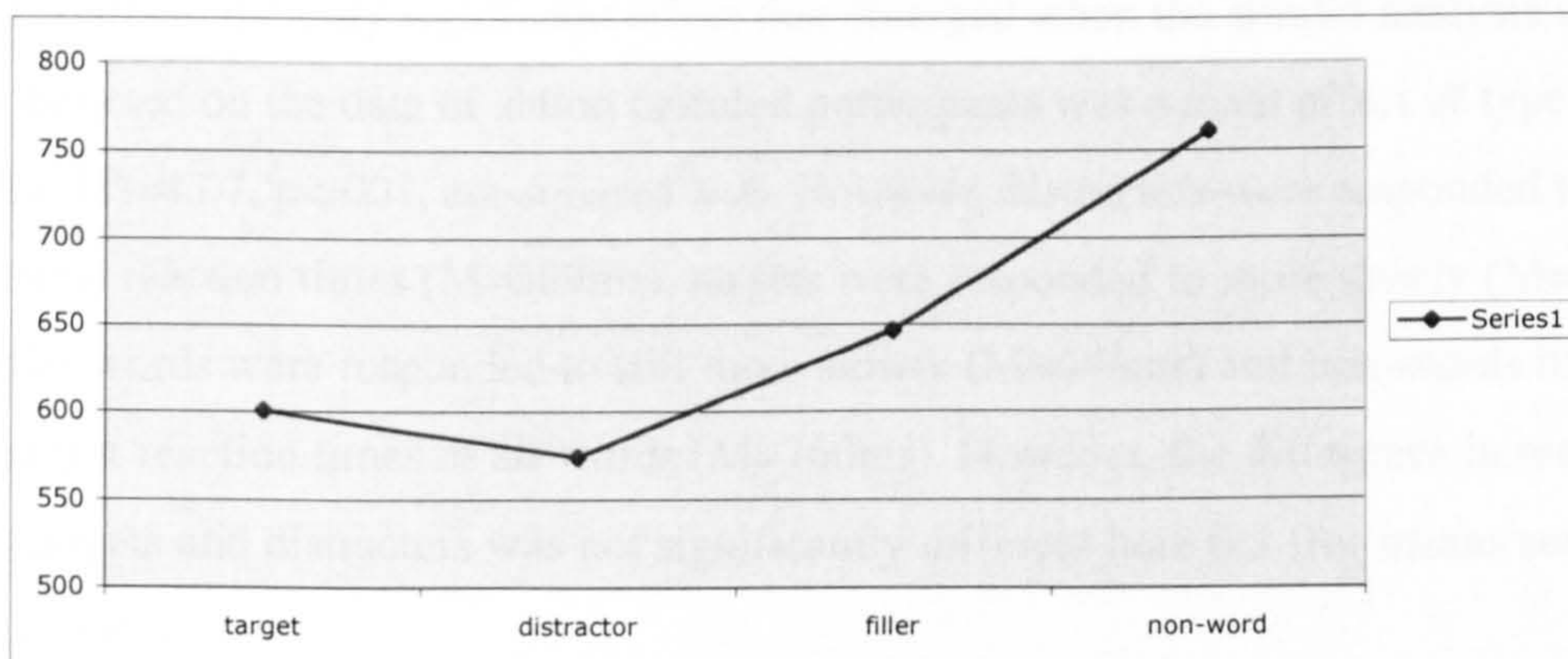
In order to test for this crucial interaction effect, the mean transformed reaction times were entered into a 2 group (suppression vs. expression) x 2 type of target thought (chair vs. ocean) x 2 load (high vs. low) x 4 type of word (target vs. distracter vs. filler word vs. non-words) mixed ANOVA with repeated measures on the last factor.

Out of all four possible main effects only two were significant. Thus, there was a main effect of load $F(1,76) = 4.73$, $p = .033$, $\eta^2 = .6$, participants in the high load condition were significantly slower to react to all words ($M = 670$ ms) when compared with those in the low load condition ($M = 618$ ms). There was also a main effect of the type of words, $F(3, 240) = 129.14$, $p < .0001$, $\eta^2 = .63$. Post hoc tests showed that, contrary to expectations, reaction times for distracter words ($M = 574$ ms) were reliably faster than target words ($M = 600$ ms), $t(82) = -2.39$, $p = .019$. However, as one would expect, reaction time to targets was reliably faster than to filler words ($M = 646$

ms) $t(82)=6.89, p=.0001$, as well as to non-words ($m = 760$ ms) $t(82)=13.292, p=.0001$. See Figure 6.1 below.

Out of all possible two and higher order interactions only a target (chair vs. ocean) by a type of word (target vs. distracter vs. filler vs. non-word) interaction was significant, $F(3,240)=3.95, p=.009$, eta-squared = .5. Tests of simple effects showed that there was a significant difference between the group whose target was “chair” and a group whose target was “ocean” in terms of their reaction times to target words, $t(82)=2.2, p=.031$, but not in terms of their reaction times to distracters, filler words or non-words. Thus, mean reaction times to target word “chair” was ($M = 584$ ms) and to target word “ocean” was ($M = 619$ ms). The crucial interaction between group (suppression vs. expression) and type of word was not significant. None of the other interactions proved significant $F<1$ in all cases.

FIGURE 6.1 - MEAN REACTION TIME AS A FUNCTION OF TYPE OF WORD (TARGET VS. DISTRACTER VS. FILLER VS. NON-WORD).



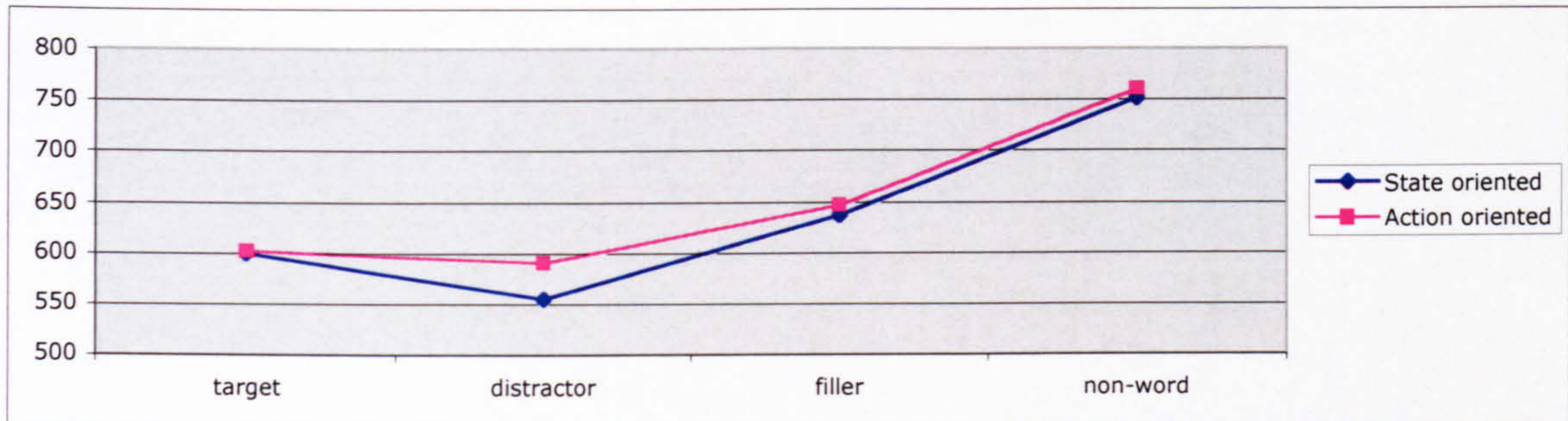
Having completed this overall analysis, the sample was then divided into two groups on the basis a median split on participants scores on state vs. action orientation (AOF subscale). The above analysis was then re-run separately for state and action oriented participants.

In state oriented participants this analysis resulted in exact replication of the findings from the overall sample. Thus, there was a main effect of type of word $F(3,108)=74.23, p<.001, \eta\text{-squared} = .67$, such that distracters were responded to with the fastest reaction times ($M=554\text{ms}$), targets were responded to more slowly ($M=598\text{ms}$), filler words were responded to even more slowly ($M=636\text{ms}$) and non-words were responded to with the longest reaction times ($M=750\text{ms}$). Crucially, the difference between distracters and targets here was significant $t(43)=-2.6, p=.013$, as in the analysis for the overall sample. There was also a main effect of load $F(1,36)=5.18, p=.029$, such that participant in the high load condition ($M = 673 \text{ ms}$) responded more slowly than participants in the low load condition ($M = 596 \text{ ms}$).

In addition, an interaction between type of word and target thought was also significant $F(3,108)=3.68, p=.014, \eta\text{-squared} = .09$. The target in the room (chair) was responded to faster ($M=579\text{ms}$) than the target outside the room (ocean $M=621\text{ms}$). None of the other interactions were significant ($F<1$)

In contrast, the only significant effect that emerged when the similar analysis was conducted on the data of action oriented participants was a main effect of type of word $F(1,93)=45.7, p<.001, \eta\text{-squared} = .6$. However, distracters were responded to with the fastest reaction times ($M=589\text{ms}$), targets were responded to more slowly ($M=601\text{ms}$), filler words were responded to still more slowly ($M=646\text{ms}$) and non-words had the longest reaction times of all words ($M=760\text{ms}$). However, the difference in reaction time to targets and distracters was not significantly different here $t<1$ (for means see Figure 6.2 below).

FIGURE 6.2 – MEAN REACTION TIMES TO TARGETS, DISTRACTERS, FILLER WORDS AND NON-WORDS AS A FUNCTION OF STATE VS. ACTION ORIENTATION



The final analysis examined the correlations between buzzing in period 1 and later reaction times to targets separately for suppressers and expressers. This analysis indicated that there was no correlation between the number of buzzer presses during suppression and reaction times to targets ($r = -.13$ $p=.38$). There was also no correlation between buzzing during expression and later reaction times to targets ($r = .245$ $p=.13$).

IV. Discussion

The results of the current study in terms of the main effect of type of word are in line with previous findings on priming in Lexical Decision Tasks. Thus, overall reaction times to targets and distracters were reliably faster than to filler words and the mean reaction times to filler words were in turn reliably faster than reaction time to non-words.

In addition, the current study was designed to demonstrate the heightened accessibility of formerly suppressed thoughts when compared to formerly expressed thoughts during the post suppression or expression period. In order to assess construct activation in the post suppression period participants completed a lexical decision task immediately after a period of thought suppression or expression. The lexical decision task contained the previously suppressed or expressed target word (repeated 6 times) a matched distracter word (also repeated 6 times), 24 unrepeated filler words and 48 non-words.

The results showed that contrary to expectations, there was no effect of previous suppression or expression on reaction time to target words. Surprisingly, the results also indicated that the matched distracter words were responded to consistently faster than target words. Not only do these results conflict with the previous results of Macrae et al. (1994) but also with the theoretical premise that previously suppressed or expressed targets should have shown faster reaction times than previously un-manipulated and unseen words.

However, the current results were not necessarily unexpected as the non-words were reacted to significantly slower than all other word classes a common finding in lexical decision research (Marsh et al., 1998). In addition, unrepeated filler words although yielding significantly faster reaction times than non-words were responded to significantly slower than the targets or distracters. Once again this pattern was expected.

The results of the current study did not provide support for the model of Macrae et al. (1994) thus, although there was no correlation between the number of buzzer presses and reaction times to targets in suppression group (as predicted) there was also no positive correlation between these variables in the expression group (contrary to predictions). Most importantly, the current results do not seem to support the intentional model of the rebound effect as this model would have predicted significantly faster reaction times to targets than to distracters in state oriented people, but not in action oriented individuals. However, distracters were responded to fastest, a finding that no current model would have predicted. In view of this unexpected finding, alternative explanations will be discussed below.

One possible explanation for the finding that distracters were responded to fastest of all other word types concerns the effects of conscious interference on encountering a previously manipulated target in a subsequent lexical decision task. For example, when participants who had been suppressing or expressing “chair” had to rate whether “chair” is a word in the lexical decision task it may have captured their attention as a result of its previous use and caused them to pause momentarily. In contrast, the previously unseen

distracter words which were repeated within the actual lexical decision task should not have had this effect.

If this hypothesis is correct one way to examine this further is to examine the effects of load on reaction times to targets and distracters. In the high load condition participants are completing two concurrent demanding tasks, therefore one could suggest that they will have less residual mental capacity for such conscious interference to occur. In contrast, the low load group will have residual capacity and therefore possibly show greater interference on encountering the previously seen target. Unfortunately, the overall interaction between type of word and load was non-significant. However, if one analyses the difference between reaction times to targets and distracters separately for the high and low load conditions one does indeed find greater likelihood of conscious interference occurring in the low load condition. Thus, the difference between reaction times to targets and distracters were significant in the low load condition $t(41) = -2.45$ $p = .018$, but insignificant in the high load condition $t(41) = -1.23$ $p = .225$.

It appears that momentary conscious realisation that the target has been manipulated previously may well be causing the targets to be responded to slower than the matched distracter words. It is important to realise that even in the event that targets and distracters are responded to equally quickly it would still represent some degree of conscious interference. Thus, a simple priming explanation would suggest that previously manipulated targets (suppressed or expressed) should be responded to faster as a result of raised activation accrued from previous use, relative to previously unseen distracters. Therefore, if the mean reaction times to targets and distracters are not different then this would already indicate some kind of interference occurring in response to targets.

This interpretation seems to be supported by the finding that faster reaction times to distracters than targets was only present in state oriented individuals and not in action oriented participants. Thus, state oriented participants demonstrate greater interference when compared to action oriented participants, as demonstrated by their significantly greater reaction times to distracters. However, it seems that in both state and action

oriented participants this most probably represents conscious interference on encountering a previously manipulated construct. Overall, these results therefore suggest that the lexical decision task may not always be a good measure of construct activation as it is currently conceived.

Interestingly, after conducting a study on prospective memory, McDaniel et al. (2003) reported similar findings. In that study participants formulated an intention to press the “Q” key whenever they saw the prospective memory target in the context of a future imagery task. However in an intervening lexical decision task participants were told to ignore the prospective memory target. The lexical decision task contained three types of words, targets (which had an associated intention – to press the Q key), previously seen words (primed by making imagery ratings) and neutral words (not previously seen). Results showed that participants were significantly slower to verify the prospective memory targets than neutral words, but significantly faster to verify previously primed words than neutral words. This represents further evidence that previously encountering a target can, under some conditions, lead either to a speeding or slowing of reaction times. In cases where the target is surreptitiously activated, for example, by making imagery ratings it leads to speeded reaction time in a subsequent lexical decision task. However, in cases where the target is activated by overt thought suppression or expression or by having an associated intention linked to it, it leads to a slowing of reaction time in a subsequent lexical decision task.

In summary, in spite of the negative findings this study has demonstrated important findings for future research using implicit methods of assessing construct activation. For example, these results strongly suggest that when assessing construct activation using Lexical Decision Tasks experimenters need to be mindful of the possible interference effects that can result from previous construct use (i.e conscious interference), this is especially important in view of the fact that many researchers assume that previous construct use will usually result in faster recognition times (Bargh & Chartrand, 2000). Furthermore, this study also demonstrated that yet again state vs. action orientation seems to affect the activation levels of certain constructs, most notably distracter reaction times.

Finally, this study also demonstrated that the environment may have implicit effects on the activational status of constructs. Thus, the results indicated that items in the experimental environment (i.e. “chair”) were consistently responded to with faster recognition latencies than items not present in the experimental environment (i.e. “ocean”), this may represent an implicit priming of constructs simply as a function of their mere presence in the immediate surroundings.

CHAPTER SEVEN

Individual differences and the use of thought suppression in everyday life in a sample of young adults

It was pointed out in the general introduction (Chapter 1) that research on thought suppression has developed along two relatively separate lines. One of these lines concerns laboratory research investigating the rebound effect that has been discussed so far in this thesis. The other line of research concerns people's tendency to use thought suppression in everyday life (as measured by the White Bear Suppression Inventory) and how this may relate to individual differences.

Previous findings in the thought suppression literature have shown that the tendency to use thought suppression in everyday life (as assessed by the WBSI) is positively related to various measures of psychopathology such as anxiety, depression, neuroticism and obsessive compulsiveness (Muris et al. 1996; Rassin et al. 1999, 2000, 2001; Wegner and Zanakos, 1994). Despite these associations, most typically, in each of the previous studies a limited set of psychopathological variables has been used. Moreover, these measures of psychopathology have rarely been examined in conjunction with other individual difference variables such as personality, cognitive style and/or ability. It may be the case that if the effects of all these variables on WBSI scores are examined simultaneously in one study one could find that only one or two variables significantly and independently predict WBSI scores. Therefore, the aim of the current study was to examine how a broad range of psychopathology, personality, cognitive style and ability measures would correlate with the tendency to use thought suppression in everyday life as assessed by the WBSI.

A second aim was to examine the relation between the WBSI and the Thought Control Questionnaire (TCQ). The TCQ was developed by Wells and Davies (1994) and was designed to assess the strategies one uses to control one's thoughts. It comprises five separate subscales designed to measure thought control by various strategies such as distraction (When I experience an unpleasant/unwanted thought - "I call to mind positive

images instead”), social methods (“I ask my friends if they have similar thoughts”), worrying (“I dwell on other worries”), self punishment (“I slap or pinch myself to stop the thought) and reappraisal of the thoughts (“I analyse the thought rationally”). An overall score is created from the scores on each of the subscales, but it is unclear exactly what this overall score measures other than the variety of methods by which a person attempts to control their thoughts. Currently this scale has remained little used in thought suppression research relative to the WBSI. Only a few clinically orientated studies have reported using it to assess relations between thought control tendencies and psychopathology (Myers, 1998; Purdon, 1999). Most importantly there is only one study that has examined the relations between the WBSI and the TCQ (Muris et al. 1996). In this study, the total score on TCQ positively correlated with the WBSI. Somewhat surprisingly the correlation was weak ($r(172) = .22$ $p < .01$) indicating that these two questionnaires may be measuring somewhat different aspects of thought suppression.

In order to address these two aims outlined above, several measures of psychopathology, personality, cognitive style and ability were obtained from 97 participants in week 1 and 2 of the large scale study described in Chapter 2. The variables included in the current study and the rationale behind using them is discussed below.

(1) Psychopathology and thought suppression

The Spielberger Trait and State Anxiety Inventory (STAI; Spielberger et al. 1983), Beck Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979), Thought Action Fusion Questionnaire (TAF; Shafran, Thordarson, and Rachman, 1996), and the Eysenck Personality Questionnaire (Psychoticism and Neuroticism subscales, EPQ-R; Eysenck, Eysenck, & Barrett, 1985) were all included due to their associations with the tendency to use thought suppression in everyday life, previously reported in thought suppression research.

Two additional previously unexplored measures that were included in the present study were The Fordyce Unhappiness Rating Scale (Fordyce, 1988) and the Schizotypal Personality Questionnaire (SPQ, Raine, 1991).

The Fordyce Unhappiness Rating Scale is a simple questionnaire asking participants to rate the percentage of time they feel sad/unhappy in everyday life. This measure was included to examine whether the use of thought suppression in everyday life might relate positively to greater unhappiness.

The Schizotypal Personality Questionnaire is a 74 item questionnaire which assesses one's schizotypal tendencies personality and has 9 subscales assessing different aspects of schizotypal personality such as experiencing unusual perceptual phenomena, or having few close friends. An example of an item from the scale is "Have you often mistaken objects or shadows for people, or noises for voices?" answers are made by circling either a yes or no response. This measure was included to investigate possible relations between schizotypy and the tendency to use thought suppression. The rationale behind its inclusion was that one component of schizotypal personality is a greater tendency to experience mild hallucination like phenomena such as mistaking objects for people at night or mild delusions. These thoughts may be candidates for suppression in view of their negative nature.

(2) Rumination and Thought Suppression

Rumination has been theoretically linked with the use of thought suppression many times (Erber & Wegner, 1996; Martin & Tesser, 1996). Erber and Wegner (1996) suggest that thought suppression can directly lead to rumination as suppression often results in a rebound effect which can be conceptualised as a form of rumination. In contrast, Martin and Tesser (1996) prefer to conceptualise the relationship between rumination and thought suppression from the other causal direction, by suggesting that rumination often leads to thought suppression in an effort to avoid the discomfort associated with rumination. Thus, according to Martin and Tesser (1996) rumination may result in thought suppression, but the primary cause of rumination itself is not thought suppression

but a failure to attain personal goals or frustration in approaching personal goals. Although correlational, the current study will be the first to examine the relation between rumination and use of thought suppression in everyday life.

Another variable closely linked to the tendency to ruminate is Linking. A questionnaire measure of this construct was also included (McIntosh, Harlow & Martin, 1995). Linking assesses the extent to which an individual views their happiness as being dependent on them attaining their goals. Greater scores on measures of linking (indicating that the person views goal attainment as central to happiness) have been shown to be related to greater rumination and thought intrusion (McIntosh & Martin, 1992).

Although not related to rumination in the literature this study also included a questionnaire measure of the Need For Cognition (Cacioppo & Petty, 1982). This measure assesses the amount a person likes to engage in thinking in general. This was included due to possible relations with both thought suppression and rumination.

(3) Personality, ability and the tendency to suppress thoughts

The present study also wanted to examine how the tendency to use thought suppression was related to personality and ability. In view of its relevance to our own intentional model of thought suppression (see page 43, Chapter 1) the first measure of personality used in the present study will be the State / Action Orientation Questionnaire (Kuhl, 1993), which assesses the global personality attributes of state and action orientation. This questionnaire contains three separate subscales, each assessing a different component of state vs. action orientation. The three subscales are : (a) Action orientation subsequent to failure vs. preoccupation (AOF), (b) Prospective and decision-related action orientation vs. hesitation (AOD), (c) Action orientation during (successful) performance of activities (intrinsic orientation) vs. volatility (AOP). It is expected that state oriented participants will report using thought suppression much more than action oriented participants.

The Eysenck EPQ-R (Eysenck, Eysenck, & Barrett, 1985) was also used in the current study. This questionnaire assesses introversion/extraversion, psychoticism, neuroticism and includes a lie scale. The rationale behind this measure's inclusion was to examine relations between personality (in particular introversion/extraversion) and the use of thought suppression in everyday life. Previously, only one study (Bourdon et al., 2001) has specifically investigated possible relations between extraversion and thought suppression, but this study examined the rebound effect and its occurrence in introverts and extroverts. In addition this study failed to demonstrate a thought rebound in either group. The current study will examine whether the tendency to use thought suppression in everyday life is related to introversion/extraversion.

The Marlowe Crowne scale was also included as a measure of social desirability (Crowne & Marlowe, 1964). This measure has been shown to assess the extent to which participants want to portray themselves in a favourable light when answering questionnaires. It is also a key measure in identifying what has been termed a repressive coping style. This will be investigated more fully in Chapter 9.

Finally, in order to investigate whether the tendency to use thought suppression is related to Fluid intelligence, the Culture Fair Intelligence Test was also administered to participants (Cattell & Cattell, 1960).

(4) Summary

The current study will extend the analysis of the previously reported associations between thought suppression and psychopathology by measuring both previously reported and previously un-investigated variables. In addition, a further aim is to investigate how personality and ability impact on the use of thought suppression in everyday life. A final aim is to investigate relations between two currently available inventories measuring the tendency to use mental control in everyday life - the WBSI and the TCQ.

II. Method

(1) Participants

97 University of Hertfordshire undergraduates (77 Females and 20 Males) volunteered to take part in return for course credit. The age range was from 18 to 60 years. The mean age was 23 years.

(2) Procedure

These 97 participants took part in a large scale study the design of which was described in Chapter 2. In this study participants took part in two 1 hour long experimental sessions. At the end of each experimental session participants completed a set of questionnaires and ability inventories. The questionnaires used were as follows:

(1) Questionnaires used in previous thought suppression studies

The following scales were used in an effort to replicate the previously found relationships between the tendency to suppress thoughts in everyday life (as assessed by the WBSI and the TCQ) and various measures of psychopathology.

- 1.The Speilberger Trait and State Anxiety Inventory STAI - (Speilberger et al., 1983)
- 2.The Beck Depression Inventory BDI – (Beck, Rush, Shaw, & Emery, 1979)
- 3.The Thought Action Fusion Questionnaire TAF – (Shafran, Thordarson, and Rachman, 1996)
- 4.The Eysenck EPQ-R – (Eysenck, Eysenck, & Baret, 1985)

(2) Questionnaires and ability measures not previously used in thought suppression research

The following scales were used due to their theoretical relevance to thought suppression in everyday life. None of these scales have been used in previous studies.

1. Culture Fair Intelligence Test - (Cattell & Cattell, 1960)
2. Rumination Inventory (McIntosh & Martin, 1992)
3. The State / Action Orientation Questionnaire – (Kuhl, 1993)
4. The Linking Questionnaire – (McIntosh, Harlow & Martin, 1995)
5. Fordyce Unhappiness Scale (Fordyce, 1988)
6. The Need For Cognition Scale – (Cacioppo & Petty, 1982)
7. The Marlowe Crowne Scale – (Crowne & Marlowe, 1964)
8. The Schizotypal Personality Questionnaire SPQ – (Raine, 1991)

Note, that the Schizotypal Personality Questionnaire was completed by participants in their own time and mailed back to the experimenter. The rate of return for this scale was much lower than expected. Therefore, the sample that successfully completed this scale was just 57 compared to 97 participants for most of the other scales.

III. Results

All of the variables used in the analyses presented below were first screened for outliers and extreme cases which could have artificially affected the correlations found. Two participants were excluded from these analyses as their scores were too extreme on the White Bear Suppression Inventory and several other inventories.

Since there were a large number of variables that were correlated with the scores on the WBSI and TCQ, a Bonferroni correction was computed to avoid capitalising on chance ($0.05/18 = 0.003$). Therefore only correlations with p values equal to or below .003 were accepted as statistically significant.

The results will be presented below in three sub-sections. In the first section the relationship between the scores of the WBSI and all other variables will be assessed. This will include the examination of pairwise correlations followed by running a regression analysis using significant predictors revealed by the initial correlational analysis. In the second section, similar correlations will be computed for the TCQ. Finally, the relationship between the WBSI and each of the 5 subscales of the TCQ will be explored.

TABLE 7.1 – CORRELATIONS BETWEEN THE WBSI, TCQ AND OTHER INDIVIDUAL DIFFERENCE MEASURES COLLECTED

Correlations

	WBSI	TCQ total	TRAITANX	MARLOWE	Psychoticism	Extraversion	Neuroticism	Lie	BDI	ADF	AOD	NEED4COG	IQ	LINKING	taf moral	McIntosh & Martin rumination scale	Forlyce unhappy	schizotypal personality questionnaire	
WBSI	1																		
Pearson Correlation		.079	.490**	-.095	.060	.190	.112	-.054	.365**	-.229*	-.302**	-.331**	-.188	-.312**	.026	.457**	-.342**	.416**	
Sig. (2-tailed)																			
N		95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
TCQ total		1																	
Pearson Correlation			.141	.049	.151	.171	.151	.217*	.168	.040	.174	.053	-.044	-.038	.163	.216*	.110	-.111	
Sig. (2-tailed)																			
N			95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
TRAITANX			1																
Pearson Correlation				-.097	-.082	-.041	-.094	.069	.714**	-.493**	-.396**	-.424**	-.032	-.353**	.040	-.467**	.574**	.483**	
Sig. (2-tailed)																			
N				95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
MARLOWE				1															
Pearson Correlation					-.082	-.041	-.094	.069	.714**	-.493**	-.396**	-.424**	-.032	-.353**	.040	-.467**	.574**	.483**	
Sig. (2-tailed)																			
N				95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Psychoticism					1														
Pearson Correlation						-.082	-.094	.069	.714**	-.493**	-.396**	-.424**	-.032	-.353**	.040	-.467**	.574**	.483**	
Sig. (2-tailed)																			
N						95	95	95	95	95	95	95	95	95	95	95	95	95	95
Extraversion						1													
Pearson Correlation							-.254*	-.083	.614**	-.521**	-.348**	-.352**	-.029	.172	.067	-.414**	.588**	.541**	
Sig. (2-tailed)																			
N							95	95	95	95	95	95	95	95	95	95	95	95	95
Neuroticism							1												
Pearson Correlation								-.083	.614**	-.521**	-.348**	-.352**	-.029	.172	.067	-.414**	.588**	.541**	
Sig. (2-tailed)																			
N							95	95	95	95	95	95	95	95	95	95	95	95	95
Lie								1											
Pearson Correlation									-.116	.041	.258*	.161	-.041	-.051	-.293**	-.060	-.038	-.068	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
BDI									1										
Pearson Correlation										-.443**	-.327**	-.376**	.040	.275*	.036	.381**	.559**	.696**	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
ADF										1									
Pearson Correlation											.366**	.202	.089	-.501**	-.104	-.311**	-.246*	-.373**	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
AOD											1								
Pearson Correlation												.052	.439	.004	.765	.023	.008	.005	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
NEED4COG												1							
Pearson Correlation													.536**	-.311**	.033	-.246*	-.287**	-.373**	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
IQ													1						
Pearson Correlation														.028	-.262*	.012	-.179	-.155	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
LINKING														1					
Pearson Correlation															.077	.351**	.191	.391**	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
taf moral															1				
Pearson Correlation																.068	.323**	.254	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
McIntosh & Martin rumination scale																1			
Pearson Correlation																	.003	.062	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
Forlyce unhappy																	1		
Pearson Correlation																		.004	
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95
schizotypal personality questionnaire																		1	
Pearson Correlation																			.004
Sig. (2-tailed)																			
N									95	95	95	95	95	95	95	95	95	95	95

** . Correlation is significant at the 0.01 level (2-tailed).
* . Correlation is significant at the 0.05 level (2-tailed).

(1) Variables correlating with the WBSI

Table 7.1 shows that scores on the WBSI correlate positively with trait anxiety, neuroticism, BDI, linking, rumination, unhappiness, and schizotypal personality. All these correlations are highly significant (all p 's equivalent or less than .005), the relationship with linking was marginally significant after Bonferroni correction ($p=.004$). In addition, the WBSI correlates negatively with the AOD subscale of state vs. action orientation and need for cognition. Higher values on the AOD scale indicate greater action orientation. The negative correlation between need for cognition and the WBSI suggests that the more one likes to think the less they report using thought suppression in everyday life. The negative correlation between AOD and the WBSI indicates that state oriented participants are more likely to report engaging in thought suppression in everyday life.

All the variables that significantly correlated with the WBSI were then entered as predictors into a multiple regression model with WBSI scores as the dependent variable. The SPQ was not included in this regression model due to its lower response rate. The model was significant $F(1,83) 4.43 p < .001$. ($R^2 = .32$ adjusted $R^2 = .248$). However, of all the predictors in the model only McIntosh and Martin Rumination Inventory and Trait Anxiety significantly and independently predicted WBSI scores. This suggests that the propensity to use thought suppression in everyday life is best predicted by anxiety (as a trait) and the tendency to ruminate (i.e. experience frequent thought intrusions).

(2) Variables correlating with the Thought Control Questionnaire

Examination of the correlations with the TCQ in Figure 7.1 reveals a very different picture from those obtained for the WBSI. Thus, the TCQ correlates only with the Lie Scale and Rumination. However, these correlations are very weak and after applying the Bonferroni correction, can no longer be accepted as significant.

(3) The relation of the WBSI with the TCQ and its subscales

As pointed out in the introduction the TCQ has five subscales which assess mental control strategies via distraction, social interaction, worry, self-punishment and mental reappraisal. The total TCQ score is based on the sum of scores on these 5 subscales.

Contrary to predictions table 7.1 shows that there is no reliable correlation between the WBSI and TCQ ($r = .08, p = .44$). In view of this absence of correlation the relationship between the WBSI and each of the five subscales of the TCQ was examined.

TABLE 7.2 – CORRELATIONS BETWEEN THE WBSI AND THE TCQ SUBSCALES.

		WBSI	TCQ distraction	TCQ Social	TCQ Worry	TCQ Punishment	TCQ Reappraisal
WBSI	R	1	.04	-.20	.22*	.46**	-.28**
	Sig 2 tailed	.	.726	.052	.031	.000	.006
	N	95	95	95	95	95	95
TCQ distraction	R	.04	1	.05	.20	-.05	-.12
	Sig 2 tailed	.726	.	.625	.055	.626	.233
	N	95	95	95	95	95	95
TCQ Social	R	-.20	.05	1	-.12	-.05	.11
	Sig 2 tailed	.052	.625	.	.248	.626	.305
	N	95	95	95	95	95	95
TCQ Worry	R	.22	.20	-.12	1	.41**	.11
	Sig 2 tailed	.031	.055	.248	.	.000	.288
	N	95	95	95	95	95	95
TCQ Punishment	R	.46**	-.05	-.05	.41**	1	.02
	Sig 2 tailed	.000	.626	.626	.000	.	.826
	N	95	95	95	95	95	95
TCQ Reappraisal	R	-.28**	-.12	.11	.11	.02	1
	Sig 2 tailed	.006	.233	.305	.288	.826	.
	N	95	95	95	95	95	95

Table 7.2 above shows that the WBSI reliably correlates with three of the TCQ subscales, namely worry, punishment and reappraisal. The first two correlations are positive. Thus,

the higher one's tendency to suppress thoughts in everyday life the more likely the person is to report worry and punishment as their mental control strategy. In contrast, the correlation with reappraisal is negative indicating that the more frequently one reports reappraisal as a mental control strategy the less likely they are to suppress unwanted thoughts in everyday life.

Finally, participants scores on these subscales of punishment, worry and reappraisal were entered into a multiple regression model with WBSI scores as the dependent variable. The model was significant, $F(3,94) = 14.04$ $p < .001$, (R^2 of .32, adjusted $R^2 = .29$) and had only two significant predictors. These were the punishment and reappraisal subscales of the TCQ. Therefore, 30% of the variance in WBSI scores can be explained by the use of punishment and reappraisal mental control strategies.

IV. Discussion

The results of this study clearly supports previous research on the WBSI by replicating the often found pattern of clear relations between various psychopathological indices and the propensity to use thought suppression in everyday life. Thus, the more one reports using thought suppression in everyday life the higher one scores on various measures of psychopathology such as trait anxiety, neuroticism, BDI, linking, rumination, unhappiness, and schizotypal personality. Even just a cursory glance at these variables indicates that the WBSI correlates with anything negative, so that one could almost substitute these variables with a latent variable such as negative affectivity. This was supported by the results of a factor analysis which indicated only one latent factor was extracted when all of the psychopathological measures were entered into the model. This latent variable explained 54% of the variance overall. These results also extend the analysis of the relationship between the use of thought suppression and psychopathology by showing that the use of thought suppression is also positively related to previously uninvestigated variables such as unhappiness, rumination, schizotypal personality and linking.

One of the most important findings however was a negative correlation with action vs. state orientation and the results of the regression analyses. For example, the results clearly show that it is the state oriented individuals that suppress most in everyday life. However, research conducted by Kuhl (1994) has shown that state orientation is a relatively stable global personality attribute, that on its own is related to psychopathology and thought intrusion. Therefore, the results seem to suggest that state oriented individuals begin with a predisposition to experience rumination and thought intrusion particularly relating to future intentions and worries. Therefore, they may instigate thought suppression as a coping strategy. However, this may result in paradoxical effects (Chapter 3 suggests that state oriented individuals show greater thought rebounds) which then results in greater distress, psychopathology and intrusions.

It is important however that in the regression analysis it was only trait anxiety and rumination that came out as significant and independent predictors of WBSI scores. Therefore any possible relation existing between use of thought suppression in everyday life and state orientation seems to be mediated by anxiety and rumination, both of which are known to occur much more frequently in state oriented individuals.

This study also clearly indicates that the tendency to use thought suppression in everyday life is best predicted by rumination. Therefore, it seems we may have identified one of the main factors in the instigation of thought suppression, as indicated by the results of the multiple regression, or to look at it the other way it may be that thought suppression is a main causal factor in rumination. In addition, there is always the possibility that some other yet unknown variable independently predicts both thought suppression and rumination. However, this seems less likely since the present study attempted to investigate a wide variety of variables that have previously been related to thought suppression both theoretically and empirically. In addition, both Martin and Tesser (1996) and Erber and Wegner (1996) conceive models of intentional thought suppression whereby rumination and thought suppression operate cyclically with one being a cause of the other and visa versa. Martin and Tesser (1996) see rumination as the cause of thought suppression which then leads to more rumination when the rebound effect occurs. In

contrast Erber and Wegner (1996) see thought suppression as the cause of rumination which then leads to more thought suppression. The data reported here can not untangle which of these theories is the more likely to be correct, but represents the first empirical demonstration of a strong relationship between the use of thought suppression in everyday life and rumination, and verifies the theoretical relationships previously specified.

Finally, the results of the present study also shed some light on the possible relationship between the WBSI and the TCQ. Contrary to expectations there was no correlation between WBSI and total TCQ . However, it is interesting that when the subscales of the TCQ were examined separately and via a regression model, clear relations between the punishment and reappraisal subscales and the WBSI emerged. Participants using punishment as a mental control strategy reported greater use of thought suppression whereas participants using reappraisal as a mental control strategy used thought suppression less. The opposite directionality of these subscales can explain why the overall correlation may be insignificant. In addition, this opposite directionality suggests that using an overall TCQ score may not be warranted.

CHAPTER EIGHT

Individual differences and the use of thought suppression in everyday life in a sample of old adults

Although there is a growing body of research examining the reliability and factor structure of the WBSI as well as its relationship with various measures of psychopathology there are virtually no studies that have examined the tendency to suppress thoughts in older people. The main purpose of this study was to see if the pattern of correlations found in Chapter 7 between measures of thought suppression (such as the White Bear Suppression Inventory and Thought Control Questionnaire) and various indices of personality and psychopathology could be replicated in a sample of older adults. There are reasons to believe they might not be. For example, Schacter (1996) has argued that aging has a great impact on the frontal lobes, with older adults having impaired frontal lobe functioning. In line with this idea it is known that the frontal lobes play a role in behavioural inhibition (Stuss & Benson 1987). They may also play a role in thought inhibition. Thus, Hasher and Zaks (1979) have shown that older adults have reduced inhibitory function. One could therefore suggest the older adults may well be less able at a suppression task than younger people.

In addition, there is much to suggest that older adults may have more to suppress than younger adults. Lynch and George (2002) refer to the well-known growth in depressive symptomology with aging. This is in line with the prevalent view that mental health problems rise as age increases. However, Krishnan et al. (2002) point out that perhaps it is problems with physical health (known to occur with aging) that prompt depression in older people. In line with this suggestion Nelson (2001) has found that the rates of depression are higher in older people from nursing homes or medical inpatients in comparison to community dwelling non-institutionalised older people. In addition, Roberts et al. (1997) in their study attributed age related effects on depression to physical disabilities rather than participants chronological age per se.

Therefore, on a purely theoretical level, one could argue that with increasing age there is no doubt that one's health starts to fail and additionally others around may start to die (friends and family) resulting in one's increased awareness of mortality. Therefore, it seems logical to suggest that older people may have more worries than younger people with regards to their health and life coming to an end. One could therefore suggest that the elderly may attempt to suppress these thoughts. If one then couples this idea with the findings of reduced inhibitory function with an increased one can see a problem. Older people may have more to worry about and experience intrusive thoughts about these worries, yet at the same time they may have less control over these intrusions due to their reduced inhibitory function. In light of these ideas the aim of the present study was to investigate overall well being in a sample of healthy community dwelling older adults and examining the frequency with which they report using thought suppression and attempting mental control.

The current Chapter reports the results of a correlational questionnaire study using 65 older community dwelling adults. In line with the methods used on the sample of younger adults (Chapter 7) two different measures of thought suppression tendencies in everyday life were used. These were, The White Bear Suppression Inventory (Wegner & Zanakos, 1994) and the Thought Control Questionnaire (Wells & Davies, 1994). Using this methodology it is possible to examine how the propensity to use thought suppression in everyday life is linked to various indices of psychopathology such as depression, anxiety and neuroticism in older adults. As with the younger sample (Chapter 7) the results of this study will shed further light on the previous work of Wegner and Zanakos 1994, Muris et al., 1996; Rassin et al., 1999, 2000, 2001), all of whom have found significant correlations between the propensity to suppress thoughts and psychopathology, albeit using young samples.

The aim of the current study was largely exploratory in its nature. Thus, specific predictions regarding the relations between the individual difference measures and the tendency to suppress thoughts were not explicitly made a priori. However, there were two specific predictions made regarding the older samples' scores on the WBSI and TCQ, it

was expected that the older adults would demonstrate significantly higher scores on both inventories assessing tendency to suppress thoughts.

One previous study which has examined the effects of mental control on older adults is the study of Champion (1998). In this study 45 participants completed a laboratory thought suppression experiment where in period 1 all participants were suppressing thoughts of a white bear and in period 2 all participants were told to continue thought verbalisation but that they could think about anything they liked in addition they were asked to press a buzzer if they happened to think about a white bear. Crucially in this experiment the 45 participants were divided into 3 distinct age groups. Thus 15 participants were aged between 20 and 40 years. 15 participants were aged between 41 to 60 years and 15 participants were aged between 61 and 80 years. The results indicated that irrespective of verbalisation period (1 vs. 2) older participants always buzzed less. Thus, they appeared to be better at thought suppression and experience little intrusion following thought suppression. Despite the usefulness of this study it did not directly examine a participants propensity to use thought suppression in everyday life as the current study aimed to. However, these results suggest an alternative prediction, that older participants may well either experience less thought intrusion or be more successful at controlling intrusions possibly resulting in less use of thought suppression in everyday life.

Finally, the current study will also compare the young and older participants on their mean scores on the individual difference variables. As many of these individual difference variables measure psychopathologies one can conceptualise these scores as giving a general index of mental health. This will enable an examination of the general mental health of a sample of young adults contrasted with a sample of older adults.

II. Method

(1) Participants

Questionnaire packets were sent out to 122 adults all of whom were members of an existing pool of healthy and community dwelling older adults maintained at the Department of Psychology. All of the older participants were retired, healthy adults. They did not report any vision, hearing or physical mobility problems nor any of the following: serious head injury, stroke, mental health and/or memory problems that had been diagnosed by their physician. Of these 122 participants contacted 65 participants completed the questionnaires and 57 participants returned the questionnaires uncompleted. Thus 54 % of those contacted took part in this questionnaire based study. The age range was from 64 to 84 years old ($M = 73$, $SD = 5.5$); out of the 65 participants, 30 of the older adult sample were male, 30 were female and 5 did not report their gender.

(2) Design and procedure

This study was conducted entirely by postal questionnaire, the following inventories were sent out with a covering letter to participants. All participants were asked to fill in the questionnaires in the order they appeared (as below). It was made clear to participants that there was no time limit to them filling in the questionnaires and that they were to be completed in spare moments and sent back to the experimenter in a pre-paid envelope.

(1) Questionnaires used

1. Spielberger Trait and State Anxiety Inventory STAI - (Spielberger et al. 1983)
2. White Bear Suppression Inventory WBSI – (Wegner & Zanakos, 1994)
3. Marlowe Crowne Scale – (Crowne & Marlowe, 1964)
4. Thought Control Questionnaire TCQ – (Wells & Davies, 1994)
5. Eysenck EPQ-R – (Eysenck, Eysenck, & Barrett, 1985)
6. Beck Depression Inventory BDI – (Beck, Rush, Shaw, & Emery, 1979)
7. Need for Cognition Scale – (Cacioppo & Petty, 1982)

8. State / Action Orientation Questionnaire – (Kuhl, 1993)
9. Linking Questionnaire – (McIntosh, Harlow & Martin, 1995)
10. Thought Action Fusion TAF – (Shafran, Thordarson & Rachman, 1996)
11. Rumination Inventory - (McIntosh & Martin, 1992)
12. Fordyce Unhappiness Rating Scale - (Fordyce, 1988)
13. Schizotypal Personality Inventory SPQ - (Raine, 1991)

III. Results

All of the variables used in the following analyses were screened for outliers and extreme values. Six participants were excluded as their scores on some variables were extreme values. The first analysis will examine how the individual difference variables correlated with the participants scores on the WBSI. Table 8.1 below shows these correlations.

A Bonferroni correction was computed for all these analyses to avoid capitalising on chance by calculating so many correlations (Bonferroni correction = $0.05/17 = 0.003$), therefore only correlations with p values of .003 or below will be examined.

TABLE 8.1 – THE CORRELATIONS BETWEEN THE WBSI AND TCQ AND ALL INDIVIDUAL DIFFERENCE MEASURES COLLECTED

Correlations

	WBSI	TCQ total	TRAITANX	MARLOWE	Psychoticism	Extraversion	Neuroticism	Lie	BDI	AOE	AOD	NEED4COG	LINKING	Inf. moral	McIntosh & Martin rumination scale	Fordyce unhappy	schizotypal personality questionnaire
Pearson Correlation	.441**	.441**	.462**	-.441**	-.047	.025	.315*	-.354**	.179	-.152	-.406**	-.360**	.052	.040	.312*	.156	.389**
Sig. (2-tailed)	.001	.001	.000	.001	.725	.853	.016	.006	.180	.267	.002	.006	.700	.769	.020	.238	.003
N	59	57	57	58	58	58	58	58	58	55	55	57	57	57	55	59	57
Pearson Correlation	.441**	.441**	.411**	-.250	-.281*	-.130	.228	-.338*	.166	-.168	-.301*	-.355**	-.118	.289*	.338*	.261*	.264
Sig. (2-tailed)	.001	.001	.002	.061	.036	.339	.091	.011	.221	.225	.027	.008	.387	.032	.012	.050	.052
N	57	57	55	57	56	56	56	56	56	54	54	55	56	55	54	57	55
Pearson Correlation	.462**	.411**	.1	-.415**	-.211	-.292*	.616**	-.420**	.467**	-.392**	-.716**	-.417**	.066	-.013	.365**	.365**	.339*
Sig. (2-tailed)	.000	.002	.5	.001	.119	.029	.000	.001	.000	.004	.000	.002	.631	.923	.007	.005	.011
N	57	55	57	56	56	56	56	53	56	53	53	55	55	53	53	57	56
Pearson Correlation	-.441**	-.250	-.415**	.1	-.191	.131	-.311*	.639**	-.330*	.168	.315*	.203	-.127	.248	-.077	-.297*	-.364**
Sig. (2-tailed)	.001	.061	.001	.1	.155	.331	.019	.000	.012	.222	.019	.133	.347	.065	.579	.023	.006
N	58	57	56	58	57	57	57	57	57	55	55	56	57	55	58	58	56
Pearson Correlation	-.047	-.281*	-.211	-.191	.1	.148	-.219	.002	-.048	.058	.162	.021	.298*	-.268*	-.191	-.060	-.049
Sig. (2-tailed)	.725	.036	.119	.155	.58	.267	.099	.989	.725	.676	.243	.876	.026	.046	.167	.657	.721
N	58	56	56	57	58	58	58	58	57	54	54	56	56	56	54	58	56
Pearson Correlation	.025	-.130	-.292*	.131	.148	.1	-.097	.073	-.192	.067	.072	.016	.219	.093	-.108	-.013	-.227
Sig. (2-tailed)	.853	.339	.029	.331	.267	.58	.470	.587	.152	.628	.606	.908	.104	.494	.438	.923	.092
N	58	56	56	57	58	58	58	58	57	54	54	56	56	56	54	58	56
Pearson Correlation	.315*	.228	.616**	-.311*	-.219	-.097	.1	-.266*	.624**	-.377**	-.617**	-.243	-.089	.129	.495**	.467**	.422**
Sig. (2-tailed)	.016	.091	.000	.019	.099	.470	.1	.042	.000	.005	.000	.071	.514	.344	.000	.000	.001
N	58	56	56	57	58	58	58	58	57	54	54	56	56	56	54	58	56
Pearson Correlation	-.354**	-.338*	-.420**	.639**	.002	.073	-.268*	.1	-.266*	.179	.358**	.007	-.045	.386**	-.290*	-.358**	-.353**
Sig. (2-tailed)	.006	.011	.001	.000	.989	.587	.042	.58	.046	.000	.008	.960	.740	.003	.034	.006	.008
N	58	56	56	57	58	58	58	58	57	54	54	56	56	56	56	58	56
Pearson Correlation	.179	.166	.467**	-.330*	-.048	-.192	.624**	-.266*	.1	-.423**	-.542**	-.309*	-.424**	-.212	.388**	.369**	.423**
Sig. (2-tailed)	.180	.221	.000	.012	.725	.152	.000	.046	.58	.001	.000	.021	.001	.117	.004	.004	.001
N	58	56	56	57	57	57	57	57	58	54	54	56	56	56	54	58	56
Pearson Correlation	-.152	-.168	-.392**	.168	.058	.067	-.377**	.179	-.423**	.1	-.495**	.198	-.424**	.052	-.331*	-.323*	-.080
Sig. (2-tailed)	.267	.225	.004	.222	.676	.628	.005	.196	.001	.000	.000	.147	.001	.713	.016	.016	.570
N	55	54	53	55	54	54	54	54	54	55	55	55	54	52	52	55	53
Pearson Correlation	-.406**	-.301*	-.716**	.315*	.162	.072	-.617**	.358**	-.542**	.495**	.1	.489**	-.217	.088	-.413**	-.579**	-.217
Sig. (2-tailed)	.002	.027	.000	.019	.243	.606	.000	.008	.000	.000	.000	.000	-.217	.531	.002	.000	.118
N	55	54	53	55	54	54	54	54	54	55	55	55	54	53	52	55	53
Pearson Correlation	-.360**	-.355**	-.417**	.203	.021	.016	-.243	.007	-.309*	.198	.489**	.1	-.144	-.154	-.156	-.156	-.216
Sig. (2-tailed)	.006	.008	.002	.133	.876	.908	.071	.960	.021	.147	.000	.021	.294	.263	.265	.245	.113
N	57	55	55	56	56	56	56	56	56	55	55	57	55	55	53	57	55
Pearson Correlation	.052	-.118	.066	-.127	.298*	.219	.089	-.045	-.424**	-.424**	-.217	-.144	.1	-.338*	.210	.107	.138
Sig. (2-tailed)	.700	.387	.631	.347	.026	.104	.514	.740	.424**	.001	.115	.294	.1	.012	.128	.430	.314
N	57	56	55	57	56	56	56	56	.424**	56	54	55	57	55	54	57	55
Pearson Correlation	.040	.289*	-.013	.248	-.268*	.093	.129	-.386**	-.212	.052	.088	-.154	-.338*	.1	.029	-.080	-.134
Sig. (2-tailed)	.769	.032	.923	.065	.046	.494	.344	.003	.117	.713	.088	.263	.012	.1	.834	.554	.330
N	57	55	55	56	56	56	56	56	56	53	53	55	55	57	53	57	55
Pearson Correlation	.312*	.338*	.365**	-.077	-.191	-.108	.495**	-.290*	.388**	-.331*	-.413**	-.156	-.210	.029	.1	.244	.234
Sig. (2-tailed)	.020	.012	.007	.579	.167	.438	.000	.034	.004	.016	.002	.265	.128	.834	.073	.073	.091
N	55	54	53	55	54	54	54	54	54	52	52	53	54	55	55	55	53
Pearson Correlation	.156	.261*	-.265**	-.297*	-.060	-.013	-.467**	-.358**	-.369**	-.323*	-.579**	-.156	-.107	-.080	-.244	.1	.208
Sig. (2-tailed)	.238	.050	.005	.023	.657	.923	.000	.006	.004	.016	.000	.245	.430	-.554	.073	.073	.120
N	59	57	57	58	58	58	58	58	58	55	55	57	57	57	55	59	57
Pearson Correlation	.389**	.264	.339*	-.364**	-.049	-.227	.422**	-.353**	-.423**	-.080	-.217	-.118	.138	-.134	.234	.208	.1
Sig. (2-tailed)	.003	.052	.011	.006	.721	.092	.001	.008	.001	.570	.118	.113	.314	.080	.091	.120	.003
N	57	55	56	56	56	56	56	56	56	53	53	55	55	55	57	57	57

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

(1) Variables correlating with the WBSI

Table 8.1 shows that the scores on the WBSI correlate positively and significantly with: Trait Anxiety, total TCQ, and schizotypal personality. Additionally, the WBSI correlates negatively with the Marlowe Crowne Scale, the Eysenck lie scale, state vs. action orientation, need for cognition. All of these correlations were highly significant, but the relationships between the WBSI, lie scale and need for cognition were only marginally significant $p=.006$. All of the variables significantly correlating with the WBSI scores were entered as predictors into a multiple regression model with WBSI scores as the dependent variable. The model was significant $F(7,49) = 3.96$ $p = .002$ ($R^2 = .40$, adjusted $R^2 = .30$). However, only TCQ total significantly predicted WBSI scores in this model. This suggests that the tendency to suppress thoughts in older adults is best predicted by TCQ scores. This variable explains 27% of the variance in WBSI scores.

(2) Variables correlating with the TCQ

Examination of the correlations with TCQ in figure 8.1 reveals that it correlates positively with WBSI and Trait Anxiety. Furthermore, TCQ scores correlates negatively only marginally with the Need for Cognition $p = .008$. All of these significant correlates of the TCQ were entered into a regression model with the TCQ score as the dependent variable. This model was significant $F(3,52)=6.74$, $p=.001$ ($R^2 = .29$, adjusted $R^2 = .25$) and indicated that TCQ scores were only significantly predicted by WBSI scores.

(3) The relation of the TCQ subscales with the WBSI

The results have shown that the TCQ correlates with the WBSI in the older adult sample strongly and positively ($r=.44$) but in addition the current study can also examine which of the TCQ subscales are contributing to the overall relationship between TCQ and WBSI (See Table 8.2 below).

TABLE 8.2 – CORRELATIONS BETWEEN THE WBSI AND THE TCQ SUBSCALES.

		WBSI	TCQ distraction	TCQ Social	TCQ Worry	TCQ Punishment	TCQ Reappraisal
WBSI	R	1	.25	.19	.31*	.22	.36**
	Sig 2 tailed	.	.06	.16	.02	.10	.006
	N	57	57	57	57	57	57
TCQ distraction	R	.25	1	-.11	.31*	.26	.38**
	Sig 2 tailed	.06	.	.42	.02	.05	.004
	N	57	57	57	57	57	57
TCQ Social	R	.19	-.11	1	-.001	.11	.05
	Sig 2 tailed	.16	.42	.	.99	.41	.71
	N	57	57	57	57	57	57
TCQ Worry	R	.31*	.31*	-.001	1	.42**	.35**
	Sig 2 tailed	.02	.02	.99	.	.001	.007
	N	57	57	57	57	57	57
TCQ Punishment	R	.22	.26	.11	.42**	1	.38**
	Sig 2 tailed	.10	.05	.41	.001	.	.004
	N	57	57	57	57	57	57
TCQ Reappraisal	R	.36**	.38**	.05	.35**	.38**	1
	Sig 2 tailed	.006	.004	.71	.007	.004	.
	N	57	57	57	57	57	57

Table 8.2 above shows that all correlations are positive but most of the impact comes through worry and reappraisal. As with the young sample a regression model was now created predicting WBSI scores from the TCQ subscales. The final model accepted contains no significant predictors but overall is still significant, mainly due to TCQ reappraisal being close to significance. Thus, the model is significant $F(5,56) = 2.69$ $p = .031$. The R^2 is .21, the adjusted R^2 is .13. This model explains 13% of the variance in WBSI scores. Indeed, if the model is re-run with only TCQ reappraisal as the predictor it is now significant within the model and explains 11% of the variance in WBSI scores.

(4) The Differences between the young and old samples on their mean scores on the individual difference variables

Finally, in order to examine the psychological well-being of older adults in comparison to young people their mean scores on the individual difference variables were directly compared in a series of t-tests (see table 8.3 below for means and significance values).

TABLE 8.3 - MEAN SCORES ON THE INDIVIDUAL DIFFERENCE VARIABLES AS A FUNCTION OF AGE. EFFECTS FOR EACH VARIABLE WERE TESTED FOR SIGNIFICANCE WITH T-TESTS.

SIGNIFICANT VALUES AFTER A BONFERONI CORRECTION WAS MADE ARE INDICATED BY A DOUBLE ASTERISK.

	old	Young	t-value	Significance
	Mean	Mean		
State Anxiety	32.65	39.41	4.39	p<.0001 **
Trait Anxiety	34.61	43.29	5.6	p<.0001 **
WBSI	44.63	51.82	4.091	p<.0001 **
Social Desirability (Marlowe Crowne)	19.19	14.95	-5.88	p<.0001 **
TCQ total	57.42	65.29	5.09	p<.0001 **
TCQ distraction	16.42	15.29	-1.84	p=.068
TCQ social	9.58	13.46	6.31	p<.0001 **
TCQ worry	9.82	10.87	2	p=.047
TCQ punishment	9.28	10.62	2.66	p=.009
TCQ reappraisal	12.21	15.33	5.12	p<.0001 **
Psychoticism	1.81	2.57	2.33	p=.021
Extraversion	5.88	8.76	5.499	p<.0001 **
Neuroticism	4.16	6.97	5.36	p<.0001 **
Lie	6.33	4.16	-5.57	p<.0001 **
BDI	3.56	5.65	2.8	P=.004
AOF	7.44	5.2	-4.12	p<.0001 **
AOD	7.89	5.45	4.5	p<.0001 **
AOP	8.29	8.48	0.083	p=.934
Linking	9.28	9.03	0.415	p=.679
Need for Cognition	22.18	29.66	1.2	P=.23
TAF moral	30.56	19.89	-6	p<.0001 **
McIntosh & Martin Rumination Scale	43.43	50.08	5.1	p<.0001 **
Fordyce unhappy	12.76	18.88	3.2	p=.001 **
Schizotypal Personality Questionnaire	13.09	19.93	3.58	p=.001 **

The above figure shows that overall the older adults seem to show significantly lower scores on virtually all indices of psychopathology when compared to young participants. Thus the older adults show significantly lower levels of anxiety (State and Trait), neuroticism, depression, rumination, unhappiness, schizotypal personality and many of its subscales. Overall the picture is that the older adults appear to be better adjusted than the younger participants. Interestingly the subscales of the TCQ above show that older adults are less likely to use social methods of mental control or reappraisal.

IV. Discussion

The aim of this study was to explore the personality correlates of the tendency to use thought suppression in everyday life in a sample of older adults. In addition, this study aimed to compare the pattern of results in older adults to the results found in a sample of younger adults (Chapter 7).

As described in Chapter 7, in the sample of young adults, WBSI scores were related positively to trait anxiety, neuroticism, BDI, rumination, unhappiness, schizotypal personality. In addition the WBSI correlated negatively with AOF & AOD (State vs Action orientation). In contrast, in the sample of older adults, tested in the present study WBSI scores were positively related to Trait Anxiety, total TCQ, and Schizotypal Personality and negatively to the Marlowe Crowne Scale, the Eysenck Lie Scale, AOD (State vs. Action orientation) and need for cognition.

However, when entered into a regression model only TCQ total scores significantly predicted WBSI scores.

Thus, there is some commonality in young and older adults in that, WBSI scores are related to elevated Trait Anxiety and Schizotypal Personality in both young and older people. In addition, both younger and older adults demonstrate negative correlations with state vs. action orientation, suggesting that in both age groups it is state oriented individuals who suppress their thoughts the most. However, it seems that in young people WBSI scores are additionally related to other psychopathologies, although this may be

due to the elderly showing less psychopathology overall (See Table 8.3). Interestingly, in the elderly the TCQ and WBSI are highly related, something which is completely absent in the young sample. Additionally, in both the young and old sample it appears that State oriented individuals are the ones suppressing most. Of key importance is that in the elderly sample the WBSI scores correlate strongly and negatively with the Marlowe Crowne scores. This cautions us to be wary of the older adults data as it is clear they are attempting to answer the questions in a manner which shows them in a favourable light. Interestingly, the younger sample are not answering in a socially desirable manner and may therefore represent a more accurate picture of the relationships between individual differences and psychopathology.

The current data shows that the mental control strategies and indeed their very deployment is different in a sample of older adults when compared to a sample of younger adults. When examining the findings in relation to the mean differences on the scales themselves, the older adults report using thought suppression much less than the younger adults and indeed they report much lower levels of all psychopathologies. There are two possible explanations for this discrepancy. First, perhaps the older adults are genuinely more mentally healthy than the younger adults and as a result of their reduced anxiety, depression, rumination and neuroticism have no need to suppress their unwanted thoughts as they have less of them to start with. The second explanation considers the fact that the older adults may in fact be similar to the younger adults in their levels of psychopathology but may under-report these levels when answering these questionnaires. This latter argument will be explored in detail in the next Chapter on Repression.

Finally, one finding of interest is that this study suggests the strategies of mental control used by young and old adults are different. The TCQ was designed to measure a person's use of various strategies of control, thus it assesses control by distraction, social methods, worry, punishment and reappraisal. Table 8.3 examined the mean scores of older and younger participants on these sub scales and showed that whilst young and old make similar use of distraction, worry and punishment the older adults make significantly less use of social and re-appraisive methods of mental control.

CHAPTER NINE

Psychological well-being and repressive coping style in young and old adults

Two previous studies described in Chapters 7 and 8 examined the relationship between the tendency to use thought suppression in everyday life and a variety of individual difference variables in a sample of young and older adults. The results showed that the variables predicting the use of thought suppression in the older sample were different from the variables predicting the use of thought suppression in younger adults. One unexpected finding from the previous chapter was that the older sample demonstrated significantly greater levels of emotional well being (as assessed by lower scores on virtually all indices of psychopathology) than the younger sample. At the same time, older adults showed significantly higher scores on the Marlowe Crowne Social Desirability Scale that measures the extent to which people try to present themselves in a favourable light.

However, high scores on the Marlow Crowne scale have been shown to be one of the crucial components in defining a person with a Repressive coping style (Weinberger et al. 1979). Another feature necessary to be classed as a repressor is the presence of low scores on a measure of trait anxiety. It would appear that the majority of older adults show this very pattern, low scores on trait anxiety and high scores on the Marlow Crowne scale. Therefore the question arose as to whether the older adults were genuinely reporting their true level of mental health or were repressors.

In addition, the previous study (Chapter 8) also demonstrated that older adults have much higher scores on TAF moral. This subscale of Thought Action Fusion assesses the extent to which one believes thinking about an act is as bad as engaging in the actual act. For example, if one thinks about being unfaithful to their partner is this as bad as actually being unfaithful? Or if one thinks about shouting at a friend for no reason is this as bad as actually shouting at the friend? With this in mind the results of Chapter 8 indicate that older adults have a greater tendency to believe that thinking about something negative is as bad as actually engaging in the act. In contrast younger adults do not show this

tendency, viewing thought as less negative than actual action. Therefore, it seems for an older person to have a negative thought about a possible action may be more worrying and threatening if they truly believe that merely having the thought is bad. One could suggest that older participants may therefore be motivated to avoid having such thoughts and this could be achieved through either conscious thought suppression or an unconscious automatic repression.

One further finding which supports the interpretation that older adults may be more repressive is that in the older sample the use of thought suppression was negatively correlated with the participants scores on Marlowe Crowne scale. This negative relationship in the older sample suggests that as the Marlowe Crowne scores rise the use of thought suppression falls. This exact relationship would be expected if one were trying to present oneself in an overly favourable light. Thus, the greater ones scores on Social Desirability scales the more one may deny having negative intrusive thoughts. This finding also suggests that repressors may make less use of intentional thought suppression, this will be investigated in the present study. One previous study by Champion (1998) has investigated repression and thought suppression in a laboratory experiment and found that repressors were consistently better at laboratory thought suppression tasks. However, this data needs to be viewed with caution, as it is subject to two alternative explanations. It could be that repressors are genuinely better at suppressive forms of mental control, or perhaps more likely they deliberately under-report thought intrusion to appear better at the task of thought suppression.

The present study therefore had two main aims. The first aim was to assess the rates of repression in both the young and older adult samples on the basis of the method developed by Weinberger et al. (1979). Using this method repressors are classified as people who score above the upper quartile on measures of defensiveness (as assessed by the Marlowe Crowne scale, Crowne & Marlowe, 1964) and below the median on an anxiety inventory (the Taylor Manifest Anxiety Inventory or the Spielberger et al. (1983) STAI - Trait anxiety inventory). In the current study the Spielberger et al. (1983) measure of trait anxiety was used to classify repressors and non-repressors as it is more often used

in studies of anxiety. In addition several studies in the repression literature have reported using the STAI for classification of repressive coping style (Derakshan and Eysenck, 1998; Tomarken and Davidson, 1994).

The second aim was to examine which individual difference variables were related to being a repressor or non-repressor in both younger and older adults. Thus, the repressors and non-repressors in both the younger and older adult samples will be compared on the basis of their mean scores on the individual difference measures collected.

II. Method

(1) Participants

The sample of young participants consisted of 97 participants who took part in the large scale study outlined in Chapter 2. Two of the younger participants were excluded from this study due to very extreme values on some of the individual difference measures. Therefore, the final sample of young adults consisted of 95 participants. The sample of older participants consisted of 65 older adults who took part in a questionnaire study described in Chapter 8. However, 9 participants were excluded from the older sample as they filled the questionnaires in incorrectly or had extreme scores on the individual difference measures. Therefore, the final sample for the older adults comprises of 56 participants. Both young and older samples completed several individual difference questionnaires including the WBSI, Marlowe-Crowne Scale and Trait Anxiety Inventory (See Chapter 8 method section p161).

(2) Assessment of the repressive coping style in young and old samples

The first task was to identify the repressors and non-repressors within these samples. This was done using a method previously developed by Weinberger et al (1979). The sample of young adults (N = 95) was first dichotomised according to the normative values from the original scales. Thus, participants scoring below the normative median for the Spielberger et al. (1983) trait anxiety inventory (35.82) and above the upper quartile on

the Marlowe Crowne scale (19.5) were classed as repressors. The rest of the sample were classed as non-repressors.

The sample of older adults (N = 56) was dichotomised once again according to the normative values from the original scales. Regarding the Marlowe Crowne scale quartile, there is no normative data on an elderly sample, and therefore the cut off remains 19.5. However, there is normative information for an older sample on the Speilberger trait anxiety inventory where the median score is 32.82. This value was used to dichotomise the older adults into a high and low anxiety group. Therefore, repressors in the older sample will be participants scoring below 32.82 on the Trait Anxiety Inventory and above 19.5 on the Marlowe Crowne scale. The rest of the older adult sample were classified as non-repressors.

III. Results

(1) The prevalence of repression in young and old sample

As a result of procedures described in the previous section, in a sample of young adults, 9 participants out of 95, were classified as repressors. Thus, only 9.5 % of the sample were repressors and 90.5 % were not. This percentage, is in line with the findings of previous studies which suggest that repressors represent between 10 to 20 % of the general population (Myers, 2000). In contrast, in a sample of older adults 20 out of 56 participants were classified as repressors. Thus, 36% of the sample were repressors and 64% were not. Therefore, in the present study the rate of repression is four times higher in the older sample in comparison to the young sample.

(2) Comparison of repressors and non-repressors in the young sample

Next, it was interesting to compare the mean scores on the individual difference variables separately for young repressors and young non-repressors. Table 9.1 shows the means and the results of statistical analyses in the young sample. When examining the means of repressors and non-repressors in Table 9.1 it is clear that some differences exist in several of the individual difference variables used. For example, in addition to Trait Anxiety,

young repressors have lower scores than non-repressors on State Anxiety, depression, neuroticism, Fordyce Unhappiness Rating, schizotypy, AOF scale of state vs. action orientation and linking. On the other hand, they have higher scores not only on Social Desirability (which is expected given that they were classed as repressors partly on the basis of high scores on this scale), but also on the Eysenck Lie Scale. Their scores on Need For Cognition as well as Thought Action Fusion (TAF) are also markedly higher than those for non-repressors, however, these differences are not significant possibly due to lack of power. Moreover, if one uses the Bonferroni correction to control for multiple comparisons made, young repressors score significantly lower than young non-repressors only on Linking.

TABLE 9.1 – THE MEAN SCORES ON INDIVIDUAL DIFFERENCE VARIABLES AS A FUNCTION OF GROUP (NON-REPRESSORS VS. REPRESSORS) IN A SAMPLE OF YOUNG ADULTS. THE SIGNIFICANCE LEVELS MARKED WITH TWO ASTERISKS REPRESENT THE VALUES REMAINING SIGNIFICANT AT .05 LEVEL AFTER A BONFERONI CORRECTION. TRAIT ANXIETY AND MARLOWE CROWNE SCORES DO NOT APPEAR BELOW AS THESE WOULD BE DIFFERENT BY DESIGN.

Young sample	non repressor	non repressor	repressor	repressor	t - value	Significance
	N	Mean	N	Mean		
STATEANX	86	40.02 (sd 9.43)	9	33.56 (sd 7.95)	1.98	p=.05
WBSI	86	52.45 (sd 9.31)	9	46 (sd 11.06)	1.96	p=.05
TCQ total	86	65.24 (sd 9.67)	9	65.78 (sd 8.01)	-0.16	P=.875
Psychoticism	86	2.62 (sd 1.86)	9	2.11 (sd 1.54)	0.78	P=.437
Extraversion	86	8.65 (sd 3.49)	9	9.78 (sd 3.38)	-0.92	P=.358
Neuroticism	86	7.2 (sd 3.02)	9	4.67 (2.45)	2.43	p=.01
Lie	86	3.94 (sd 2.41)	9	6.22 (1.92)	-2.73	P=.007
BDI	86	6.05 (sd 5.16)	9	1.89 (sd 2.02)	2.34	p=.01
AOF	84	4.93 (sd 3.02)	9	7.78 (sd 4.18)	-2.58	p=.01
AOD	84	5.26 (sd 3.06)	9	6.33 (sd 3.16)	-0.85	p=.40
AOP	84	8.45 (sd 2.04)	9	8.78 (sd 1.8)	-0.459	p=.64
NEED4COG	88	27.73 (sd 36.71)	9	47.22 (sd 30.82)	-1.53	p=.13
SPQ	50	21.2 (sd 11.73)	5	8 (sd 5.43)	2.46	p=.01
LINKING	75	9.44 (sd 3.35)	9	5.44 (sd 4.69)	3.2	p=.002 **
taf moral	75	19.47 (sd 9.27)	9	24.56 (sd 9.79)	-1.56	p=.16
Rumination scale	76	50.29 (sd 6.76)	9	48.33 (sd 4.8)	0.841	p=.40
Fordyce unhappy	76	19.67 (sd 11.82)	9	12.22 (sd 9.39)	1.82	p=.072
IQ	70	106.75 (14.28)	8	113.12 (20.7)	-1.14	p=.259

(3) Comparison of repressors and non-repressors in the older sample

The above analysis comparing younger non-repressors and repressors on their mean scores on the individual difference measures collected in this study was also calculated for the older adult sample.

When examining the means of repressors and non-repressors in table 9.2 it is clear that differences exist on several of the individual difference variables used. Thus, older repressors score lower than older non-repressors on WBSI, TCQ, neuroticism, depression, linking, rumination, unhappiness and SPQ. Furthermore, older repressors have higher scores than older non-repressors on Eysenck Lie Scale, State vs. action orientation (AOF, AOD, AOP) and need for cognition.

If one uses a Bonferoni correction to adjust for the high number of comparisons being made older repressors score significantly lower than non-repressors on neuroticism and depression. In addition, older repressors score significantly higher than non-repressors on Eysenck Lie Scale, State vs. action orientation (AOD). Finally, older repressors have lower scores on the WBSI, TCQ and SPQ which are of borderline statistical significance.

TABLE 9.2 - THE MEAN SCORES ON THE INDIVIDUAL DIFFERENCE MEASURES AS A FUNCTION OF GROUP (NON REPRESSORS VS. REPRESSORS) IN A SAMPLE OF OLDER ADULTS. SIGNIFICANCE VALUES MARKED WITH A DOUBLE ASTERISK REPRESENT VALUES REMAINING SIGNIFICANT AT .05 LEVEL AFTER A BONFERONI CORRECTION. TRAIT ANXIETY AND MARLOWE CROWNE SCORES DO NOT APPEAR BELOW AS THESE WOULD BE DIFFERENT BY DESIGN.

Older sample	non repressor		repressor		t - value	Significance
	N	Mean	N	Mean		
STATEANX	36	35.61 (sd 8.59)	20	26.8 (sd 5.51)	4.11	p=.001 **
WBSI	36	46.36 (sd 7.56)	20	40.2 (sd 9.03)	2.72	p=.009
TCQ total	36	59.33 (sd 7.1)	19	53.21 (sd 9.53)	2.7	p=.009
Psychoticism	36	1.74 (sd 2.3)	20	1.9 (sd 1.52)	-0.276	p=.78
Extraversion	35	5.51 (sd 3.02)	20	6.8 (sd 3.71)	-1.39	p=.168
Neuroticism	35	5.17 (sd 3.26)	20	2.15 (sd 2.03)	4.23	p=.001 **
Lie	35	5.49 (sd 2.64)	20	8.1 (sd 2.17)	-3.7	p=.001 **
BDI	35	4.17 (sd 2.8)	20	2.05 (sd 1.67)	3.52	p=.001 **
AOF	34	6.76 (sd 3.05)	19	8.84 (sd 2)	-2.66	p=.01
AOD	34	6.85 (sd 2.63)	19	10.21 (sd 1.51)	-5.57	p=.001 **
AOP	34	7.71 (sd 2.29)	19	9.15 (sd 1.77)	-2.39	p=.021
NEED4COG	35	15.6 (sd 37.05)	19	34.74 (sd 26.22)	-2.28	p=.027
LINKING	35	9.48 (sd 9.49)	20	7.25 (sd 4.19)	1.99	p=.05
taf moral	36	30.38 (sd 12.11)	18	32.67 (sd 11.96)	-0.65	p=.51
Rumination scale	32	44.82 (sd 8.62)	20	41.05 (sd 6.39)	1.69	p=.097
Fordyce unhappy	36	14.61 (sd 11.07)	20	9.6 (sd 7.65)	1.8	p=.078
SPQ	36	14.78 (sd 7.63)	19	8.79 (sd 5.22)	3.06	p=.004

In comparison to the young sample, the results of the old sample are stronger and more straightforward. This may reflect the fact that in the older sample there are a higher proportion of repressors and therefore higher power. In this sample, repressors seem to rate themselves as having significantly less psychopathology (anxiety - State, neuroticism and depression. In addition, older repressors score significantly higher than non-repressors on Eysenck Lie Scale, State vs. action orientation (AOD). The borderline significant differences found between the WBSI scores and TCQ scores of repressors and non-repressors both indicate that it is the non-repressors who endorse using suppressive forms of mental control.

Overall, it would appear that repressors do have different scores on the individual difference variables in both young and old samples when compared to non-repressors. Therefore the final analysis was designed to compare the scores of young and old participants scores on these individual difference measures with the repressors from both samples removed. If the presence of the large number of repressors is the factor reducing the older samples scores on the various measures of psychopathology one would expect that the previous significant differences existing between the scores of young and older participants should be reduced by removing the repressors (See Table 9.3 below).

TABLE 9.3 - MEAN SCORES ON THE INDIVIDUAL DIFFERENCE MEASURES AS A FUNCTION OF AGE (YOUNG NON-REPRESSORS VS. OLDER NON-REPRESSORS). SIGNIFICANCE VALUES MARKED WITH A DOUBLE ASTERISK REPRESENT VALUES REMAINING SIGNIFICANT AT .05 LEVEL AFTER A BONFERONI CORRECTION.

	Young non repressor N	Young non repressor Mean	Old non repressor N	Old non repressor Mean	t - value	Significance
STATEANX	86	40.02 (sd 9.43)	36	35.61 (sd 8.59)	2.4	p=.018
TRAITANX	86	44.3 (sd 9.46)	36	38.22 (sd 7.7)	3.2	p=.002 **
WBSI	86	52.45 (sd 9.31)	36	46.36 (sd 7.56)	2.81	p=.006
Marlowe	86	14.25 (sd 4.57)	36	17.44 (sd 4.6)	-4.48	p=.001 **
TCQ total	86	65.24 (sd 9.67)	36	59.33 (sd 7.1)	2.93	p=.004
Psychoticism	86	2.62 (sd 1.86)	36	1.74 (sd 2.3)	2.11	p=.037
Extraversion	86	8.65 (sd 3.49)	35	5.51 (sd 3.02)	4.85	p=.001 **
Neuroticism	86	7.2 (sd 3.02)	35	5.17 (sd 3.26)	3.45	p=.001 **
Lie	86	3.94 (sd 2.41)	35	5.49 (sd 2.64)	-3.18	p=.002 **
BDI	86	6.05 (sd 5.16)	35	4.17 (sd 2.8)	2.27	p=.025
AOF	84	4.93 (sd 3.02)	34	6.76 (sd 3.05)	-2.6	p=.01
AOD	84	5.26 (sd 3.06)	34	6.85 (sd 2.63)	-2.51	p=.13
AOP	84	8.45 (sd 2.04)	34	7.71 (sd 2.29)	1.48	p=.14
NEED4COG	88	27.73 (sd 36.71)	35	15.6 (sd 37.05)	1.6	p=.12
LINKING	50	21.2 (sd 11.73)	35	9.48 (sd 9.49)	0.21	p=.83
taf moral	75	19.47 (sd 9.27)	36	30.38 (sd 12.11)	-5.59	p=.001 **
Rumination scale	76	50.29 (sd 6.76)	32	44.82 (sd 8.62)	3.36	p=.001 **
Fordyce unhappy	76	19.67 (sd 11.82)	36	14.61 (sd 11.07)	2.57	p=.01
SPQ	50	21.2 (sd 11.73)	36	14.78 (sd 7.63)	2.96	p=.004

However, Table 9.3 shows that even when the repressors are removed from the older and younger samples the older sample still scores significantly lower than the young sample on Trait Anxiety, Extraversion, Neuroticism and Rumination. But the older sample scores higher than the younger sample on the Marlowe Crowne scale, Eysenck lie scale and TAF moral. This pattern argues against repression being entirely responsible for the differences between young and older participants on the indices of psychopathology.

IV. Discussion

To our knowledge no published study has yet investigated the prevalence of repression in a sample of older adults. The aim of the present study was to directly compare the prevalence of repression in a sample of younger and older adults, and to compare repressors and non-repressors in both samples on a number of individual difference measures. The results demonstrate that whereas 9.5% of the younger sample were classed as repressors 36% of the older sample are classed as repressors. Thus according to the present data the prevalence of repression is as many as 4 times higher in older participants.

It could be argued that as a result of this finding the older participants may well be being avoidant when one examines their significantly lower scores on the psychopathology indices in comparison with the younger participants (See Chapter 8). However, in order to investigate this question the current study directly compared the younger non-repressors with the older non-repressors and found that the older adult group still displayed significantly lower scores on most of the psychopathological indices (see Table 9.3). Thus, after repressors are removed the older participants still show significantly lower scores on Trait anxiety, Extraversion, Neuroticism and Rumination. In addition, the older participants show higher scores on Marlowe Crowne scale, Eysenck lie scale and TAF moral. Once again the higher scores in the older participants on the Marlowe Crowne scale and lie scale suggest that the older participants may well be deliberately distorting their values on these psychopathology scales to appear more healthy than may

be warranted, although due to repressor removal one could discount the effects of repression.

In the literature on the elderly and Lie scales (Eysenck lie scale and Marlowe Crowne Scale) one previous study has reported that significant positive correlations exist between scores on lie scales and age (Ray, 1988). Importantly, Ray (1998) examined the correlation between lie scales and age in seven different samples, six of the seven samples found significant positive correlations. This positive correlation suggests that one may become more defensive (conscious use of lying and/or unconscious use of repression) with increasing age. The current study cannot systematically evaluate the effects of increasing age as here two separate samples of older and younger participants were chosen both to fall within clearly defined age bounds. As a result the current study had virtually no participants falling between the ages of 35 and 65. Therefore an interesting avenue for future research is to determine whether the tendency to use a repressive coping style increases with age.

The current study however does provide preliminary evidence suggesting that repression may occur more in older adult samples. Many questions stem from this analysis. For example, if older participants do genuinely have greater rates of repression, one would need to ascertain whether repression rises with increasing age or whether there is something about the current generation of older adults that makes them more repressive when compared to the current generation of younger adults. One unpublished study by Champion (1998) on repression and aging can give some insight into this question. In this study there were 45 participants belonging to three discrete age groups, 15 young participants (20 – 40 years), 15 middle aged participants (41 – 60 years), and 15 older participants (61 – 80 years), they found that repression increased with age. Thus, there were fewest repressors in the young participants, more in the middle aged participants and still more in the oldest participants. This is therefore preliminary evidence that repression may increase with aging.

The current study also found that TAF scores were higher in the older adult sample even after removal of the repressors. This finding suggests that older adults view thinking

about an act as being almost as bad as actually engaging in that act. This finding may explain some of the discrepancies found between younger and older participants in their scores on the individual difference measures collected. Thus, younger participants have low scores on TAF moral suggesting that they rarely view thinking of an act as bad in itself, in contrast the older sample (even the older non-repressors) seem to view thinking of unpleasant acts as being tantamount to actually carrying out the suggested acts. With this distinction in mind it is therefore not surprising that given this propensity the older adults may well chose to deny having these thoughts at all.

In summary the current study suggests that older adults score significantly lower than younger adults on many psychopathological indices even after repression has been taken into account. However, the fact that the older adults still show significantly greater scores on the Eysenck lie scale (when compared to the young sample) and Marlowe Crowne scale even after repressor removal suggests that one must remain cautious in interpreting this result as indicating genuinely greater levels of mental well being in older adults.

CHAPTER TEN¹

The role of thought suppression / expression in the perception of intentionality of completed actions

The final two studies represent a departure from the mental control literature and were conducted to broaden the field of thought suppression by moving the research into previously unexplored directions. One central tenet of the new intentional theory of the rebound effect that has been outlined in this thesis is that mental control is an intentional act. Therefore, the final two studies have been designed to examine the impact of thought suppression or expression on the perception of intentionality ascribed to voluntary actions and on the timely execution of one's future intentions (i.e. prospective memory).

In everyday life people often try to suppress their thoughts in an effort to avoid acting in a certain way. For example, one might suppress thoughts of having an extra drink in order to avoid actually having the extra drink. In a similar vein, one may try to avoid thoughts of smoking when trying to stop. However, it is also the case that many times in life these self-regulatory efforts do not work (Baumeister, Heatherton and Tice, 1994). Frequently, the result is that one does end up having had the extra drink or smoking despite their best efforts to the contrary. In addition, on finding that they have engaged in a counter intentional act people often tend to claim it was not them who did it. For example, a person who is on a diet and has been suppressing thoughts of eating chocolate but nevertheless does end up eating chocolate will often assert that it was unintentional and 'just happened'. The central question then becomes whether this is how the person really feels, (i.e. does it really feel like the act of eating the chocolate was unwilled) or is the person just lying to themselves and others in an effort to reduce cognitive dissonance (Festinger, 1957).

¹ The research reported in this chapter represents published work (Wegner & Erskine, 2003) see appendix N for the original article.

The current study aimed to explore these very questions, by examining how the control of mental contents may affect the perception of intentionality of supposedly voluntary actions. For example, if there is a pen on the desk and someone picks it up whilst firmly holding in mind the intention of picking it up, the act feels like a completely controlled and intentional act. However, if one picks up the pen whilst thinking of what to have for dinner or deliberately trying not to think of picking it up the act may feel as if it just happened with very little sense of one having consciously willed the act. It was therefore reasoned that, perhaps acts that are carried out whilst not thinking about them lose the feeling of having been willed.

This argument would be consistent with new models of how humans infer causality, which are based on the principals thought to govern the perception of causality more generally (Hume, 1888; Kelly, 1972; Michotte, 1954, 1962). Thus, Wegner and colleagues (Wegner 2001, 2003; Wegner & Wheatley 1999) have suggested that crucial among the sources of information we use to infer causality are prior consistent thoughts of the act, that occur temporarily before the act, and that there are no alternative causes apparent

Therefore, one can see how avoiding thinking about an act while, at the same time, engaging in it could lead to a feeling that one had not willed the act. This would be due to the fact that one would have blocked the prior consistent thoughts of the act from occurring. In contrast, completing an act whilst holding in mind the intention to perform the act should lead to an inflated sense of having willed the action, due to the strong presence of consistent thought just prior to the action occurring.

This analysis suggests an interesting idea, that perhaps people can make themselves voluntarily feel their actions are occurring involuntarily. In a recent article, Wegner and Erskine (2003) have labelled this phenomenon “voluntary involuntariness”. The idea of “voluntary involuntariness,” then, turns on two different definitions of voluntary. The exertion of mental control that occurs when a person attempts to influence the availability of thoughts about action may be voluntary in the sense that it is goal-directed. This goal-

directed activity could potentially undermine the person's experience of voluntariness during subsequent action. To the extent that a person might be able to inhibit awareness of the elements underlying the inference of conscious will—awareness of the thought, the action, or their interrelation—the person might voluntarily create a sense of involuntariness.

The current study explores the effects of various mental control instructions on perception of intentionality of a variety of simple actions carried out in the laboratory. Thus, participants were asked to carry out a series of simple tasks while following mental control instructions. They were asked in advance of each task either to suppress thoughts of their intention to perform the task, to concentrate on such thoughts, or to monitor their thoughts without trying to change them. Following each task, participants rated their experience of will for the action (on a scale from “it just happened” to “I did it on purpose, intentionally”). They subsequently were led to perform the actions again without instructions, again reporting experienced will.

The predictions are that acts completed whilst suppressing the intention to act should be rated as significantly less intentional than acts completed under no mental control instructions (baseline control condition). Furthermore, acts completed whilst holding in mind the intention to act should be rated as significantly more intentionally completed than acts undertaken with no mental control instructions.

II. Method

(1) Participants

Twenty-four Harvard University undergraduates (16 female and 8 male) volunteered to participate in return for course credit or \$6. All participants completed the experiment correctly and no one was excluded from the sample.

(2) Tasks

Ten tasks were used, one for practice and nine for the experiment. The tasks were adapted from studies in the Zeigarnik effect literature (Lewis & Franklin, 1944; Reeve, Cole, & Olson, 1986; Rickers-Ovsiankina, 1935) and involved relatively simple actions. The practice task was copying a shopping list, and the experimental tasks included: copying a geometric figure; circling the vowels in a short paragraph; completing a wooden puzzle for children; lifting a brick to a height of 10 inches and setting it down again; alphabetizing 10 letters on index cards; spiraling a pipe cleaner around a pencil and taking it off; rolling an elongated piece of clay into a ball; winding loose thread on to a spool; and completing a set of 5 simple anagrams. Participants performed these tasks in one of 3 possible fixed orders.

(3) Procedure

All participants were tested individually. At the beginning of the experiment each participant was informed that the aim of the study was to find out how thinking about tasks affects perceptions of one's role in performing these tasks. The experimenter explained that the main dimension of interest was how some tasks feel more intentional than others, and then went on to say: "Some everyday tasks feel fully intentional, like writing a difficult essay (one *does* these things), whereas others feel as if they just *happen* or "run off" with little feeling of intentionality (e.g., driving or brushing one's teeth)." To make sure participants understood the distinction they were asked to rate four simple everyday actions in terms of how intentional they usually feel on a 9-point scale with 1 = *it felt like it just happened*, and 9 = *it felt like I did it on purpose, intentionally*. The four practice actions they rated were eating popcorn at the cinema, walking down stairs, watering the plants, and dreaming (cf. Malle & Knobe, 1997). The rating scale for these items was the same scale used to rate the intentionality of the subsequent experimental tasks, and was based on measures used to assess involuntariness in hypnosis (e.g., Lynn, Nash, Rhue, Frauman, & Sweeney, 1984) and the experience of intention and conscious will in automatism and everyday actions (e.g., Malle & Knobe, 1997; Wegner & Wheatley, 1999).

If at this juncture it was clear that participants understood the distinction, they were invited to proceed with the practice task (copying a shopping list). After completing the practice task they were given the intentionality scale and asked to rate their experience. Participants were then introduced to the main experimental manipulation as follows:

“In the tasks we will begin in a moment I will be asking you to either monitor your thoughts before and during the task or to suppress or to concentrate on the intention to perform the act. You will have 10 seconds before each task to practice the mental task. If I ask you to suppress the intention to perform the action it is vital that you try to suppress this thought during the few seconds before the act but also during performance of the action. Equally, if I ask you to concentrate on the intention to perform the action it is vital that you try to keep this thought in mind during the few seconds before the act but also during performance of the action. For monitoring, you only have to monitor your thoughts and notice what you are thinking without trying to change them at all.”

In addition to these general instructions, specific instructions were given to participants just before each action. Three tasks were performed with suppression instructions, 3 with concentration instructions, and 3 with monitoring instructions.

For suppression, the instructions were:

“During performance of the next action I would like you to try not to think about your intention to perform the action while doing it. Thus, your task is to suppress any thoughts about the intended behavior while performing it”.

For concentration, the instructions were:

“During performance of the next action I would like you to try to think about your intention to perform the action while doing it. Thus your task is to concentrate on thoughts about the intended behavior while performing it”.

For monitoring, the instructions were:

“During performance of the next action I would like you to monitor your thoughts without trying to change them. Just notice what you are thinking about while performing the behavior, whatever this may be”.

Following each instruction, the experimenter said:

“You will have a few seconds to settle into this task, at the end of which I will press this buzzer telling you to carry out the action.” When approximately 10 s had elapsed, the experimenter pressed a buzzer. All participants did successfully perform all assigned tasks.

Participants completed the nine experimental tasks in one of three fixed orders. The order of the thought instructions was fully counterbalanced such that, across participants, each of the nine tasks was suppressed, expressed, and monitored an equal number of times across the three task orders. After each task, participants were asked to rate their experienced intentionality for the task on the rating scale. They were asked a further question which depended on the thought instructions they had received for that task. If they had been suppressing thoughts of the intention they were asked to rate “How hard were you trying to suppress the thought given to you?” on a scale from 1 (not very hard) to 9 (extremely hard). If they had been concentrating on thoughts of the intention, they were asked to rate “How hard were you trying to express/ concentrate on the thought given to you?” Finally, if they had been monitoring their thoughts, they were asked to rate “What were you thinking about before and during enactment of the task?” on a scale from 1 (thinking exclusively about something other than the task) to 9 (thinking exclusively about the task).

After all of the tasks had been completed with the respective thought instructions, the experimenter reset all of the tasks so that they could be undertaken a second time. Participants were then asked to run through all of the tasks again, this time with no thought instructions so they could think what they wanted. Participants were told they could complete the tasks in any order providing eventually they had done them all. After each task participants again rated the intentionality of their action.

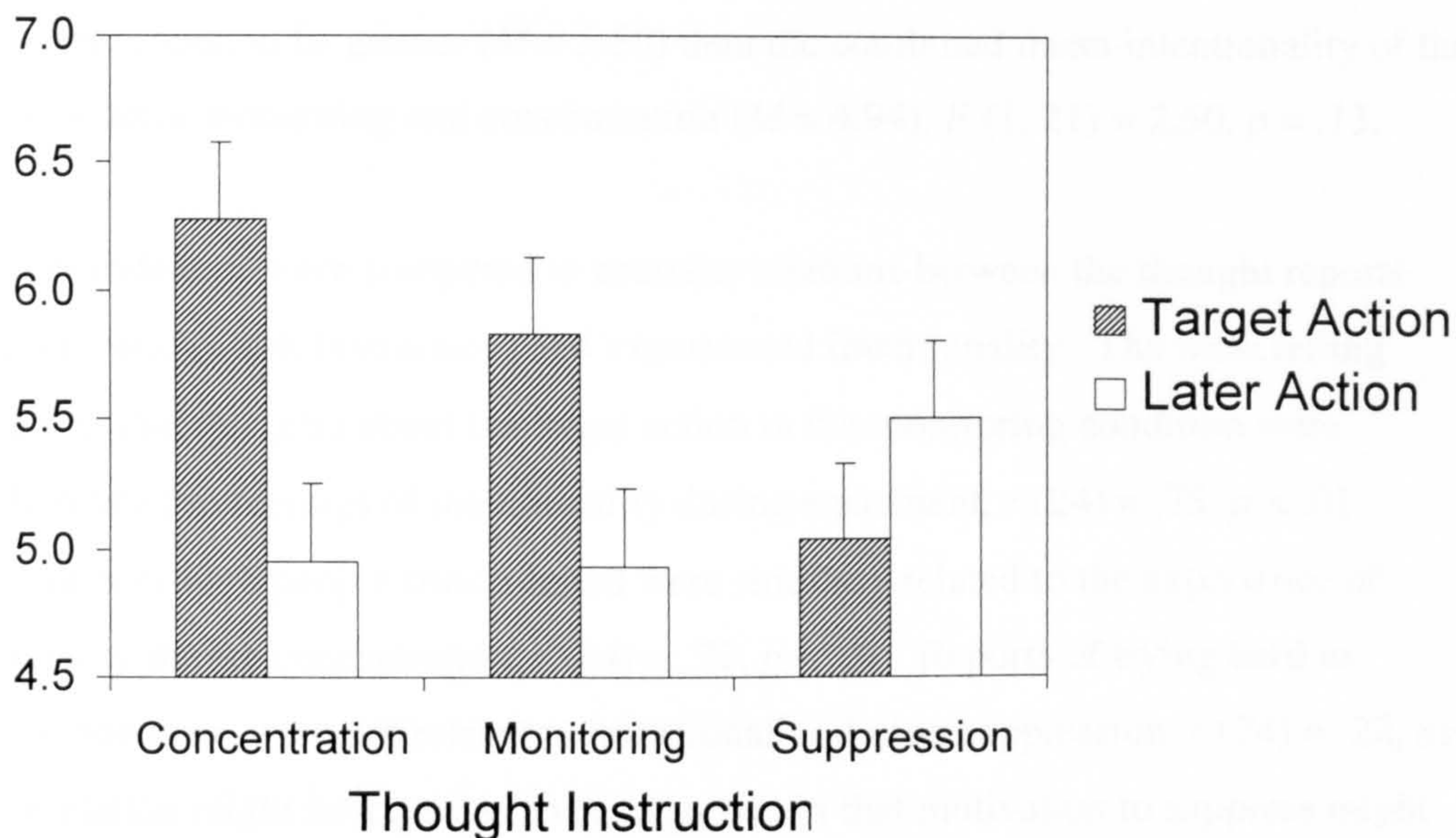
III. Results

Initial analyses showed that participants took their instructions seriously. Participants indicated trying fairly hard to concentrate on the thought in concentration trials ($M = 6.14$ on the 9-point scale), and also trying fairly hard to suppress the thought in suppression trials ($M = 6.63$). They reported thinking primarily about the action rather than other things on the monitoring trials ($M = 6.26$). These thought manipulations did not influence action per se, however, as all participants carried out all tasks. Participants' initial level of intentionality on the practice task was near the scale midpoint of 5 ($M = 5.67$) and the means for all the tasks across conditions were near this value. Initial analyses also indicated, however, that one of the experimental tasks (anagrams) elicited high intentionality ratings overall, so further analyses were conducted with this task excluded.

Mean intentionality pooled across tasks was examined in a 3 order of tasks x 3 instruction (concentration vs. monitoring vs. suppression) x 2 action (target action vs. later action) analysis of variance (ANOVA) with repeated measures on the latter two variables. Although there were significant main effects of action and instruction, and also significant interactions of order with each of these variables, these are best interpreted in light of the significant interaction of instruction and action, $F(2, 42) = 8.46, p < .001, \eta^2 = .29$. Task order did not qualify this effect, so the influence of order will not be examined further. The means are shown in Figure 10.1 below.

FIGURE 10.1 - MEAN INTENTIONALITY EXPERIENCED FOR ACTIONS PERFORMED DURING OR AFTER EACH OF THREE THOUGHT INSTRUCTIONS (CONCENTRATE ON THOUGHT OF INTENTION, MONITOR THOUGHTS, OR SUPPRESS THOUGHT OF INTENTION). ERROR BARS REPRESENT STANDARD ERROR.

Experienced Intentionality



The influence of thought instructions on intentionality of the target action was examined by simple main effects and contrast analysis. Suppression instructions reduced intentionality for the target action ($M = 5.03$) below the level prompted only by monitoring ($M = 5.83$), $F(1, 21) = 4.63, p < .05$, and also below the level yielded by concentration ($M = 6.28$), $F(1, 21) = 13.07, p < .002$. Intentionality levels for the target action during monitoring and concentration did not differ significantly.

The influence of thought instructions can also be seen in comparisons between intentionality experienced for the target action, and intentionality for that action performed later without instructions. Concentration yielded greater intentionality for the target action ($M = 6.28$) than the later action ($M = 4.95$), $F(1, 21) = 20.54, p < .001$, and monitoring also yielded greater intentionality for the target action ($M = 5.83$) than the later action ($M = 4.93$), $F(1, 21) = 9.66, p < .005$. However, suppression did not have

such an effect, and even produced a tendency in the opposite direction. Intentionality for the target action during suppression ($M = 5.03$) was nominally lower than intentionality for the same action following suppression ($M = 5.50$), $F(1, 21) = 1.82, p < .18$.

Contrasts between intentionality levels experienced for the later action did not yield any reliable effects. However, it is noteworthy that intentionality of the later action after suppression tended to be greater ($M = 5.50$) than the combined mean intentionality of the later action after monitoring and concentration ($M = 4.94$), $F(1, 21) = 2.50, p = .13$.

Finally, correlations were computed to examine relations between the thought reports during the various task instructions and experienced intentionality. The most telling finding was that thoughts about the target action in the monitoring condition were strongly related to feelings of intentionality during enactment, $r(24) = .75, p < .01$. Reports of how hard people concentrated were similarly related to the experience of intentionality during concentration, $r(24) = .79, p < .01$. Reports of trying hard to suppress, however, were not related to intentionality during suppression, $r(24) = .22, ns$. This correlation might be expected to be negative, in that motivation to suppress might enhance suppression success and thus undermine apparent mental causation. However, trying hard to suppress does not guarantee successful suppression (Wegner & Zanakos, 1994), and the lack of a link from motivation to reported intentionality may be understood in this light.

IV. Discussion

The main aim of the current study was to examine whether engaging in various actions whilst under different mental control instructions can affect one's perception of having "caused" the act. It was predicted that acts completed whilst trying not to think about them would be rated as having been less willed and feeling more as if they just happened. In contrast, it was predicted that acts completed whilst holding the intention in mind would come to feel more intentional, and more wilful. The results of this study supported these predictions. Acts completed whilst trying not to think about them were rated as

feeling significantly less wilful and as if they were just happening, when compared to the control group which merely carried out the acts with no specific mental control instructions. Importantly acts completed whilst holding in mind the intention to perform the act were rated as feeling more wilful and intentional, when compared to the control group (no mental control instructions).

These results support Wegner and Wheatley's (1999) theory of apparent mental causation. According to this theory acts occurring without prior consistent thought and with many alternative explanations for the act should feel as if they are not caused by the person themselves. The current experiment extends this analysis by demonstrating that (via mental control) one can lead oneself to a place where it feels as if one is not the actor willing various acts, but is an innocent bystander where they act with little feeling that they have indeed acted. As stated in the introduction it seems one can indeed experience a state of "voluntary involuntariness".

One issue which may weaken the conclusions drawn from the present study is the influence of experimental demand. The participants in this study were exposed to clear demands to control their own thoughts, and given the repeated measures design were exposed to all conditions. It is therefore possible that some participants became aware of the comparisons the experimenter was likely to draw among each of the experimental conditions. Although, participants were not made aware of any experimental hypotheses linking the thought instructions to possible influences on the experience of intentionality for each of the actions, it is reasonable to believe participants may have been able to infer these.

Despite this possibility there are reasons to believe this was not the case in the current study. Firstly post experimental probing revealed that only four participants had an idea about the experimental hypotheses, but even these participants who guessed that the different mental control instructions may effect later intentionality ratings, did not correctly identify the expected direction of intentionality rating movement. Thus, they didn't know which mental control processes would result in enhanced intentionality and

which would result in reduced intentionality. A second argument against an experimental demand explanation concerns the nature of the actions undertaken. All of the actions undertaken in the present study were very simple everyday acts with no associated negativity or positivity. This is important because one can imagine that engaging in a counter intentional negative act in everyday life (e.g. having an affair) makes one strongly motivated to reduce the feels of intentionality to reduce cognitive dissonance and guilt. In the current experiment there was no such associated negativity and therefore little reason for people feel a need to change their intentionality ratings.

Another observation on the role of demand in this study centres on the apparent counterdemand effects of mental control on actions when mental control is rescinded. Although the observed effects were not strong, there was a tendency for suppressed intentions to rebound, yielding enhanced voluntariness for actions once the suppression instruction was no longer in operation. This ironic effect (Wegner, 1994) cannot as easily be traced to demand, as it does not follow from the instructions participants were given, and even appears to oppose them. The possibility of such post-suppression ironic effects on intentionality deserves scrutiny in further research.

It remains a question for future research whether suppression or concentration prompted spontaneously, without social pressure, and without any pressure to report consequent changes in voluntariness would have influences on voluntariness like those observed for instructed mental control in this experiment.

The results of this study therefore suggest that instances of people engaging in counter-intentional acts and then proclaiming “it wasn’t me” may not simply reflect lying on the part of the person. If the person was attempting not to undertake the act via thought suppression it is quite possible that the phenomenological sense of intentionality is indeed lessened.

In summary, this study, only begins to reduce the mystery that has previously surrounded experiences of involuntariness. The present research opens these phenomena to new

understanding through the idea that people might visit changes in intentionality upon themselves through the exercise of mental control. In a larger sense, these data also comprise evidence pertaining to the processes addressed by the theory of apparent mental causation (Wegner, 2002; Wegner & Wheatley, 1999). Mental control of thoughts about action can influence whether thoughts occur in mind relevant to the action, and so can create significant transformations in the experience of will.

CHAPTER ELEVEN

The role of thought suppression / expression in remembering one's future intentions

The study described in Chapter 10 examined the effects of thought suppression or expression on the perception of intentionality for one's own actions. The results of that study demonstrated that, in addition to the rebound effect, mental control can have other subtle effects on people's perceptions and behaviour. The final study of this thesis was designed to examine this idea further by investigating the effects of thought suppression / expression on prospective memory i.e. remembering to carry out previously intended actions at some point in the future. The basic idea behind this study, outlined in Chapter 1, is quite simple. Since thought suppression can result in a rebound effect whereby previously suppressed thoughts spring to mind with greatly enhanced frequency, could this effect be used positively to enhance one's prospective memory performance?

It is known that conscious thought raises the activation levels of those thoughts (Higgins 1989). Therefore, consciously thinking about one's future intention during the retention interval should improve one's prospective memory performance (e.g. Kvavilashvili, 1987; Harris & Wilkins, 1982). However, because thought suppression often results in hyperaccessibility so that thoughts can become even more activated than when being consciously thought about (Wegner & Erber, 1992). One may suggest, that thought suppression could perhaps result in even better prospective memory performance than conscious thought expression (i.e. rehearsal). Erskine and Kvavilashvili (2000) tested this idea in their study in which participants had to undertake an action (circle a response) whenever they encountered the target "white bear" in an ongoing sentence verification task. During an interval between receiving prospective memory instructions and the onset of the sentence verification task, however, all participants had to perform a 5-minute thought verbalisation task, either suppressing or expressing a certain thought. Half of the participants in each of two groups had to suppress / express the prospective memory target "white bear" and another half – the irrelevant target "brown sugar". Both conscious thought of the prospective memory target or suppression of the prospective

memory target resulted in no better prospective memory performance than groups suppressing or expressing totally irrelevant stimuli (brown sugar).

This counterintuitive finding has experimental support from another study investigating the effects of reminders on prospective memory performance (Guynn et al., 1998). The results of this study showed that target only reminders (i.e. reminders including the prospective memory target but not the associated action) did not enhance prospective memory performance relative to no reminders. However reminders including the prospective memory target and associated action (i.e. the whole intention) did enhance prospective memory performance relative to no reminders. Guynn et al. (1998) explain this finding by suggesting that simply activating the target is insufficient to improve prospective memory performance. They go on to suggest that for reminders to be effective they need to contain a representation of both the prospective memory target and the associated intention.

The aim of the present study was to examine whether suppressing a whole intention (i.e. a prospective memory target and associated action) during the retention interval could subsequently enhance prospective memory performance during a later ongoing word association task. Thus, in the current experiment the ongoing task consisted of generating associated words to words presented on screen at a rate of one word every six seconds. Six prospective memory targets (animal words) were embedded in this ongoing task. Participants had to remember to press the space bar every time an animal word came up (prospective memory task). As in the previous study of Erskine and Kvavilashvili (2000) the design was a 2 group (suppression vs. expression) by 2 intention (relevant, animal vs. irrelevant, food) between groups ANOVA. Thus, one group suppressed the prospective memory target and intention, one group expressed the prospective memory target and intention, another group suppressed an irrelevant intention and target and the final group expressing an irrelevant intention and target.

It was therefore hypothesised that there would be a main effect of type of manipulated target (relevant vs. irrelevant intention). Thus, those participants who were suppressing or

expressing the relevant prospective memory intention (remembering to press the space bar on seeing an animal word) would demonstrate better prospective memory performance than those who were expressing/suppressing an irrelevant intention (the intention to eat later on today). Most importantly however, it was expected that, due to the rebound effect, those participants who were suppressing the prospective memory intention would demonstrate better prospective memory performance than those participants who were merely expressing the prospective memory intention (i.e. a group by intention interaction).

An additional aim of the experiment was to examine the post-suppression rebound effect via yet another implicit measure. Thus, not only could the effects of thought suppression or expression on prospective memory performance be examined, but additionally one could also examine whether rebound effects occurred in the suppression group in the post-suppression period when participants were engaged in the word association task. This represents an important question because the study of Erskine and Kvavilashvili (2000) that failed to find a memory enhancing effect of suppression did not directly measure whether the rebound effect occurred during the sentence verification task. Therefore, one could question whether under these new circumstances rebound effects will occur at all. One advantage of choosing a word association task was that it provides a method by which the rebound effect can be implicitly checked. Here the number of food words produced by participants previously asked to suppress their intention to eat later on can be compared with the number of food words produced by participants expressing the intention to eat later on. If more food associates are produced in the suppression period this would represent a rebound effect. The same comparison cannot be made for the animal words as with animal words participants had the animal intention to remember as well which adds another source of possible contamination. Therefore, we chose to examine only the number of food responses participants made in the word association task as a function of group.

(1) Summary

In summary, the current study was designed to ascertain whether suppression or expression of a prospective memory target and intention during the retention interval could enhance prospective memory performance relative to a group which suppressed or expressed an irrelevant intention (to eat later on). In addition, using the current methodology would allow for an implicit test of the rebound effect in the group which suppressed or expressed the irrelevant intention (to eat later on). If a rebound effect is present one would expect the group suppressing the intention to eat would generate more food related words in the later word association task than the group expressing the intention to eat later on.

II. Method

(1) Participants

A total of 88 undergraduates volunteered to take part in return for £3 (51 Females, 37 Males). All participants completed the protocol correctly but three participants were excluded due to being outliers on the number of buzzer presses during thought expression.

(2) Materials and Apparatus

A buzzer was used which the participants pressed every time they thought about or mentioned the target thought given them to express or suppress. A tape recorder was used to record participants' thought verbalisations.

The main experimental task consisted of a computer programme written using SUPERLAB™ which displayed words on screen at a rate of 1 word every 6 seconds. The computer recorded the time taken from displaying the word to the participants' verbal response to this word. Finally a stopwatch was used to time all of the various tasks.

Six prospective memory targets (animal words) were all chosen to be of similar length, frequency of use in English language (Toglia and Battig, 1978). In addition, ten words designed to provoke food related responses were chosen to be of similar frequency of use to the animal target words. These food related words were all chosen to not be foods themselves but to be words with a food associate in the top ten associated words. A constraint added was that the food associate should not be the most associated word. Finally, 104 other words were chosen to be un-associated to foods or animals and to be a similar frequency of use to the animal and food provoking words. These words were all chosen using Toglia and Battig (1978), Postman and Keppel (1970), the MRC Psycholinguistic Database and Wordnet.

(3) Design

The experimental design was a 2 group (suppression vs. expression) x 2 intention (relevant vs. irrelevant) x 2 word association task (version 1 vs. version 2) between subjects design. There were 11 participants in each of the resultant 8 cells.

(4) Procedure

All participants were tested individually. On arrival at the laboratory participants were introduced to the aims of the study. They were informed that the main aim of the study was to investigate two separate but related issues. The first issue concerned examining how good the participant was at mental control (i.e. their ability to suppress or express thoughts successfully). The additional interest was to investigate how controlling ones thoughts impacted on performance on subsequent cognitive tasks after suppression or expression had been discontinued. Participants were instructed that in order to test their ability at mental control they would have to try to verbalise their thoughts aloud whilst simultaneously suppressing or expressing a thought that would be given to them. They were informed that there would be a 3 minute practice verbalisation period, followed by a further 5 minutes of verbalisation where they would also be suppressing or expressing a given construct depending on experimental group.

Next participants were told that after the period of thought verbalisation they would be required to carry out a fairly simple computerised word association task which consisted of having participants watch a computer screen that displayed a new word on screen at a rate of 1 word every six seconds. When each new word appeared on screen the participant was asked to verbalise out loud the first word that came to their mind. Participants were informed that they would have an opportunity to practice all of the various tasks before completing the real tasks. If it was clear that participants understood they were asked to sign the consent form. Once signed participants were given a short subject information questionnaire. This consisted of a 10 item questionnaire. Most of the information contained in this questionnaire would not be used in the experiment, its main purpose was to check that all participants had the intention to eat later on in the day as this was to be the irrelevant intention participants could be asked to suppress or express. If any participant said they did not intend to eat later on today (only 2 participants said this) they were automatically placed in the relevant intention condition and therefore not asked to suppress or express the intention to eat later on today.

At this stage the participant was introduced to a practice version of the word association task which did not contain any of the stimuli from the main test presented later in the experiment. It was explained that the task was to say the first word that came to mind whenever they saw a new word presented on the screen and that each word would remain stay on screen for 6 seconds. Participants were told that there were no restrictions on the words they could say. Specifically, some of the words they might say will be associated to the word on screen and this was fine, but it was equally correct if the associate they produce had no relation at all to the word on screen. It was explained that what was important was that the participant say aloud the first word that came to mind, even if they felt this word was silly or offensive. The computer was set to record the time it took participants to produce this first word, therefore participants were asked to try not to make any other sounds as the microphone was very sensitive and any other sounds could trigger it before the verbalisation was recorded.

Once it was clear the participant understood the task, the practice word association task commenced. This practice task comprised of 10 words appearing in a random order. After this practice task the experimenter discussed any problems and the participant was informed that the task they had just practiced would occur later in the course of the experiment. The experimenter then went on to say:

“by the way, an additional interest of this experiment is to look at how people remember to do things in the future. In order to study your ability to remember to do things in the future I want you to remember to press the space bar whenever you see a word depicting an animal on the screen in the word association task that you will be doing later on. You may do this before or after verbalising your associate. Is that ok?”

Once the participant understood the experimenter went on to say:

“however, before I can give you this word association task I want you first to do the task in which you will be thinking aloud. Within the next three minutes you will be left alone in this room and you will have to speak aloud into this tape recorder describing all the thoughts that come to your mind. You may think about anything you wish and you do not have to explain or justify the thoughts at all. There are no restrictions, qualifications, conventions or expectations. Now I will start the tape and leave the room, you may begin.”

After the 3 minute practice verbalisation task the experimenter returned and gave instructions for the next 5 minute verbalisation task which varied depending on experimental group:

Suppression of relevant intention group

“Now I would like you to continue expressing your thoughts for five more minutes, But this time I would like you to try not to think about your intention to press the space bar whenever an animal word comes up in the word association task. So your task is to think aloud and to avoid

any thoughts about your intention to press the space bar in response to animal words in the word association task. If you do happen to think about this or mention it please could you press this buzzer.”

Expression of relevant intention group

“Now I would like you to continue expressing your thoughts for five more minutes, But this time I would like you to try to think about your intention to press the space bar whenever an animal word comes up in the word association task. So your task is to think aloud and to concentrate on thoughts about your intention to press the space bar in response to animal words in the word association task. If you do happen to think about this or mention it please could you press this buzzer.”

Suppression of irrelevant intention group

“Now I would like you to continue expressing your thoughts for five more minutes, But this time I would like you to try not to think about your intention to have food later on today. So your task is to think aloud and to avoid any thoughts about your intention to have food later on today. If you do happen to think about this or mention it please could you press this buzzer.”

Expression of irrelevant intention group

“Now I would like you to continue expressing your thoughts for five more minutes, But this time I would like you to try to think about your intention to have food later on today. So your task is to think aloud and to concentrate on thoughts about your intention to have

food later on today. If you do happen to think about this or mention it please could you press this buzzer.”

Once it was clear that the participant understood their new instructions the experimenter started the tape recorder and left the room for the 5 minute verbalisation period. On returning the experimenter explained that they would now move on to the computerised word association task. At this stage no mention was made of the former prospective memory instructions. Additionally, it was explained to participants that although the computer would record the reaction time taken for them to verbalise their associate to the word on screen, it would not record the actual word they said. Therefore, the experimenter said he would be sitting in the corner writing down all the words that they would say aloud in response to the words presented on the computer screen. Once clear they understood the computerised word association task commenced.

At the end of the word association task each participant had to answer some questions depending on whether they forgot or remembered to carry out the prospective memory task during the word association task. For those participants who forgot to press the space bar on all six occasions the first question was to indicate if there was anything else they had been asked to do in addition to producing associated words in the word association task. If the participant could not provide an answer they were then asked whether there was anything they had to do if they saw a particular word . If the participant could still not recall their previous intention they were asked what they were asked to do when they saw an animal word. If the participant still did not respond they were given a description of three possible actions from which they had to choose the correct action (say the word aloud, press any letter key or press the space bar).

If the participant remembered to press the space bar on at least one occasion the experimenter asked them whether they thought about this intention only on encountering an animal word in the actual computerised task, or if they thought about this intention at other times as well. If the participant indicated that they had thought about the intention

at other times as well they were asked to indicate how often they had been thinking about the intention. These ratings were made on a 7 point scale (1 = not at all, 7 = all the time)

At this stage participants were debriefed and the real purpose of the study was fully explained to them.

III. Results

The results are presented in three sections. In the first section the number of buzzer presses is examined to assess how well participants followed the thought suppression / expression instructions. The second section examines prospective memory performance as a function of the independent variables.

Two versions of the computerised word association task were used, however all analyses showed that the version employed made no difference to any of the statistical analysis, therefore all analyses reported are collapsed over version of the word association task.

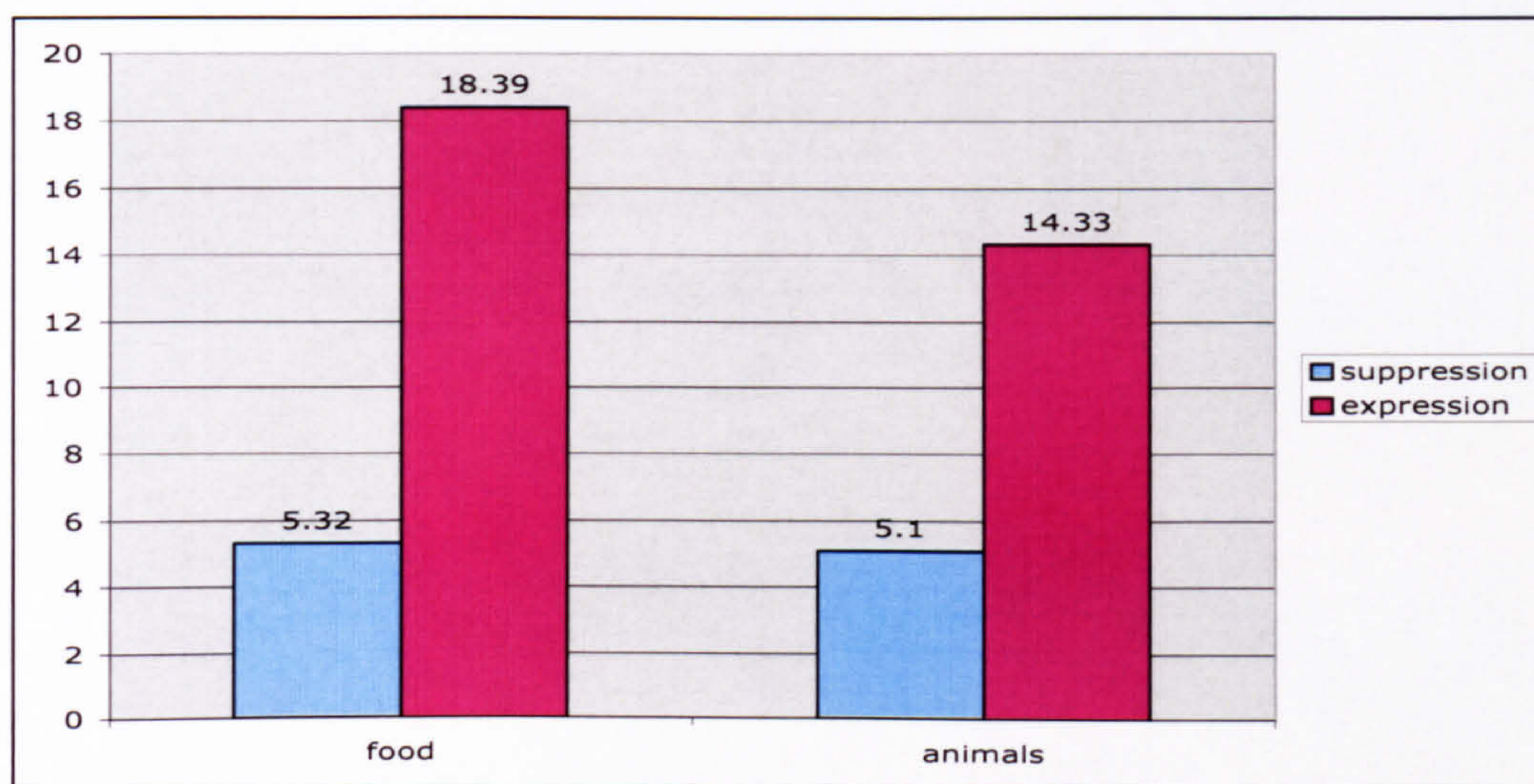
(1) Performance in suppression and expression tasks

The first analysis examined whether participants had followed the experimental instructions during the thought suppression or expression period. As it has already been shown in previous studies, the number of buzzes as a variable in thought suppression experiments is nearly always positively skewed. Therefore following the same procedure as in the former studies, the number of buzzes was square root transformed. After transformation boxplots were used to screen for outliers. These boxplots suggested that 3 outliers remained even after transformation. These were therefore removed from all further analyses. For the sake of clarity where means are reported they will be reported in the untransformed format.

The mean number of buzzer presses as a function of group and type of intention are presented in Figure 11.1 below. The mean number of buzzer presses were entered into a 2

group (suppression vs. expression) by 2 intention (relevant vs. irrelevant) between subjects ANOVA. This revealed a main effect of group $F(1,77) = 46.42$ $p < .0001$, eta-squared = .38. Those participants in the suppression group buzzed significantly fewer times ($M = 5.21$) than those in the expression group ($M = 16.21$). There was no main effect of intention or interaction (F 's < 1). Thus, the results show that participants did follow the experimental instructions.

FIGURE 11.1 - THE MEAN NUMBER OF BUZZER PRESSES IN A 5-MINUTE THOUGHT VERBALISATION TASK AS A FUNCTION OF GROUP (SUPPRESSION VS. EXPRESSION) AND INTENTION (RELEVANT VS. IRRELEVANT)



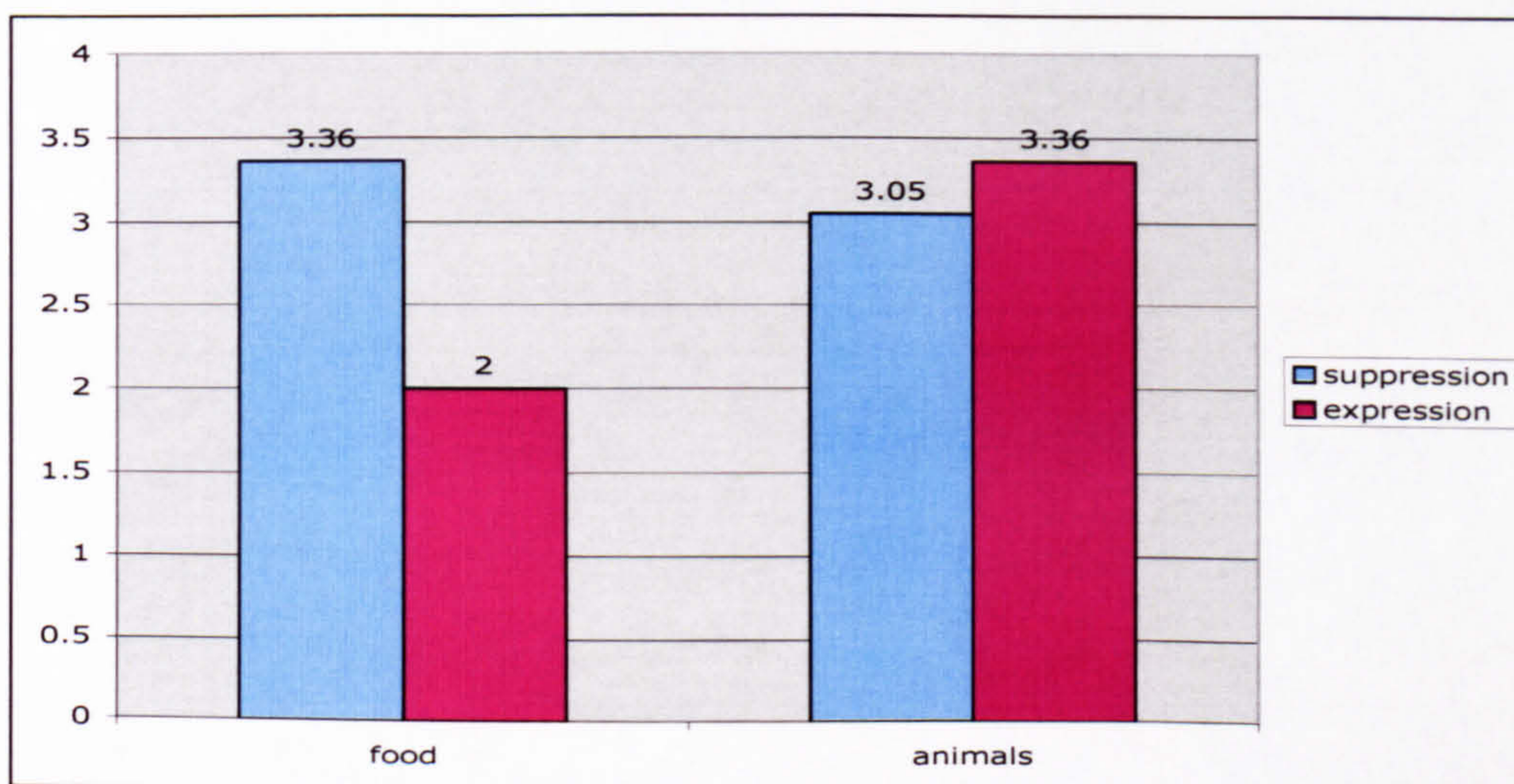
(2) Prospective memory performance

Performance on the prospective memory task was measured by the number of times (out of 6) that participants remembered to press the space bar when encountering the animal word. The animal words used were: wolf, camel, horse, crow, snake and spider. Overall there was a quite variable pattern of responding, thus, 21 participants (24.7%) forgot to respond on all occasions, 53 participants (62.4%) responded to some of the prospective memory targets but not all, and 11 participants (12.9%) responded to all targets. For the participants who forgot on all six occasions, 18 remembered when asked the first probing question “was there anything else you had been asked to do in addition to producing associated words in the word association task”. 2 participants remembered on the second more specific question “was there anything you had to do if they saw a particular word?”

and I remembered at level on the fourth question “they were given a description of three possible actions from which they had to choose the correct action (say the word aloud, press any letter key or press the space bar)”.

A 2 group (suppression vs. expression) by 2 intention (relevant vs. irrelevant) ANOVA was performed on this data. Results indicated no main effect of group $F(1,85) = 1.57$, $p = .21$. Thus, overall those who expressed ($M = 3.21$) performed no differently from those who suppressed ($M = 2.72$). This was expected as here performance was averaged across the type of intention (relevant vs. irrelevant). Surprisingly, however, there was no main effect of construct $F(1,85) = 1.72$, $p = .19$. Those who manipulated (suppressed / expressed) an intention relevant to the prospective memory task ($M = 3.21$) were no better at remembering the prospective memory task than those who suppressed / expressed an intention that was unrelated to the prospective memory task (i.e. having food later on $M = 2.72$). Finally, although the interaction approached significance $F(1,85) = 3.1$ $p = .08$, it was in the opposite to anticipated direction. Thus, the group expressing food seems to have performed more poorly relative to all other groups, but manipulating (suppressing / expressing) the relevant intention did not result in better performance than a group suppressing the intention to eat later on (see Figure 11.2).

FIGURE 11.2 – THE MEAN NUMBER OF PROSPECTIVE MEMORY RESPONSES AS A FUNCTION OF GROUP (SUPPRESSION VS. EXPRESSION) AND INTENTION (RELEVANT VS. IRRELEVANT)



These results indicate that even actively thinking about the to be performed intention (i.e. rehearsal) in the retention interval between prospective memory instructions and the onset of the ongoing task (i.e word association task) does not improve prospective memory performance. Interestingly, the current study also took measures of whether participants thought about the relevant intention only when they saw an animal word or at other times as well during the word association task. Therefore it was possible to examine whether thinking about the relevant intention at some points during the ongoing word-association task would result in enhanced prospective memory performance.

Those who reported thinking about the relevant intention at other times as well demonstrated better prospective memory, remembering to respond to 4.27 of the 6 possible animal target words compared to the group which reported only thinking of the relevant intention when they saw an animal ($M = 3.1$). This difference was statistically significant $t(60) = -2.56$ $p = .013$.

(3) Assessing the rebound effect with an implicit measure in the irrelevant intention condition

The final analysis examined whether the expression or suppression instructions resulted in the rebound effect or priming. This was done by examining participants frequency of producing food associates to the words in the word association task. The mean number of food associates produced in the word association task was entered into a 2 group (suppression vs. expression) x 2 intention (relevant vs. irrelevant) between subjects ANOVA. This revealed no main effect of group ($F < 1$). However, there was a main effect of intention $F(1,81) = 5.50$, $p = .02$. Those participants in the irrelevant intention group who manipulated (suppressed or expressed) the intention to eat later on produced more food words ($M = 2.27$) in the word association task than those in the relevant intention condition who manipulated the animal intention ($M = 1.47$). There was no group by intention interaction ($F < 1$), indicating that the main effect of intention was equally present in both suppression and expressing conditions.

Thus, the results are indicative of simple priming as manipulating the irrelevant intention resulted in production of more food words, but no rebound in that this effect was no stronger in the suppression group than in the expression group.

IV. Discussion

The current study shows that manipulating (suppressing or expressing) an intention which one soon must enact during the retention interval does not help one to remember to enact the intention any more successfully than if one had suppressed or expressed a completely unrelated intention. This is a highly counterintuitive finding, as the general expectation is that if a person had to remember to buy bread on the way home, then thinking of this intention whilst at work would help the person to remember to actually buy the bread on the way home with greater success. The results of this study suggest this may not be the case.

This finding is even more surprising given that there was an effect of our manipulation on the frequency with which people mention food items in the word association task. Thus, those participants who suppressed or expressed a food related intention subsequently generated a significantly greater number of food items in response to the word association task than those participants who had been manipulating the animal intention. Thus, it seems the experiment succeeded in demonstrating some priming of previously suppressed and expressed targets. If we succeeded in heightening the activation levels of food constructs using this method the suppression / expression of the related intention (concerning animals) should have similarly resulted in heightened activation of animal constructs. Yet, despite this heightened activation prospective memory performance remained poor. The results here support the hypothesis that reminders may not always help one to remember future intentions.

These findings are discrepant with the previous findings of Guynn et al. (1998) who demonstrated that whilst target only reminders did not enhance prospective memory

performance, reminders including the intention (target + associated action to be carried out) did improve prospective memory performance relative to a no reminder condition.

However, these contradictory results could be explained by one important methodological difference between the present study and that of Guynn et al. (1998). Thus, in the study of Guynn et al. (1998) the reminders occurred during the ongoing task where the intention could be enacted whereas in the present study the rehearsal occurred before the onset of the ongoing activity into which the prospective memory targets were embedded. This suggests that the timing of reminders may be the critical variable that may enhance prospective memory performance.

Taken together the results of the Guynn et al. (1998) study and the current study reported here suggest that in order to be effective reminders need to include both the prospective memory target and the associated action but also to occur at a point in time when the actual intention can potentially be carried out. Therefore, to think of buying bread whilst at work may not improve the likelihood with which one actually buys the bread, but to think of buying bread whilst in the car on the way home should enhance the likelihood of actually buying the bread. Further support for the idea that reminders need to occur during the period when the intention can be enacted to be effective comes from the results reported here showing that participants who thought about the prospective memory task during the ongoing word association task had better prospective memory performance than those participants who stated they only thought about the prospective memory task on encountering an animal word.

The key findings from this study are as follows. Thinking about or suppressing one's future intention during the retention interval may not always help one to remember to enact the intention. In addition, thought suppression or expression can lead to significant effects shown in a completely different later task (greater frequency of self generated food words in the irrelevant intention conditions). This last finding can be conceptualised as an implicit effect of thought expression or suppression, but does not represent a

rebound as the suppression group did not generate more food words than the expression group.

CHAPTER TWELVE

General discussion

What a man needs is simply and solely independent volition, whatever that independence may cost and wherever it may lead

Fyodor Dostoyevsky 1864 Notes from underground

The discussion will start by presenting a summary of the research aims. This will be followed by several sections discussing the major findings. For the purpose of clarity findings will be presented in the order in which they were presented in the thesis which does not necessarily reflect the level of importance of each finding. Some of the broader issues raised by these findings will be examined and their possible implications for mental control research will then be discussed. This will be followed by a short section examining some of the methodological problems that occurred in some of the studies. Finally, some general conclusions and some of the remaining questions for future research will be outlined.

I. Aims of the thesis

This thesis aimed to expand the research on intentional thought control in several directions. One of the major objectives was to attempt to untangle some of the controversy within the research on thought suppression where some studies have demonstrated the rebound effect (Clarke et al., 1991; Roemer & Borkovec, 1994; Salkovskis & Campbell, 1994; Wegner, et al., 1987) and others using similar methods have failed to obtain it (LoSchiavo & Yurak, 1995; Merckelbach, et al., 1991; Rutledge, et al., 1993). In order to solve this controversy the thesis specifically focused on comparing two methods used to index the rebound effect as well as the role of several important individual difference variables in the rebound effect. Related aims were to systematically evaluate the factors that could be responsible for individual differences in thought suppression and expression performance in the laboratory, as well as assessing the postsuppression rebound effect with implicit measures.

The second major objective of the thesis was to investigate possible relations between the propensity to use thought suppression in everyday life (as assessed by the WBSI) and various individual differences in a sample of young and older adults. In line with this aim the phenomenon of repression (here conceptualised as unconscious avoidance) was also examined with regards to its impact on the propensity to use conscious thought suppression in everyday life.

A final aim was to examine thought suppression from a broader perspective and ascertain whether the act of mental control (suppression or expression) can have some other ironic effects on people's perceptions and behaviour in addition to the rebound effect.

II. Main findings of this thesis

1. The rebound effect: Methodological issues and individual differences

Studies 1 and 3 (Chapters 3 and 5) aimed to replicate the rebound effect with a 15-minute delay between the verbalisation periods in a large sample using two different targets (present vs. absent from the room), and contrasting two different methods of indexing the rebound (original method vs. modified method). In addition, measures of individual differences in personality and ability were taken in order to examine if the rebound effect is mediated by any of these variables.

Study 1 demonstrated that the rebound effect found after intentional thought suppression can still be detected even if a 15-minute delay is placed between the two verbalisation periods. Most importantly, however, the results demonstrated that the rebound effect was dependent on the method used to measure the effect. Using the modified method of assessing the rebound effect no effect was obtained. However, when using the original method a rebound effect was clearly demonstrated with both targets.

This finding may explain some of the controversy reported in the literature where studies have failed to replicate the effect. It appears that the modified method may represent a more conservative method of indexing the rebound effect that is less likely to result in significant rebound effects even when the effect may actually be present. More importantly, the results from Study 1 suggest that the modified method may be inappropriate due to a confound: an increase in the target thought across period 1 and period 2 of thought verbalisation (see also Merckelbach et al., 1991). This rise could represent either a practice or priming effect, and clearly demonstrates that the mean number of thoughts expressed in period 2 is influenced by the previous period 1 expression.

When Study 1 is viewed in conjunction with Study 3 (Chapter 5) which attempted to replicate Study 1 on a different week using different targets for suppression and expression, the effects of expressing twice become even more apparent. Thus, Study 3 failed to replicate the findings from Study 1, but this was due to the expression group demonstrating a significant increase in the number of target thoughts (in week 2) as a result of the practice with expression from week 1 (Study 1). Taken together, results of Studies 1 and 3 suggest that thought expression is extremely sensitive to the effects of previous practice and using the number of buzzer presses in expression condition after previous expression may not be the best comparison group to assess the rebound effect. Therefore, the original (Wegner et al., 1987) method may well prove to be a “cleaner” method of assessing the rebound effect.

An additional and perhaps the most important finding of Study 1 was that the rebound effect is mediated by a specific personality variable, state vs. action orientation, irrespective of the method of indexing the rebound effect (modified vs. original). Thus, in Study 1, state oriented participants consistently demonstrated a rebound effect (eta squared = .10, for modified method, and eta squared = .15, for original method), which was not detectable with action oriented participants. Thus, the research has discovered an important individual difference factor (state vs. action orientation) that may mediate the rebound effect. Moreover, this interesting finding lends some support to the new

intentional model of the rebound effect proposed here. In this model, the rebound effect results from the fact that the decision to suppress a thought represents the formulation of an *intention to suppress*. Since it has been demonstrated that intentions have a privileged status in memory, called the Intention Superiority Effect (ISE) (Kuhl, 1994; Marsh, Hicks & Bink, 1998; Marsh, Hicks & Bryan, 1999) this fact alone could be responsible for the rebound effect.

A possible problem with this new account of the rebound effect, based on the ISE, is that under this account expressed thoughts would also be subject to an ISE. Thus, the decision to express (or think about) a certain thought can also be viewed as formulating an intention to express. Therefore, one would still need to explain why suppressed thoughts may come to be more accessible than expressed thoughts. One explanation comes from the goal directed nature of mental control. For example, participants attempting suppression formulate an intention to suppress and then experience some intrusion of the thought even during active suppression. Since this intrusion represents failure to fulfil the goal of thought suppression one does not see a deactivation of this intention after thought suppression. Therefore, the intention persists at a heightened activation level akin to a Zeigarnik effect (Zeigarnik, 1927). In contrast, the intention to express a thought is fulfilled during thought expression. So the intention may be deactivated, as has been demonstrated for completed intentions (Marsh et al., 1998). In line with this argument Martin et al. (1993) demonstrated that participants suppressing thoughts of a white bear, but subsequently given feedback suggesting that they had done well at this task (succeeded) did not demonstrate a rebound effect, whereas participants suppressing the white bear but not given success feedback did show a thought rebound.

The importance of the mediating role of state vs. action orientation in the rebound effect is also underscored by the fact that none of the other individual difference variables (such as fluid intelligence, anxiety, depression or need for cognition) had any effect on the rebound. Contrary to the suggestions of Rutledge et al. (1993,1996) fluid intelligence did not have an impact on the occurrence of the rebound effect. The mediational effect of

state vs. action orientation represents evidence that rebound effects are mainly influenced by the activation and deactivation of constructs.

2. Mechanisms of Thought Suppression and Thought Expression

In addition to assessing the rebound effect the thesis explored the question of whether suppression and expression performance, as demonstrated in the laboratory, can be viewed as an ability that varies intra-individually. This is an important question with major implications concerning the amount of control people have over their thoughts in general. Therefore, Study 2 (Chapter 4) was designed to investigate which individual differences relate to suppression and expression performance in the laboratory. The main finding from Study 2 was that thought intrusion during suppression (as assessed by buzzer pressing) was positively correlated with later thought intrusion during expression. This finding is important as it suggests that the two main forms of mental control (thought suppression and thought expression) are not underpinned by a unitary mechanism. Thus, good performance at one form of mental control implies poor performance at the alternate form. Study 2 demonstrates that one may not be able to be uniformly competent at both thought suppression and expression.

Study 2 also demonstrated that successful performance at thought suppression and expression are best predicted by a different set of individual difference variables. Thus, performance in a laboratory suppression task was shown to be predicted by state vs. action orientation and extraversion, and performance in an expression task was predicted by fluid intelligence. When one examines the factors predicting successful suppression performance in more depth it becomes apparent that being state oriented is a hindrance to successful suppression whereas being action oriented helps one to suppress their thoughts with greater success. Once again this is in line with Kuhl's (1994) theory of state vs. action orientation which proposes that state oriented individuals experience greater thought intrusions, have a problem with perseverating thoughts, and find it difficult to deactivate intentions. The results of Study 2 suggest that state oriented participants may also find the "deactivation" (or suppression) of thought in general to be difficult, as seen

in their worse performance on the suppression task. In conjunction with the findings from Study 1 it would seem that state oriented individuals are both more prone to experience difficulty with thought suppression during active suppression and also more likely to experience rebound effects during the post suppression period. In contrast, action oriented participants seem to have more success during thought suppression and are less prone to experience rebound effects.

Thought suppression performance was also found to be affected by the personality dimension of introversion / extraversion. Thus, successful performance during active suppression was found to be related to being an extrovert and unsuccessful suppression performance was related to being an introvert. This finding may be explicable when one examines models of extraversion, which suggest that introverts may be more easily aroused by external events than extroverts (Eysenck, 1982; 1990). They therefore seek out quiet environments and may feel overwhelmed in very active situations. In view of these findings one could suggest that perhaps in introverts constructs are activated more easily. This possible ease of activation could interfere with thought suppression in introverts. It is therefore not surprising that introverts perform less well on a suppression task than extroverts.

With regards to expression performance this was only significantly predicted by fluid intelligence. Thus, the greater one's fluid intelligence the better one's performance on a laboratory expression task. This once again, suggests that mental control involves the activation and deactivation of constructs, and that fluid intelligence may be related to one's ability to activate constructs. Participants with higher fluid intelligence are apparently more likely to activate and maintain a thought in consciousness than those with low fluid intelligence.

Interestingly, the tendency to use thought suppression in everyday life, as assessed by the WBSI, was not shown to relate to a person's suppression performance in the laboratory. Even when the level of analysis was taken to the item level, none of the items comprising the WBSI were shown to relate to actual suppression in the laboratory. This suggests

three possibilities. Firstly, the use of thought suppression in everyday life may be unrelated to thought suppression ability in the laboratory (i.e. thought suppression does not improve with practice). Secondly, the WBSI may not assess accurately the tendency to use thought suppression in everyday life. A third possibility is that the measures of thought suppression taken in the laboratory are unreliable. The second possibility is discussed later in this section. All three explanations may operate, as they are not mutually exclusive.

3. The tendency to use thought suppression in everyday life and individual differences in young and older participants.

Studies 4 and 5 (Chapters 6 & 7) were designed to examine which individual difference variables (psychopathology and personality) relate to the use of thought suppression in everyday life, as measured by the White Bear Suppression Inventory (WBSI), in samples of younger and older adults. The hypothesis was that the use of thought suppression in everyday life would be related to various psychopathologies, most notably trait anxiety, depression and neuroticism, as found in previous studies (Muris et al. 1996; Rassin et al. 1999, 2000, 2001; Wegner and Zanakos 1994). However, the aim was not merely to replicate previous findings in this area, but also to investigate the effects of other individual differences (not previously investigated) such as schizotypal personality, extroversion / introversion, rumination, linking and need for cognition. A further important aim was to investigate the relation between the WBSI and another similar instrument designed to measure the strategies of thought suppression in everyday life, the Thought Control Questionnaire (TCQ).

Study 5 is one of the first explorations of the propensity to use thought suppression in an older adult sample. As a result, the hypotheses were mainly exploratory although it was expected that the tendency to use thought suppression would also be related most strongly to various psychopathologies as it has been shown in younger participants.

(1) The Younger Adult Sample

In line with the above hypotheses, Study 5 showed that in young participants the use of thought suppression in everyday life was indeed related positively to several psychopathological variables. Thus, the frequent use of thought suppression (as assessed by the WBSI) was related to increased trait anxiety, neuroticism, depression, unhappiness, and schizotypal personality. Furthermore, the use of thought suppression was also related to the personality dimensions of linking, rumination, and state orientation. However, when WBSI scores were predicted from all of the variables collected, only rumination and anxiety were significant predictors, explaining 30% of the variance in WBSI scores. This suggests that it is mainly trait anxiety and rumination which mediate relations between psychopathologies and the use of thought suppression.

The finding relating to rumination is particularly important, as both Martin and Tesser (1996) and Erber and Wegner (1996) propose models of intentional thought suppression whereby rumination and thought suppression operate cyclically, with one being a cause of the other and *visa versa*. Martin and Tesser (1996) see rumination as the cause of thought suppression which then leads to more rumination when the rebound effect occurs. In contrast, Erber and Wegner (1996) see thought suppression as the cause of rumination which then leads to more thought suppression. The data reported here cannot untangle the directionality of any possible causation, but does serve to validate these models where thought suppression and rumination reinforce each other.

Study 5 showed that the two measures of the tendency to use thought suppression in everyday life (WBSI and TCQ) were uncorrelated. Although at first surprising, this finding can be explained in two ways. First there is some doubt over whether WBSI only measures the tendency to suppress thought in everyday life. Two studies that used factor analysis have suggested that, in addition to the tendency to suppress thoughts, the WBSI assesses a tendency to experience intrusive thoughts (Blumberg, 2000; Höping and Jong-Meyer, 2002). In contrast, the TCQ appears to measure primarily the frequency with which people use various strategies to control their thoughts some of which do not involve suppression at all (e.g., social methods and reappraisal). Due to these differences

between the WBSI and the TCQ only two subscales of the TCQ reliably correlated with the WBSI scores (worry and punishment). This is an important finding as currently there is a tendency to believe that these two measures assess similar constructs.

(2) The Older Adult Sample

Study 6 (Chapter 7) attempted to replicate the pattern of correlations found in the young participants, in the sample of older adults (all over 65 years). Several important findings emerged. First, older adults had reliably lower scores than the young sample on the WBSI, indicating less use of thought suppression. Second, the WBSI correlated positively with only one measure of psychopathology (schizotypal personality). Third, the WBSI was correlated negatively with social desirability. Finally, and somewhat unexpectedly, older adults had reliably lower scores on all of the psychopathological measures (anxiety, depression, neuroticism, schizotypal personality). The older adult's low scores on the psychopathological measures and high scores on social desirability were suggestive that the older adults might be answering defensively in order to appear better adjusted. This possibility was examined by assessing the prevalence of a repressive coping style in both the younger and older samples (Study 7, Chapter 9).

4. Repression

The relationships among repression, aging and use of conscious thought suppression were examined in Study 7 (Chapter 9). Repressors were defined as those having high social desirability scores (Marlowe Crowne), but low anxiety scores (Spielberger). The results showed that the older adult sample contained a higher proportion of repressors (36.0%) than the younger sample (9.5%). Since both samples had narrowly defined age bands, the correlation between age and repressiveness across the age span could not be investigated. One possibility is that as people age they become more repressive. Such an increase in repressiveness with age is an interesting idea because the older adults were found to display significantly lower levels of virtually all psychopathologies than the younger sample. Ray (1988) found that age and Marlowe Crowne social desirability were

positively correlated in eight separate studies, suggesting indeed that defensiveness may increase with age. These findings therefore deserve much greater emphasis in future studies.

In Study 7 the WBSI scores of young repressors were not significantly different from those of the young non-repressors; although there was a trend for them to be lower. There is a problem of power in this quasi-experiment, as the young sample contained only 9 repressors. In the older adult sample, the WBSI scores of repressors were significantly lower than the scores of non-repressors. Thus, it would seem older adults who are repressors report using thought suppression significantly less than non-repressors. One possible explanation for this finding is that the older repressors are underreporting their “true” use of thought suppression. Alternatively, being a repressor may protect one from thoughts that would otherwise need to be intentionally suppressed. Provisional support for this idea comes from a study by Schlagman et al. (2003) in which older adults (over 65 years) reported very few negative involuntary autobiographical memories (5%) in comparison to younger adults (35%) during a one week long diary study in which participants had to record all those autobiographical memories that occurred involuntarily in the course of everyday life. In summary, it seems repressors show an inclination to use conscious thought suppression less than non-repressors and that repressive tendencies are more prevalent in older samples.

5. Other effects of mental control

A final aim was to examine whether mental control can have some other effects apart from the rebound effect on the perception of intentionality and on the ability to successfully enact future intentions. In line with this aim Study 8 (Chapter 10) was conducted to examine the effects of suppressing or expressing thoughts of an action on one’s perception of willing the action after its completion. This study relied heavily on recent models of how humans infer causality in their own actions (Wegner, 2001, 2003; Wegner & Wheatley, 1999). All of these models suggest that prior consistent thoughts of the upcoming action (i.e. action previews) are necessary for one to feel that actions have

been willed. If these thoughts are lacking one may feel as if the action was less intentionally completed. The idea behind Study 8 was to discover whether participants' own sense of intentionality could be changed by undertaking actions whilst under different mental control instructions. The hypothesis was that actions completed whilst trying to suppress thoughts of the upcoming action (suppression condition) would subsequently be rated as less intentional than actions undertaken with no mental control instructions. In contrast, actions completed whilst holding in mind the intention to complete the action (expression condition) should come to feel more intentional.

The results of Study 8 were exactly in line with the hypothesis. Acts completed whilst suppressing thoughts of the intention to engage in the act were subsequently rated as less intentional. Acts completed when holding this intention in mind were rated as more intentional, relative to the baseline (no mental control instructions) condition. This finding can potentially explain some of the numerous everyday examples of people engaging in counter intentional behaviour and subsequently proclaiming that it was not them, that the action just happened. The actions may indeed come to feel unintentional due to the effort expended on mental control whilst trying not to act in that way (e.g., having an extra drink in the bar).

In line with the overall aim of broadening the scope of mental control research, Study 9 (Chapter 11) attempted to investigate whether the rebound effect could be used positively to help people remember their intentions. Study 9 tested the hypothesis that if suppressed intentions subsequently rebound, then this rebound may well help people to remember to act on their intentions. However, contrary to expectations, neither suppression and conscious expression of the upcoming intention served to enhance the prospective memory performance relative to suppression or expression of an irrelevant intention. As thought expression can be conceptualised as a reminder of the intention it seems counter intuitive that prospective memory was not improved.

One problem often encountered with prospective memory experiments is ceiling effects, which prevent the detection of statistically reliable differences. However, the failure to

find significant group differences cannot be explained by ceiling effects, since all participants had 6 opportunities to respond to the prospective memory target, yet the mean response across the groups was 3. Therefore, opportunity for increasing prospective memory performance clearly existed.

The fact that expression or suppression of the relevant intention did not enhance prospective memory performance is puzzling. However, previous research has also found similar results (Guynn et al., 1998). It may be that in order for reminders to be effective they need to occur at the 'right' time. It seems the right time may need to be during the period when the intention can actually be acted on. In the Guynn et al. (1998) study reminders (comprising of the prospective memory target and the action) that occurred during the period when the intention could have been acted on proved to be effective at enhancing prospective memory performance. The fact that in Study 9 thinking (expressing) about the to be enacted intention did not improve prospective memory performance may be because active expression (i.e. rehearsal) of intentions happened during the retention interval and not during the critical period when the intention could be enacted (i.e. during the word-association task).

The lack of rehearsal effects prior to the critical period has major implications for prospective memory research. Indeed, Study 9 is one of the first studies to demonstrate that even highly specific reminders presented during the retention interval may be completely ineffective at improving prospective memory performance. Study 9 therefore has further implications for more naturalistic research attempting to find simple means by which people can enhance their prospective memory performance suggesting that reminders need to occur in the right circumstances to be effective.

III. Global Issues in Mental Control Research

Having reviewed the major findings above and discussed some of the implications for mental control research, this section discusses the implications of the findings from a more global perspective.

1. Robustness of the Rebound Effect

In the research on thought suppression there has been a tendency to portray the rebound effect as robust with serious implications for many areas of life including mental health and psychopathology. The present results, however, support the idea that the rebound effect is less robust than a cursory reading of the literature might suggest. Studies 1 and 3 demonstrate that the rebound effect is highly method dependent as the effect was only found using the original but not the modified method of assessment.

Furthermore, Study 5 which attempted to replicate the findings of Study 1, using different targets, failed to demonstrate a rebound effect using either method of assessment. The most likely reason for this failure is the strong effect of previous practice on later thought expression. This is a further demonstration of the fragility of the effect. Study 5 also suggest that once participants have already undertaken one thought suppression experiment they may be unsuitable for further thought suppression experiments. Thus, Study 5 failed to demonstrate the rebound a second time, even after a one-week delay between experiments.

The intentional model of the rebound effect suggests an alternative reason for the non-robustness of the rebound effect. It may be that the effect is only present for some personality types. Study 1 provides some evidence that state oriented participants display a rebound effect, whilst the effect is absent in action oriented participants. This novel finding calls into question the implicit assumption that a rebound effect occurs for anyone attempting suppression. It may well be the case that certain people (state oriented) are predisposed to experience rebound after suppression and other people are not (action oriented).

Interestingly, state versus action orientation alone can account for some of the studies that have failed to replicate the basic rebound effect. Thus, if one assumes that state and action oriented individuals are equally represented in the general population (something

which is unclear from Kuhl & Beckmanns 1994 theory) one is lead to the possibility that rebound effects are weak or non-existent where samples have high proportions of action oriented people. As is the case in Study 1, when examining the whole sample using the modified method of assessment no rebound effect was demonstrated. However, when the sample was dichotomised into state and action oriented participants and the analysis re-run, a medium effect was present in state oriented and none was present in action oriented. It is therefore possible that differences in the proportions of state and action oriented participants account for whether rebound effect is found, or not.

In summary, the review in Chapter 1 and the experimental findings in Chapters 3-8 show that the rebound effect is not as robust as often suggested (Wegner et al., 1987; Wenzlaff & Wegner, 2000). This research shows that the rebound effect depends on the method of assessment, individual differences in personality, and practice effects. The effect sizes were, at best, medium.

2. Implications for Psychopathology

After the first demonstration of the rebound effect in 1987, Wegner and his colleagues were keen to develop a programme of research to further explore this interesting phenomenon. In the course of the ensuing research and the subsequent upsurge of interest in mental control, one of the areas to receive intensive attention was psychopathology (Purdon, 1999; Purdon & Clark 1999; Wegner, 1997; Wenzlaff & Bates, 1998). If the rebound effect is a regular occurrence in people who suppress their thoughts then one could ask whether this could be used in cognitive models of psychopathologies. Several researchers have now begun to include the rebound effect in their cognitive models of various psychopathologies, most notably anxiety, depression, post-traumatic stress disorder and obsessive-compulsive disorder (Purdon, 1999; Rachman, 1997; 1998). It has been proposed that the use of thought suppression may be an aetiological factor in various psychopathologies, or that it can exacerbate already present disorders. The results

of the current thesis suggest that if the rebound effect is not as robust as first thought these models may require revision.

In view of fragility and weakness of the rebound effect, it is unlikely that thought suppression is a major cause of psychopathology as, Wegner and his colleagues have suggested. Thus, Wegner conceptualises the theoretical relationship between thought suppression and psychopathology as a causal one. Once a thought is suppressed it rebounds, leading to greater thought that can be viewed as a form of rumination. Thus, individuals on experiencing a thought rebound may begin to ruminate on why they cannot avoid the thought. Suppression may be re-instigated in an attempt at control, but is likely to only results in greater intrusion, discomfort and anxiety. The current thesis demonstrates some clear associations between the tendency to use thought suppression and psychopathology, and showing that anxiety and rumination explain a substantive amount of variance in the use of thought suppression. However, the causal direction of the association has not yet been untangled. Theoretically it would seem to make more sense to suggest that psychopathology leads to the use of thought suppression rather than the alternate direction of causality. The reasoning behind this centres on the idea that for a thought to be suppressed it must already be in some way intrusive and unwanted. Therefore, on balance, it seems that thought suppression may not necessarily be a major cause of psychopathology, but it is likely that once a person is experiencing troublesome or unwanted thoughts efforts to control these may exacerbate the problem.

3. What does the WBSI measure?

Another important issue raised by the results of the thesis is the question about what exactly is measured by the WBSI. Previous factor analyses have reported discrepancies, with some studies reporting a one factor solution (Wegner & Zanakos, 1994; Muris et al., 1996), others a two factor solution (Höping and Jong-Meyer, 2002) and still others three factors (Blumberg, 2000). It would appear there is confusion over exactly what the inventory measures. In the two previous studies that reported a multi-factor solution, an additional factor identified was unwanted intrusive thoughts. This is important because if

one examines the face validity of the items it does indeed seem that some of the items may be more accurately construed as measuring thought intrusion rather than a tendency to suppress. This idea is further supported by the results of Study 5 which demonstrated that WBSI scores were predicted by rumination that often represents intrusive and unwanted thoughts.

Another problem with the WBSI revealed by the results of the studies is the lack of validity of this inventory. Thus, performance in the laboratory suppression task did not correlate with the WBSI scores. There is a lack of research investigating any relations between the tendency to use thought suppression in everyday life and actual suppression performance demonstrated in a laboratory task. Furthermore, when developing the WBSI Wegner and Zanakos (1994) did not validate their measure with actual laboratory suppression performance.

4. How Much Control Do We Have Over Our Thoughts?

One global issue, raised by the results of the current thesis, is the degree to which people have control over their thoughts, if at all. To put it another way, the question is whether people can elicit and / or extinguish thoughts from their mind at will, or whether people are doomed to experience thoughts over which they have no control.

Taken together, the results that were obtained here suggest that people's actual degree of mental control may be somewhat limited. Study 1 demonstrated that suppressed thoughts are likely to rebound. If short-term suppression success is bought at the price of later preoccupation it can hardly be termed success at mental control. Furthermore, Study 2 indicated that virtually all participants reported some thought intrusion, even during active suppression. This could be conceptualised as task failure. Of key importance was the finding in Studies 1 and 2 that both the propensity to experience rebound effects and one's performance on an actual suppression task in the laboratory were strongly affected by the personality dimension of state vs. action orientation. State oriented participants

were more likely to experience greater thought intrusion during active suppression, and also more likely to experience the rebound effect when compared to action oriented participants. This finding suggests that state oriented people may be predisposed to experience ironic effects, and so overall experience less control over their thoughts than action oriented people. This intriguing finding deserves much greater emphasis in future thought control research, as it implies that certain individuals may be liable to have more problems with mental control than others.

When examining expression, mental control was once again far from complete. For example, there was a large variance in performance between individuals during a 5-minute thought expression period. One participant in the expression group buzzed 104 times during the 5-minute verbalisation period and another buzzed just 3 times during the same 5-minute period. In addition, the only correlate of expression performance was fluid intelligence, with higher fluid intelligence predicting better thought expression performance. This may suggest that fluid intelligence is assessing a construct that partially measures the ease with which a person can activate thoughts and maintain these in working memory. However, this finding again suggests that expression of thought is a task over which people have only limited control.

The results of the final two studies also seem to suggest that people may have less control over their thoughts and other mental processes. Study 8 (Chapter 10) illustrated that if a behaviour is carried out whilst thinking of something completely different (by suppressing thoughts about the action), the act subsequently feels as if it were less intentionally performed. In addition, if the behaviour is carried out whilst holding in mind the intention to perform it, the act subsequently feels more intentional. This finding suggests that either form of mental control may have a subtle effect on one's subsequent perception of intentionality. The interesting feature of this is that most often in everyday life this mechanism would operate with little conscious awareness. Thus, in everyday life, one acts (not really concentrating on what is in mind at the time), one then experiences thoughts relating to the act that suggest the act was either intentionally completed or just happened automatically. Because the "true" source of the feeling of will remains to an

extent unknown (i.e. what was in mind at the time of enactment), this suggests that thought control can lead to later perceptions and thoughts which are to some extent mysterious and perceived as un-caused.

Study 9 (Chapter 11) provides further support for this interpretation by demonstrating that conscious thought or thought suppression of an upcoming intention did not help one to remember to perform the intention any more successfully than two other groups of participants suppressing or expressing a completely irrelevant intention. Often, in everyday life, individuals seem to hold the implicit assumption that conscious thought about an upcoming intention should help one to enact it with greater success. Thus, one may attempt mental control in the service of prospective memory, yet be unaware that this behaviour does not actually increase the likelihood of enactment.

These final two studies suggest that the cognitive architecture of humans and the poor assessment of co-variation often means mental control has strange and unanticipated effects, which the person does not necessarily associate with the act of mental control. Again, this analysis suggests that thought control does not involve a mechanism which can be applied at will without consequence. The consequences of mental control, however, will vary depending on its form (suppressive or expressive) and its purpose (suppressing a single unwanted thought or suppressing an intention to act in a particular way).

The idea that thought is a domain over which people have little control has empirical support from experiments conducted by Logan (1983, 1985b). In a series of experiments participants were asked to make speeded category and rhyme judgements about word pairs. In addition, participants had to inhibit their responses to particular word-pairs. Whether the thought stopped when relevant responses / actions were inhibited or continued to completion was assessed by examining memory for the words presented in the task. The underlying assumption was that if thoughts did not continue to completion memory performance should be worse for inhibited actions than for words where responses were not inhibited. The results indicated no difference in memory performance

for completed and inhibited words. These findings were taken as evidence that thoughts are “ballistic” continuing to completion even in cases where the associated action is successfully inhibited. These findings represent further evidence of a dichotomy between thought and action with control of thought being much more capricious than control of action.

In summary, it would seem the present thesis challenges the view that thought is a domain over which one has a large degree of control. The present analysis suggests that the very act of mental control is both difficult and often unsuccessful. Furthermore, even when mental control is partially successful, it often results in paradoxical effects that seem to undermine the notion that we are indeed in control of our thoughts.

IV. Potential Problems of Methodology and Interpretation

One potential problem is the reliance on self-report data as the dependent variable in most of the studies. In an attempt to address this criticism, Study 4 (Chapter 6) sought to assess the activation of previously suppressed or expressed thoughts using an implicit measure, the reaction time to recognise stimuli as words or non-words in a Lexical Decision Task. It was hypothesised that previously manipulated (suppressed or expressed) target words would show faster recognition latencies due to the heightened activation accrued from previous use. Unfortunately this study did not yield statistically significant results. Both previously suppressed and expressed targets produced a slowing relative to distracters. This slowing in response to previously manipulated targets (suppressed or expressed) most likely represents conscious interference as the participant may notice the target as previously manipulated causing the slowing. This result therefore cautions against using Lexical Decision Tasks to assess construct activation in cases where there is a possibility that the association between the previous task and the Lexical Decision Task will be noticed.

A further problem related to the use of self-report data as a dependent variable is that performance on suppression and expression tasks examined in Study 2 has not been tested for reliability. Performance on the suppression task in Study 2 was only investigated in one five-minute period of suppression. It is therefore an open question as to whether there is a reliable suppression performance that varies between individuals. However, the design of the large scale investigation, as described in Chapter 2, permits exploration of the reliability of expression performance. This is because participants expressed a different target on two separate weeks, therefore if there is a reliable measure of expression performance which varies between individuals this should be detected in this study. Importantly, the correlation between expression performance across the two weeks was .54. This implies substantial stability, and hence reliability, in a measure of expression performance over two weeks. The correlation between two periods of suppression, using different targets and weeks needs to be examined in future research.

V. Final Conclusions and Future Directions

This thesis has produced a set of interesting findings that have important implications for thought suppression research. It has also raised several questions that merit further investigation, these will now be discussed.

The results suggest that some of the controversy in the thought suppression literature may be explained by the methods used for indexing the rebound effect. The modified method appears to be flawed by having a comparison group that expresses twice. The original method of Wegner et al. (1987) may represent a “cleaner” method of assessment. However, even the original Wegner et al. (1987) method is not without its problems. Thus, the main reason for the development of the modified method was the criticism that in the original method the rebound effect is assessed by comparing an expression group in period 1 and another expression group in period 2 (after prior suppression), thus these two groups have had differential practice with the task of thought verbalisation. One group has verbalised twice and the other group only once. One method of assessment that

may overcome some of the problems inherent in all current paradigms is as follows. During period 1 one group suppresses and the other group merely verbalises all their thoughts out loud as in the previous practice period. In period 2 both groups express and are compared to index the rebound effect. Using this method, both groups have equal practice with the verbalisation task and one also avoids the problems inherent in expressing thoughts twice.

However, it is clear that all of these assessment methods still share the reliance on self reported thought as the dependent variable. Future research needs to make much greater use of implicit methods of rebound effect assessment. The key study demonstrating the rebound effect with implicit measures during the post suppression period still awaits investigation. The current thesis suggests that in designing this study the implicit task chosen is of paramount importance. Thus, here a Lexical Decision Task proved to be a poor choice for assessing construct activation after previous suppression or expression.

The studies examining the effects of individual differences clearly show that state oriented individuals are more likely to display rebound effects. In addition, action oriented participants were reliably more successful at laboratory suppression than state oriented participants. This dimension needs to receive much greater attention in thought suppression research as the results of this thesis suggest it may be a key mediational variable with the potential to explain several thought control phenomena.

Future studies also need to examine in depth whether there is indeed a consistent suppression and expression performance that varies between individuals. Furthermore, research is necessary to delineate which personality variables are related to suppression and expression ability. Interestingly the current studies found no relationship between suppression performance in the laboratory and the use of thought suppression in everyday life. If thought suppression is an ability that improves with practice, future research will need to demonstrate such relationships. In line with this it is clear that more precise measures of the tendency to suppress thoughts in everyday life need to be developed which are not contaminated by a tendency to experience intrusive thoughts.

One further important direction for future research is to examine in detail the relationship between thought suppression and aging. Currently there are no published studies examining mental control and thought suppression in older adults. In view of the interesting finding that older adults score significantly lower on the WBSI but show a much greater proportion of repression this research is clearly needed.

Perhaps the most exciting idea stemming from this research is the possibility that the effects of mental control investigated in this thesis may generalise to overt behaviour. The idea is simply that the likelihood of enacting a behaviour may become greater if one tries not to carry out the act by suppressing it. In short, can there be rebound effects in intentional behaviour? Although not part of the current thesis these questions and other similar ideas represent important questions for the future.

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Appendix A

State / Trait Anxiety Inventory

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Q1	02	Q3	Q4
1. I feel calm				
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I am regretful	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.
9. I feel anxious	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 "high strung"	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 over-excited and "rattled"	1	2	3	4
19. I feel joyful	1	2	3	4
20. I feel pleasant	1	2	3	4

STAI FORM X-2

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 tire quickly	1	2	3	4
23. I feel like crying	1	2	3	4
25. I am loosing out on things because I can't make up my mind soon enough	1	2	3	4
26. If feel rested	1	2	3	4
27. I am "calm cool, and collected"	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that really doesn't matter	1	2	3	4
30. I am happy				
31. I am inclined to take things hard	1	2	3	4
32. I lack self confidence				
33. If feel secure	1	2	3	4
34. I try to avoid facing a crisis or difficulty	1	2	3	4
35. I feel blue	1	2	3	4
36. I am content	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

Appendix B

White Bear Suppression Inventory

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

A B C D E

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 B

15. Sometimes I stay busy just to keep thoughts from intruding on my mind

Appendix C

Marlowe Crowne Scale

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to you personally

True False

- | | | |
|--|---|---|
| 1. Before voting I thoroughly investigate the qualifications of all the candidates: | T | F |
| 2. I never hesitate to go out of my way to help someone in trouble. | T | F |
| 3. It is sometimes hard for me to go on with my work if I am not encouraged. | T | F |
| 4. I have never intensely disliked someone. | T | F |
| 5. On occasion I have had doubts about my ability to succeed in life. | T | F |
| 6. I sometimes feel resentful when I don't get my way. | T | F |
| 7. I am always careful about my manner of dress. | T | F |
| 8. My table manners at home are as good as when I eat out in a restaurant. | T | F |
| 9. If I could get into a movie without paying and be sure I was not seen I would probably do it. | T | F |

- | | | |
|--|---|---|
| 10. On a few occasions, I have given up doing something because thought too little of my ability. | T | F |
| 11. I like to gossip at times. | T | F |
| 12. There have been times when I felt like rebelling against people in authority even though I knew they were right. | T | F |
| 13. No matter who I'm talking to, I'm always a good listener. | T | F |
| 14. I can remember 'playing sick' to get out of something. | T | F |
| 15. There have been occasions when I took advantage of someone. | T | F |
| 16. I'm always willing to admit it when I make a mistake. | T | F |
| 17. I always try to practise what I preach. | T | F |
| 18. I don't find it particularly difficult to get along with loud-mouthed, obnoxious people. | T | F |
| 19. I sometimes try to get even rather than forgive and forget. | T | F |
| 20. When I don't know something I don't at all mind admitting it. | T | F |
| 21. I am always courteous, even to people who are disagreeable. | T | F |
| 22. At times I have really insisted on having things my own way. | T | F |
| 23. There have been occasions when I felt like smashing things. | T | F |
| 24. I would never think of letting someone else be punished for my wrong-doing. | T | F |

- | | | |
|--|---|---|
| 25. I never resent being asked to return a favour. | T | F |
| 26. I have never been irked when people expressed ideas very different from my own. | T | F |
| 27. I never make a long trip without checking the safety of my car. | T | F |
| 28. There have been times when I was quite jealous of the good fortune of others. | T | F |
| 29. I have almost never felt the urge to tell someone off. | T | F |
| 30. I am sometimes irritated by people who ask favours of me. | T | F |
| 31. I have never felt that I was punished without cause. | T | F |
| 32. I sometimes think when people have a misfortune they only get what they deserve. | T | F |
| 33. I have never deliberately said something that hurt someone's feelings. | T | F |

Appendix D

Thought Control Questionnaire

Most people experience unpleasant, and/or unwanted thoughts (in verbal and/or picture form), which can be difficult to control. We are interested in the techniques that you generally use to control such thoughts. Below are a number of things that people do to control these thoughts. Please read each statement carefully, and indicate how often you use each technique by circling the appropriate number:

1=NEVER 2=SOMETIMES 3=OFTEN 4=ALMOST ALWAYS

There are no right or wrong answers. Do not spend too much time thinking about each one.

WHEN I EXPERIENCE AN UNPLEASANT/UNWANTED THOUGHT:

1 2 3 4 1.I call to mind positive images instead.

1 2 3 4 2.I tell myself not to be so stupid.

1 2 3 4 3.I focus on the thought.

1 2 3 4 4. I replace the thought with a more trivial
bad thought.

1 2 3 4 5. I don't talk about the thought to anyone.

1 2 3 4 6.I punish myself for thinking the thought.

1 2 3 4 7.I dwell on other worries.

1 2 3 4 8.I keep the thought to myself.

- 1 2 3 4 9.I occupy myself with work instead.
- 1 2 3 4 10.I challenge the thought's validity.
- 1 2 3 4 11.I get angry at myself for having the
thought.
- 1 2 3 4 12.I avoid discussing the thought.
- 1 2 3 4 13.I shout at myself for having the thought.
- 1 2 3 4 14.I analyze the thought rationally.
- 1 2 3 4 15.I slap or pinch myself to stop the thought.
- 1 2 3 4 16.I think pleasant thoughts instead
- 1 2 3 4 17.I find out how my friends deal with these
thoughts.
- 1 2 3 4 18.I worry about more minor things instead.
- 1 2 3 4 19.I do something that I enjoy.
- 1 2 3 4 20.I try to reinterpret the thought.
- 1 2 3 4 21.I think about something else
- 1 2 3 4 22.I think more about the more minor problems
have.
- 1 2 3 4 23.I try a different way of thinking about it.

1 2 3 4 24.I think about past worries instead.

1 2 3 4 25.I ask my friends if they have similar

thoughts.

1 2 3 4 26.I focus on different negative thoughts.

1 2 3 4 27.I question the reasons for having the

thought.

1 2 3 4 28.I tell myself that something bad will

happen if I think the thought.

1 2 3 4 29.I talk to a friend about the thought.

1 2 3 4 30.I keep myself busy.

31. What else do you do in order to get rid of unpleasant or unwanted thoughts? (Please use the space below for your answer.)

Appendix E

Eysenck Personality Questionnaire

Directions – A number of statements appear below. Read each statement and then circle the response on the right that best applies to yourself. There are no correct answers.

1. Does your mood often go up and down? YES NO
2. Do you take much notice of what people think? YES NO
3. Are you a talkative person? YES NO
4. If you say you will do something, do you always keep your promise no matter how inconvenient it might be? YES NO
5. Do you ever feel “just miserable” for no reason? YES NO
6. Would being in debt worry you? YES NO
7. Are you rather lively? YES NO
8. Were you ever greedy by helping yourself to more than your share of anything? YES NO
9. Are you an irritable person? YES NO

- | | |
|--|--------|
| 10. Would you take drugs which may have strange or dangerous effects? | YES NO |
| 11. Do you enjoy meeting new people? | YES NO |
| 12. Have you ever blamed someone for doing something you knew was really your fault? | YES NO |
| 13. Are your feelings easily hurt? | YES NO |
| 14. Do you prefer to go your own way rather than act by the rules? | YES NO |
| 15. Can you usually let yourself go and enjoy yourself at a lively party? | YES NO |
| 16. Are all your habits good and desirable ones? | YES NO |
| 17. Do you often feel "fed-up"? | YES NO |
| 18. Do good manners and cleanliness matter much to you? | YES NO |
| 19. Do you usually take the initiative in making new friends? | YES NO |
| 20. Have you ever taken anything (even a pin or button) that belongs to someone else ? | YES NO |

21. Would you call yourself a nervous person ? YES NO
22. Do you think marriage is old-fashioned and should be done away with ? YES NO
23. Can you easily get some life into a rather dull party ? YES NO
24. Have you ever broken or lost something belonging to someone else? YES NO
25. Are you a worrier? YES NO
26. Do you enjoy co-operating with others? YES NO
27. Do you tend to keep in the background on social occasions? YES NO
28. Does it worry you if you know there are mistakes in your work? YES NO
29. Have you ever said anything bad or nasty to anyone? YES NO
30. Would you call yourself tense or "highly strung"? YES NO
31. Do you think people spend too much time safeguarding their future with savings and insurances ? YES NO
32. Do you like mixing with people? YES NO

33. As a child were you ever cheeky to your parents? YES NO
34. Do you worry too long after an embarrassing experience? YES NO
35. Do you try not to be rude to people? YES NO
36. Do you like plenty of bustle and excitement around you? YES NO
37. Have you ever cheated at a game? YES NO
38. Do you suffer from “nerves”? YES NO
39. Would you like other people to be afraid of you? YES NO
40. Have you ever taken advantage of someone? YES NO
41. Are you mostly quiet when you are with other people? YES NO
42. Do you often feel lonely? YES NO
43. Is it better to follow society’s rules than go your own way? YES NO
44. Do other people think of you as being very lively? YES NO
45. Do you always practice what you preach? YES NO

46. Are you often troubled about feelings of guilt? YES NO

47. Do you sometimes put off until tomorrow what you ought to do today? YES NO

48. Can you get a party going? YES NO

Appendix F

Beck Depression Inventory

Instructions : This is a questionnaire. On the questionnaire are groups of statements. Please read the entire group of statements in each category. Then pick out the one statement in that group which best describes the way you feel today, that is, right now! Circle the number beside the statement you have chosen. If several statements in the group seem to apply equally well, circle each one.

Be sure to read all the statements in each group before making your choice.

A.

3. I am so sad or unhappy that I can't stand it.
2. I am blue or sad all the time and I can't snap out of it.
1. I feel sad or blue.
0. I do not feel sad.

B.

3. I feel that the future is hopeless and that things cannot improve.
2. I feel I have nothing to look forward to.
1. I feel discouraged about the future.
0. I am not particularly pessimistic or discouraged about the future.

C.

3. I feel I am a complete failure as a person (parent, husband, wife).
2. As I look back on my life, all I can see is a lot of failures.
1. I feel I have failed more than the average person.
0. I do not feel like a failure.

D.

3. I am dissatisfied with everything.
2. I don't get satisfaction out of anything anymore.
1. I don't enjoy things the way I used to.
0. I am not particularly dissatisfied.

E.

3. I feel as though I am very bad or worthless.
2. I feel quite guilty.
1. I feel bad or unworthy a good part of the time.
0. I don't feel particularly guilty.

F.

3. I hate myself.
2. I am disgusted with myself.
1. I am disappointed in myself.
0. I don't feel disappointed in myself.

G.

3. I would kill myself if I had the chance.
2. have definite plans about committing suicide.
1. I feel I would be better off dead.
0. I don't have any thoughts of harming myself.

H.

3. I have lost all of my interest in other people and don't care about them at all.
2. I have lost most of my interest in other people and have little feeling for them.
1. I am less interested in other people than I used to be.
0. I have not lost interest in other people.

I.

- 3. I can't make any decisions at all anymore.
- 2. I have great difficulty in making decisions.
- 1. I try to put off making decisions.
- 0. I make decisions about as well as ever.

J.

- 3. I feel that I am ugly or repulsive looking.
- 2. I feel that there are permanent changes in my appearance and they make me look unattractive.
- 1. I am worried that I am looking old or unattractive.
- 0. I don't feel that I look any worse than I used to.

K.

- 3. I can't do any work at all.
- 2. I have to push myself very hard to do anything.
- 1. it takes extra effort to get started at doing something.
- 0. I can work about as well as before.

L.

- 3. get too tired to do anything.
- 2. I get tired from doing anything.
- 1. I get tired more easily than I used to.
- 0. I don't get any more tired than usual.

M.

- 3. I have no appetite at all anymore.
- 2. My appetite is much worse now.
- 1. My appetite is not as good as it used to be.
- 0. My appetite is no worse than usual.

Appendix G

Need For Cognition

Directions – A number of statements appear below. Read each statement carefully and then circle the appropriate number on the right. There are no correct or incorrect answers.

	Very Strong Disagreement	Strong Disagreement	Moderate Disagreement	Slight Disagreement	Neither Agreement nor Disagreement	Slight Agreement	Moderate Agreement	Strong Agreement	Very Strong Agreement
1. I really enjoy a task that involves coming up with new solutions to problems.	-4	-3	-2	-1	0	1	2	3	4

- | | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|--|----|----|----|----|---|---|---|---|---|
| 2. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought. | | | | | | | | | |
| 3. I tend to set goals that can be accomplished only by expending considerable mental effort. | | | | | | | | | |
| 4. I am usually tempted to put more thought into a task than the job minimally requires. | | | | | | | | | |
| 5. Learning new ways to think doesn't excite me very much. | | | | | | | | | |
| 6. I am hesitant about making important decision after thinking about them. | | | | | | | | | |
| 7. I usually end up deliberating about issues even when they do not affect me personally. | | | | | | | | | |

- | | | | | | | | | | |
|---|----|----|----|----|---|---|---|---|---|
| 8. I prefer just to let things happen rather than try to understand why they turned out that way. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 9. I have difficulty thinking in new and unfamiliar situations. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 10. The idea of relying on thought to make my way to the top does not appeal to me. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 11. The notion of thinking abstractly is not appealing to me. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 12. I am an intellectual | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 13. I only think as hard as I have to. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 14. I don't reason well under pressure. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 15. I like tasks that require little thought once I've learned them. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 16. I prefer to think about small, daily projects to long-term ones. | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |

17. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. -4 -3 -2 -1 0 1 2 3 4
18. I find little satisfaction in deliberating hard and for long hours. -4 -3 -2 -1 0 1 2 3 4
19. I more often talk with other people about the reasons for and possible solutions to international problems than about gossip or titbits of what famous people are doing -4 -3 -2 -1 0 1 2 3 4
- 20.. These days, I see little chance for performing well, even in “intellectual” jobs, unless one knows the right people -4 -3 -2 -1 0 1 2 3 4
21. More often than not, more thinking just leads to more errors. -4 -3 -2 -1 0 1 2 3 4

22. I don't like to have the responsibility of handling a situation that requires a lot of thinking. -4 -3 -2 -1 0 1 2 3 4
23. I appreciate opportunities to discover the strengths and weaknesses of my own reasoning. -4 -3 -2 -1 0 1 2 3 4
24. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort. -4 -3 -2 -1 0 1 2 3 4
25. Thinking is not my idea of fun. -4 -3 -2 -1 0 1 2 3 4
26. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something. -4 -3 -2 -1 0 1 2 3 4
27. I prefer watching educational to entertainment programmes -4 -3 -2 -1 0 1 2 3 4
28. I think best when those around me are very intelligent. -4 -3 -2 -1 0 1 2 3 4

29. I prefer my life to be filled with puzzles that I must solve. -4 -3 -2 -1 0 1 2 3 4
30. I would prefer complex to simple problems. -4 -3 -2 -1 0 1 2 3 4
31. Simply knowing the answer rather than understanding the reasons for the answer to a problem is fine with me. -4 -3 -2 -1 0 1 2 3 4
32. It's enough for me that something gets the job done, I don't care how or why it works. -4 -3 -2 -1 0 1 2 3 4
33. Ignorance is bliss. -4 -3 -2 -1 0 1 2 3 4
34. I enjoy thinking about an issue even when the results of my thoughts will have no effect on the outcome of the issue. -4 -3 -2 -1 0 1 2 3 4

Appendix H

State Action Orientation Questionnaire

Directions – below are a list of statements, with two possible responses labelled B and A.
Circle the response that is most like yourself.

1. When I have lost something that is very valuable to me and I can't find it anywhere :
 - A. I have a hard time concentrating on something else.
 - B. I put it out of my mind after a little while.

2. When I know I must finish something soon :
 - A. I have to push myself to get started.
 - B. I find it easy to get it done and over with.

3. When I have learned a new and interesting game :
 - A. I quickly get tired of it and do something else.
 - B. I can really get into it for a long time.

4. If I've worked for weeks on one project and then everything goes completely wrong with the project :
 - A. It takes me a long time to adjust myself to it.
 - B. It bothers me for a while, but then I don't think about it anymore.

5. When I don't have anything in particular to do and I am getting bored :
 - A. I have trouble getting up enough energy to do anything at all.
 - B. I quickly find something to do.

6. When I'm working on something that's important to me :
 - A. I still like to do other things in between working on it.
 - B. I get into it so much that I can work on it for a long time.

7. When I'm in a competition and have lost every time :
- A. I can soon put losing out of my mind.
 - B. The thought that I lost keeps running through my mind.
8. When I am getting ready to tackle a difficult problem :
- A. It feels like I am facing a big mountain that I don't think I can climb.
 - B. I look for a way that the problem can be approached in a suitable manner.
9. When I'm watching a really good movie :
- A. I get so involved in the film that I don't even think of doing anything else.
 - B. I often want to get something else to do while I'm watching the movie.
10. If I had just bought a new piece of equipment (for example, a tape deck) and it accidentally fell on the floor and was damaged beyond repair :
- A. I would manage to get over it quickly.
 - B. It would take me a long time to get over it.
11. When I have to solve a difficult problem :
- A. I usually don't have a problem getting started on it.
 - B. I have trouble sorting out things in my head so that I can get down to working on the problem.
12. When I have been busy for a long time doing something interesting (for example reading a book or working on a project) :
- A. I sometimes think about whether what I'm doing is really worthwhile.
 - B. I usually get so involved in what I'm doing that I never think to ask about whether it's worthwhile.

13. If I have to talk to someone about something important and, repeatedly, can't find him/her at home:
- A. I can't stop thinking about it, even while I'm doing something else.
 - B. I easily forget about it until I can see the person again.
14. When I have to make up my mind about what I am going to do when I get some unexpected free time :
- A. It takes me a long time to decide what I should do during this free time.
 - B. I can usually decide on something to do without having to think it over very much.
15. When I read an article in the newspaper that interests me :
- A. I usually remain so interested in the article that I read the entire article.
 - B. I still often skip to another article before I've finished the first one.
16. When I've bought a lot of stuff at a store and realise when I get home that I paid too much – but I can't get my money back :
- A. I can't concentrate on anything else
 - B. I easily forget about it.
17. When I have work to do at home :
- A. It is often hard for me to get the work done.
 - B. I usually get it done right away.
18. When I'm on vacation and I'm having a good time :
- A. After a while, I really feel like doing something completely different.
 - B. I don't even think about doing anything else until the end of my vacation.
19. When I am told that my work has been completely unsatisfactory :
- A. I don't let it bother me for too long.
 - B. I feel paralysed.

20. When I have a lot of important things to do and they must all be done soon :
- A. I often don't know where to begin.
 - B. I find it easy to make a plan and stick with it.
21. When one of my co-workers brings up an interesting topic for discussion :
- A. It can easily develop into a long conversation.
 - B. I soon lose interest and want to go do something else.
22. If I'm stuck in traffic and miss an important appointment :
- A. At first, it's difficult for me to start doing anything else at all
 - B. I quickly forget about it and do something else
23. When there are two things that I really want to do, but I can't do both of them :
- A. I quickly begin one thing and forget about the other thing I couldn't do.
 - B. It's not easy for me to put the thing that I couldn't do out of my mind.
24. When I am busy working on an interesting project :
- A. I need to take frequent breaks and work on other projects.
 - B. I can keep working on the same project for a long time.
25. When something is very important to me, but I can't seem to get it right :
- A. I gradually lose heart.
 - B. I just forget about it and go do something else.
26. When I have to take care of something important but which is also unpleasant :
- A. I do it and get it over with.
 - B. It can take a while before I bring myself to do it.

27. When I am having an interesting conversation with someone at a party :
- A. I can talk to him or her the entire evening.
 - B. I prefer to go do something else after a while.
28. When something really gets me down :
- A. I have trouble doing anything at all
 - B. I find it easy to distract myself by doing other things.
29. When I am facing a big project that has to be done :
- A. I often spend too long thinking about where I should begin.
 - B. I don't have any problems getting started.
30. When it turns out that I am much better at a game than the other players :
- A. I usually feel like doing something else
 - B. I really like to keep playing
31. When several things go wrong on the same day :
- A. I usually don't know how to deal with it.
 - B. I just keep on going as though nothing happened.
32. When I have a boring assignment :
- A. I usually don't have any problems getting through it.
 - B. I sometimes just can't get moving on it.
33. When I read something I find interesting :
- A. I sometimes still want to put the article down and do something else.
 - B. I will sit and read the article for a long time

34. When I have put all my effort into doing a really good job on something and the whole thing doesn't work out :

A.I don't have too much difficulty starting something else.

B.I have trouble doing anything else at all.

35. When I have an obligation to do something that is boring and uninteresting :

A I do it and get it over with

B.It usually takes a while before I get around to doing it.

36. When I am trying to learn something new that I want to learn :

A.I'll keep at it for a long time.

B. I often feel like I need to take a break and go do something else for a while.

Appendix I

Linking Questionnaire

INSTRUCTIONS: Which of the following two possible reactions more closely describes how you feel about the preceding statement? Please choose one or the other. Indicate your choice by checking the space next to that choice.

1. You've won \$10,000 in a contest.

A) Now that I can afford many of the things I've always wanted, I will be much happier.

B) I'm glad that I won the money, although I don't think it will influence how happy I am overall.

2. Does your weight influences your happiness?

A) I am only happy when I am at my ideal weight.

B) It would be nice to be at my ideal weight, but I would be just as happy if I were not.

3. Do you get more happiness out of pursuing your goals or as a result of reaching them?

A) I get more happiness out of striving for my goals; reaching them is just icing on the cake.

B) My happiness comes primarily from reaching my goal.

4. How critical for your happiness is it for you to be in a romantic relationship?

___ A) It is difficult for me to be truly happy if I do not have someone in my life.

___ B) I prefer to have someone in my life, but I can be just as happy without a boyfriend/girlfriend.

5. Imagine that over the next six months the following things happen: Someone gives you a new car, then you fail two classes, then you go on a great vacation to Hawaii, then someone steals your car.

___ A) My happiness will swing up and down as events in my life change.

___ B) These are just natural events in my life and they won't necessarily influence my happiness

6. One day you realize that you have all the things you want -- the job you want, the spouse you want, the free time you want.

___ A) This will not directly influence how happy I am, because happiness is something I determine, regardless of what happens to me.

___ B) If I have all the things I want, then I will be very happy.

7. How important is having money to your happiness?

___ A) Being able to buy the things I want definitely makes me happier.

___ B) Once I have enough money for the basic necessities of life (like food, clothing, and shelter), more money will not make me happier.

8. Your roommate is one of the most annoying, unpleasant people you have ever known.

___ A) I am probably going to be unhappy whenever I'm around my roommate.

___ B) I can be happy when I'm around my roommate if I really want to be.

9. What would it take for you to be happy right now?

___ A) How I respond to good and bad events in my life is more important than the good and bad events themselves.

___ B) The best way for me to keep from being unhappy is to keep bad things from happening to me. The best way for me to be happier is to make good things happen to me.

10. What would it take for you to be happy right now?

___ A) There are certain things that must happen in my life for me to be truly happy.

___ B) The only thing that is keeping me from being happy right now is myself.

11. You just lost the job which you've had for 5 years and enjoyed very much.

___ A) I'll only be happy again if I find another good job.

___ B) I can be happy whether I get another good job or not.

12. Does being outgoing affect your happiness?

___ A) I would be happier if I was more outgoing.

___ B) I would be about as happy as I am now if I was more outgoing.

13. Think about the things in your life that you really want, but just can't get. Maybe you want to be a good doctor, but you realize that your grades are not going to be good enough to get into medical school. Or maybe you want to go out with a certain person, but that person won't go out with you. How does this affect your happiness.

___ A) The more things I want but can't get, the less happy I am.

___ B) Wanting things I can't get does not make me less happy.

14. If something bad happens in my life:

___ A) I could conceivably become happier during the bad experience.

___ B) It is highly unlikely that I could become happier during the bad experience.

15. Think about the important things in your life.

___ A) There are a lot of things that I have in my life that, if I were to lose them, I would be very unhappy.

___ B) There are very few things in my life that, if I were to lose them, I would be very unhappy.

16. My overall life plan to be happy is better described as:

___ A) Try to be happy right now, regardless of what my life is like.

___ B) Strive to get my life to be so good that I will be happy without even trying.

17. What is happiness to you?

___ A) Happiness is something I get closer to each time I succeed in reaching an important goal.

___ B) Happiness is a state of mind. I can be happy regardless of whether or not I reach my goals.

18. Suppose you go blind or lose a limb, what do you think your reaction would be?

___ A) Obviously, my life would not be the same as before, but I imagine I could still find ways to be happy.

___ B) I would be severely depressed and my life would never be the same.

19. Get an image in your mind of your dream car. Suppose one day you get to own it.

___ A) I would feel that I had it made and it would make me happy for a long time.

___ B) I would probably enjoy it for a while, but then, as it is with most things, I'd get used to having it, and it would not make me happy any more.

20. Which of the following statements seem most likely to be true?

___ A) Rich people are probably happier than poor people.

___ B) Rich people are not necessarily any happier than poor people.

21. When I reach an important goal:

___ A) I am pleased and savor the achievement, but I wouldn't say that my overall happiness is directly affected.

___ B) My overall happiness is usually boosted.

22. If I were to reach the pinnacle of success in my chosen profession:

___ A) I would be happy from then on.

___ B) I would not necessarily be happy all the time from then on.

Appendix J

Thought Action Fusion Questionnaire

Directions – A number of statements appear below. Read each statement and then circle the appropriate number on the right. 0 refers to disagree strongly and 4 refers to agree strongly.

- | | Disagree
strongly | | | | Agree
strongly |
|---|----------------------|---|---|---|-------------------|
| 1. Thinking of making an extremely critical remark to a friend is almost as unacceptable to me as actually saying it. | 0 | 1 | 2 | 3 | 4 |
| (a) Having a blasphemous thought is almost as sinful to me as a blasphemous action. | 0 | 1 | 2 | 3 | 4 |
| (b) Thinking about swearing at someone else is almost as unacceptable to me as actually swearing. | 0 | 1 | 2 | 3 | 4 |
| (c) When I have a nasty thought about someone else, it is almost as bad as carrying out a nasty action. | 0 | 1 | 2 | 3 | 4 |
| (d) Having violent thoughts is almost as unacceptable to me as violent acts. | 0 | 1 | 2 | 3 | 4 |
| (e) When I think about making an obscene remark or gesture in church, it is almost as sinful as actually doing it | 0 | 1 | 2 | 3 | 4 |

(f) If I wish harm on someone, it is almost as bad as doing harm. 0 1 2 3 4

(g) If I think about making an obscene gesture to someone else, it is almost as bad as doing it. 0 1 2 3 4

(h) When I think unkindly about a friend, it is almost as disloyal as doing an unkind act. 0 1 2 3 4

(i) If I have a jealous thought, it is almost the same as making a jealous remark. 0 1 2 3 4

(j) Thinking of cheating in a personal relationship is almost as immoral to me as actually cheating. 0 1 2 3 4

(k) Having obscene thoughts in a church is unacceptable to me. 0 1 2 3 4

1. If I think of a relative / friend losing their job, this increases the risk that they will lose their job. 0 1 2 3 4

2. If I think of a relative / friend being in a car accident, this increases the risk that he / she will have a car accident. 0 1 2 3 4

3. If I think of a relative / friend being injured in a fall this increases the risk that he / she will have a fall and be injured. 0 1 2 3 4

4. If I think of a relative / friend falling ill this increases the risk that he / she will fall ill. 0 1 2 3 4

a. If I think of myself being injured in a fall , this increases the risk that I will have a fall. and be injured. 0 1 2 3 4

b. If I think of myself being in a car accident, this increases the risk that I will have a car accident. 0 1 2 3 4

c. If I think of myself falling ill, this increases the risk that I will fall ill. 0 1 2 3 4

Appendix K

Rumination Inventory

Directions: Indicate how well each of the statements below describes you by placing a checkmark on the corresponding line.

1. I seldom think about things that happened in the past.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

2. I often get distracted from what I am doing with thoughts about something else.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

3. If I don't want to think about something, I'm able to just stop thinking about it.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

4. I often think about what my life will be like in the future.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

5. When I have a problem, I tend to think about it a lot of the time.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

6. I rarely become "lost in thought."

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

7. When I know that I am going to have an important talk or an argument with someone in the near future, I rehearse in my mind what I will say and what they will probably say in response.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

8. Sometimes I feel like I have no control over my thoughts.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

9. I have no trouble focusing all of my attention on one thing.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

10. When I don't understand something that happens, I tend to run
it over in my mind until I can make sense out of it.
like in the future.

Does not
describe -- -- -- -- -- -- -- Describes
me well me well

Appendix L

Fordyce Unhappiness Ratings

On the average, what percent of the time do you feel happy, what percent of the time do you feel unhappy, and what percent of the time do you feel neutral? Your percentages should add up to 100%.

Happy _____%

Unhappy _____%

Neutral _____%

Total 100 %

Appendix M

Schizotypal Personality Questionnaire

PLEASE ANSWER EACH ITEM BY CIRCLING Y (YES) OR N (NO). ANSWER ALL ITEMS EVEN IF UNSURE OF YOUR ANSWER. WHEN YOU HAVE FINISHED, CHECK OVER EACH ONE TO MAKE SURE YOU HAVE ANSWERED THEM.

1. Do you sometimes feel that things you see on the TV or read in the newspaper have a special meaning for you? Y N
2. I sometimes avoid going to places where there will be many people because I will get anxious. Y N
3. Have you had experiences with the supernatural? Y N
4. Have you often mistaken objects or shadows for people, or noises for voices? Y N
5. Other people see me as slightly eccentric (odd). Y N
6. I have little interest in getting to know other people. Y N
7. People sometimes find it hard to understand what I am saying. Y N
8. People sometimes find me aloof and distant. Y N
9. I am sure I am being talked about behind my back. Y N
10. I am aware that people notice me when I go out for a meal or to see a film. Y N
11. I get very nervous when I have to make polite conversation. Y N
12. Do you believe in telepathy (mind reading)? Y N
13. Have you ever had the sense that some person or force is around you, even though you cannot see anyone? Y N
14. People sometimes comment on my unusual mannerisms and habits. Y N
15. I prefer to keep to myself. Y N

- | | | |
|-----|--|-----|
| 16. | I sometimes jump quickly from one topic to another when speaking. | Y N |
| 17. | I am poor at expressing my true feelings by the way I talk and look. | Y N |
| 18. | Do you often feel that other people have got it in for you? | Y N |
| 19. | Do some people drop hints about you or say things with a double meaning? | Y N |
| 20. | Do you ever get nervous when someone is walking behind you? | Y N |
| 21. | Are you sometimes sure that other people can tell what you are thinking? | Y N |
| 22. | When you look at a person, or yourself in a mirror, have you ever seen the face change right before your eyes? | Y N |
| 23. | Sometimes other people think that I am a little strange. | Y N |
| 24. | I am mostly quiet when with other people. | Y N |
| 25. | I sometimes forget what I am trying to say. | Y N |
| 26. | I rarely laugh and smile. | Y N |
| 27. | Do you sometimes get concerned that friends or co-workers are not really loyal or trustworthy? | Y N |
| 28. | Have you ever noticed a common event or object that seemed to be a special sign for you? | Y N |
| 29. | I get anxious when meeting people for the first time. | Y N |
| 30. | Do you believe in clairvoyanay (psychic forces, fortune telling)? | Y N |
| 31. | I often hear a voice speaking my thoughts aloud. | Y N |

32. Some people think that I am a very bizarre person. Y N
33. I find it hard to be emotionally close to other people. Y N
34. I often ramble on too much when speaking. Y N
35. My "non-verbal" communication (smiling and nodding during a conversation) is poor. Y N
36. I feel I have to be on my guard even with friends. Y N
37. Do you sometimes see special meanings in advertisements, shop windows, or in the way things are arranged around you? Y N
38. Do you often feel nervous when you are in a group of unfamiliar people? Y N
39. Can other people feel your feelings when they are not there? Y N
40. Have you ever seen things invisible to other people? Y N
41. Do you feel that there is no-one you are really close to outside of your immediate family, or people you can confide in or talk to about personal problems? Y N
42. Some people find me a bit vague and elusive during a conversation. Y N
43. I am poor at returning social courtesies and gestures. YN
44. Do you often pick up hidden threats or put-downs from what people say or do? Y N
45. When shopping do you get the feeling that other people are taking notice of you? Y N
46. I feel very uncomfortable in social situations involving unfamiliar people. Y N
47. Have you had experiences with astrology, seeing the future, UFOs, ESP or a sixth sense? Y N
48. Do everyday things seem unusually large or small? Y N

49. Writing letters to friends is more trouble than it is worth. Y N
50. I sometimes use words in unusual ways. Y N
51. I tend to avoid eye contact when conversing with others. Y N
52. Have you found that it is best not to let other people know too much about you? Y N
53. When you see people talking to each other, do you often wonder if they are talking about you? Y N
54. I would feel very anxious if I had to give a speech in front of a large group of people. Y N
55. Have you ever felt that you are communicating with another person telepathically (by mind reading)? Y N
56. Does your sense of smell sometimes become unusually strong? Y N
57. I tend to keep in the background in social situations. Y N
58. Do you tend to wander off the topic when having a conversation? Y N
59. I often feel that others have it in for me. Y N
60. Do you sometimes feel that other people are watching you? Y N
61. Do you ever suddenly feel distracted by distant sounds that you are not normally aware of? Y N
62. I attach little importance to having close friends. Y N
63. Do you sometimes feel that people are talking about you? Y N
64. Are your thoughts sometimes so strong that you can almost hear them? Y N
65. Do you often have to keep an eye out to stop people from taking advantage of you? Y N

- | | | |
|-----|---|-----|
| 66. | Do you feel that you are unable to get "close" to people? | Y N |
| 67. | I am an odd, unusual person. | Y N |
| 68. | I do not have an expressive and lively way of speaking. | Y N |
| 69. | I find it hard to communicate clearly what I want to say to people. | Y N |
| 70. | I have some eccentric (odd) habits. | Y N |
| 71. | I feel very uneasy talking to people I do not know well. | Y N |
| 72. | People occasionally comment that my conversation is confusing. | Y N |
| 73. | I tend to keep my feelings to myself. | Y N |
| 74. | People sometimes stare at me because of my odd appearance. | Y N |

THANK YOU FOR YOUR TIME AND COOPERATION!

Appendix N

**Voluntary Involuntariness: Thought Suppression and the Regulation of the
Experience of Will**

Daniel M. Wegner

Harvard University

James Erskine

University of Hertfordshire

Daniel M. Wegner

Department of Psychology

Harvard University

33 Kirkland St., WJH 1470

Cambridge, MA 02138

Ph: (617) 496-2596

E-mail: wegner@wjh.harvard.edu

Abstract

Participants were asked to carry out a series of simple tasks while following mental control instructions. In advance of each task, they either suppressed thoughts of their intention to perform the task, concentrated on such thoughts, or monitored their thoughts without trying to change them. Suppression resulted in reduced reports of intentionality as compared to monitoring, and as compared to concentration. There was a weak trend for suppression to enhance reported intentionality for a repetition of the action carried out after suppression instructions had been discontinued.

Voluntary Involuntariness: Thought Suppression and the Regulation of the Experience of Will

Can we intend not to intend? Try not to try? Voluntarily behave involuntarily?

At first blush, these possibilities sound paradoxical if not absurd, more like philosophers' puzzles than questions of relevance to scientific psychology. However, it is possible to frame these questions in a way that does make sense, and further, in a way that promises to explain some previously puzzling phenomena. The capacity of the will to *cancel itself* may underlie phenomena in which people experience involuntariness for actions despite external indications that the action has arisen voluntarily. To test this possibility, the present study examined whether trying not to think about one's intention can induce an experience of involuntariness for the intended action.

Experienced Involuntariness

The feeling that an action is "happening" rather than that one is "doing it" can occur under a variety of conditions. People can experience such involuntariness when they are performing complicated, lengthy, goal-directed actions, and even when they are fully able to report the conscious goal of the action. Experiences of involuntariness occur regularly in hypnosis (Gorassini & Perlini, 1988; Kihlstrom, 1985; Kirsch & Lynn, 1999), for example, and have been considered a signal characteristic of the hypnotic state (Lynn, Rhue, & Weekes, 1990). Hypnosis may not always prompt the occurrence of a suggested behavior (e.g., the person's arm rising), but it regularly yields experiences of involuntariness when such behavior occurs (i.e., the person feels the arm rising without conscious will).

Involuntariness is also characteristic of several unusual phenomena classed as *automatisms*. People report reduced or absent experiences of conscious will in trance channeling (Brown, 1997), spirit possession (Boddy, 1994), automatic writing (Koutstaal, 1992; Zusne & Jones, 1989), table-turning (Carpenter, 1875), water dowsing (Vogt & Hyman, 1959), and other automatisms such as Ouija-board spelling and pendulum divining (Ansfield & Wegner, 1996; Spitz, 1997). There are also circumstances leading people to experience enhanced conscious will for events or actions over which they have no demonstrable control (Langer, 1975; Thompson, Armstrong, & Thomas, 1998; Wegner & Wheatley, 1999). Such circumstantial variation in experienced voluntariness, both its reduction and its enhancement, suggests that the experience of conscious will is not an infallible indicator of the conscious causation of the action. Rather, experiences of involuntariness or voluntariness may be better understood as the outputs of a mental process that estimates degrees of *apparent* mental causation.

What then drives these estimates? The early insight of Hume in *A Treatise on Human Nature* (Hume, 1888) was that the “constant union” and “inference of the mind” that underlies the perception of causality between physical events must also give rise to perceived causality in “actions of the mind.” Drawing on this idea, the theory of *apparent mental causation* (Wegner, 2002; Wegner & Wheatley, 1999) suggests that the experience we have of causing our own actions arises whenever we draw a causal inference linking our thought to our action. When thought seems to cause action, we experience will. Principles guiding such inferences can be drawn from principles of attribution and inference that govern cause perception more generally (Gilbert, 1995; Heider, 1958; Kelley, 1972; Michotte, 1963).

According to this theory, when a thought appears in consciousness just prior to an action, is consistent with the action, and is not accompanied by salient alternative causes of the action, we experience conscious will and ascribe authorship to ourselves for the action. In contrast, when thoughts do not arise with such *priority, consistency, and exclusivity*, we experience the ensuing actions as less willed or voluntary. In essence, this theory suggests that voluntariness is experienced primarily when thought about action is the primary candidate for having caused the action that is observed.

In commonplace actions, we often do have thoughts of action that are consistent, prior, and exclusive. We may think of going into the bedroom before we do so, for example, so when we indeed go, we quickly conclude that we did it. If we were not thinking of going into that room but nonetheless found ourselves standing there looking at the bed, the lack of consistency between our thought and action would undermine our feeling of conscious will for the action. If we thought of going to the room only *after* the action, in turn, we would have the requisite consistent thought—but its lack of appropriate priority would yield little sense of will for the action. And of course, if we were conveyed into the room by someone else (say, a pushy lover), even if we had thought of going and had been quite happy with the idea, we might find our experience of will undermined because the thought was not an exclusive cause.

The application of these principles of inference suggests that experiences of voluntariness or involuntariness are guided by perceptions of mental causation, not by actual mental causation. There is considerable evidence suggesting that the manipulation of access to information about consistency, priority, and exclusivity is indeed what underlies the experience of involuntariness in hypnosis and in many of the automatisms

(Wegner, 2002). When thoughts are made to *seem* inconsistent with an action, when the order of thought and action is somehow obscured, or when plausible causes of action other than thought are introduced to the person's awareness, experiences of involuntariness ensue. These distortions can be created through interpretive sets (e.g., Lynn et al., 1990; Spanos & Katsanis, 1989) and through direct manipulations of information availability (e.g., Wegner, Fuller, & Sparrow, 2003).

This insight suggests, then, how it might be that a person could experience voluntary involuntariness. If the person actively attempted to control the circumstances surrounding an action to influence own perception of the action's causal origins, the experience of will might thus be influenced by active, voluntary processes. The idea of "voluntary involuntariness," then, turns on two different definitions of *voluntary*. The exertion of mental control that occurs when a person attempts to influence the availability of thoughts about action may be voluntary in the sense that it is goal-directed. This goal-directed activity could potentially undermine the person's *experience* of voluntariness during subsequent action. To the extent that a person might be able to inhibit awareness of the elements underlying the inference of conscious will—awareness of the thought, the action, or their interrelation—the person might voluntarily create a sense of involuntariness.

Suppression of Intention

The idea that people could attempt to influence their own experience of actions has surfaced before in the literature on involuntariness. Hilgard (1986) proposed that "selective inattention" might be active in producing the experience of involuntariness in hypnosis, and several other analyses of hypnosis have drawn on the idea that people

might be actively involved in interpreting their behavior as unwilling (Comey & Kirsch, 1999; Gorassini & Perlino, 1988; Kirsch & Lynn, 1999; Lynn, 1997; Ruehle & Zamansky, 1997). The role of active interpretation of cues to involuntariness has also been noted in commentaries on spirit possession and mediumistic trance (Halperin, 1995; Hughes, 1991). How could people control their minds in this way?

Perhaps the most direct form of mental control is thought suppression—trying not to think about something. When people suppress a simple thought, they are able to do so in some ways but not in others. People who are instructed to suppress the thought of a white bear while reporting their stream of consciousness aloud tend to mention white bears about once per minute (Wegner, Schneider, Carter, & White, 1987)—which is, of course, more than they would do so without any such instruction. There is evidence that intentional suppression ironically enhances the accessibility of the unwanted thought by a variety of measures, and is particularly likely to do this when the person is under mental load (Wegner, 1994; Wegner & Erber, 1992; Wegner, Erber, & Zanakos, 1993). This effect is not as clear, however, when it comes to consciously reported thinking (Wegner & Smart, 1997). Suppression instructions actually reduce self-reported thinking as compared to instructions to concentrate on a thought, and they can also reduce thinking as compared to instructions to monitor the thought (see reviews by Abramowitz, Tolin, & Street, 2000; Wegner, 1992; Wenzlaff & Wegner, 2000). Perhaps people who try to suppress thoughts of an intended action might reduce those thoughts below normal levels (even while not eradicating them completely).

There is a further possibility raised by the literature on thought suppression. A frequent finding in this research is that thoughts once suppressed tend to rebound after

suppression is discontinued (Wegner et al., 1987). It may be that the suppression of an intention could result in the rebound of intention-related thoughts when suppression is no longer in mind. Such a rebound could function, then, to *enhance* the experience of will for any occurrences of the associated action during this post-suppression period. The voluntary suppression of thought could reduce experienced voluntariness for action initially, then, but perhaps increase the sense of voluntariness for subsequent instances of the action. The present study examined the influence of suppression of intention on the experience of will for a current action, and on this experience for an action undertaken when suppression was discontinued.

Previous research on thoughts of action has not examined how such thoughts impinge on the experience of will. The general finding in this area is simply that intentions are difficult to put out of mind once they are formed. This phenomenon, known in the history of psychology as the Zeigarnik effect, involves a tendency for interrupted or uncompleted actions to engender a strong motivation to complete the action (Ovsiankina, 1928; Zeigarnik, 1927). In addition, current research on prospective memory shows that intentions may have a privileged status in memory by being stored at heightened levels of activation. This intention superiority effect (Goschke & Kuhl, 1993; Marsh, Hicks, & Bink, 1998) provides further evidence that intentions may be hard to suppress. It is an open question, then, whether people can suppress thoughts of actions as they perform them, so as to influence their experience of will. This experiment was designed as a first step in addressing this question.

Method

Overview and Design

Participants were asked to carry out a series of simple tasks while following mental control instructions. They were asked in advance of each task either to *suppress* thoughts of their intention to perform the task, to *concentrate* on such thoughts, or to *monitor* their thoughts without trying to change them. Following each task, participants rated their experience of will for the action (on a scale from “it just happened” to “I did it on purpose, intentionally”). They subsequently were led to perform the actions again without instructions, again reporting experienced will.

Participants

Harvard University undergraduates (16 female and 8 male) volunteered to participate in return for course credit or \$6. All participants completed the experiment correctly and no one was excluded from the sample.

Tasks

Ten tasks were used, 1 for practice and 9 for the experiment. The tasks were adapted from studies in the Zeigarnik effect literature (Lewis & Franklin, 1944; Reeve, Cole, & Olson, 1986; Rickers-Ovsiankina, 1935) and involved relatively simple actions. The practice task was copying a shopping list, and the experimental tasks included: copying a geometric figure; circling the vowels in a short paragraph; completing a wooden puzzle for children; lifting a brick to a height of 10 inches and setting it down again; alphabetizing 10 letters on index cards; spiraling a pipe cleaner around a pencil and taking it off; rolling an elongated piece of clay into a ball; winding loose thread on to a spool; and completing a set of 5 simple anagrams. Participants performed these tasks in one of 3 possible fixed orders.

Procedure

All participants were tested individually. At the beginning of the experiment each

participant was informed that the aim of the study was to find out how thinking about tasks affects perceptions of one's role in performing these tasks. The experimenter explained that the main dimension of interest was how some tasks feel more intentional than others, and then went on to say: "Some everyday tasks feel fully intentional, like writing a difficult essay (one *does* these things), whereas others feel as if they just *happen* or "run off" with little feeling of intentionality (e.g., driving or brushing one's teeth)." To make sure participants understood the distinction they were asked to rate four simple everyday actions in terms of how intentional they usually feel on a 9-point scale with 1 = *it felt like it just happened*, and 9 = *it felt like I did it on purpose, intentionally*. The 4 actions they rated were: eating popcorn at the cinema, walking down stairs, watering the plants, and dreaming (cf. Malle & Knobe, 1997). The rating scale for these items was the same scale used to rate the intentionality of the subsequent experimental tasks, and was based on measures used to assess involuntariness in hypnosis (e.g., Lynn, Nash, Rhue, Frauman, & Sweeney, 1984) and the experience of intention and conscious will in automatisms and everyday actions (e.g., Malle & Knobe, 1997; Wegner & Wheatley, 1999).

If at this juncture it was clear that participants understood the distinction, they were invited to proceed with the practice task (copying a shopping list). After completing the practice task they were given the intentionality scale and asked to rate their experience. Participants were then introduced to the main experimental manipulation as follows:

In the tasks we will begin in a moment I will be asking you to either monitor your thoughts before and during the task or to suppress or to concentrate on the

intention to perform the act. You will have 10 seconds before each task to practice the mental task. If I ask you to suppress the intention to perform the action it is vital that you try to suppress this thought during the few seconds before the act but also during performance of the action. Equally, if I ask you to concentrate on the intention to perform the action it is vital that you try to keep this thought in mind during the few seconds before the act but also during performance of the action. For monitoring, you only have to monitor your thoughts and notice what you are thinking without trying to change them at all.

In addition to these general instructions, specific instructions were given to participants just before each action. Three tasks were performed with suppression instructions, 3 with concentration instructions, and 3 with monitoring instructions. For suppression, the instructions were:

During performance of the next action I would like you to try not to think about your intention to perform the action while doing it. Thus, your task is to suppress any thoughts about the intended behavior while performing it.

For concentration, the instructions were:

During performance of the next action I would like you to try to think about your intention to perform the action while doing it. Thus your task is to concentrate on thoughts about the intended behavior while performing it.

For monitoring, the instructions were:

During performance of the next action I would like you to monitor your thoughts without trying to change them. Just notice what you are thinking about while performing the behavior, whatever this may be.

Following each instruction, the experimenter said: “You will have a few seconds to settle into this task, at the end of which I will press this buzzer telling you to carry out the action.” When approximately 10 s had elapsed, the experimenter pressed a buzzer. All participants did successfully perform all assigned tasks.

Participants then completed the 9 experimental tasks in one of 3 fixed orders. The order of the thought instructions was fully counterbalanced such that, across participants, each of the 9 tasks was suppressed, expressed, and monitored an equal number of times across the three task orders. After each task, participants were asked to rate their experienced intentionality for the task on the rating scale. They were asked a further question which depended on the thought instructions they had received for that task. If they had been suppressing thoughts of the intention they were asked to rate “How hard were you trying to suppress the thought given to you?” on a scale from 1 (not very hard) to 9 (extremely hard). If they had been concentrating on thoughts of the intention, they were asked to rate “How hard were you trying to express/ concentrate on the thought given to you?” Finally, if they had been monitoring their thoughts, they were asked to rate “What were you thinking about before and during enactment of the task?” on a scale from 1 (thinking exclusively about something other than the task) to 9 (thinking exclusively about the task).

After all of the tasks had been completed with the respective thought instructions, the experimenter reset all of the tasks to their original states. Participants were then asked to run through all of the tasks again, this time with no thought instructions so they could think what they wanted. Participants were told they could complete the tasks in any order providing eventually they had done them all. After each task participants again rated the

intentionality of their action.

Results

Initial analyses showed that participants took their instructions seriously. Participants indicated trying fairly hard to concentrate on the thought in concentration trials ($M = 6.14$ on the 9-point scale), and also trying fairly hard to suppress the thought in suppression trials ($M = 6.63$). They reported thinking primarily about the action rather than other things on the monitoring trials ($M = 6.26$). These thought manipulations did not influence action per se, however, as all participants carried out all tasks. Participants' initial level of intentionality on the practice task was near the scale midpoint of 5 ($M = 5.67$) and the means for all the tasks across conditions were near this value. Initial analyses also indicated, however, that one of the experimental tasks (anagrams) elicited high intentionality ratings overall, so further analyses were conducted with this task excluded.

Mean intentionality pooled across tasks was examined in a 3 (order of tasks) X 3 (instruction: concentration, monitoring, or suppression) X 2 (action: target action vs. later action) analysis of variance (ANOVA) with repeated measures on the latter two variables. Although there were significant main effects of action and instruction, and also significant interactions of order with each of these variables, these are best interpreted in light of the significant interaction of instruction and action, $F(2, 42) = 8.46, p < .001, \eta^2 = .29$. Task order did not qualify this effect, so the influence of order will not be examined further. The means are shown in Figure 1.

The influence of thought instructions on intentionality of the target action was examined by simple main effects and contrast analysis. Suppression instructions reduced

intentionality for the target action ($M = 5.03$) below the level prompted only by monitoring ($M = 5.83$), $F(1, 21) = 4.63$, $p < .05$, and also below the level yielded by concentration ($M = 6.28$), $F(1, 21) = 13.07$, $p < .002$. Intentionality levels for the target action during monitoring and concentration did not differ significantly.

The influence of thought instructions can also be seen in comparisons between intentionality experienced for the target action, and intentionality for that action performed later without instructions. Concentration yielded greater intentionality for the target action ($M = 6.28$) than the later action ($M = 4.95$), $F(1, 21) = 20.54$, $p < .001$, and monitoring also yielded greater intentionality for the target action ($M = 5.83$) than the later action ($M = 4.93$), $F(1, 21) = 9.66$, $p < .005$. However, suppression did not have such an effect, and even produced a tendency in the opposite direction. Intentionality for the target action during suppression ($M = 5.03$) was nominally lower than intentionality for the same action following suppression ($M = 5.50$), $F(1, 21) = 1.82$, $p < .18$.

Contrasts between intentionality levels experienced for the later action did not yield any reliable effects. However, it is noteworthy that intentionality of the later action after suppression tended to be greater ($M = 5.50$) than the combined mean intentionality of the later action after monitoring and concentration ($M = 4.94$), $F(1, 21) = 2.50$, $p < .13$.

Finally, correlations were computed to examine relations between the thought reports during the various task instructions and experienced intentionality. The most telling finding was that thought during the monitored actions was strongly related to feelings of intentionality during enactment, $r(24) = .75$, $p < .01$. Reports of how hard people concentrated were similarly related to the experience of intentionality during

concentration, $r(24) = .79, p < .01$. Reports of trying hard to suppress, however, were not related to intentionality during suppression, $r(24) = .22, ns$. This correlation might be expected to be negative, in that motivation to suppress might enhance suppression success and thus undermine apparent mental causation. However, trying hard to suppress does not guarantee successful suppression (Wegner & Zanakos, 1994), and the lack of a link from motivation to reported intentionality may be understood in this light.

Discussion

People in this study who were asked not to think about their intention before they performed an action described the action as seeming less intentional as a result. Suppressed thought of intentions yielded reduced reports of intentionality as compared to concentration on intentions, and as compared to simple monitoring of thoughts as well. There was a weak trend for suppression during an initial action to enhance experienced intentionality during a subsequent repetition of that action once suppression instructions had been discontinued. So, although it is possible to produce “voluntary involuntariness” through thought suppression, such suppression did not have an effect over time, and may yield a rebounding sense of intentionality for actions that were previously put out of mind.

As with any study of the influence of instructional sets, these results must be considered in light of the potentially powerful role of experimental demand. Certainly, participants in this experiment were exposed to clear demands to control their own thinking. Moreover, the repeated-measures design of the study guaranteed that participants were also made aware of the different instructional sets and the comparisons the experimenter was likely to draw among them. Participants were specifically *not*

alerted to any experimental hypothesis relating the thought instructions to possible influences on experiences of intentionality for the actions, but it is reasonable to suggest that such influences were not difficult for them to infer. One might expect that, on being asked not to think of one's intention to act, for example, one's level of intentionality might be expected to decrease. Similarly, participants could have inferred that an instruction to concentrate on their intention might be expected to enhance their experience of intentionality. The influence of mental control instructions could thus be understood as an effect of demand characteristics of this experiment.

The role of demand in the results should be appreciated, however, in terms of two key observations. First, it is important to recognize that the processes labeled as "demand" in psychology experiments may mirror in many respects the essential processes underlying the social manipulation of experiences of will in natural contexts. Experiences of involuntariness are often precipitated in real-world circumstances by influential figures who, like an experimenter, offer strong instructions and expectations designed to influence the person's exertion of mental control, and even to mold the person's interpretation of the effects of such control. Just as experiments have demanding experimenters, for instance, hypnosis has forceful hypnotists. In the case of the automatism, in turn, channeling occurs at the urging of guides and coaches, dowsing and divining experiences happen at the behest of models and mentors, and Ouija-board spelling occurs in the presence of expectant audiences (Wegner, 2002). Social pressures in our experiment may well be critical in the production of voluntary involuntariness because just such pressures are present to promote the effect in most of its other manifestations. Participants in our study may have been motivated to suppress thoughts

because of demand, and may, too, have been motivated to report reduced intentionality following suppression due to demand. There are several circumstances, of course, in which people engage in mental control spontaneously, exerting influence on their thoughts without external instigation (Wenzlaff & Wegner, 2000). Personal fears might prompt suppression, for example, or desires could yield concentration. It remains a question for future research whether suppression or concentration prompted spontaneously, without social pressure, and without any pressure to report consequent changes in voluntariness would have influences on voluntariness like those observed for instructed mental control in this experiment.

A second observation on the role of demand in this study centers on the apparent counter-demand effects of mental control on actions when mental control is rescinded. Although the observed effects were not strong, there was a tendency for suppressed intentions to rebound, yielding enhanced voluntariness for actions once the suppression instruction was no longer operative. This ironic effect (Wegner, 1994) cannot as easily be traced to demand, as it does not follow from the instructions participants were given, and even appears to oppose them. The possibility of such post-suppression ironic effects on intentionality deserves scrutiny in further research.

This study, in short, only begins to open the veil of mystery that has previously surrounded experiences of involuntariness. Many of the phenomena of involuntariness have historically been resistant to empirical analysis, relegated instead to catalogs of psychological anomalies (Spitz, 1997; Zusne & Jones, 1989). The present research opens these phenomena to new understanding through the idea that people might visit changes in intentionality upon themselves through the exercise of mental control. In a larger

sense, these data also comprise significant evidence pertaining to the processes addressed by the theory of apparent mental causation (Wegner, 2002; Wegner & Wheatley, 1999). Mental control of thoughts about action can influence whether thoughts occur in mind relevant to the action, and so can create significant transformations in the experience of will.

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Figure Captions

Figure 1. Mean intentionality experienced for actions performed during or after each of three thought instructions (concentrate on thought of intention, monitor thoughts, or suppress thought of intention). Error bars are standard error.

Experienced Intentionality

