

**Maladaptive cognitive processes during exposure in
people with OCD (checking subtype)**

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Abstract

Cognitive Behaviour Therapy (CBT) is regarded as one of the most efficacious psychological treatments of Obsessive Compulsive Disorder (OCD) and is recommended in the recent National Institute for Clinical Excellence guidelines (NICE, 2006). Despite this, comparative studies have consistently shown CBT to be no more effective than Exposure and Response Prevention (ERP; McLean et al., 2001). Recently, cognitive theories of OCD have identified specific cognitive mechanisms involved in symptom-based subtypes of OCD (OCCWG, 1997, 2005). It is possible that specifically targeting these mechanisms may increase the efficacy of the cognitive component of treatment (McKay et al., 2004). This study aims to expand on recent research that suggests that repeated checking behaviours are maladaptive coping strategies that serve to maintain the difficulty (Rachman, 2002). Because previous research suggests that individuals with checking rituals are more likely to have an intolerance of uncertainty (Tolin et al., 2003), it is possible that they will also use specific cognitive safety behaviours to try to manage their anxiety during exposure. The current study hypothesized that the use of a memory search and a reasoning task during exposure would lead to a decrease in memory detail and confidence, and an increase in urge to check and anxiety. Data were collected from five participants currently on the waiting list for clinical psychology services. A single case experimental design with counterbalancing was used to test each hypothesis. The results of the study were mixed and showed little change in all four experimental conditions. Furthermore, mean change scores were inconsistent with the research hypotheses. That is, the use of a memory search and a reasoning task did not appear to have a maladaptive effect. The clinical and research implications of the results are discussed along with several limitations of the study. On the basis of the findings, it was concluded that OCD is a heterogeneous disorder and that further research is needed to examine the suitability of subtyping in OCD and the implications this has for treatment.

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Abbreviations

BAI	Beck Anxiety Inventory
BDI-II	Beck Depression Inventory (2 nd Edition)
C-BOCI	Clark-Beck Obsessive Compulsive Inventor
CBT	Cognitive Behavioural Therapy
CT	Cognitive Therapy
ERP	Exposure and Response Prevention
MINI	MINI International Neuropsychiatric Inventory
MOCI	Maudsley Obsessional-Compulsive Inventory
NICE	National Institute of Clinical Excellence
OBQ-44	Obsessional Beliefs Questionnaire
OCCWG	Obsessive Compulsive Cognitions Working Group
OCD	Obsessive Compulsive Disorder
RCT	Randomised Controlled Trial
S-REF	Self-Regulatory Executive Function model
TAF	Thought Action Fusion
WOCI	Weekly Obsessive Compulsive Inventory
Y-BOCS	Yale-Brown Obsessive Compulsive Scale

1. Introduction and Literature Review of Obsessive Compulsive Disorder

1.1 Overview of the Thesis

Despite a theoretical move towards looking at subtypes of Obsessive Compulsive Disorder (OCD), treatments carried out in clinical trials still tend to follow a more traditional and generalized Cognitive Behavioural Therapy (CBT) approach. It is possible that this lack of specificity may be affecting the efficacy of treatments for OCD and that future research needs to be based on model-relevant rationale (McKay et al., 2004). Recent theories of OCD (checking subtype) suggest that checking behaviours are maladaptive coping strategies that serve to maintain the difficulty (Rachman, 2002). Previous research supports this view. For example, Van den Hout and Kindt (2003a, 2003b) found that repeated checking decreased the vividness, detail and confidence an individual had of their memory. People who engage in overt checking behaviours may also use cognitive safety behaviours which maintain their anxiety. However, research to date has not yet addressed this issue. The primary aim of the current study is to examine the affect of manipulating the safety behaviours in individuals with OCD (checking subtype) when they are exposed to fear provoking stimuli. The identification of such strategies should expand on recent theories and contribute to the refinement and improvement of cognitive treatments for OCD.

1.2 Definition

OCD is classified as an anxiety disorder, characterised by clinically significant obsessions or compulsions that usually occur together (American Psychiatric Association, 2000; Taylor, 2002). *Obsessions* are defined as recurrent persistent thoughts, impulses, or images that occur repeatedly and are experienced as intrusive, inappropriate and distressing (Swinson, Antony, Rachman, & Richter, 1998). The content of the obsessions are not simply excessive worries about day-to-day problems and are unlikely to relate to real-

life events. The most common obsessions reported are in relation to fears of contamination, aggressive thoughts, need for order and fear of making mistakes (O'Connor, Aardema, & Pelissier, 2005). *Compulsions* are defined as repetitive behaviours or mental acts that an individual feels compelled to perform, often with a desire to resist. Compulsions are excessive and are unconnected in a realistic way to the events they are aimed to prevent (Swinson et al., 1998). The most common compulsions reported are checking and cleaning (Muller & Roberts, 2005). For a diagnosis of OCD, The ICD-10 provides the following description:

The essential feature is recurrent obsessional thoughts or compulsive acts. Obsessional thoughts are ideas, images, or impulses that enter the patient's mind again and again in a stereotyped form. They are almost invariably distressing and the patient often tries, unsuccessfully, to resist them. They are, however, recognized as his or her own thoughts, even though they are involuntary and often repugnant. Compulsive acts or rituals are stereotyped behaviours that are repeated again and again. They are not inherently enjoyable, nor do they result in the completion of inherently useful tasks. Their function is to prevent some objectively unlikely event, often involving harm to or caused by the patient, which he or she fears might otherwise occur. Usually, this behaviour is recognized by the patient as pointless or ineffectual and repeated attempts are made to resist. Anxiety is almost invariably present. If compulsive acts are resisted the anxiety gets worse.

World Health Organization (WHO, 2006, ¶ F42)

Along with the presence of obsessions and/or compulsions, DSM-IV suggests that the following criteria should be met when making a diagnosis of OCD:

1. *At some point during the course of the disorder, the person recognises that the obsessions or compulsions are excessive or unreasonable.*
2. *The obsessions or compulsions cause marked distress, are time consuming (take more than 1 hour a day), or significantly interfere with*

the person's normal routine, occupational (or academic) functioning, or usual social activities or relationships.

3. *If another Axis I disorder is present, the content of the obsessions or compulsions is not restricted to it (e.g., preoccupation with food in the presence of an Eating Disorder; hair pulling in the presence of Trichotillomania; concern with appearance in the presence of Body Dysmorphic Disorder; or guilty ruminations in the presence of Major Depressive Disorder).*
4. *The disturbance is not due to the direct physiological effects of a substance or a general medical condition.*

American Psychiatric Association (APA, 2000, pp. 456-463)

1.3 Prevalence and Chronicity

Accurate prevalence rates are difficult to determine owing to the number of people who do not seek treatment. Estimated lifetime prevalence rates in the UK are suggested to be around 1.1% (Singleton, Bumpstead, & O'Brien, 2001) with average age of onset being in the early twenties (Abramowitz, 1997). For some, onset is thought to be associated with an environmental trigger which involves either an increase in responsibility (e.g., a new baby, a promotion at work) or a loss of some kind (e.g., death of a loved one, loss of employment) (Rasmussen & Tsuang, 1986). However, the majority of individuals do not report a trigger and pre-morbid subclinical precursors are often thought to be common (O'Connor et al., 2005). OCD has a chronic, fluctuating course and can have a significant impact on an individual's professional, social and family life if left untreated. Symptoms usually fluctuate throughout the course of the disorder and although obsessions and compulsions may evolve over time, there are no reported cases of spontaneous remissions (O'Connor et al., 2005). A follow-up study by Skoog and Skoog (1999) highlighted the poor outcome for people with this disorder. They found that, even after almost fifty years of illness, only 20% of the sample achieved full remission, 28% showed sub-clinical symptoms, 44% continued to experience significant symptoms, and 8% deteriorated. Given that

individuals with OCD also commonly experience other affective symptoms of fear, anxiety, chronic worry, and depression, identifying effective interventions is extremely important (Swinson et al., 1998).

1.4 Heterogeneity of OCD

Although the DSM-IV diagnosis of OCD has reliably defined the syndrome, individuals seeking treatment have clinical presentations associated with many different types of obsessional concerns and compulsive behaviours, as well as different patterns of comorbidity and age of onset (McKay et al., 2004). This heterogeneity presents significant challenges to clinicians attempting to diagnose and treat the condition, and to researchers attempting to formulate comprehensive aetiological theories to develop treatment that is more effective (Calamari et al, 2006). The need for greater specificity in assessment and treatment strategies for OCD is particularly highlighted in studies of treatment outcome, which have been shown to differ according to symptoms. Van Oppen, Hoekstra, and Emmelkamp (1995), for example, compared the efficacy of Cognitive Therapy (CT) and Exposure Response Prevention (ERP) in clients with checking or washing rituals. Clients with checking rituals were shown to respond slightly better to treatment than washers, with CT having better outcomes than ERP. Similarly, McLean et al. (2001) found a significant relationship between symptom type and recovery status and Abramowitz, Franklin, Schwartz, and Furr (2003) found that people with hoarding compulsions were the least responsive to treatment.

The broad range of symptoms seen in OCD along with the differential response to treatment has led researchers and clinicians to propose that important subtypes of OCD exist (McKay et al., 2004). Several methods for identifying symptom-based subtypes of OCD have been developed. For example, an early principal components factor analysis of the Maudsley Obsessional Compulsive Inventory (MOCI) in 100 clients yielded four factors: “checking,” “cleaning,” “slowness,” and “doubting” (Rachman, 2002). Since then, scales have become more comprehensive and include additional cognitive items. For example, the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) is organised into eight

obsession categories (aggressive, contamination, sexual, hoarding, symmetry, religious, somatic, miscellaneous) and seven compulsion categories (washing, checking, counting, ordering/arranging, hoarding, repeating, miscellaneous) (McKay et al., 2004). It is now generally accepted that symptoms on this scale represent the main OCD symptom types (Swinson et al., 1998).

The existing literature on subtypes of OCD relies almost exclusively on overt symptoms as a basis for subtyping schemes (McKay et al., 2004). However, Calamari et al. (2006) argue that symptom-based subtyping is limited due to the way that similar symptoms may connect to very different underlying motivations. For example, in a recent study of clients with washing compulsions, two different motivations were identified: an attempt to prevent harm from germs and an attempt to remove evil (Calamari et al., 2004). In addition, Tallis (1996) argues that another motivation underlying washing compulsions is an effort to achieve an inner sense of completeness or perfection. The role of dysfunctional beliefs and appraisals in OCD is now well established in cognitive theory, with six belief domains suggested to be important (Obsessive Compulsive Cognitions Working Group, OCCWG, 1997). However, dysfunctional beliefs have also been shown to differ across symptom subtypes. For example, Rachman (1998) suggested that slowness, indecisiveness, and concerns about memory were more characteristic of checkers than cleaners. Recent research suggests that these differences could provide a means of forming new subgroups of OCD (e.g., Taylor et al., 2006) and raises the possibility that specialized cognitive and behavioural treatment procedures that target specific characteristics of OCD subtypes will be more effective than traditional treatment packages (McKay et al., 2004).

1.5 OCD with Checking Compulsions

Checking is one of the most common symptom-based subtypes of OCD and will be the focus of this thesis. Although information about the relative frequency of subtypes is incomplete, it is suggested that compulsive checking is more common than compulsive cleaning, with a ratio of approximately 4:3 to 6:3 (Antony et al., 1997, as cited in Rachman, 2002; Henderson & Pollard, 1988).

Research into checking compulsions has further highlighted the heterogeneity of the disorder, with checking compulsions showing the most variability with respect to how they cluster in factor analytic studies (McKay et al., 2004). The checking behaviour may vary from being overt and obvious to covert and inaccessible to an observer (Rachman, 2002). It can also be carried out by proxy and can be protracted, thereby leading to intolerable slowness and poor time keeping. Although generally considered to be a form of preventative behaviour, reasons for checking are also thought to vary. Some checkers may report intrusions relating to harm (e.g., fire, theft) which they believe will actually increase the likelihood of the specified feared event occurring. Other checkers may have unwanted sexual or aggressive thoughts and may check to relieve doubt as to their actual dangerous behaviour. Finally, some individuals may overestimate the likelihood of making mistakes and feel overly responsible for potential disasters, and therefore check to ensure safety (McKay et al., 2004).

1.6 Early Theories of OCD

Early explanations of OCD were dominated by psychoanalytic theories and did not distinguish between different subtypes. Freud's (1909) conceptualisation of obsessional phenomena became the most influential theory in this field. Freud argued that anxiety derived from unresolved oedipal conflicts resulted in anal-sadistic regression, which the ego fends off through defence mechanisms such as reaction formation, intellectualisation, undoing and isolation (Freud, 1909). Within this model, the symptoms represent the client's unconscious struggle for control over drives that are unacceptable at a conscious level (Goodman, 2000). Psychoanalytic therapy for OCD was therefore based on attempts to modify obsessional symptoms and treat unconscious conflicts which were presumed to underlie the symptoms. However, despite the popularity of this treatment, there was no evidence to suggest that obsessional thoughts or ritualistic behaviour decreased (Esman, 2001). Although psychoanalytic theory offered an explanation for the content of obsessions it failed to offer any insight into the underlying processes involved in the disorder and, hence, features little in the current literature.

1.7 Behavioural theories and treatment

Early behavioural models of OCD were based on the basic principle of conditioning. This model hypothesizes that normal intrusive thoughts become associated with fear and anxiety through a classical conditioning process and this anxiety is then maintained by learned avoidance or escape responses (Taylor, 2002). Rachman and Hodgson (1980) conducted a series of experimental studies to examine the applicability of this model to people suffering from OCD. As predicted by the model, they found that elicitation of the obsession was associated with increased anxiety and that this anxiety decreased if the client was then allowed to carry out a ritual. A person with washing compulsions, therefore, may have a conditioned fear of contamination. Avoidance and escape from 'contaminated' stimuli (e.g., public toilets) will then persist as a way of reducing distress (Taylor, 2002). Some individuals with checking compulsions actually report *increased* levels of anxiety after performing their compulsions. However, it is argued that mildly anxiety-evoking behaviors might be considered as avoidance behaviors if they serve to prevent the occurrence of strong anxiety (Herrnstein, 1969). For example, checking the oven may elicit anxiety in some clients but refraining from checking the oven is perceived as an even more anxiety-producing event because of the increased risk of an aversive event.

Conditioning models led to what has been established as one of the most effective treatments for OCD, Exposure and Response Prevention (ERP). This model is based on the idea that anxiety usually decreases after sufficient duration of contact with the feared stimuli through the process of habituation (Bouvard, 2002). Helping the client to prevent neutralizing or ritualising responses (response prevention) will ensure that adequate exposure is achieved. For example, an individual with contamination concerns would be encouraged to touch progressively 'dirtier' objects whilst refraining from cleaning or washing (Maltby & Tolin, 2003). For those clients who engage in more covert compulsive behaviours, exposure occurs on a cognitive level by focusing on the intrusive thoughts whilst the response prevention deals with the internal mental rituals (Frost & Steketee, 2002).

ERP is often considered the psychological treatment of choice for OCD and is widely used in the UK (Abramowitz, 1997). Over the years a number of

clinical outcome studies have established that 40-97% of individuals with OCD show significant improvement after completing a 13-20 session course of ERP (Clark, 2005). For example, Foa and Kozak (1996) concluded that across ERP outcome studies the average percentage of individuals who showed symptomatic improvement was 83%. In addition, improvements post-treatment have been found to be maintained at up to 3.5 years follow-up (Goodman et al., 2000) and have shown significantly better maintenance of treatment gains when medication is discontinued (Abramowitz, 1997).

Despite conditioning models leading to important advances in the understanding and treatment of OCD, both the model and ERP have important limitations (Taylor, 2005). Conditioning models have been criticized for their lack of specificity because they fail to differentiate between the theoretical conceptualization of different anxiety disorders and fail to adequately explain why some people become obsessional and others do not (Frost & Steketee, 2002). ERP outcome studies have been criticized for failing to define clinical improvement (e.g., Foa & Kozak, 1996). Fisher and Wells (2005a) argue that the criteria for defining Empirically Supported Treatments (ESTs) focus predominantly on the relative efficacy, rather than the absolute efficacy of a particular treatment which is necessary, but not sufficient to demonstrate that an active treatment is superior to a control treatment. They suggest that studies should use the approach of Jacobson and Truax (1991) which requires clients to meet a two-fold criterion in order to be classified as recovered or having made clinically significant change. Other criticisms of ERP focus on the way that some clients are unable or unwilling to tolerate the distress associated with the exposure (Taylor, 2005). For example, Stanley and Turner (1995) concluded that only 63% of OCD clients responded favorably to ERP when refusal, drop-out, and non-response rates were taken into consideration. Further, follow up studies indicate that even if OCD clients are treated successfully with ERP, the majority continue to experience some obsessive-compulsive symptoms (Abramowitz, 1998) along with relapses and reoccurrence of OCD (Foa & Kozak, 1996). With the added limitation of co-morbid depression hindering the effects of ERP (Steketee, Chambless, & Tran, 2001) it is argued that alternatives are still needed (Wilson & Chambless, 2005).

1.8 Cognitive Models of OCD

1.8.1 Overview.

Over the last decade, cognitive theories have dominated the literature on the causes, maintenance and treatment of OCD. Although a number of different models have been proposed over the years, they all share several basic features in common. First, cognitive models of OCD begin with the well-established finding that the unwanted, intrusive thoughts that make up an obsession are almost universally experienced. For example, research has shown that the form, and to some extent the content, of obsessions reported by non-psychiatric respondents and by obsessional clients are similar and usually reflect the person's current concerns (Rachman & De Silver, 1978). Secondly, it is argued that these cognitive intrusions (or concerns) develop into obsessions only when they are appraised as personally significant or threatening (Abramowitz, 2006). Thus, cognitive models all agree that the problem is not at the level of the intrusion but is instead at the level of the appraisal of the intrusion.

Thirdly, compulsions are suggested to occur as a behavioural response to the anxiety created by the recurrent and persistent obsessive thoughts. Compulsions are therefore seen as an attempt to "put things right", to neutralise the effects of unacceptable, intrusive obsessions (Rachman, Shafran, Trant, & Teachman, 1996). These behaviours can either be overt ritualistic behaviours, such as washing and checking, or covert attempts to neutralise the thought by mental effort in order to control or attenuate its negative impact (O'Connor et al., 2005). Attempts at distracting oneself from the unwanted intrusions, however, paradoxically increase the frequency of intrusions, possibly because the distracters become reminders of the intrusions (Taylor, 2002). Originally proposed by Salkovskis (1985, 1989), cognitive models therefore suggest two main reasons why such compulsions become persistent and excessive. First, they are reinforced by immediate distress reduction and by temporary removal of the unwanted thought and, secondly, they prevent the person from learning that their appraisals are unrealistic.

1.8.2 Dysfunctional beliefs in OCD.

Cognitive theories of OCD all share the common principle that the misinterpretation of the significance of one's intrusive thoughts result from the dysfunctional beliefs or assumptions held by the individual which will influence their appraisal of the event (Salkovskis, 1985, 1989; Rachman, 1997). Contemporary cognitive-behavioural models differ in that they each suggest different types of dysfunctional beliefs are relevant to the development and exacerbation of obsessive-compulsive symptoms (OCCWG, 2005). To facilitate research in this area, a number of measures have been developed to try to identify beliefs that are specific to OCD (see table 1 for a summary of published measures). However, it is argued that the number and diversity of these measures have created a confusing picture of the role of cognitive phenomena in OCD (OCCWG, 1997). In order to gain some consensus and assist in the development of interventions, therefore, the OCCWG (1997, 2005) identified six belief domains believed to be of central importance to OCD: 1) inflated responsibility, 2) thought-action fusion and other beliefs concerning the overimportance of the consequences of one's thoughts; 3) excessive concern about the importance of controlling one's thoughts; 4) overestimation of the probability and severity of threat; 5) intolerance of uncertainty; and 6) perfectionism.

Table 1. Published measures assessing dysfunctional beliefs in OCD.

Author(s)	Instrument
Clark et al. (2003)	Meta-cognitive Beliefs Questionnaire
Eisen et al. (1998)	Brown Assessment of Beliefs Scale
Foa et al. (1995)	Fixity of Beliefs Questionnaire
Freeston et al. (1993)	Irrational Beliefs Regarding Obsessions
Frost et al. (1990)	Multidimensional Perfectionism Scale
Frost et al. (1993)	Lucky Beliefs Questionnaire
Kugler and Jones (1992)	Guilt Inventory
Rheaume et al. (1994)	Responsibility Questionnaire
Rheaume et al. (1995)	Perfectionism Questionnaire
Shafran et al. (1996)	Thought-Action Fusion Scale
Sookman et al. (2001)	Vulnerability Schemata Scale
Steketee et al. (1998)	Obsessive Compulsive Beliefs Questionnaire

1.8.3 Inflated responsibility.

Salkovskis' (1985, 1989) theory of inflated responsibility was one of the first cognitive-behavioural approaches to OCD and has received the most attention in the cognitive literature on dysfunctional beliefs. The theory suggests that intrusive thoughts become clinical obsessions only when individuals appraise the intrusions as indicating they might be responsible for harm to themselves or others if they fail to take action (Fisher & Wells, 2005a). Checking, therefore, is invariably used to prevent their being held responsible for future catastrophes. Along with inflated responsibility beliefs, this theory also suggests that people with OCD believe that errors of omission are as bad as errors of commission, especially if one can foresee the possibility of harm (OCCWG, 1997). This often leads to the person engaging in a number of mental-control activities (e.g., attempts at gaining an accurate memory, taking account of all factors when making decisions, and preventing the occurrence of unacceptable material) (Salkovskis & Forrester, 2002). Ideas about personal responsibility have been found to be particularly strong predictors of checking behaviour (Artz, Voncken, & Goosen, 2007). For example, perceived responsibility has been shown to directly predict anxiety levels as well as an individual's urge to check (Lopatka & Rachman, 1995).

1.8.4 Thought-action fusion and the over-importance of thoughts.

Some theories have discussed responsibility in terms of one's own thoughts and their consequences. In their theory on the over importance of thoughts, Freeston, Ladouceur, Gagnon, and Thibodeau (1993) argued that the mere presence of a thought appears to give it status. In a similar vein, Rachman (1993) suggested that a belief in 'thought-action fusion' (TAF) serves to inflate the importance of intrusive thoughts and is likely to motivate particular behavioural responses such as trying to control actions or thinking. This idea has two related components: 'Moral' TAF that reflects the belief that thoughts are morally equivalent to actions, and 'likelihood' TAF that reflects the belief that

thoughts can increase the probability of bad events actually occurring (Rachman, Thordarson, Shafran, & Woody, 1995). An individual with checking OCD may, therefore, believe that having a negative thought means that he/she has done something negative and may engage in mental or behavioural checking in an attempt to invalidate the intrusion (Wells, 1997).

Some authors have expanded on this idea through the introduction of a meta-cognitive model of OCD. Clark and Purdon (1993), for example, suggest that beliefs about thoughts and thought processes in general can also lead to active resistance. They hypothesize that the following features are likely to characterise people with OCD: Excessive monitoring for the presence of mental intrusions; belief that these intrusions portend some catastrophe; belief that one is responsible for this harm because of the thoughts; and belief that one must control the thoughts to avoid harm and reduce distress. Wells and Matthews (1994) suggest that individuals with OCD have an inflated sense of responsibility through the beliefs they hold about the meaning and significance of intrusive thoughts. Metacognitive beliefs about intrusive thoughts are suggested to fall broadly into three domains: thought-action fusion (TAF; Rachman, 1993), thought-event fusion (TEF; Wells, 1997) and thought-object fusion (TOF; Wells, 2000). In an attempt to control thought occurrences, individuals are suggested to adopt specific attentional strategies that are likely to maintain OCD. For example, seeking a 'felt sense' or 'perfect memory' to indicate when to discontinue neutralizing (Fisher & Wells, 2005a). The Self-Regulatory Executive Function (S-REF) model (Wells & Matthews, 1994) has been used to demonstrate the information processing and self-regulation mechanisms involved in OCD. The S-REF consists of the activation of self-relevant beliefs, the appraisal of internal and external stimuli with respect to these beliefs, and the regulation of appraisal and behaviour intended to overcome any discrepancies between appraised actual and desired states of the self (Wells, 1997). Wells (2000) argues that obsessional clients have a tendency to assign priority to internally generated events rather than external events, therefore focusing excessive attention on fantasies concerning the consequences of not performing an action. The generic plan retrieved from self-knowledge is likely to specify control of the internal cognitive environment through maladaptive coping strategies such as suppression, avoidance, monitoring, and other attempts at mind

control such as continued rumination (Wells and Matthews, 1994). This then serves to maintain consciousness of the intruding thought through continued priming of factors associated with anxiety and the elaboration and reinforcement of self-knowledge through prevention of disconfirmation (Wells & Matthews, 1994).

1.8.5 Overestimation of threat, intolerance of uncertainty, perfectionism and control.

Several writers have also proposed that people with OCD tend to overestimate the probability and cost of aversive events (e.g., Freeston, Rheume, & Ladouceur, 1996; Salkovskis, 1985). For example, Foa and Kozak (1986) suggested that people with OCD have problems with epistemological reasoning and therefore view situations as dangerous until proven safe. Similarly, O'Connor and Robillard (1995, 1999) outline an inference-based approach (IBA) to suggest that obsessions arise as a result of distorted inductive reasoning processes. This model suggests that whilst initially the person with OCD may perceive reality correctly, he/she is more susceptible to be influenced by self-generated narratives, which leads the person to doubt reality and infer a hypothetical state of affairs (Pelissier & O'Connor, 2002). O'Connor and Robillard (1995) have observed several reasoning errors that could contribute to the maintenance of OCD. These include inference processes such as category errors, drawing inferences from irrelevant memories, facts, and unrelated associations, and a dismissal of actual evidence and sense information in favor of basing action on a hypothetical reality. O'Connor and Robillard (1995) argue that such reasoning errors give rise to inferential confusion where a person confuses an imagined possibility with an actual probability based in the senses, and then acts 'as if' the imagined possibility is real.

Perfection is another domain that has featured largely in the OCD literature. This domain is defined as the belief that there is a perfect solution to every problem, that it is necessary to do things without making mistakes, and that even minor mistakes will have serious consequences (Clark, 2002). Excessive concern over mistakes and the need for making things 'just right' are suggested to be linked to specific types of OCD symptoms such as checking (Gershunny &

Sher, 1995), cleaning (Tallis, 1996), and hoarding (Frost & Gross, 1993). 'Intolerance of uncertainty' (Krohne, 1989) is suggested to be one factor that may influence both estimation of threat in OCD and perfectionist tendencies (Sookman, Pinard, & Beauchemin, 1994). It has long been observed that people with OCD have difficulty making decisions through appearing more cautious, requesting information to be repeated, and displaying greater doubt about the correctness of their decisions (OCCWG, 1997). These decision-making difficulties are thought to arise from an excessive need for certainty in order to control and predict events. However, because complete certainty over everyday events is extremely difficult to achieve, such individuals may feel uncertain about their capacity to reduce risk when there are no perfect solutions. Intolerance of uncertainty may therefore be linked to beliefs about threat estimation, perfectionism, and need for control (Sookman & Pinard, 2002).

1.8.6 Critique of dysfunctional beliefs research in OCD.

Despite there being empirical evidence for the different cognitive theories of OCD, research suggests a high degree of association and overlap across the six cognitive domains (Clark, 2002). Purdon and Clark (2002), for example, argue that certain types of control beliefs are the product of beliefs about responsibility or thought-action fusion beliefs. Perfectionism and intolerance of uncertainty are also suggested to be similar constructs (OCCWG, 2005). Salkovskis and Forrester (2002) suggest that an inflated sense of responsibility, the overimportance of thoughts and beliefs about the importance of controlling one's thoughts are so closely linked as to tap a single construct linked to the idea of causing harm.

In addition, research suggests that most of the belief domains are not exclusive to people with obsessive compulsive problems. For example, intolerance of uncertainty and overestimation of threat are suggested to be vulnerability factors for anxiety disorders in general and are likely to contribute to the misinterpretation and negative appraisal of intrusions in important but less specific ways (Beck, Emery, & Greenberg, 1985). Some studies, however, have found cognitive characteristics unique to OCD. For example, Steketee, Frost, and

Cohen (1998) administered a self-report measure containing questions on different belief domains to a large sample of individuals with OCD, anxious controls, and non-clinical controls. Comparison of scores for each sample revealed that the Control, Responsibility, and Threat Estimation belief domains were considerably higher in individuals with OCD as opposed to general beliefs characteristic of anxiety. Salkovskis and Forrester (2002) also argue that the inflated responsibility domain is specific to OCD.

Finally, it is argued that certain types of negative interpretations and beliefs associated with intrusive thoughts foster particular obsessive compulsive symptoms (OCCWG, 1997, 2005; Rachman, 2002). For example, pathological doubt, or intolerance of uncertainty, is most clearly evident among clients with checking rituals (Rachman & Hodgson, 1980) whereas importance of thoughts may be more relevant for obsessions dealing with harm and aggression (Thordarson & Shafran, 2002). Emmelkamp and Aardema (1999) also found that thought-action fusion plays an important role in the washing and checking subscales of the Padua-R (Van Oppen et al., 1995), but not in the impulses, precision and rumination subscales. A recent study by Taylor et al. (2006) suggested that dysfunctional beliefs may not play an important role in all types of OCD. Their study identified two cognitive subtypes of OCD: OC-high, which was characterised by relatively high scores on measures of OC-related beliefs, and OC-low, which generally did not differ from controls on measures of beliefs. It was argued that such findings may eventually yield important implications for developing subtype specific treatments for OCD.

1.9 Cognitive Treatments for OCD

1.9.1 Cognitive Therapy.

Cognitive Therapy (CT) for OCD was developed to target distorted cognitions conceptualized as potential maintaining factors that remain unaddressed with behavioral treatment and to provide a less anxiety-provoking alternative to ERP, which would hopefully result in lower drop out rates (Whittal, Thordarson, & McLean, 2005). The strategies used are based on methods derived from Beck's cognitive therapy (Beck, Emery, & Greenberg,

1985) and focus on the modification of beliefs and appraisals. General strategies used in CT for OCD include enabling the client to see intrusions as stimuli, identifying and challenging negative automatic thoughts that immediately follow the intrusions, and to look for the underlying dysfunctional schemas and modify these (Bouvard, 2002).

An important general cognitive technique used by the therapist to challenge automatic thoughts is Socratic Dialogue (Beck, 1976). That is, the client is encouraged to question the catastrophic significance of the intrusive thought and construct alternative less catastrophic interpretations (Bouvard, 2002). Several case reports and papers have also described specific techniques to help modify obsessions in OCD by reducing the degree to which clients view them as significant and important (e.g., Salkovskis & Warwick, 1985; Steketee, 1993; Van Oppen & Arntz, 1994; Whittal & McLean, 2000). Freeston et al. (1996) offer cognitive techniques for clients who describe obsessions without compulsive behaviour, including tape-loop exposure and response prevention, cognitive restructuring using standard techniques such as Socratic Questioning, and identification of negative automatic thoughts, behavioural experiments, and relapse prevention.

1.9.2 Meta-cognitive techniques.

Recent theories of OCD have influenced the selection of treatment strategies and led to criticisms of more traditional techniques. Wells (1997), for example, argues that modification of declarative beliefs alone may only be partially effective if the individuals processing routine continues to generate patterns of attention and appraisals that generate dysfunctional knowledge. Socratic Dialogue may therefore not be the most useful way to modify beliefs as it may serve to activate dysfunctional processes (Wells, 1997). Wells (1999) argues that in order to generate and effect changes in procedures it is necessary for the client to acquire new skills of processing that require repeated practice of new processing routines. The use of 'meta-cognitive profiling' techniques (Wells & Matthews, 1994) is suggested to identify dysfunctional beliefs and map attentional, memory, and ideational processes. 'Decentering' (Teasdale, 1999), or

the ability to view thoughts as mental events in a wider context of awareness rather than as expressions of reality, is also seen as central to therapy (Wells & Matthews, 1994). As a result, new cognitive techniques include ‘detached mindfulness’ (Wells & Matthews, 1994) in which clients are instructed to disengage ruminative appraisal from intrusive thoughts.

1.9.3 Cognitive Behavioural Therapy.

CBT for OCD combines Cognitive Therapy (CT) with Exposure and Response Prevention (ERP) exercises. These exercises are framed as behavioural experiments to test appraisals and beliefs (Taylor, 2002). The obsession is deliberately provoked and the client is instructed to maintain concentrated attention on the unwanted thought and its associated interpretation, while at the same time preventing a compulsive or neutralization response (Clark, 2005). In addition to ERP, more standard cognitive restructuring is used to directly modify faulty appraisals and obsession-related beliefs.

Similar techniques are used in more recent CBT treatments. For example, Wells’ (1997, 2000) metacognitive model of OCD suggests that treatment requires the modification of thought-fusion beliefs by incorporating brief exposure and response prevention experiments (ERP-E). These behavioural experiments consist of five minute exposure to obsessional stimuli designed to explicitly test the veracity of metacognitive beliefs. Response prevention then helps the client to attribute the non-occurrence of imagined catastrophe to the falseness of the metacognitive belief rather than to the performance of the ritual (Fisher & Wells, 2005a). This technique is argued to be markedly different to traditional ERP as it helps shift clients to metacognitive processing of the validity of beliefs about intrusions.

1.9.4 Efficacy of current treatments.

Despite overwhelming evidence highlighting the significant role played by cognitive mechanisms in OCD, there is little evidence to suggest that the cognitive components of CBT add to the effectiveness of traditional Behaviour

Therapy (Steketee, Frost & Wilson, 2002). Emmelkamp, Visser, and Hoekstra (1988) compared CT with exposure in vivo and response prevention over a period of ten sessions. They found that the results of CT were about equally effective as self-controlled exposure in vivo. Both treatments led to a reduction in symptoms and CT led to significant improvements in depressed mood (Emmelkamp, Van Oppen, & Van Balkom, 2002). A meta-analysis of studies that directly compared CBT and ERP also concluded that exposure procedures used alone is as effective as CBT (Abramowitz, 1997). McLean et al. (2001) compared group ERP with group CBT and found that the ERP group had significantly lower scores on an OCD inventory than the CBT group. In addition, at 3-month follow-up a significantly higher percentage of ERP treatment completers (44%) reached recovered status compared to CBT completers (13%). However, McLean et al. (2001) suggest that the results may have been because ERP was easily adapted to be delivered in a group format whereas the idiosyncratic nature of the appraisals in OCD would likely favour individual CBT over group CBT. Finally, Fisher and Wells (2005a) found that when standardized Jacobson methodology (Jacobson & Truax, 1991) was applied to studies to define clinically significant change, ERP appeared the most effective treatment currently available.

A recent paper by Whittal et al. (2005) suggests that CBT produces an equivalent rate of refusal, drop-outs, homework non-compliance and treatment non-response as does ERP. It could be argued, therefore, that currently there is no systematic empirical evidence that CBT might be more effective in treating obsessional clients who refuse ERP (Clark, 2005). The findings of outcome studies are argued by some to be a result of basing treatment on early cognitive therapy techniques and not targeting the appraisals suggested by current cognitive theories (Wells, 2000; Whittal et al. 2005). Old techniques such as thought-stopping and distraction and dismissal procedures are now argued to be potentially counter therapeutic for clients with OCD, either by virtue of becoming 'neutralising' in themselves, or by interfering with functional exposure (Salkovskis, 1985).

Recently, it has been suggested that specialized cognitive and behavioral treatment procedures that target specific characteristics of OCD subtypes appear to improve outcome (McKay et al., 2004). Subtype-specific protocols would

incorporate specific procedures into the treatment protocol depending on the presence of various cognitive and behavioral symptoms (Wilhelm & Steketee, 2002). Although research is currently ongoing in this area, initial outcome evaluations of such an approach have been very positive (Wilhelm, Steketee, Fama, & Golan, 2003). The current study will attempt to add to this work by examining two cognitive processes that may be important in the checking subtype.

1.9.5 Current treatment guidelines.

Despite the lack of evidence to suggest that CBT is superior to ERP, the National Institute of Clinical Excellence (NICE, 2006) recently recognised CBT as the treatment of choice for individuals with OCD. The following guidelines have been recently published:

“In the initial treatment of adults with OCD, low intensity psychological treatments (including ERP) (up to 10 therapist hours per patient) should be offered if the patient’s degree of functional impairment is mild and/or the patient expresses a preference for a low intensity approach. Low intensity treatments include:

Brief individual CBT (including ERP) using structured self-help materials.

Brief individual CBT (including ERP) by telephone.

Group CBT (including ERP).

Adults with OCD with moderate functional impairment should be offered the choice of either a course of an SSRI or more intensive CBT (including ERP) (more than 10 therapist hours per patient), because these treatments appear to be comparably efficacious. Adults with OCD with severe functional impairment should be offered combined treatment with an SSRI and CBT (including ERP)”.

(NICE, 2006, pp. 231-232).

Despite this positive move towards psychological therapy as an effective treatment of OCD, NICE still recommend that further work is necessary to determine the optimal interventions for those people who do not initially respond to CBT (NICE, 2006).

1.10 Psychological Theories of Checking Compulsions

1.10.1 Introduction.

In recent years, the limitations of general cognitive theories to explain specific symptoms of OCD have been highlighted. For example, Van den Hout and Kindt (2003b) argue that whilst cognitive theory explains the occurrence of checking urges, it does not readily explain the persistence of doubt after checking. In addition, some studies have found that particular types of dysfunctional beliefs are more prominent in some subtypes of OCD compared to others. For example, Tolin, Abramowitz, Brigidi, and Foa (2003) found that obsessive compulsive checkers showed greater intolerance of uncertainty than obsessive compulsive non-checkers and anxious controls. Also, the hypothesis that OCD clients in general would evidence greater intolerance of uncertainty compared to anxious controls was not supported suggesting that some cognitive models may only apply to a particular subgroup of OCD. As a result, cognitive theories have begun to look more specifically at different subtypes of OCD, with a particular focus on checking compulsions.

1.10.2 Models of memory deficits.

Historically, neuropsychiatric models of checking compulsions looked at the possibility of memory deficits that could trigger doubt and motivate individuals to repeatedly check an action (Tallis, Pratt, & Jamani, 1999). Results supporting a deficit in episodic memory however have been weak and inconsistent. For example, Deckersbach, Otto, Savage, Baer, and Jenike (2000) found that OCD clients were impaired in both immediate and delayed free recall

but had preserved verbal memory recognition concluding that the deficits did not appear to be pervasive. On the other hand, MacDonald, Antony, MacLeod, and Richter (1997) investigated recall and recognition memory among OCD checkers and found no statistical differences between OCD checkers, OCD non-checkers and controls. Several other studies have also failed to find evidence of any memory deficits (e.g., Foa, Amir, Gershuny, Molnar, & Kozak, 1997; Rachman & Shafran, 1998). Some research has focused specifically on deficits in memory for 'actions' and found that OCD checkers exhibit deficits in recalling and recognizing self-performed actions (Rubenstein, Peynirdoglu, Chambless, & Pigott, 1993; Ecker & Engelkamp, 1995). It may be, therefore, that OCD checkers are impaired in recall of human actions, particularly their own actions, but not necessarily in more general information (Muller & Roberts, 2005). However, it is unclear whether this form of memory impairment is specifically correlated with checking behaviours versus OCD in general and whether it is an actual memory deficit or an overly critical attitude towards memory functioning that prompts checking behaviour (Muller & Roberts, 2005).

In addition to the inconsistent findings of memory research, critiques also focus on the ability of an individual with checking OCD to comfortably carry out neutral mental tasks at work and at home, even when these tasks call on considerable memorial resources (Rachman, 2002). Instead, the memory difficulties appear to be specific, and even disappear when responsibility is removed, reduced or transferred (Radomsky & Rachman, 1999; Radomsky, Rachman, & Hammond, 2001). Finally, use of neuropsychological tests to assess general memory deficits in OCD have produced discrepant results and suggest that any observed memory deficits may be driven by difficulties organizing information (Coles, Radomsky, & Horng, 2006).

1.10.3 Alternative cognitive explanations.

Owing to the lack of evidence in memory research, some studies have attempted to seek alternative explanations for repeated checking behaviours. Tuna, Tekcan, and Topcuoglu (2005), for example, argue that individuals who repeatedly check do so through a lack of confidence in their memory

performance. This lack of confidence leads to a 'meta-memory' problem that causes them to doubt their actions and repeatedly check. Consistent with this, Tolin et al. (2001) found that clients with OCD whose primary symptom was checking were less confident in their long-term memory performance than OCD individuals without checking symptoms. In a meta-analysis of impairment and confidence in explicit memory, Woods, Vevea, Chambless, and Bayen (2002) also found the highest effect size was for memory confidence. That said, compulsive checking is not generally observed in individuals with major depression, traumatic brain injury, or the normal aging process, all of which might also be characterised by poor memory confidence (Tolin et al., 2003). Other research has focused on particular types of dysfunctional beliefs introduced in more general cognitive models of OCD. For example, studies have found that individuals with checking compulsions are more likely to show an intolerance of uncertainty and therefore desire more vivid memories. Constans, Foa, Franklin, and Matthews (1995), for example, found that despite no difference in reported memory vividness, compulsive checkers stated that they desired more vivid memories than did non-anxious controls. Julian, O'Connor, Aardema, and Todorov (2006) investigated specificity of belief domains in OCD subtypes and found that perfectionism/certainty predicted checking compulsions.

Wells and Matthews' (1994) draw on their self-regulatory executive function (S-REF) model in an attempt to explain repeated checking behaviours through information processing biases and self-regulation. Rather than suggesting a direct failure of encoding or retrieval, Wells and Matthews (1994) argue that repeated checking may be due to a meta-cognitive failure in distinguishing fantasy from reality. They argue that as checkers are particularly prone to question their memory for actions, and imagine negative consequences in situations, they are more likely to be characterised by a heightened self-consciousness that attends to negative fantasies (Wells, 1997). This failure to engage in 'reality monitoring' may mean the person confuses the memory of the fantasy of action failure with the memory of actually performing the action, which is sufficient to stimulate further checking in an attempt to reduce the associated anxiety (Wells & Matthews, 1994). Wells (1997) argues that strategies of detached mindfulness and techniques for reducing heightened cognitive self-consciousness should prove helpful as additions to treatment.

1.10.4 Recent experimental research.

Recently, experimental work has extended research into pathological doubt and memory by examining the impact of repeated checking on memory accuracy and confidence. Van den Hout and Kindt (2003a, 2003b, 2004) attempt to explain why individuals are compelled to repeatedly check an action through the use of Tulvings (1985) 'remember/know' distinction. That is, the belief that an action has taken place may stem from either *remembering* physical details of the event or from *knowing* that something happened because it is part of a general rule. Van den Hout and Kindt (2003a) apply this to repeated checking behaviours by suggesting that increased familiarity of an action/event results in a less vivid and detailed recollection owing to the individual simply 'knowing' an event occurred rather than actually 'remembering' doing it. The more an OCD client checks, therefore, the more familiar the checking gets, which results in a less vivid and detailed recollection and, hence, a reduction in the confidence of that memory. Through a series of experiments using virtual computerised stoves, the authors supported this hypothesis by showing first that non-clinical individuals who engaged in relevant repeated checking showed marked decreases in memory confidence, vividness and detail and secondly, that repeated checking led to a shift from 'remembering' the most recent check at pre-test to simply 'knowing' that they had checked the relevant item at post-test (Van den Hout & Kindt, 2003a, 2003b).

It appears therefore that rather than checking compulsions being the result of memory impairment, repeatedly checking can cause memory impairment by making recollection less vivid and detailed (Muller & Roberts, 2005). Further work replicating and expanding on these ideas has been conducted. For example, Radomsky et al. (2006) expanded on earlier experiments by using a real kitchen stove (relevant checking) or a real kitchen faucet (irrelevant checking). Consistent with Van den Hout and Kindt (2003a, 2003b), results demonstrated that repeated checking led to a significant decline in memory confidence, vividness and detail. Further, repeated checking under ecologically valid conditions produced small but significant declines in memory accuracy. Cole et al. (2006) designed an experiment to further delineate the impact of repeated checking on memory and metamemory. Not only did the results replicate those

of Radomsky et al. (2006), it was discovered that the greatest changes in memory confidence, vividness, and detail might occur between 2 and 10 checks. Finally, Boschen & Vuksanovic (in press) extended previous findings by using a clinical sample of individuals with OCD. They found that the deterioration of memory confidence seen in individuals with OCD was broadly equivalent to that seen in student controls, until, that is, a condition of perceived responsibility was added. When perceived responsibility for a mild shock to another person was added, individuals with OCD showed a significant further deterioration in memory confidence compared with students.

1.10.5 A cognitive model of checking compulsions.

Given the dominance of checking in OCD, Rachman (2002) recently proposed a detailed theoretical formulation of repeated checking that adds to Salkovskis (1985) original work on OCD by incorporating ideas taken from recent research. According to this theory, compulsive checking occurs when people who have an inflated responsibility for preventing harm feel unsure that a perceived threat has been adequately reduced or removed. In their attempts to achieve certainty about the absence or the unlikelihood of harm occurring, the individual repeatedly checks for safety. Paradoxically, these attempts to check for safety can produce adverse affects that turn the checking behaviour into a self-perpetuating mechanism. Rachman (2002) proposes that checking is maintained by four main factors: 1) an unsuccessful search for certainty, 2) decreases in memory confidence with repeated checking, 3) elevations in the predicted likelihood of harm when one feels personally responsible, and 4) increases in perceived responsibility with repeated checking.

Based on this theory, Rachman (2002) proposes that it is the response prevention component of behaviour therapy, and not the exposure, which has an impact on the individuals' difficulties. That is, if repeated checking results in a self-perpetuating mechanism by increasing levels of personal responsibility and decreasing memory confidence, exposure is unlikely to have a direct impact on the factors that maintain the checking behaviours. Response prevention, however, may help the client to re-assess the perceived probability of danger and

responsibility. Addressing the primary cognitive elements in compulsive checking, namely the belief that one has a special elevated responsibility for protecting others/self from harm, would therefore be of central importance. Rachman (2002) summarises this by suggesting three main components of treatment: a) reduction of the core belief of inflated responsibility; b) modification of the maladaptive cognitive misinterpretations of one's out-of-control behaviour and the impaired confidence in one's memory; and c) use of response prevention tactics. Rachman argues that each component deals with a specific aspect of compulsive checking. For example, changing misappraisals will have the greatest affect on anxiety whilst response prevention will reduce responsibility and recurrency, and lower the estimates of harm. It is therefore essential that all four components of treatment be addressed in order to produce dependable and significant reductions in compulsive checking behaviour (Rachman, 2002).

1.11 Current study

1.11.1 Rationale and aims.

Despite a vast amount of literature in this area, the current review suggests that there is still a gap in our knowledge and understanding of OCD and its effective treatment. Although recommended in the recent NICE guidelines, there is still little or no evidence that cognitive components of treatment add to the effectiveness of traditional Behaviour Therapy (Steketee et al., 2002). Because of a theoretical move towards looking at subtypes of OCD, research into the different types of dysfunctional beliefs and cognitive processes involved in the maintenance of OCD has become more specific. Despite this, clinical trial research still tends to follow a more traditional and generalized CBT approach. It is possible that this lack of specificity may be affecting the efficacy of treatments for OCD.

Recent theories of checking compulsions suggest that checking behaviours themselves could become a self-perpetuating mechanism that maintains the difficulty (Rachman, 2002; Van den Hout & Kindt, 2003a, 2003b).

Research to date concentrates on behavioural compulsions where individuals physically repeat a checking action to reduce anxiety (e.g., Van den Hout & Kindt, 2003a, 2003b; Radomsky et al., 2006). However, as a desire for certainty is more likely in individuals with checking behaviours (Constans et al., 1995), it is highly likely that such individuals will also engage in cognitive strategies in an effort to obtain certainty and reduce their anxiety. Within a cognitive-behavioural framework, these cognitive strategies are seen as 'safety behaviours'. That is, behaviours that an individual uses in an attempt to decrease anxiety or perceived feared catastrophe (Salkovskis, 1991). However, these safety behaviours often have a paradoxical effect in that they prevent disconfirmation of unrealistic beliefs and instead may serve to increase anxiety (Wells et al., 1995). The use of safety behaviours may be limiting the effectiveness of traditional exposure treatments. For example, a recent study by Salkovskis, Hackmann, Wells, Gelder, and Clark (2007) found that exposure that included the drop or reversal of safety seeking behaviours was more effective for individuals with panic disorder than exposure based solely on habituation. This suggests that the manipulation of key safety behaviours as an adjunct to ERP could provide a more effective treatment. The same effect could potentially occur in individuals with OCD (checking subtype). That is, the manipulation of key cognitive strategies used by individuals with OCD (checking subtype) during and after exposure may help to reduce the anxiety and urge to go back and check. With further research, therefore, CBT techniques could effectively move on to targeting specific cognitive safety behaviours that are having this maladaptive effect in people who repeatedly check, as well as addressing underlying beliefs which should improve the efficacy of treatments.

When conducting research of this kind, some authors have argued that carefully controlled outcome investigations may not generalise to the circumstances that characterise actual clinical practice (Borkovec & Castonguay, 2006). In addition, conclusions regarding a statistically significant difference found between treatment and control conditions are limited to the therapy as a whole rather than the identification of effective components of treatment (Borkovec & Castonguay, 2006). Instead, it is argued that methods should involve dismantling and additive designs in order to identify cause-and-effect relationships (Behar & Borkovec, 2003). Controlled experimental designs are

suggested to be crucial for the specification of causes and subsequent contribution to the improvement of treatment (Borkovec & Castonguay, 2006). This study will therefore use a single-case series experimental design to focus on the potentially maladaptive use of two cognitive safety behaviours commonly used by individuals with checking compulsions.

1.11.2 Hypotheses

1.11.2.1 Experiment 1: Memory searching.

An intolerance of uncertainty is thought to be prominent in individuals who engage in checking behaviours. Searching for a perfect memory in an effort to reduce this uncertainty may therefore be counterproductive for these individuals (Rachman, 2002). For example, because the person is unlikely to hold a perfect memory of a habitual action, engaging in a memory search will serve to highlight this uncertainty and therefore have a paradoxical effect of increasing anxiety, urge to check, and negative belief. Conversely, engaging in a task that enables an individual to retain the image in mind but prevents them from checking their memory is likely to have a reverse effect.

Hypothesis 1: Asking a participant with OCD (checking subtype) to engage in a memory search immediately after checking will lead to a decrease in memory detail and confidence compared to a condition in which the participant does not search their memory.

Hypothesis 2: Asking a participant with OCD (checking subtype) to engage in a memory search immediately after checking will lead to an increase in anxiety and urge to check compared to a condition in which the participant does not search their memory.

1.11.2.2 Experiment 2: Reasoning.

Reasoning with oneself is often used as a strategy to reduce uncertainty in people with OCD (Aardema & O'Connor, 2003). However, because intolerance of uncertainty is a key feature of OCD, reasoning with oneself may actually serve to confirm the feared beliefs (i.e. that the risk is not zero). That is, if the goal of reasoning with oneself is to reduce uncertainty to zero, then this reasoning will maintain awareness of the discrepancy between the desired and actual state, so will serve to maintain or increase anxiety. On the other hand, an exercise designed to weaken the association between uncertainty and anxiety may serve to 'decatastrophize' uncertainty and increase an individual's self-efficacy to tolerate the feeling of uncertainty (Tolin et al., 2003).

Hypothesis 3: Asking a participant with OCD (checking subtype) to reason with themselves about the likelihood that an item was not checked properly immediately after checking will lead to a decrease in memory detail and confidence compared to a condition in which the participant is encouraged to accept uncertainty.

Hypothesis 4: Asking a participant with OCD (checking subtype) to reason with themselves about the likelihood that an item was not checked properly immediately after checking will lead to an increase in anxiety and urge to check compared to a condition in which the participant is encouraged to accept uncertainty.

2. Method

2.1 Design

A single-case experiment can be defined as “a designed experiment in which one entity is observed repeatedly during a certain period under different levels (“treatments”) of at least one independent variable” (Onghena & Edgington, 2005, p. 57). It differs from the case study in that it seeks to systematically rule out alternative explanations of a result through the use of within-subject randomisation and repeated measurement, thus reducing threats to internal validity by controlling for potential confounding variables (Malott & Trojan Suarez, 2004). Single-case series experimental designs are ideal for applied settings where Randomised Controlled Trials (RCTs) may be prohibitive due to lack of a sufficient sample size or a low incidence of the presenting problem (Hayes, Barlow, & Nelson-Gray, 1999). An advantage of this method is that it enables the researcher to ‘mimic’ a component of treatment in a naturalistic way which is of great importance to the current study where the primary objectives include refining and improving treatments for OCD.

For the current study, an ABC single-case series experimental design (Barlow & Hersen, 1984) was used with B and C conditions counterbalanced across participants. Condition A in the study acted as a baseline and conditions B and C allowed for the manipulation of key safety behaviours. The inclusion of a baseline is common in studies that look at the manipulation of safety behaviours (e.g., Wells et al., 1995; Salkovskis, Clark, Hackmann, Wells, & Gelder, 1999). It allows for a measure of outcome through the calculation of a change score and provides information on levels of anxiety and what the participant usually does in a naturalistic setting. The ABC design allows for a controlled focus on specific cause-and-effect relationships within therapy and is thus suitable for meeting the aims and objectives of the research. In addition, the replication of the experiment increases the external validity of findings across clients. A between-group design may also have established cause-and-effect relationships sufficiently; however, the sample size needed for such a design is considerably larger (Barlow & Hersen, 1984). In addition, a counterbalanced cross-over design enables each participant to receive every experimental condition, which has the advantage of

controlling for variability in the sample across conditions that is more likely to arise with between-group designs (Fisher & Wells, 2005b). In the current study, it was important to control for possible order effects. That is, the possibility that condition C works only because it follows on from condition B or that is it presented at a certain time during the session. Order effects such as these were controlled for by counterbalancing the sequence of tasks in both experiments. Half of the participants were randomly assigned to receive condition B before C; the other participants received condition C then B. Details of how participants were randomized to each condition are provided in the procedure section.

2.2 Participants

Potential participants were selected from outpatient clinical psychology referrals to adult (18-65 year olds) clinical psychology services in Leeds and Wakefield. Referrals to these services are accepted from a variety of sources including GP's, Psychiatrists or any other member of a multi-disciplinary team. Waiting lists varied in length between departments and some services operated a pre-assessment and post-assessment waiting list. Where this was the case, both waiting lists were used to select potential participants. Through liaison with the service manager, a clinician working at each service was asked to examine the waiting list. In order to maximize the potential of selecting suitable clients for the study, clinicians were asked to use a set of inclusion/exclusion criteria when looking through the waiting list. That is, they were asked to search for key words such as 'obsessions', 'compulsions', 'rituals', and 'checking' in the referral letter as well as selecting people already with a diagnosis of OCD (checking subtype).

Once potential participants had been identified, an information pack was sent out to each person by the secretaries at each site. The information pack (see appendix A & B) included a letter inviting the potential participant to take part in the study (with a response sheet attached), a participant information sheet, and a stamped addressed envelope for potential participants to return their response slip to the researcher. All documents sent out in the information pack had been approved by York Research Ethics Committee and undergone Site Specific Assessments. Potential participants were asked to fill in their name and contact

details on the response slip if they were interested in finding out more about the study.

2.3 *Inclusion and exclusion criteria*

During the assessment session, potential participants were invited to take part in the study if he/she met the following inclusion and exclusion criteria:

Inclusion:

- Not currently receiving psychological treatment
- Not received Cognitive Behaviour Therapy in the past two years
- Aged between 18 and 65 years
- Meets diagnostic criteria for OCD as assessed by the MINI (Sheehan et al., 1998)
- OCD is the main presenting problem
- Participant reports checking symptoms to be the primary presenting symptom

To establish whether participants meet the above inclusion criteria, a clinical interview and semi-structured interview was used in the assessment session. Open-ended questions were used to identify the type of treatment participants had previously received. Similarly, the researcher identified the primary presenting problems through asking the participant what problem behaviours they were hoping to focus on in treatment. Descriptive measures used in the assessment session provided further detail on the frequency and severity of checking behaviours in relation to the participant's difficulties. In no cases was there any discrepancy between the researcher's clinical judgment of the primary presenting problem and the results of the descriptive measures.

Exclusion:

- The assessment reveals a suicide or self-harm risk
- Alcohol or drug dependence

Co-morbidity was not classed as an exclusion criterion providing that the OCD was seen by the participant and researcher as the main presenting problem. Level of suicide and self-harm risk was established through the use of the MINI (Sheehan et al., 1998, see page 41) and the BDI-II (Beck et al., 1996, see page 41). Similarly, alcohol and drug dependence was measured by the MINI (Sheehan et al., 1998).

2.4 Description of the sample

Twenty-seven people were identified from the waiting list over a six month period. Out of 27 letters sent, nine people (33%) expressed an interest in the study. Of these, seven people met criteria at the assessment interview and five people went on to complete the study. Two participants dropped out of the study following the assessment interview. One of these participants became anxious at the thought of taking part in the exposure tasks. The other participant was spoken to rudely by a member of staff at the department at which he was assessed and subsequently withdrew his consent. The demographic characteristics of the participants are presented in table 2. Because of ethical guidelines, the researcher was unable to obtain demographic information about participants who did not complete the study.

Table 2. Descriptive information on the sample

Participant	Age	Gender	Comorbid axis I diagnosis	Medication	Previous treatment
1	27	Female	Agoraphobia	Paroxetine 40mg	Counselling
2	41	Female	None	None	CBT
3	50	Female	None	None	None
4	29	Female	Past depressive episode, agoraphobia	Sertraline 100mg	None
5	40	Male	Past depressive episode	Fluvoxamine 100mg	CBT

2.5 Measures

2.5.1 Descriptive measures.

MINI International Neuropsychiatric Interview (MINI; Sheehan et al., 1998)

The MINI is a short diagnostic structured interview that screens 17 Axis I DSM-III-R disorders for 24 current and lifetime diagnoses. It was developed to meet the need for a brief reliable and valid structured diagnostic interview that could replace existing diagnostic tools such as the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I). The MINI is fully structured to allow administration by non-specialized interviewers (Lecrubier et al., 1997). It shows good agreement with the SCID-I and the Composite International Diagnostic Interview (CIDI) (Pinninti et al., 2003; Sheehan et al., 1998). It also shows good inter-rater and test-retest reliability (Lecrubier et al., 1997).

Beck Anxiety Inventory (BAI; Beck & Steer, 1993)

The BAI is a 21-item self-report measure that assesses anxiety symptoms in adults and adolescents. Each item is rated with reference to the last week. Items are rated on a 4-point scale with the following correspondence: “Not at all” (0 points); “mildly; it did not bother me that much” (1); “Moderately; it was unpleasant, but I could stand it” (2); and “severely; I could barely stand it” (3). The BAI total score is the sum of the ratings for the 21 items, with a maximum score of 63. Total scores of 0 to 7 reflect *minimal levels of anxiety*; scores of 8 to 15 indicate *mild anxiety*; scores of 16 to 25 reflect *moderate anxiety*; and scores of 26 to 63 indicate *severe anxiety*. The BAI demonstrates high convergent validity (Steer & Beck, 1997) and internal consistency (Harari, Waehler, & Rogers, 2005).

Beck Depression Inventory – Second edition (BDI-II; Beck, Steer, & Brown, 1996)

The BDI-II is a 21-item self-report measure that assesses the level of depressive symptomatology in adults and adolescents aged 13 years or older. Each item is rated in relation to the past two weeks and is scored on a scale ranging from 0 (*no symptomatology*) to 3 (*severe symptoms*). Total scores of 0 to

13 reflect *minimal level of depression*; scores of 14 to 19 indicate *mild depression*; scores of 20 to 28 reflect *moderate depression*; and scores of 29 to 63 indicate *severe depression*. Respondents have to score above 13, therefore, to fall within the clinical range. The first edition of the BDI became one of the most widely accepted instruments for assessing the severity of depression in diagnosed patients and for detecting possible depression in normal populations (Archer, Maruish, Imhof, & Piotrowski, 1991). The revised BDI-II demonstrates high test-retest reliability and good internal consistency (Beck, Steer, Ball, & Ranieri, 1996).

Clark-Beck Obsessive Compulsive Inventory (CBOCI, Clark & Beck, 2002)

The CBOCI is a 25-item self-report screening measure for OCD. It is designed to be efficient, comprehensive and precise and can be completed in 10-20 minutes. The CBOCI is patterned after the BDI-II, with a similar response format and structure. Each item is rated on a 4-point scale from 0 to 3. A response of 0 indicates absence of the symptom within the past two weeks. A response of 3 indicates the highest frequency/difficulty with the symptom. The obsessions subscale score is based on the summation of the first 14 items with a maximum score of 42. The Compulsions subscale score is based on the summation of the last 11 items with a maximum score of 33. The two subscales are added together to give a total score. Total scores of 0 to 20 reflect *minimal/nonclinical symptoms*; scores of 21 to 52 indicate *mild to moderate clinical symptoms*; and scores of 53 to 73 indicate *severe clinical symptoms*. To fall within the clinical range, therefore, respondents have to score nine or above on each subscale and have a total score of 20 or above. The CBOCI has demonstrated good convergent and discriminant validity (Clark, Beck, Antony, & Swinson, 2005).

Maudsley Obsessional-Compulsive Inventory (MOCI; Hodgson & Rachman, 1977).

The MOCI is a 30-item true/false self-report questionnaire that assesses overt rituals and their related obsessions. A total score as well as washing (11 items), checking (9 items), slowness (7 items) and doubting (7 items) subscale scores may be determined. Although there is no universal cut-off score for the

MOCI, a recommended clinical cut-off score on the checking sub-scale is 5 (Gershunny & Sher, 1995). The sub-scales have been found to have adequate internal consistency and test-retest reliability (Hodgson & Rachman, 1977). The MOCI also shows moderate agreement with the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) and the Leyton Obsessional Inventory (LOI) and has good predictive validity when measured against the Anxiety Disorders Interview Schedule (ADIS) (Steinberger & Burns, 1990). Despite the development of numerous alternative measures of OCD severity over the last two decades, the MOCI probably remains the most widely used instrument for assessing general OCD symptomatology (Einstein & Menzies, 2004).

Obsessional-Beliefs Questionnaire (OBQ-44; OCCWG, 2005)

The OBQ-44 consists of 44 belief statements developed to characterize obsessive thinking (OCCWG, 2005). The OBQ-44 has three factor analytically determined subscales: (a) inflated personal responsibility and the tendency to overestimate threat (Responsibility/Threat), (b) perfectionism and intolerance of uncertainty (Perfectionism/Certainty), and (c) over-importance and over-control of thoughts (Importance/Control). Respondents rate their level of agreement with items on a 7-point rating scale, with 1 being *disagree very much* and 7 being *agree very much*. Higher scores therefore indicate a greater strength of beliefs. The OBQ-44 demonstrates good test-retest reliability, convergent validity, and discriminant validity (OCCWG, 2001, 2003, 2005).

Weekly Obsession and Compulsion Index - adapted (WOCI; Single Case Research and Practice Group, unpublished)

The WOCI (see appendix C) was designed by the Single Case Research and Practice Group (SCRAP) in Leeds as a brief, weekly rating scale of obsessive and compulsive symptoms. It was also designed to provide ratings of the type of cognitions typically seen in OCD. The WOCI consists of four questions about symptoms and behaviours during the last week rated on a 0 (*not at all*) to 8 (*extremely distressing*) scale:

How distressing have you found your intrusive thoughts?

How strong has the urge been to carry out your rituals?

How many times have you carried out your rituals?

How much have the intrusive thoughts interfered with your life (e.g., family relationships, work, social life)?

A simple 0-100 belief rating scale is also included to rate how much the participant believes in each of the listed thoughts, with 0 being *do not believe the thought at all* and 100 being *completely convinced the thought is true*:

I must do everything I possibly can to stop harm from occurring.

It is important to have certainty in life.

I should be able to control my thoughts.

Bad thoughts can make bad things happen.

Thinking a bad thought makes me a bad person.

I must do things perfectly.

For the purpose of this study, an additional belief rating scale was added to rate how often participants used particular strategies to try to prevent checking rituals, with 0 being *do not use this strategy at all* and 100 being *always use this strategy*:

Searching your memory for a clear picture.

Try to distract yourself from having thoughts.

Try to reason with yourself that you did check correctly.

Try to accept that you will never be certain.

This scale was added to determine the extent to which participants were already using the strategies tested out in each experimental condition.

2.5.2 Dependent measures.

Four rating scales were constructed to assess the dependent variables (see appendix D). The vividness and confidence scales were taken from Van den

Hout and Kindt (2003b), and the urge to check and anxiety scales were taken from Fisher and Wells (2005b).

1. **Memory detail:** Participants were asked to indicate how detailed and clear their recollection of the exposure task was on a scale ranging from 0 (*'not detailed'*) to 100 (*'extremely detailed'*).
2. **Confidence in memory:** Participants were asked to indicate how accurate they felt their memory was of the exposure task on a scale ranging from 0 (*absolutely not confident*) to 100 (*absolutely confident*).
3. **Urge to check:** Participants were asked to indicate their urge to engage in the compulsive checking ritual on a scale ranging from 0 (*I do not feel the urge to neutralize at all*) to 100 (*my urge to neutralize could not be any stronger*).
4. **Anxiety/distress:** Participants were asked to rate their anxiety/distress level on a scale ranging from 0 (*not at all anxious/distressed*) to 100 (*the most anxious/distressed I have ever been*).

Each scale was administered at 1, 3, and 5 minutes during the control and experimental conditions. Participants were asked to write down a number between 0-100 that reflected how they were feeling at that current time. This particular method of measurement is widely used within cognitive research (Fisher & Wells, 2005b) and clinical practice (Wells, 1997).

2.5.3 Helpfulness ratings and manipulation check.

Participants were asked to rate how helpful they felt each task would be in managing their anxiety on a 0-100 scale, with 0 being *not at all helpful* and 100 being *extremely helpful*. Participants were asked to provide these ratings immediately after each rationale for the experimental condition was read out. Two manipulation checks were carried out immediately after the five minute experimental tasks:

1. Participants were asked to indicate how well they felt they had completed the task on a scale ranging from 0 (*I completed the task very poorly*) to 100 (*I completed the task perfectly*).
2. Participants were asked to indicate how well they had managed to stay focused on the task on a scale ranging from 0 (*I didn't manage to stay focused at all*) to 100 (*I managed to stay completely focused on the task*).

2.5.4 Feedback questionnaire.

This short questionnaire consisted of several questions relating to the helpful and unhelpful aspects of taking part in the study (see appendix E). The questionnaire was designed to offer further evidence of which techniques may be helpful in therapy. Participants were sent the questionnaire, along with a pre-paid envelope, one month after completing the research. They were informed that any information provided would be anonymous and used only for the purpose of the study.

2.6 Procedure

2.6.1 Assessment session.

A detailed research protocol was followed for the assessment session and the two subsequent experimental sessions (see appendix F). The protocol was designed in a semi-structured interview format so that the researcher could follow the same procedure but be free to answer any queries the participant had or elaborate on instructions where necessary.

At the start of the assessment session, the researcher read out the participant information sheet and answered any questions the participant had about the study. If the participant was interested in taking part they were asked to sign a consent form (see appendix G). At this stage, participants were reminded that the study involved taking part in a number of brief tasks that asked them to try out different ideas. They were informed that although the tasks would not cause them any harm, they may not necessarily do them any good and it would

be advisable to not repeat any of the techniques used in the study outside of the research room.

Participants were then assessed for suitability using the MINI (Sheehan et al., 1998). If participants met criteria for more than one Axis-I disorder, the researcher asked further questions to identify which difficulty was the primary presenting problem. For example, participants were asked about their potential goals for treatment and what they would hope to focus on in therapy. Those that meet criteria on the MINI were then asked to complete six descriptive measures (CBOCI, PI, MOCI, WOCI, BAI, BDI-II). The researcher read out the instructions for each descriptive measure before handing the questionnaires to the participant to complete themselves. One participant asked the researcher to read out the questions aloud. Participants were then asked about situations that lead to checking behaviours with at least a subjective anxiety rating of 70 or above (out of 100). This was to ensure that the experiments used in the experimental sessions would elicit enough anxiety to be able to detect any differences. The situation with the highest anxiety rating was chosen for the experimental sessions. If more than one situation was identified with the same anxiety rating, the researcher chose the situation that could most accurately be replicated in an experimental setting. Participants were then informed that the situation discussed would become the focus for the rest of the study. Table 3 shows the stimuli identified for each participant.

Table 3. Checking stimuli identified for each participant.

Participant	Checking stimuli	Participants predicted rating of anxiety
1	Gas cooker	100
2	Digital phones	80
3	Gas cooker	100
4	Gas cooker	100
5	Electric cooker	100

The rituals described by participants who identified gas or electric cookers as their stimuli were all similar. Participants reported that they would repeatedly check whether they had turned off the hob and oven dials correctly and that the switch at the plug socket was turned off. The participant who identified the digital phones as their stimuli described repeatedly checking that the three cordless phones in her house were all correctly in their holders and that

the digital display on each phone was visible, indicating that the phones were switched on.

Participants were also asked questions to elicit dysfunctional beliefs commonly associated with OCD. For example, a question on inflated responsibility included '*what do you feel would happen if you didn't go back and check?*', and a question on intolerance of uncertainty included '*How certain would you have to be to not go back and check?*' To avoid replication, the researcher focused on areas highlighted by the descriptive measures. On completion of the assessment session, the participant was informed that a letter would be sent to their GP to notify them of the study (see appendix H).

2.6.2 Overview of experimental sessions.

Participants met the researcher for two further sessions of approximately one hour each. Where possible, the experimental sessions were conducted in the person's own home to increase the ecological validity of the experiments. Each session consisted of an ABC design and tested out one of the two hypotheses. The basic structure for each experiment was the same, with the only difference being the rationale and manipulation. Each experimental condition occurred straight after a brief exposure to the feared stimuli identified in the assessment session. The experimental condition was explained to the participant in the form of a written rationale. Both the researcher and the participant were given a copy of the rationale so that it could be read out aloud and followed together. The rationales were read out once the participant had been exposed to their feared stimuli and had returned to the research room. For the purpose of this study, the 'research room' was the room in which the participant completed the experimental tasks and that did not contain the feared stimuli.

Participants received the baseline experimental test (condition A) followed by the two counterbalanced experimental conditions (B and C) in a single session. Participants were randomly assigned to the order of B and C using a random number generator. For the purpose of the random number generator condition B was allocated a label of '1' and condition C was allocated a label of '2' before being randomized eight times. Each participant was told that ratings of

memory detail and confidence, urge to check, and level of anxiety/distress would be taken on three occasions (1, 3 and 5 min) during each condition. All participants were given practice in making their ratings before beginning the experiment.

The experimental sessions were piloted on several clients currently involved in treatment at a clinical psychology department. No major amendments were made following these pilot sessions.

2.6.3 Study 1: Memory search.

2.6.3.1 Experimental session 1.

Experimental session 1 consisted of a baseline experimental test (A) followed by two experimental conditions (B & C). Condition B and C were counterbalanced, with two participants receiving condition B then C and three participants receiving condition C then B. At the start of the session, participants were reminded that they would be taking part in several brief tasks that would involve them being exposed to situations that usually cause them to check. They were told that they may expect to feel a little anxious and that they were free to withdraw from the study at any time. The participants were then shown the rating scales and were told that they would be asked to fill them in at three different points in time. Participants were told that they would need to fill in the rating scales as quickly as possible and that it may help if they spent a few minutes familiarising themselves with each question.

Stage 1: baseline experiment (condition A): Participants were told that they would shortly be exposed to the fear-provoking stimuli identified in the assessment session. They were then informed that they would be asked to spend five minutes doing what they normally do with the exception of going back to check. The researcher accompanied the participant to the fear-provoking stimuli and gave clear instructions of what they needed to do. For example, a participant who frequently checks the cooker was asked to turn each hob and oven on and off before turning away from the cooker and walking out of the room.

Participants were reminded that they should not go back to check. Once the participants understood what was required of them, the researcher left the participant alone to complete the exposure task. This procedure is in line with previous research that suggests that completing exposure tasks in the absence of the researcher elicits significantly stronger urges to check than if the researcher is present (Roper & Rachman, 1976). On return to the research room, the participant was asked to spend five minutes doing what they normally do when they have just checked something (with the exception of going back to check). The researcher noted down the time on the research protocol before the task started. During the five minutes, participants were asked to fill in the rating scales at 1, 3, and 5 minute intervals. A stop watch was used by the researcher to indicate when they needed to ask the participant to pause what they were doing and fill in the rating scales. All times were recorded on the research protocol. The researcher remained in the room during the five minutes in order to administer the rating scales and time the task. However, the researcher sat discreetly in the corner of the room and completed documentation in an effort to minimize the impact of having the researcher present.

Stage 2: experiment (condition B): Condition B involved a simple computer task, designed to prevent the participant from using a memory search. It consisted of a power point presentation of images of the fear provoking stimuli (e.g., cookers, digital phones) which were set up after the assessment session for each participant. Each presentation consisted of 22 images of fear provoking stimuli found on the internet and 3 images of the actual stimuli that participants were exposed to. In the case of home visits, these pictures were taken before the start of the experimental session and uploaded onto the computer. The 25 images were randomized with a random number generator to appear 100 times. The images were set to flash up on the screen every two seconds. The aim of this task was to ensure that the participant retained the image of the feared stimuli in their mind but captured their attentional resources sufficiently to prevent them from using a memory search.

Participants were informed that they would shortly be repeating the exposure to their fear provoking stimuli but instead of returning to the research room to spend five minutes doing what they normally do, they would be given a

rationale describing a simple computer task. Participants were informed that clear instructions would be given in the rationale and the task would only start once they were clear about what was required of them. The participant then repeated their exposure to the fear-provoking stimuli in exactly the same way as in the baseline experiment. On returning to the research room, a rationale for a simple computer task was read out. The written instructions were as follows:

I would like you to spend five minutes doing a computer task. This will involve looking at different pictures on the computer screen and deciding which ones you have seen before.

When you are ready, this computer will keep showing different pictures of (insert feared stimuli). Each picture will remain on the screen for two seconds before it changes to the next picture. Each time you see a new picture, I would like you to tell me whether you think is it the same as the (insert feared stimuli) you were exposed to earlier. Do you understand?

Once it was clear what was required of them, participants were asked to rate how helpful they felt the task might be in managing their anxiety on a 0-100 scale. The rating was recorded on the research protocol. Participants were then told that they would spend five minutes completing the computer task and would be asked to rate the same rating scales at 1, 3, and 5 minute intervals. As in the baseline experiment, a stop watch was used by the researcher to indicate when they needed to ask the participant to pause what they were doing and fill in the rating scales. All times were recorded on the research protocol. Again, the researcher remained in the room during this process but sat in a corner and completed documentation. At the end of the five minutes, participants were asked to use a 0-100 rating scale to indicate how well they felt they had completed the task and how focused they had managed to stay on the task.

Stage 3: experiment (condition C): Participants were told that they would shortly be repeating the exposure to their fear-provoking stimuli but instead of returning to the research room to spend five minutes doing what they normally do, they would be given a rationale about the use of memory searching. Participants were informed that clear instructions would be given in the rationale and the task would only start once they were clear about what was required of them. The participant then repeated their exposure to the fear-provoking stimuli

in exactly the same way as in the baseline experiment. On returning to the research room, a rationale for memory searching as a technique people sometimes use to prevent them from checking was read out to the participant. Participants were told that they would be asked to spend five minutes performing a memory search by working through a memory of their last actions in detail to try to get a clear picture in their mind of exactly what happened. The written instructions were as follows:

Feeling the urge to check something over and over again can take up a lot of time and can be distressing. It is common for people with this urge to try to resist checking by attempting to remember whether they carried out the action correctly the last time they checked.

Some people with an urge to check will try to do this through a technique called 'memory searching'. Memory searching is when you try to work through a memory of your last actions in detail. That is, try to get a clear picture in your mind of exactly what happened. For example, a person who feels an urge to check whether they locked their car door would search their memory in an attempt to gain a clear picture of their actions right up to when they walked away from the car.

I would like you to try this 'memory searching' technique for the next five minutes. Search your memory for whether you (insert feared stimuli).

Once it was clear what was required, the participant was asked how helpful they felt the task might be in managing their anxiety on a scale of 0-100. The rating was recorded by the researcher on the research protocol. The participant then kept the rationale in front of them and was asked to spend five minutes doing a memory search. During the five minutes, participants were asked to fill in the rating scales at 1, 3, and 5 minute intervals. As in the baseline experiment, a stop watch was used by the researcher to indicate when they needed to ask the participant to pause what they were doing and fill in the rating scales. All times were recorded on the research protocol. Again, the researcher remained in the room during this process but sat in a corner and completed documentation. At the end of the five minutes, participants were asked to use a 0-100 rating scale to indicate how well they felt they had completed the task and how focused they had managed to stay on the task.

Participants were informed that they had completed experimental session 1 and were reminded that although the tasks may not cause them any harm, they may also not do them any good. Participants were advised to not attempt to use the strategies learnt in the session outside of the research room

2.6.4 Study 2: reasoning with yourself

Experimental session 2 took place approximately one week after the first experimental session. The design of the experiment was exactly the same as experiment 1 except that the rationales tested hypothesis 2. Experimental session 2 therefore consisted of a baseline experimental test (A) followed by two experimental conditions (B & C). Condition B and C were counterbalanced, with three participants receiving condition B then C and two participants receiving condition C then B. The baseline task asked participants to spend five minutes doing what they would normally do with the exception of going back to check. The experimental conditions provided rationales for ‘accepting uncertainty’ (condition B), and ‘reasoning with yourself’ (Condition C).

Stage 2: experiment (condition B): Rationale 3 described ‘accepting uncertainty’ as a technique some people use when they are worried about whether they performed an action correctly last time they checked. The rationale asked participants to spend five minutes reminding themselves that there is no certainty in life. Participants were asked to do this by watching what goes on in their mind and looking out for when their mind tried to look for uncertainty. Each time this happened, participants were asked to remind themselves that there is no such thing as certainty in life and they should accept the small uncertainty. The written instructions were as follows:

Different people use different ways of dealing with their worries about (insert feared stimuli). We want to find out how effective the different strategies are.

One thing people do when they are worried about (insert feared stimuli) is to accept that there is no certainty in life. Although some bad things

are very unlikely to happen, we can never be certain that they wont. What some people do is remind themselves of this.

For the next five minutes, I would like you to practise accepting uncertainty. I want you to do this by watching what goes on in your mind. While you are doing this, you may notice that your mind tries to look for uncertainty. For example, your mind may start to ask whether it is certain that (insert feared stimuli).

Each time this happens, try to remind yourself that although it is very unlikely that (insert feared stimuli), it is impossible to be certain, because there is no such thing as certainty in life. Remind yourself that because there is no such thing as certainty in life, you are going to accept the small uncertainty. Once you have done this, switch back to watching what goes on in your mind.

Go through the stages each time you spot your mind trying to search for certainty. Keep watching your mind in this way for the next five minutes.

Stage 3: experiment (condition C): Rationale 4 described ‘reasoning with yourself’ as a technique some people use when they are worried about whether they performed an action correctly last time they checked. The rationale asked participants to spend five minutes asking themselves five specific questions to try to help them feel more certain. The written instructions were as follows:

Different people use different ways of dealing with their worries about (insert feared stimuli). We want to find out how effective the different strategies are.

One thing people do when they are worried about (insert feared stimuli) is to reason with themselves to try to feel more certain. What some people do is ask themselves questions to try to get more certainty about (insert feared stimuli).

For the next five minutes, I want you to practise reasoning with yourself to try to feel more certain. I want you to do this by attempting to answer the following list of questions in your mind:

How certain are you that you did check (insert feared stimuli) correctly?

What evidence do you have that you did not check correctly?

What is the quality of that evidence?

What is the evidence that you did check correctly?

What is the quality of that evidence?

If you get to the end of the questions, work your way through them from the start again until the five minutes are up.

At the end of experimental session 2, participants were debriefed about the predicted hypotheses of the study. The debrief included a reflective component on whether the participant found any of the strategies helpful to try and overcome their difficulties. In addition, the researcher noted down any comments made by the participant about what they felt about each experimental condition and their reasons for why a task felt helpful or unhelpful.

Feedback questionnaire.

Participants were sent a feedback questionnaire in the post one month after they had completed the study. The completion of the questionnaire was on a voluntary basis and a stamped addressed envelope addressed to the researcher was included. Of five questionnaires sent, three were completed and returned.

2.7 Statistical Analysis

The experimental data was analyzed using Statistical Package for the Social Sciences (SPSS) version 13.0. Analysis began with a visual inspection of the data, an important strategy in single case research. Because of the small sample, it was possible to report frequency data for individual participants rather than provide summary statistics (e.g., total scores for the BDI-II rather than the mean scores). Change scores for all four experimental conditions were calculated for each participant and a mean change score was obtained. Change scores were calculated by subtracting the mean rating of one condition from the mean rating of another, depending on which order the tasks were given. For example, for ABC participants, change scores for the computer task were calculated by subtracting the mean rating of the baseline from the mean rating of the computer task. Alternatively, for ACB participants, change scores for the computer task were calculated by subtracting the mean rating of the memory search from the mean rating of the computer task. A more detailed example of the calculation of a change score is shown in appendix I. This method of calculating the change

score is widely used in single-case research (e.g., Wells & Papageorgiou, 1998; Fisher & Wells, 2005b). Originally, it was expected that a Wilcoxon Signed Rank Test would be used to determine any significant differences between change scores. However, given the small N in the current study it was more appropriate to provide a descriptive analysis of the findings.

3.0 Results

3.1 Descriptive Information

Descriptive statistics for measures of anxiety and depression are shown in table 4. The severity of anxiety and depressive symptoms differed between participants, ranging from ‘minimal’ to ‘severe’.

Table 4. Participant scores on general measures.

Participant	BAI raw score	BAI range	BDI-II raw score	BDI-II range
1	19	Moderate	7	Minimal
2	23	Moderate	16	Mild
3	5	Minimal	1	Minimal
4	26	Severe	29	Severe
5	37	Severe	28	Moderate

Descriptive statistics for measures of obsessive compulsive symptomatology are shown in tables 5, 6, and 7. Scores on the CBOCI were fairly consistent with all five participants scoring in the ‘mild to moderate’ range on the obsession and compulsion subscales, meeting clinical criteria. Only one participant’s total score fell within the range for ‘severe’ symptoms, with the remaining participants in the ‘mild to moderate’ range.

Scores on the OBQ-44 showed that inflated responsibility/over-estimation of threat and perfectionism/intolerance of uncertainty were the most common dysfunctional beliefs in this sample. One participant scored considerably lower on the inflated responsibility subscale compared to the other participants. Finally, scores on the MOCI showed that participants commonly engaged in behaviours related to the checking subtype of OCD. All five participants met the recommended cut-off score of 5 (Gershuny & Sher, 1995) on the checking subscale.

Table 5. Participant scores on the C-BOCI.

Participant	Obsessions subscale score	Obsessions range	Compulsions subscale score	Compulsions range	Total score	Total range
1	24	Mild/mod	18	Mild/mod	42	Mild/mod
2	14	Mild/mod	21	Mild/mod	35	Mild/mod
3	26	Mild/mod	23	Mild/mod	49	Mild/mod
4	28	Mild/mod	25	Mild/mod	53	Severe
5	23	Mild/mod	24	Mild/mod	47	Mild/mod

Table 6. Participant scores on the OBQ-44.

Participant	Inflated responsibility and over-estimation of threat subscale	Perfectionism and intolerance of uncertainty subscale	Over-importance and over-control of thoughts subscale	Total score
1	92	40	57	189
2	36	62	25	123
3	94	101	34	233
4	96	83	49	228
5	78	93	53	224

Table 7. Participant scores on the MOCI.

Participant	Washing subscale	Checking subscale	Slowness subscale	Doubting subscale	Total score
1	3	7	4	5	19
2	4	6	2	4	16
3	2	6	4	7	19
4	0	5	2	3	10
5	5	7	7	7	26

Participants also completed the Weekly Obsessive Compulsive Inventory (WOCI) to provide further information on the strategies participant's use to deal with the urge to check. Table 8 summarises individual ratings given on a 0-100 scale for each strategy, with 0 being '*do not use this strategy at all to reduce checking*' and 100 being '*always use this strategy to reduce checking*'.

'Reasoning with yourself' was the most commonly used strategy, followed by 'distraction'.

Table 8. Frequency of use of cognitive strategies.

Participant	Distraction	Memory searching	Trying to acceptance uncertainty	Reasoning with yourself
1	30	50	0	90
2	50	80	50	60
3	20	0	50	100
4	90	50	80	80
5	90	90	90	100

3.2 EXPERIMENT 1

Experiment 1 compared a condition in which the participant was asked to perform a five-minute memory search with a condition in which the participant was asked to engage in a simple computer task.

3.2.1 Manipulation checks and helpfulness ratings.

Ratings of how helpful participant's expected each experimental condition to be are shown in table 9. Ratings were given on a 0-100 scale, with 0 being '*not at all helpful*' and 100 being '*extremely helpful*'. Only one participant predicted that the computer task would be more helpful than the memory search task.

Table 9. Pre-experiment helpfulness ratings.

Participant	Helpfulness ratings	
	Computer task	Memory search
1	60	80
2	50	40
3	50	50
4	0	50
5	50	90

Measures of how well participants felt they completed the tasks are shown in table 10. Ratings were given on a 0-100 scale, with 0 being '*I completed the task very poorly*' and 100 being '*I completed the task perfectly*'. Four out of five participants rated themselves at 80 or above. One participant was

unsure of her success on both tasks and opted for a middle rating. Three out of five participants felt they had completed the computer task better than they had completed the memory search. Only one person felt that they had completed the memory search better.

Table 10. Manipulation check on completion of the task.

Participant	Extent to which the participant managed to complete the task	
	Computer task	Memory search
1	100	80
2	50	50
3	90	100
4	100	80
5	100	80

Measures of how well participants had managed to focus on the tasks are shown in table 11. Ratings were based on a 0-100 scale with 0 being '*I didn't manage to stay focused at all*' and 100 being '*I managed to stay completely focused on the task*'. Four out of five participants rated themselves at 70 or above. Again, one participant was unsure of how well she had been able to stay focused throughout the task and opted for a middle rating. Three out of five participants stayed more focused on the computer task than the memory search. Only one person felt they were able to focus on the memory search more than the computer task.

Table 11. Manipulation check of focusing on the task.

Participant	Extent to which the participant managed to focus on the task	
	Computer task	Memory search
1	75	80
2	50	50
3	90	80
4	80	70
5	90	80

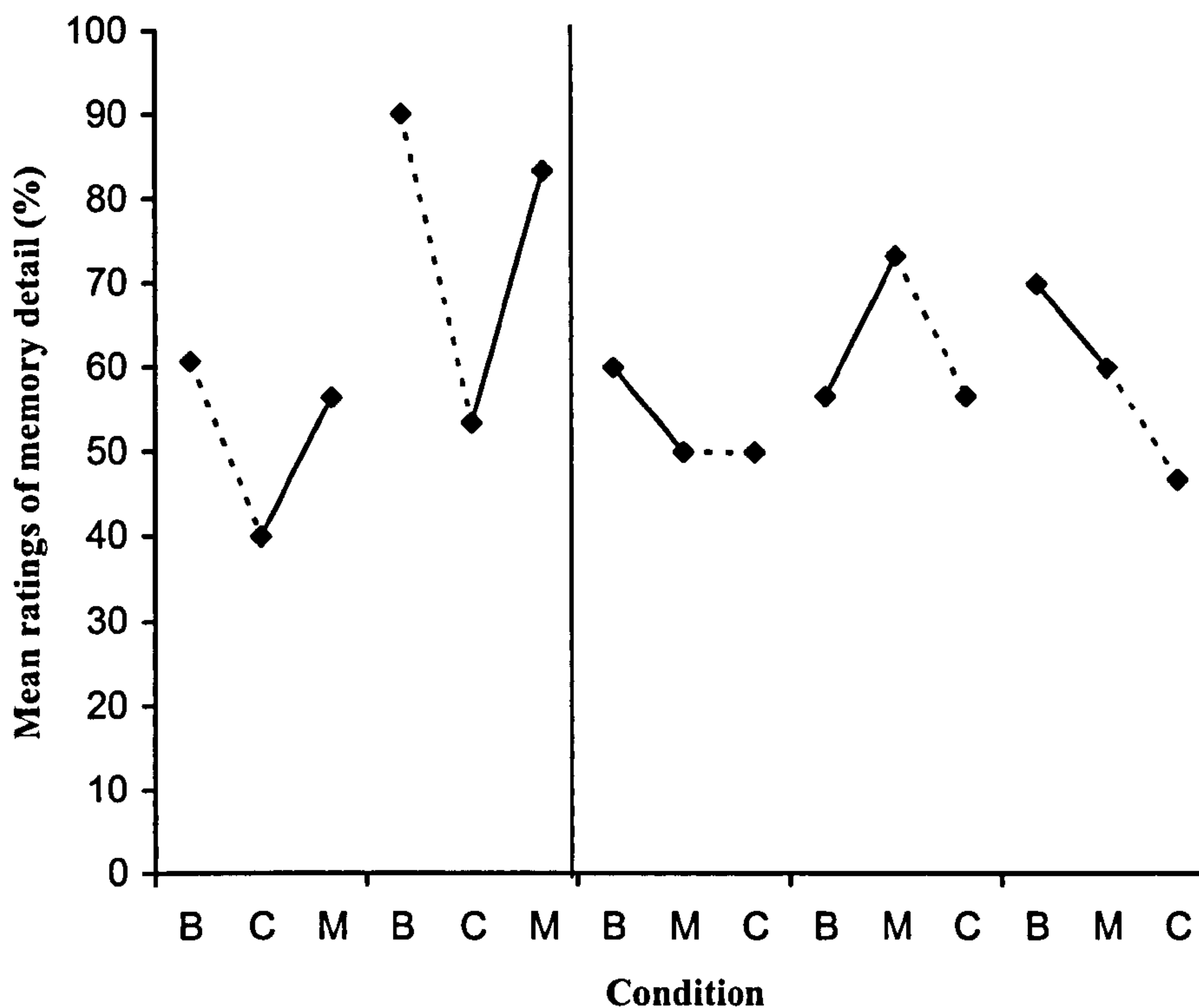
3.2.2 Ratings of memory detail.

Measures of how detailed or clear participants memories were during each task are shown in figure 1. Ratings were given on a 0-100 scale, with 0 being '*not detailed*' and 100 being '*extremely detailed*'. It was predicted that the use of a memory search immediately after checking would lead to a decrease in the detail of a memory compared to a condition that did not use a memory search. Four out of five participants rated their memory as being the clearest during the baseline experiment, with one person rating their memory as clearest during the memory search. When comparing the two experimental conditions, four out of five participants rated themselves as having a more detailed memory during the memory search in comparison to the computer task, contradictory to hypothesis 1. One person rated the same level of detailed memory for both experiments. This person differed from the other participants in that they used a different experimental stimulus. That is, during the exposure they checked whether their digital cordless phones were turned on whereas the other four participants checked whether the cooker was turned off. This participant also had the lowest rating of inflated responsibility as measured by the WOCI and the OBQ-44.

Change scores were calculated between the baseline and first experimental condition, and between the first experimental condition and the second experimental condition. For two of the participants, the first experimental condition consisted of the computer task whilst for three participants it consisted of the memory search task. A more detailed description of the calculation of change scores can be found in the method section and in appendix I. Changes associated with the memory search condition were computed in a similar way. A negative change denotes a decrease in how detailed the participant's memory is and a positive change score denotes an increase in how detailed the participant's memory is. The change score for the computer task was -17.47 whilst the change score for the memory search was 8.60. Although changes were minimal, these results suggest that the introduction of a five minute computer task may serve to decrease a participant's ratings of how detailed or clear their memory is.

Figure 1. Mean ratings for memory detail during the baseline, computer condition, and memory search condition for each participant.

	Computer task first		Memory search first		
	S1	S4	S2	S3	S5



B = baseline, C = computer task, M = memory search

3.2.3 Ratings of memory confidence.

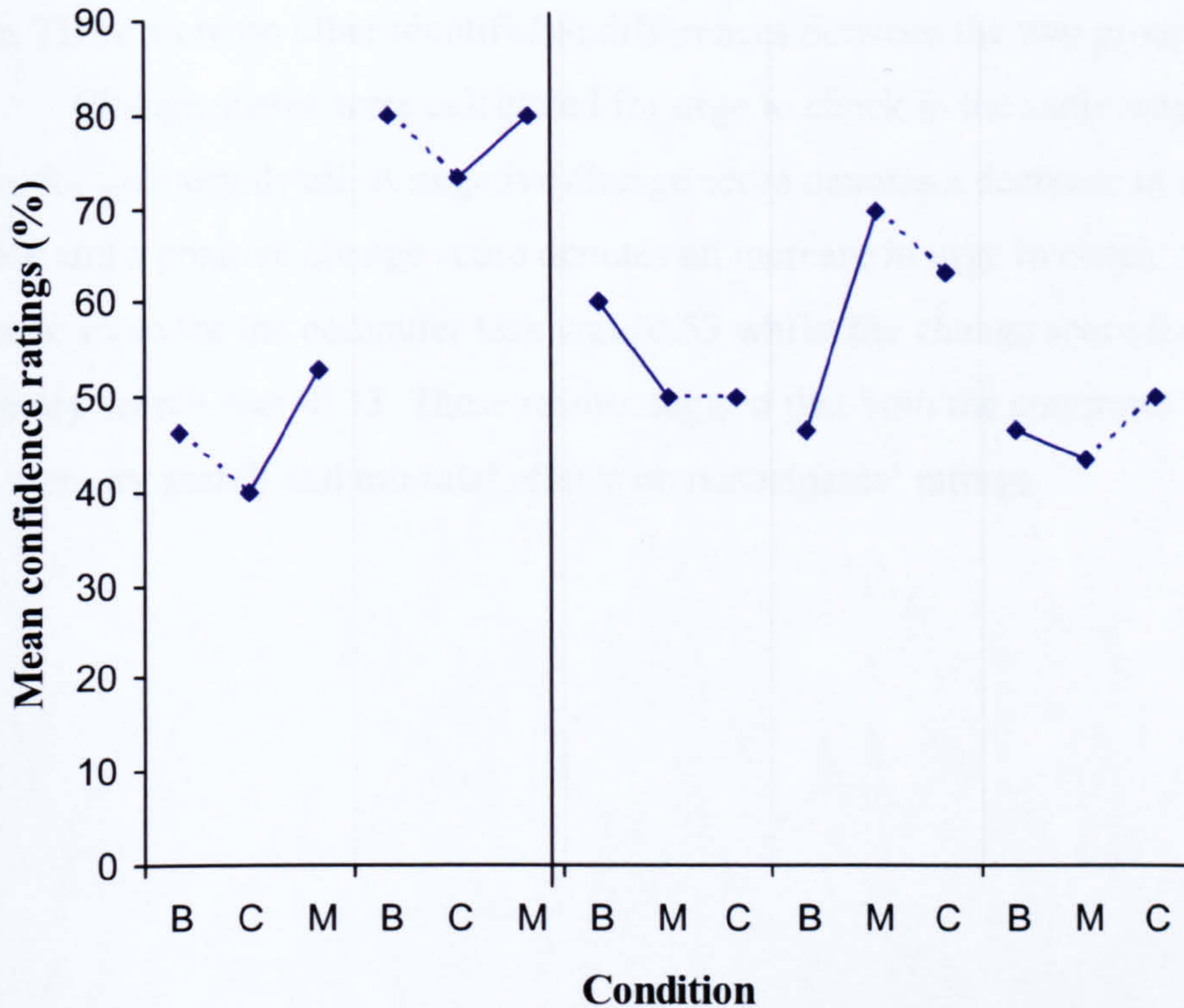
Measures of how confident participants were in their memory during each task are shown in figure 2. Ratings were given on a 0-100 scale with 0 being 'absolutely not confident' and 100 being 'absolutely confident'. It was predicted that the use of a memory search immediately after checking would lead to a decrease in confidence in memory compared to a condition that did not use a memory search. The results display a mixed picture. Two out of five participants rated their confidence as being highest during the memory search condition, one participant rated their confidence as being highest during the computer task, and one person rated their confidence as being the highest during the baseline. The final participant rated the baseline and memory search condition at the same level. When comparing the two experimental conditions, three out of five

participants rated their confidence higher in the memory search in comparison to the computer task, contradicting hypothesis 1. One person supported the hypothesis by rating their confidence higher during the computer task than the memory search task. The only difference between this participant and the other four participants is that he was the only male in the sample.

Change scores were calculated for memory confidence in the same way as they were for memory detail. A negative change score denotes a decrease in confidence and a positive change score denotes an increase in confidence. The change score for the computer task was -2.53 whilst the change score for the memory search was 5.93. These results suggest that both the computer task and the memory search have a minimal effect on participant's ratings.

Figure 2. Mean ratings for confidence in memory during the baseline, computer task, and memory search conditions for each participant.

	Computer task first		Memory search first		
	S1	S4	S2	S3	S5



B = baseline, C = computer task, M = memory search

3.2.4 Ratings of urge to check.

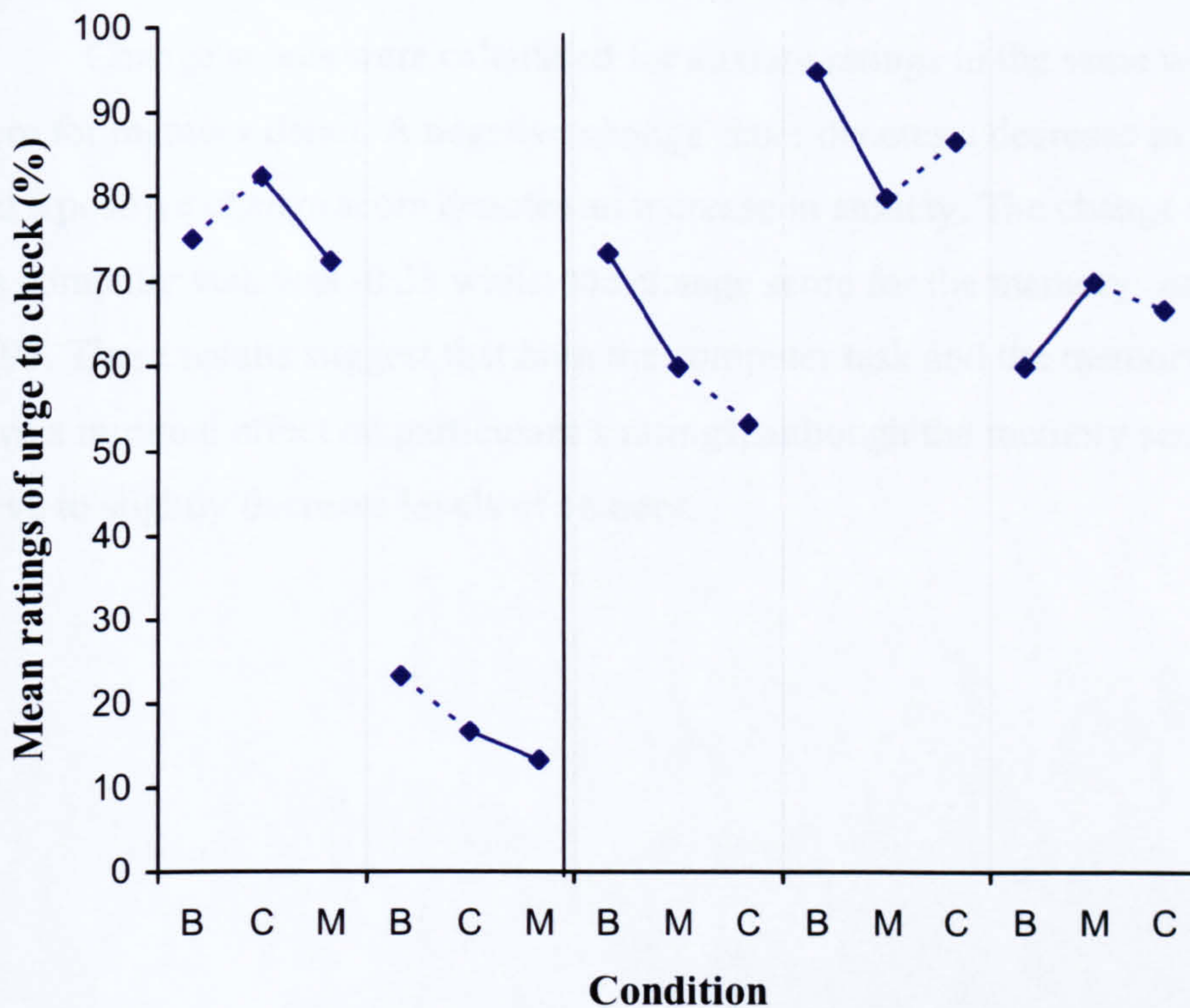
Measures of participant's urge to check during each task are shown in figure 3. Ratings were given on a 0-100 scale with 0 being 'I do not feel the urge to check at all' and 100 being 'my urge to check could not be any stronger'. It was predicted that the use of a memory search immediately after checking would lead to an increase in urge to check compared to a condition that did not use a memory search. Three out of five participants rated their urge to check as being highest during the baseline condition, one participant rated their urge to check as being highest during the computer task, and one person rated their urge to check

as being the highest during the memory search condition. When comparing the two experimental conditions, three out of five participants rated their urge to check as higher in the computer task in comparison to the memory search, contradicting hypothesis 2. Two participants supported the hypothesis by rating their urge to check as higher during the memory search. These participants were both exposed to the memory search condition first followed by the computer task. There were no other identifiable differences between the two groups.

Change scores were calculated for urge to check in the same way as they were for memory detail. A negative change score denotes a decrease in urge to check and a positive change score denotes an increase in urge to check. The change score for the computer task was -0.53 whilst the change score for the memory search was -6.33. These results suggest that both the computer task and the memory search had minimal effects on participants' ratings.

Figure 3. Mean ratings of urge to check during the baseline, computer task condition, and memory search condition for each participant.

	Computer task first		Memory search first		
	S1	S4	S2	S3	S5



B = baseline, C = computer task, M = memory search

3.2.5 Ratings of anxiety.

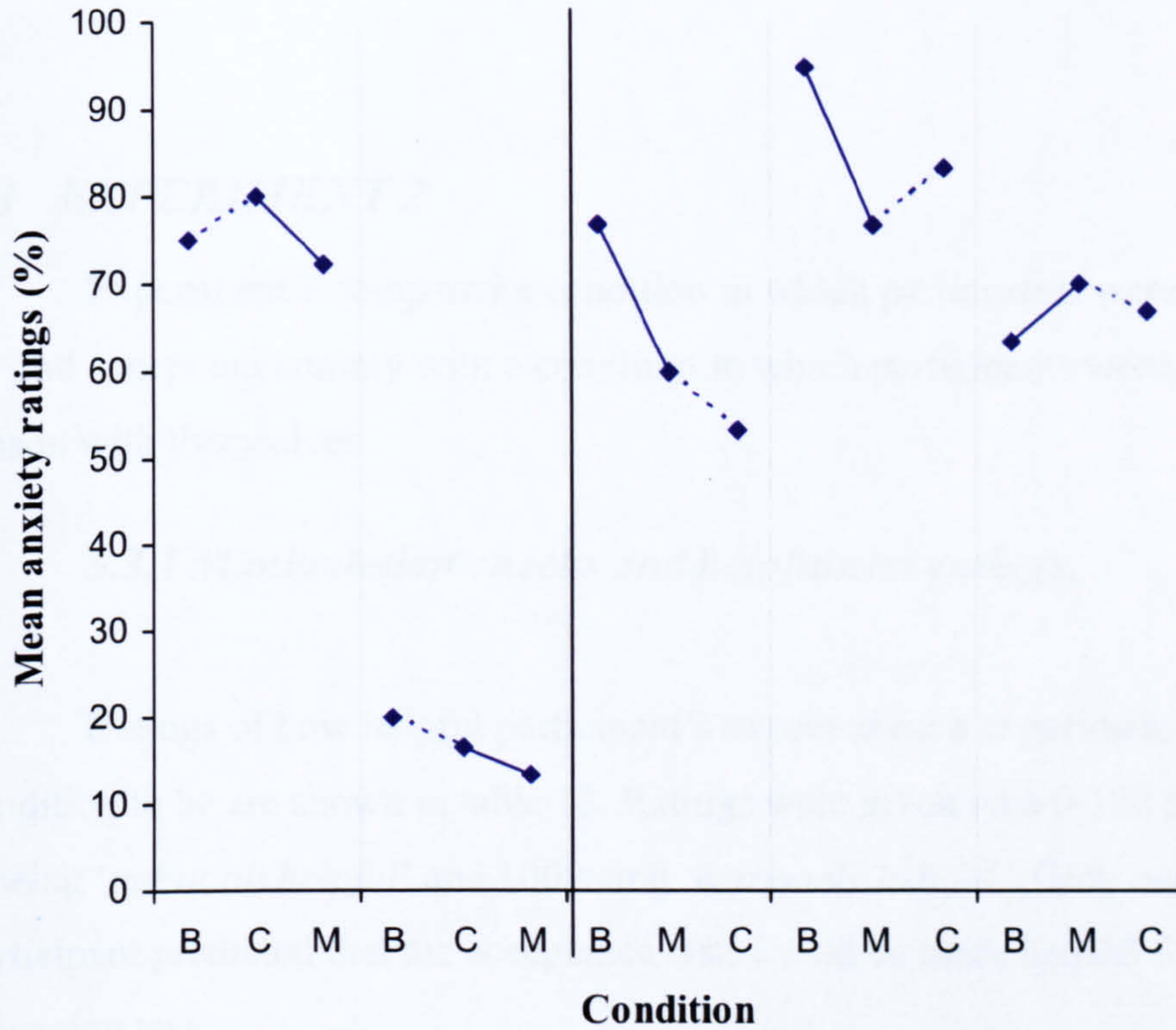
Measures of participant's anxiety during each task are shown in figure 4. Ratings were given on a 0-100 scale with 0 being '*not at all anxious/distressed*' and 100 being '*the most anxious/distressed I have ever been*'. It was predicted that the use of a memory search immediately after checking would lead to an increase in anxiety compared to a condition that did not use a memory search. Three out of five participants rated their anxiety as being highest during the baseline condition, one participant rated their anxiety as being highest during the computer task, and one person rated their anxiety as being the highest during the

memory search condition. When comparing the two experimental conditions, three out of five participants rated their anxiety as higher in the computer task in comparison to the memory search, contradicting hypothesis 2. Two participants supported the hypothesis by rating their anxiety as higher during the memory search. As with the urge to check ratings, these participants were both exposed to the memory search condition first followed by the computer task. There were no other identifiable differences between the two groups.

Change scores were calculated for anxiety ratings in the same way as they were for memory detail. A negative change score denotes a decrease in anxiety and a positive change score denotes an increase in anxiety. The change score for the computer task was -0.33 whilst the change score for the memory search was -7.93. These results suggest that both the computer task and the memory search have a minimal effect on participant's ratings, although the memory search may serve to slightly decrease levels of anxiety.

Figure 4. Mean ratings of anxiety during the baseline, computer task, and the memory search task for each participant.

	Computer task first		Memory search first		
	S1	S4	S2	S3	S5



B = baseline, C = computer task, M = memory search

3.2.6 Findings in relation to hypothesis 1 and 2.

Hypothesis 1 predicted that the use of a memory search would decrease memory detail and confidence, in comparison to a task that did not allow for a memory search. Hypothesis 2 predicted that the use of a memory search would increase urge to check and anxiety, compared to a task that did not allow for a memory search. Out of the five participants, three individuals failed to support any of the hypotheses and one person supported hypothesis 2 only. One participant supported all the hypotheses with the exception of memory detail. This participant obtained the highest score on the BAI, falling in the 'severe'

range, and the second highest score on the BDI-II, falling in the ‘moderate’ range. On the WOCI, this participant gave the joint highest frequency rating of using distraction as a method to prevent themselves from checking, and the highest rating of using a memory search. Finally, they gave the highest rating for how helpful they predicted the memory search task to be prior to the start of the experiment.

3.3 EXPERIMENT 2

Experiment 2 compared a condition in which participants were asked to try and accept uncertainty with a condition in which participants were asked to reason with themselves.

3.3.1 Manipulation checks and helpfulness ratings.

Ratings of how helpful participant’s expected each experimental condition to be are shown in table 12. Ratings were given on a 0-100 scale, with 0 being ‘*not at all helpful*’ and 100 being ‘*extremely helpful*’. Only one participant predicted that the acceptance task would be more helpful than the reasoning task.

Table 12. Pre-experimental helpfulness rating.

Participant	Helpfulness ratings	
	Acceptance task	Reasoning task
1	40	90
2	40	70
3	50	85
4	50	40
5	80	80

Measures of how well participants felt they completed the tasks are shown in table 13. Ratings were given on a 0-100 scale, with 0 being ‘*I completed the task very poorly*’ and 100 being ‘*I completed the task perfectly*’.

Ratings for the acceptance task were mixed. Two participants felt they had completed the task well and rated themselves at 80, two participants were unsure of their performance and opted for a middle rating, and one participant struggled to complete the task and rated their performance as 10. The majority of participants felt they had completed the reasoning task better than the acceptance task with four out of five participants rating themselves as 70 or above. Only one participant felt they had performed better on the acceptance task.

Table 13. Manipulation check on completion of the task.

Participant	Extent to which participants managed to complete the task	
	Acceptance task	Reasoning task
1	80	60
2	50	70
3	80	100
4	50	80
5	10	80

Measures of how well participants managed to focus on the tasks are shown in table 14. Ratings were based on a 0-100 scale with 0 being '*I didn't manage to stay focused at all*' and 100 being '*I managed to stay completely focused on the task*'. Ratings for the acceptance task were mixed. Two participants felt they had focused on the task well and rated themselves at 80 or above, one participant was unsure of how focused they had stayed on the task and opted for a middle rating, and two participants felt they had struggled to stay focused on the task and rated themselves below 50. Four out of five participants stayed more focused on the reasoning task than the acceptance task. Only one person felt they were more focused on the acceptance task.

Table 14. Manipulation check of focusing on the task.

Participant	Managed to focus on the task	
	Acceptance task	Reasoning task
1	80	90
2	50	65
3	40	80
4	100	80
5	10	80

3.3.2 Ratings of memory detail.

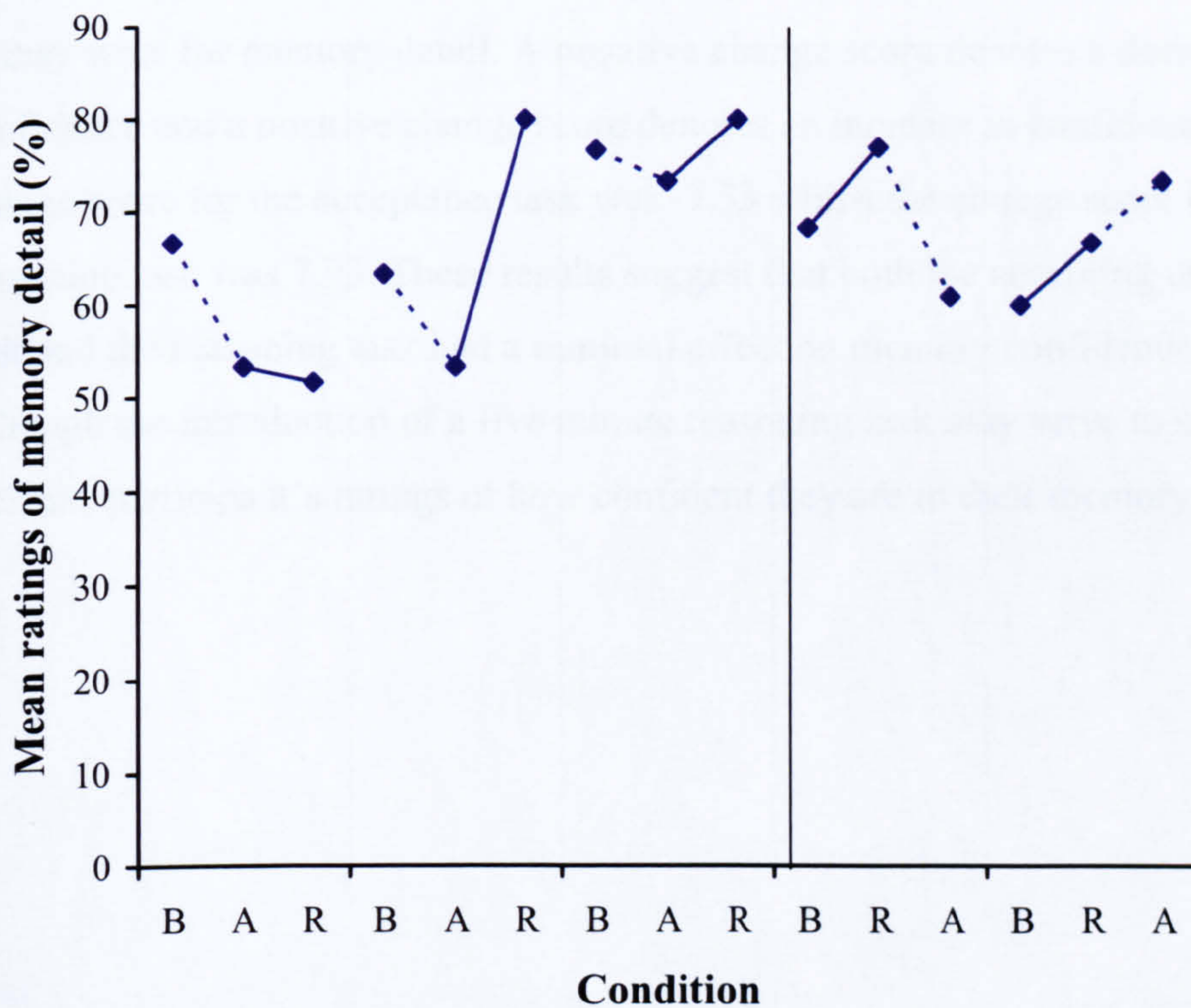
Measures of how detailed or clear participants memories were during each task are shown in figure 5. Ratings were given on a 0-100 scale, with 0 being '*not detailed*' and 100 being '*extremely detailed*'. It was predicted that a reasoning task immediately after checking would lead to a decrease in memory detail compared to a condition in which the participant is encouraged to accept uncertainty. Three out of five participants rated their memory as being the clearest during the reasoning task, with one person rating their memory as clearest during the baseline, and one person rating their memory as clearest during the acceptance task. When comparing the two experimental conditions, three out of five participants rated themselves as having a more detailed memory during the reasoning task in comparison to the acceptance task, contradicting hypothesis 3. Only one person supported hypothesis 3 by rating their memory as clearest during the acceptance task. During manipulation checks, this person indicated that they had managed to focus on the acceptance task 100% which was the highest rating in the sample.

Change scores were calculated between the baseline and first experimental condition, and between the first experimental condition and the second experimental condition. For three of the participants the first experimental condition consisted of the acceptance task whilst for two participants it consisted of the reasoning task. A more detailed description of the calculation of change scores can be found in the method section and appendix I. Changes associated with the reasoning condition were computed in a similar

way. A negative change score denotes a decrease in how detailed the participant's memory is and a positive change score denotes an increase in how detailed the participant's memory is. The change score for the acceptance task was -7.20 whilst the change score for the reasoning task was 9.40. These results suggest that both the accepting uncertainty task and the reasoning task have a minimal effect on participant's ratings, although the reasoning task may serve to slightly increase memory detail.

Figure 5. Mean ratings for memory detail during the baseline condition, acceptance condition, and reasoning condition for each participant.

Acceptance task first			Reasoning task first	
S2	S3	S5	S1	S4



B = baseline, A = acceptance task, R = reasoning task

3.3.3 Ratings of memory confidence.

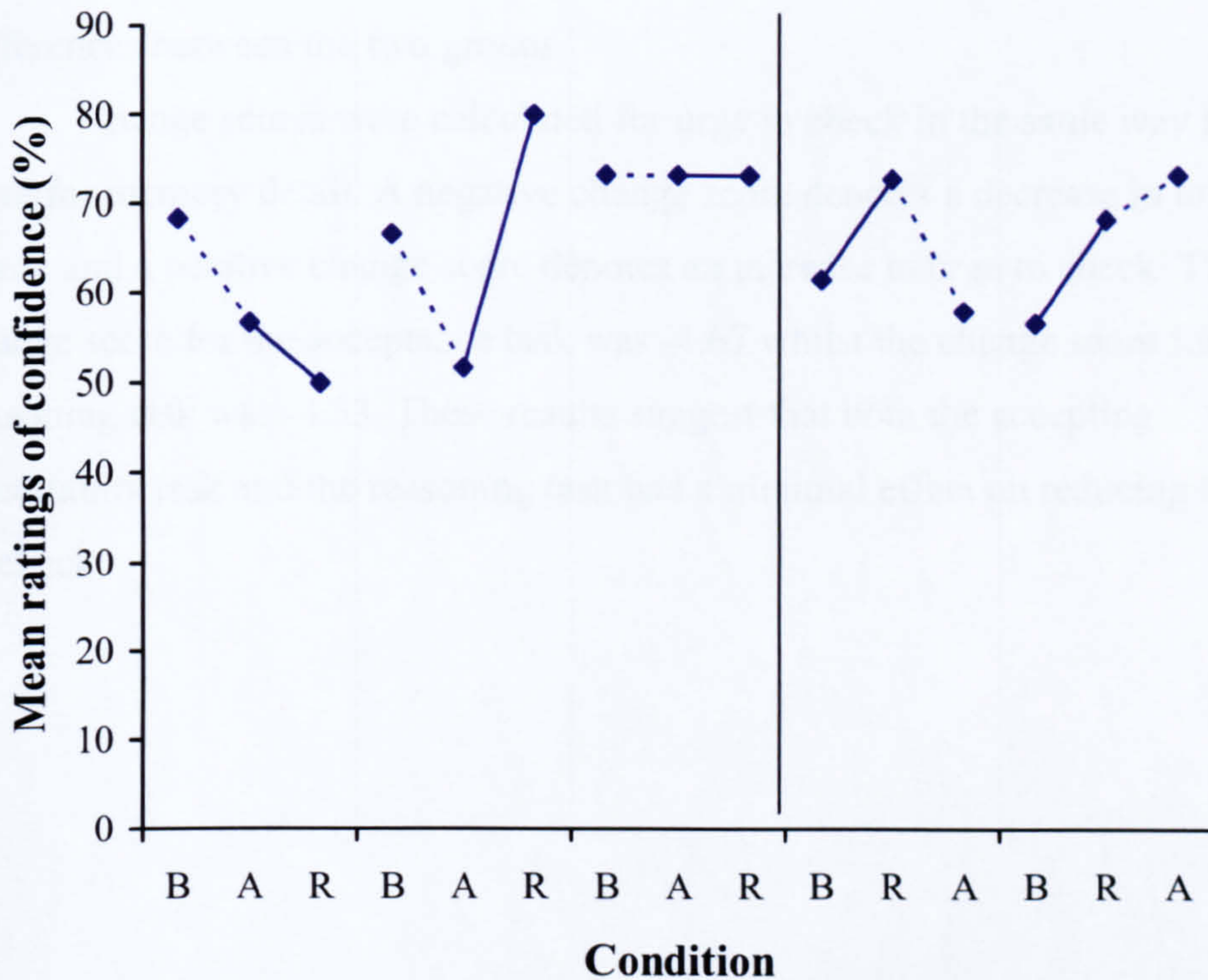
Measures of how confident participants were in their memory during each task are shown in figure 6. Ratings were given on a 0-100 scale with 0 being

'absolutely not confident' and 100 being *'absolutely confident'*. It was predicted that a reasoning task immediately after checking would lead to a decrease in memory confidence compared to a condition that encouraged the participant to accept uncertainty. The results display a mixed picture. Two out of five participants rated their confidence as being highest during the reasoning task, one participant rated their confidence as being highest during the acceptance task, and one participant rated their confidence as being the highest during the baseline. The final participant rated all three conditions at the same level. When comparing the two experimental conditions, two out of five participants rated their confidence higher in the acceptance task in comparison to the reasoning task, supporting hypothesis 3. Two participants contradicted hypothesis 3 by rating their confidence higher during the reasoning task than the acceptance task. There were no obvious differences between these two groups.

Change scores were calculated for memory confidence in the same way as they were for memory detail. A negative change score denotes a decrease in confidence and a positive change score denotes an increase in confidence. The change score for the acceptance task was -7.33 whilst the change score for the reasoning task was 7.93. These results suggest that both the accepting uncertainty task and the reasoning task had a minimal effect on memory confidence, although the introduction of a five minute reasoning task may serve to slightly increase participant's ratings of how confident they are in their memory.

Figure 6. Mean ratings for confidence in memory during the baseline, acceptance, and reasoning conditions for each participant.

Acceptance task first			Reasoning task first	
S2	S3	S5	S1	S4



B = baseline, A = acceptance task, R = reasoning task

3.3.4 Ratings of urge to check.

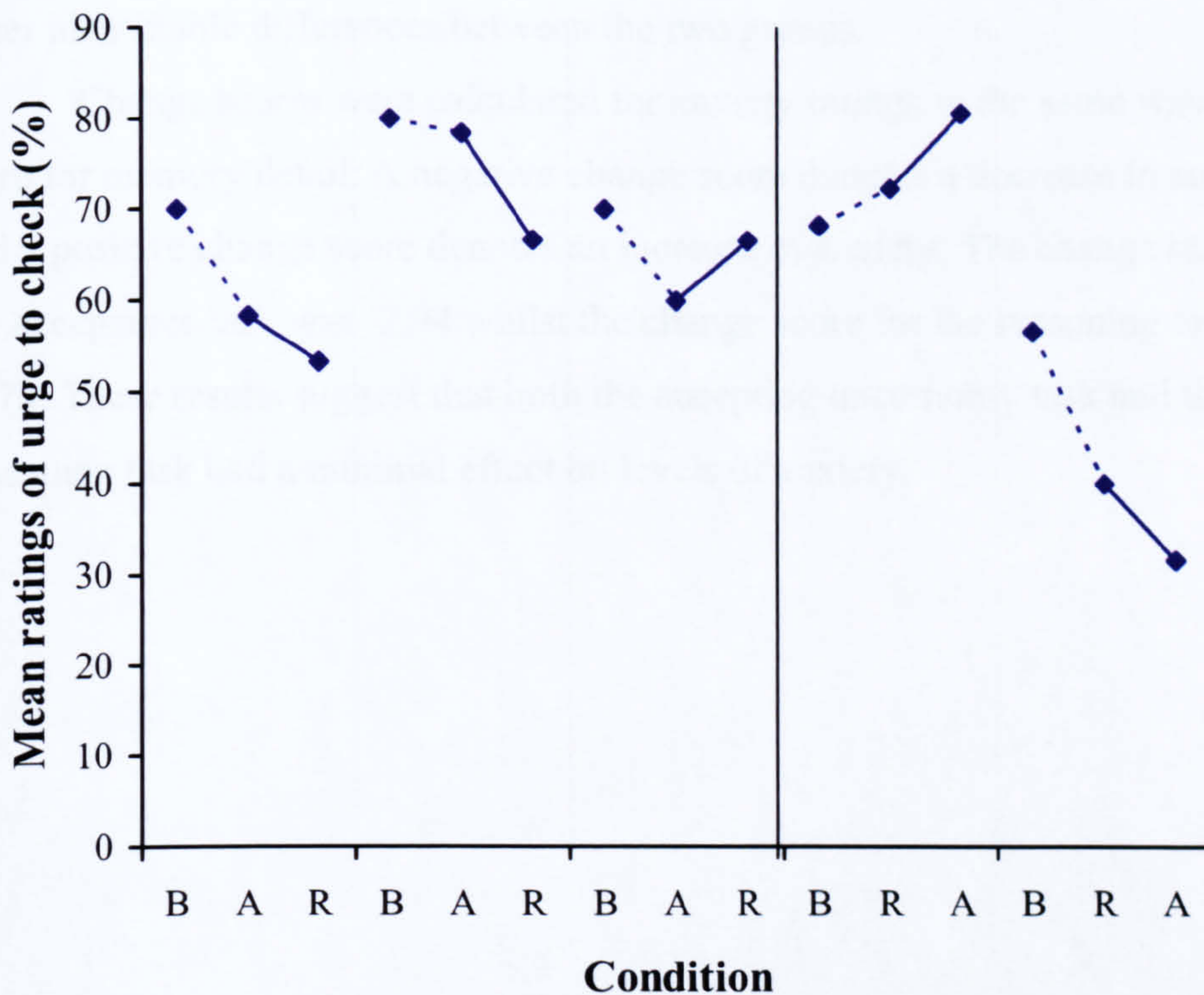
Measures of participant's urge to check during each task are shown in figure 7. Ratings were given on a 0-100 scale with 0 being 'I do not feel the urge to check at all' and 100 being 'my urge to check could not be any stronger'. It was predicted that a reasoning task immediately after checking would lead to an increase in urge to check compared to a condition that encouraged participants to accept uncertainty. Four out of five participants rated their urge to check as being highest during the baseline condition, with one participant rating their urge to check as being highest during the acceptance task. When comparing the two experimental conditions, three out of five participants rated their urge to check as

higher in the acceptance task in comparison to the reasoning task, contradicting hypothesis 4. Two participants supported hypothesis 4 by rating their urge to check as higher during the reasoning task. On pre-experimental measures, these two participants gave the highest ratings for how frequently they try to accept uncertainty to prevent themselves from checking. They also rated distraction higher in comparison to the other participants. There were no other identifiable differences between the two groups.

Change scores were calculated for urge to check in the same way as they were for memory detail. A negative change score denotes a decrease in urge to check and a positive change score denotes an increase in urge to check. The change score for the acceptance task was -4.67 whilst the change score for the reasoning task was -4.53. These results suggest that both the accepting uncertainty task and the reasoning task had a minimal effect on reducing the urge to check.

Figure 7. Mean ratings of urge to check during the baseline, acceptance condition, and reasoning condition for each participant.

Acceptance task first			Reasoning task first	
S2	S3	S5	S1	S4



B = baseline, A = acceptance task, R = reasoning task

3.3.5 Ratings of anxiety.

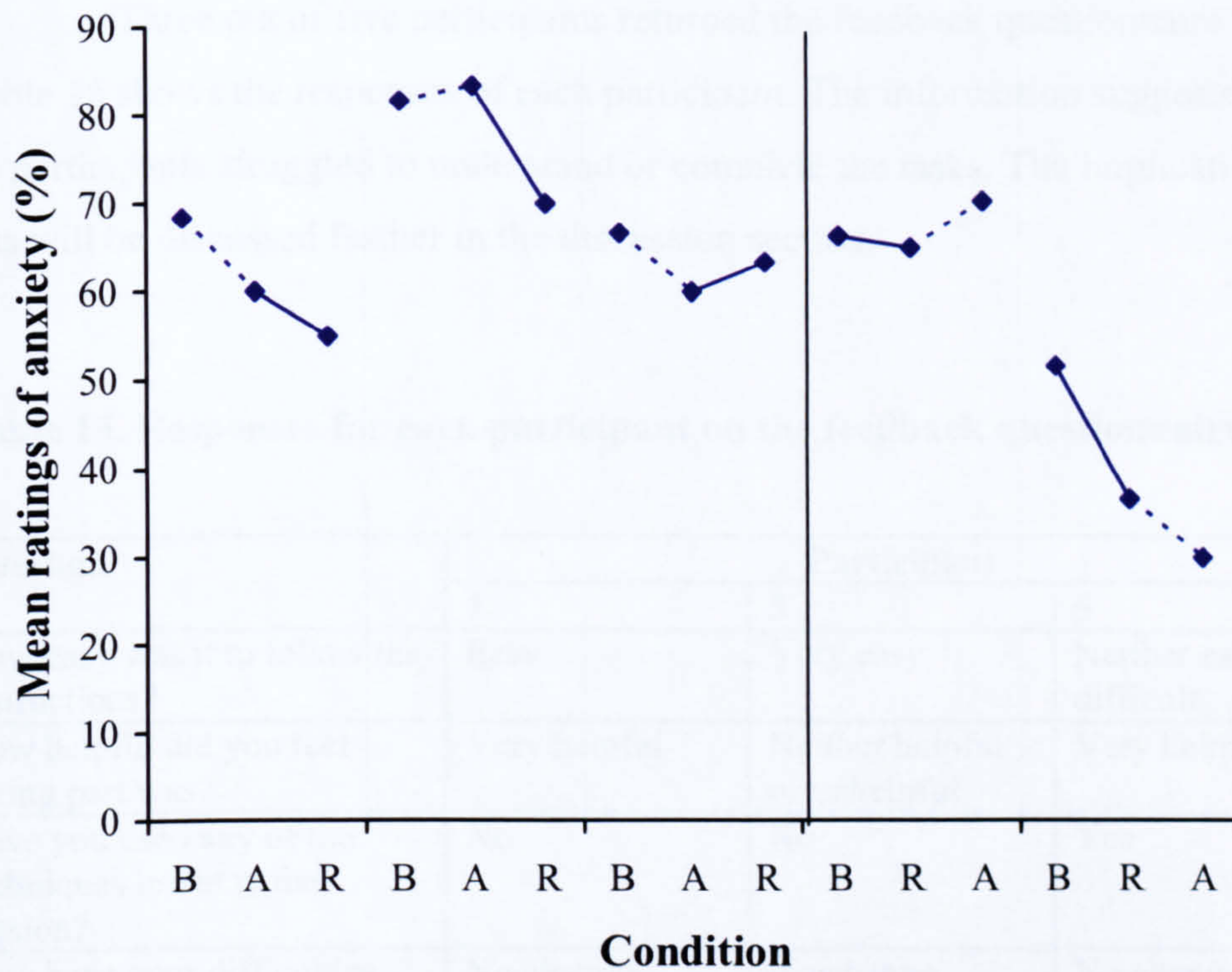
Measures of participant's anxiety during each task are shown in figure 8. Ratings were given on a 0-100 scale with 0 being '*not at all anxious/distressed*' and 100 being '*the most anxious/distressed I have ever been*'. It was predicted that a reasoning task would lead to an increase in anxiety compared to a condition that encouraged the participant to accept uncertainty. Three out of five participants rated their anxiety as being highest during the baseline condition, whereas two participants rated their anxiety highest during the acceptance task. When comparing the two experimental conditions, three out of five participants

rated their anxiety as higher during the acceptance task in comparison to the reasoning task, contradicting hypothesis 4. Two participants supported hypothesis 4 by rating their anxiety as higher during the reasoning task. As with the urge to check ratings, these participants both reported trying to accept uncertainty and using distraction as a way to prevent them from checking more than the other participants on the pre-experimental measures. There were no other identifiable differences between the two groups.

Change scores were calculated for anxiety ratings in the same way as they were for memory detail. A negative change score denotes a decrease in anxiety and a positive change score denotes an increase in anxiety. The change score for the acceptance task was -2.94 whilst the change score for the reasoning task was -5.73. These results suggest that both the accepting uncertainty task and the reasoning task had a minimal effect on levels of anxiety.

Figure 8. Mean ratings of anxiety during the baseline, acceptance, and reasoning conditions for each participant.

	Acceptance task first			Reasoning task first	
	S2	S3	S5	S1	S4



B = baseline, A = acceptance task, R = reasoning task

3.3.6 Findings in relation to hypothesis 3 and 4.

Out of the five participants, three individuals failed to support any of the hypotheses and one person supported hypothesis 4 only. One participant supported all the hypotheses. This participant was the only person to score in the 'severe' range on the BDI-II and the C-BOCI. In addition they obtained the second highest score on the BAI, also scoring in the 'severe' range. On the WOCI, this participant gave the joint highest frequency rating for the use of distraction as a method to prevent themselves from checking, and the second highest rating for trying to accept uncertainty. This may have influenced the participant's predictions of how useful the accepting uncertainty task was in

managing their anxiety. Finally, this participant was the only person to suggest they had managed to focus on the acceptance task 100% and the only participant to predict that the acceptance task would be more helpful than the reasoning task.

3.4 Feedback questionnaire

Three out of five participants returned the feedback questionnaire.

Table 15 shows the responses of each participant. The information suggests that no participants struggled to understand or complete the tasks. The implications of this will be discussed further in the discussion section.

Table 15. Responses for each participant on the feedback questionnaire.

Question	Participant		
	1	3	5
How easy was it to follow the instructions?	Easy	Very easy	Neither easy or difficult
How helpful did you feel taking part was?	Very helpful	Neither helpful or unhelpful	Very helpful
Have you used any of the techniques learnt in the session?	No	No	Yes
How have your difficulties changed since completing the study?	No change	No change	No change

4. Discussion

4.1 Key Findings from the Study

The current study sought to identify the effect of two hypothesized cognitive safety behaviours used during exposure with individuals with OCD (checking subtype). Because previous research suggests that individuals with checking rituals are more likely to have an intolerance of uncertainty (Tolin et al., 2003), it was hypothesised that the use of a memory search and a reasoning task immediately after checking would have a maladaptive effect on memory detail and confidence and on levels of anxiety and urge to check. The findings in the current study were mixed. A minority of participants appeared to support some of the hypotheses whilst other participants did not, although in all cases any changes were minimal. The calculation of a mean change score for each condition failed to support any of the hypotheses. That is, the use of a memory search and the use of a reasoning task did not appear to have a maladaptive effect on individuals with OCD (checking subtype). However, it is important to acknowledge that the calculation of change scores in the current study were limited to detecting differences between groups based on the order in which the tasks were performed. It is possible that more differences may have been identified if data analysis had been extended to test group changes from baseline in both experiments. Because of the small sample size in this study, any conclusions should be interpreted with caution and it may therefore be more appropriate to conclude that there were no major differences between the four conditions in terms of their effect on memory detail, confidence, urge to check and anxiety.

The finding that the manipulation of cognitive strategies during exposure in individuals with OCD does not appear to facilitate change is in keeping with conclusions from recent research. Meta-analyses of studies that directly compare cognitive-behavioural treatments with Exposure and Response Prevention (ERP) have found that the behavioural components of treatment tend to be more efficacious in reducing obsessive and compulsive symptoms than cognitive interventions (Abramowitz, Franklin, & Foa, 2002; Eddy, Dutra, Bradley, &

Western, 2004). Other studies have shown CBT and ERP to be equally effective (e.g., McLean et al., 2001). In addition, ERP has been shown to produce similar changes on cognitive belief questionnaires to CBT (e.g., McLean et al., 2001) and an equivalent rate of refusals, drop-outs, homework non-compliance and treatment non-response (Whittal et al., 2005). Such findings have led to the argument that there is little evidence to suggest that the cognitive components of CBT add to the effectiveness of traditional behaviour therapy (Steketee et al., 2002). Indeed, some authors have suggested that cognitive treatments could be counterproductive by diluting the amount of ERP that patients receive in the course of treatment (Clark, 2005). Given the evidence for the effectiveness of ERP, it is possible that this study provides further support for the argument that exposure is the most important component of treatment for individuals with OCD. However, before making conclusions of this kind, it is important to consider the limitations of the study, along with any alternative explanations for the current findings.

4.2 Limitations and Alternative Explanations of the Study

4.2.1 Assessing validity.

Before the null hypothesis can be accepted, it is important to consider whether any influencing factors within the design or sample of the study can account for the results. A useful way of considering these alternative explanations is to evaluate potential threats to validity by using the framework developed by Cook and Campbell (1979). Cook and Campbell (1979) suggest that there are four main types of validity:

Internal validity – ‘The approximate validity with which statements can be made about whether there is a causal relationship from one variable to another in the form in which the variables were manipulated or measured’.

Statistical-conclusion validity – ‘Inferences about whether it is reasonable to presume covariation given a specified α level and the obtained variances’.

Construct validity – ‘The approximate validity with which one can make generalizations about higher-order constructs from research operations’.

External validity - The approximate validity with which conclusions are drawn about the generalisability of a causal relationship to and across populations of persons, setting, and times’

Cook and Campbell (1979, p. 37-39).

This framework will be used to consider the various limitations of the study.

4.2.2 Sample bias.

The design of the study served to minimise threats to external validity. For example, referrals to clinical psychology departments over a six month period were approached to take part in the study which increases the likelihood of representing those individuals who are likely to seek psychological treatment. However, one of the major threats to external validity in this study was the low sample size. Although single case experimental methods are ideal for ‘difficult to recruit’ populations, the small sample size weakens the generalisability of the study and makes it difficult to suggest whether the sample did end up representing the target population. Response rates in the current study were low. Only 9 out of 27 (33%) potential participants returned their response sheets to express interest in the study. In addition, because the researcher was restricted by ethical guidelines on data protection, it was not possible to obtain data on those individuals who did not respond to the invitation to take part in the study. Sample biases cannot therefore be ruled out. For example, it is possible that clients with more severe symptoms of OCD did not feel able to take part in the study and did not therefore return the reply slip.

Because of recruitment difficulties, it was not possible to stick to the original inclusion and exclusion criteria for all participants. That is, one participant had received a course of Cognitive Behavioural Therapy within the last two years. Given that individuals with OCD are already known to be a

heterogeneous population, inter-subject variability may have contributed to the lack of consistent results. Finally, because only one researcher conducted the experimental sessions in this study, it is not possible to generalise the findings across therapists. A factorial design may have ruled out some of the threats to generalisability. However, this was not feasible in the current study due to the cost and time scale implications, as well as the need for a large sample (Barlow & Hersen, 1984).

4.2.3 Order effects.

The randomised counterbalanced design of this study served to reduce threats to internal validity. For example, the results could have been a consequence of the order in which the experimental conditions were presented. That is, the memory search could have worked better if it was given last either because the participant had been able to confirm to themselves that they had checked correctly twice before or because emotional change had occurred through the process of habituation. This is particularly important given that recent experimental work has shown that repeated checking leads participants to shift from 'remembering' the most recent check at pre-test to simply 'knowing' that they have checked the relevant item at post-test (Van den Hout & Kindt, 2003a, 2003b). However, in the current study each participant received every experimental condition in a random order, with approximately half the sample receiving condition B then C, and approximately half receiving condition C then B. On examination of individual differences, there appeared to be no relationship between the results of the experiment and the order in which participants received the conditions, which suggests that differences due to order effects can potentially be ruled out. Another possibility is that the results of the second experiment were influenced by the completion of the first experiment a week earlier. Baseline measurements for each participant were similar in both experiments which provide some evidence that any interference effects from the first experiment can be ruled out. However, the internal validity of the study may have been strengthened if the two experiments had been counterbalanced so that

half the participants received experiment 1 then 2, and half the participants received experiment 2 then 1.

4.2.4 Participant characteristics.

An advantage of single case designs is that it is possible to develop tentative ideas about which type of persons benefit from a particular treatment. This may be an important consideration given that previous research on ‘Aptitude x Treatment Interactions’ (ATI, Cronbach & Snow, 1977) suggests that the effects of psychotherapy depend on specific characteristics of patients and the therapies to which they are exposed. More specifically, the ATI hypothesis states that appropriate matching of patients with treatment will result in better outcomes (Smith & Sechrest, 1991). Although the small sample in the current study did not allow for a statistical analysis of the relationship between participant characteristics and outcome, a visual inspection of the data was undertaken to try to identify any clear differences. For example, the rationale for the current study would suggest that individuals with a higher level of intolerance of uncertainty would be more likely to experience the maladaptive effect predicted in the hypotheses. However, although there was some variability within the sample on measures of dysfunctional beliefs, these differences did not appear to predict outcome.

The current study identified one factor that could potentially affect treatment response. The two participants who scored in the ‘severe’ range for anxiety and the ‘moderate’ or ‘severe’ range for depression both supported the hypotheses for at least one experiment. In contrast, participants who did not meet clinical criteria on the BDI-II did not support any of the hypotheses. Previous research has suggested that severely depressed obsessive-compulsive clients are less likely to gain from behavioural treatments (Foa et al., 1983; Abramowitz, Franklin, Street, Kozak, & Foa, 2000). The results of this study, therefore, could potentially support the argument that individuals with OCD and co-morbid depression and anxiety problems are more likely to use maladaptive coping strategies during exposure that impedes the effectiveness of this procedure and thus affects the responsiveness to behaviour therapy. In agreement with

Abramowitz (2004) and Salkovskis et al. (2007) therefore, such clients may benefit from the incorporation of cognitive treatments that address the underlying strategies used to prevent checking. Because of the very small N in the current study, there is a need to be tentative about any conclusions drawn. More research is therefore needed to investigate this potentially important finding further.

Several other differences were noted on an individual level that could possibly have affected the outcome. In experiment 1, the participant who supported the majority of the hypotheses was the only male in the sample. In addition, two out of the three participants who received the memory search condition first rated their urge to check and anxiety as highest during the memory search. In experiment 2, the participant who supported both of the hypotheses reported that they had managed to stay focused on the accepting uncertainty task 100%, which was the highest rating of the sample. In addition, prior to the experiments, this person also reported the highest usage of acceptance and distraction methods as a way of preventing themselves from checking. It is possible, therefore, that the mixed results in this study could be due to some of the individual differences present in the sample and future research would need to investigate this further using a larger sample.

Some participant characteristics thought to affect response to treatment may not have been identified in the current study. For example, previous research has shown a relationship between specific personality traits (e.g., schizotypal, passive-aggressive) and treatment outcome in a group behaviour therapy programme for individuals with OCD (Fricke et al., 2006). In addition, the heterogeneous nature of OCD means that it is difficult to control for variability in the sample with regard to OCD symptomatology, co-morbidity, and severity of symptoms. Standardised measures used in the assessment sessions attempted to identify some of this variability. For example, the MOCI was used as a measure of compulsive checking and washing behaviours and the C-BOCI provided a brief screening of OCD symptomatology as well as the severity of the symptoms. However, as clinical reports rarely reveal that an individual only engages in one particular type of obsession or compulsion (McKay et al, 2004), it may be necessary to determine primary, secondary, and possibly tertiary OCD subtypes to gain an insight into treatment effects. To enable comparisons of the occurrence and impact of compulsions other than checking behaviours in the current sample,

therefore, it may have been useful to include a measure that clearly identifies the different subtypes of OCD. For example, the Y-BOCS is often considered essential to the assessment of symptoms and includes a checklist of the main obsessive and compulsive behaviours. That said, several authors have criticised the Y-BOCS for its low discriminant validity and for being a time-consuming and costly measure to administer (Taylor, 1998; Feske & Chambless, 2000; Antony, 2001).

4.2.5 Participant and researcher expectancy effects.

It is possible that results will have been affected by the researcher's confidence and experience in conducting the experiments. For example, the researcher may have gained confidence as they became more familiar with conducting the experiments and this may have had an impact on how easily the instructions were explained and how comfortable the participant felt during the experiments. A number of measures were put in place to try to reduce these threats. First, an experimental protocol was used so that the researcher could follow a structured design as closely as possible. However, because participants varied in their experiences as well as their ability to understand the instructions, it was not possible to strictly adhere to a written protocol at all times. In addition, performance on the tasks may have varied according to whether participants asked for the rationale to be repeated or explained in more detail. For example, feedback from participants immediately after the experiments suggested that several participants had initially found it difficult to complete the accepting uncertainty task even though not all of them requested additional instructions. It is possible, therefore, that those participants who requested more information completed the task in a different way to those participants who didn't ask for more instructions. A feedback questionnaire was sent out to participants to try to gauge how well participants understood the experimental tasks. Out of those who responded, there was no indication that participants found the experiments too difficult to follow. However, information provided in these questionnaires needs to be interpreted with caution as it is possible that the participants' desire to please the researcher will have influenced their responses.

It is also possible that the dependent variables were influenced by the participant's own expectancy effects. For example, participants were informed in the information sheet that the purpose of the study was to find out whether certain types of thinking make people more anxious and more likely to check. It is possible therefore that some hypothesis guessing may have taken place with participants making treatment-related hypotheses which were different to the researchers. The use of subjective measures of change may have increased the likelihood of confounding results in this way. However, the helpfulness ratings and manipulation checks used in this study were also used in an attempt to control for this effect. In experiment 1, the participant who met the majority of hypotheses gave the highest helpfulness rating on the memory search task which suggests that expectancy effects did not take place (see page 67). In experiment 2, however, the participant who supported the hypotheses was the only person to suggest that the accepting uncertainty task may be more helpful than the reasoning task which suggests that there may have been an expectancy effect occurring (see page 77). In addition, in the current study the researcher was not blind to the hypotheses and could therefore not rule out the potential of experimenter expectancy effects on the study. For example, Fisher and Wells (2005b) recommend a replication of their study with independent assessors to rule out potential expectancy effects.

4.2.6 Threats to construct validity.

Rather than the results providing evidence for the lack of effectiveness of cognitive mechanisms in CBT, the findings in this study could be due to a failure to successfully manipulate the independent variables. This could occur either through a failure to replicate 'real life' for the participant or through a failure to mimic treatment offered in clinical practice.

4.2.6.1 Failure to replicate real life.

The minimal change shown in this study may have been due to flaws in the design, in particular, a failure to replicate real life and therefore elicit the crucial content and processes seen as central to cognitive theories of OCD.

Several measures were put in place to attempt to control for threats to construct and ecological validity. For example, the location of the experiments was chosen following a discussion with each participant about situations that made them feel anxious. Thus, home visits were arranged where participants identified their anxiety as being related to their own possessions or family. However, a limitation of this was it was more difficult to control for factors influencing their performance. For example, for one participant a member of their family walked into the room during the experimental session, and for another participant, a neighbour was playing loud music during one of the experimental tasks. It is possible therefore that these incidents will have affected the participants concentration and performance on the tasks.

In addition, the exposure task was designed in support of the clinical guidelines that exposure must take place in the absence of the clinician (Salkovski, 1989). For each exposure, therefore, the researcher demonstrated to the participant what was required of them before leaving the room for the participant to complete the exposure alone. Following the exposure, the researcher sat quietly in a corner of the room and completed documentation whilst the participant completed the experimental task. However, during the baseline experiments each participant rated their anxiety lower than the level they had expected to feel when asked during the assessment session. It may be, therefore, that despite these actions, the presence of the researcher in the house during both the exposure and the experimental conditions still affected the participant's concentration and attention to the task at hand, as well as the experiment's ability to elicit the dysfunctional beliefs that usually drive anxiety and the urge to check.

The elicitation of dysfunctional beliefs may also have been affected by the practical limitations of setting up the experiment. For example, inflated responsibility is one of the six belief domains viewed as central to the development and maintenance of OCD (OCCWG, 1997, 2005) and has been shown to be a strong predictor of checking behaviour (Artanz et al., 2007). Rachman (1993) argues that checkers in particular experience urges to neutralise only in those circumstances in which they assume personal responsibility for safety, and Lopatka and Rachman (1995) found that decreases in perceived responsibility were followed by significant decreases in anxiety, urge to check,

probability of anticipated harm, and estimated length of time needed to finish checking. Consistent with this, scores on the OBQ-44 and the WOCI in the current study suggested that, for the majority of participants, responsibility beliefs were an important maintaining factor of their OCD. On further questioning, participants referred to both the responsibility they feel for other people, such as their children, and the responsibility for their own safety. However, when setting up the experiments it was sometimes difficult to replicate the situations that caused participants to check and would therefore elicit these inflated responsibility beliefs. For example, several participants found that they became most anxious at night time, before they went to bed. In addition, one participant felt more anxious when the children were sleeping in the house, and a couple of participants talked about feeling distressed if they were in the house alone. It is possible therefore that the levels of responsibility that participants felt during the experiments did not sufficiently replicate real life and this may have contributed to the lack of change during the experiments.

The lack of findings in the current study may have been due to a failure to successfully manipulate the constructs that the experiments had been designed to measure. For example, the computer task used in experiment 1 was designed to prevent the participant from performing a memory search whilst retaining an image of the feared stimuli in their mind. This ensured that the task did not end up being an intervention in itself in the form of distraction. However, feedback from the participants suggested that the computer task may have been perceived as helpful because they were able to 'check' the feared stimuli when the photos of the familiar objects flashed up on screen. For example, one participant reported that they were able to see that their cooker was turned off correctly on the photo which reduced their anxiety and urge to check. Future research would need to consider the limitations of this manipulation and perhaps conduct a more rigorous pilot study of alternative designs.

The timing of when the experimental tasks were performed may also have limited the impact of the manipulations. That is, participants were asked to perform the experimental tasks when they had returned to the research room, immediately after checking the feared stimuli. The experimental tasks were then used to either encourage or reduce potentially maladaptive safety seeking behaviours whilst preventing the participant from going back to check. In clinical

practice this design approximates Exposure and Response Prevention rather than Cognitive Behaviour Therapy, whose primary focus is on enabling participants to check the validity of their thoughts, perceptions, and beliefs. Recent research on the manipulation of safety seeking behaviours requires participants to perform the manipulations during situational exposure rather than after the exposure has occurred (Salkovskis et al., 2007; Wells et al., 1995). It is possible that a similar design in the current study would have strengthened the manipulations.

4.2.6.2 Failure to replicate clinical practice.

During the pilot phase of this study, the experiments were replicated in clinical practice by a Clinical Psychologist seeing clients diagnosed with OCD. Feedback from these pilot studies suggested that the results supported the initial hypotheses. There are several reasons why this difference in results may have occurred. Firstly, it is possible that the sample in the current study differed from the clients used in the pilot study. Possible sample biases have already been discussed; however they are unlikely to have affected the pilot study sample given that they were taken from the same waiting list. Secondly, the difference in the results may be due to the knowledge and experience of the qualified clinician compared to the researcher. Previous research has shown that the experience of the therapist can affect treatment outcome (Taylor, 1999), which is suggested to be due to a deeper understanding of general CBT principles and more skill in developing a therapeutic alliance (Huppert et al., 2001). However, in the current study training was provided prior to the start of data collection and the researcher was observed by the clinician during both experiments for one participant. It could therefore be that the difference in results was due to the timing of when the experiments were conducted, rather than the experience of the clinician. For example, 'unrecognised factors' in therapy have long been regarded as crucial to positive outcomes (Grencavage & Norcross, 1990). Conducting the experiments part way through treatment, therefore, may have allowed for the client to establish a good therapeutic alliance with the clinician which helped them to engage in the tasks more effectively. Similarly, conducting the experiments part way through therapy may have increased the likelihood of expectancy effects on subjective ratings of change because the client is more likely to be aware of the

research hypotheses. It was for this reason that the decision was made to conduct the experimental manipulation before the start of treatment.

The timing of the research experiments may also have affected results. That is, the fact that participants in this sample were on the waiting list for therapy, rather than already receiving treatment, may have affected their ability to learn and effectively apply some of the techniques commonly used in therapy. In support of this, three participants reported that they struggled to understand or use some of the experimental tasks, in particular, the ability to accept uncertainty. In addition, the participant who supported the hypothesis was the only person to suggest that they had managed to stay focused on the task 100%. Within clinical practice, it is usual for a clinician to introduce the cognitive-behavioural model, and some of its techniques, over several sessions. For example, in treatments for Generalised Anxiety Disorder (GAD), where intolerance of uncertainty is very common, a therapist may dedicate a whole session to explaining the importance of one's perception of uncertainty, clarifying that the treatment's goal is not to eliminate uncertainty, but rather to help participants recognize it, accept it, and develop coping strategies when faced with uncertain situations (Dugas & Ladouceur, 2000). In addition, techniques used to assist with the acceptance of uncertainty are usually found to merge with techniques that help clients to reevaluate their beliefs (e.g., Ladouceur et al., 2000), which may suggest that the technique used in the current study did not replicate the techniques used in therapy.

These factors may suggest that the current study did not allow for sufficient time and knowledge to adequately apply the techniques used in the study. A similar point has been made in previous research that failed to find support for cognitive mechanisms in a group CBT programme (Whittal et al., 2005). Alternatively, it may be that the length of time given to complete the task (five minutes) was too short to produce an effect. However, previous research using a similar design to the current study has produced a significant effect which suggests that five minutes is adequate to produce change (e.g., Wells & Papageorgiou, 2001; Fisher & Wells, 2005b).

4.3 Interpretation of the Findings

Given the limitations of the current study, any conclusions about the findings need to be interpreted with caution. It is therefore not possible to suggest whether the minimal change indicates a lack of support for the theoretical basis of the experiments or whether it was because of underlying methodological limitations in the design of the study. The finding that results were mixed, however, may be more relevant as it raises several important implications for clinical practice and for future research.

4.3.1 Theoretical implications of the study.

This study attempted to target cognitive strategies that may be particularly relevant to the checking subtype of OCD, with the aim of expanding on recent theories and contributing to the refinement and improvement of cognitive treatments. Despite selecting a sample of participants whose primary difficulty was checking compulsions, there was still a lot of variability in the sample in terms of demographic characteristics, co-morbidity with other psychological difficulties, and in the dysfunctional beliefs identified to be associated with their OCD. It is possible, therefore, that the inconsistent results of the present study may partially be a result of this heterogeneity and suggests several important implications.

First, this study could potentially contribute to the debate around the suitability of the classic symptom-based subtyping system of OCD. It is consistent with the argument that individuals with checking rituals appear to show the most variability with respect to how they cluster in factor analytic studies (McKay et al., 2004), and perhaps lends support to the view that OCD is in fact a group of disorders rather than a unitary syndrome (Taylor, in press). The broad range of symptoms seen in OCD, along with the differential response to treatment, has naturally led researchers to suggest a need for greater specificity in assessment and treatment strategies (e.g., Ball et al., 1996; McKay et al., 2004). However, it is argued that there may be more suitable ways of distinguishing between people with OCD than the classic subtyping of compulsive behaviours. For example, Calamari et al. (2006) suggest that subtyping should be done on the basis of core cognitive beliefs or on treatment response rather than by behaviour.

Similarly, Taylor et al. (2006) found that it was possible to identify two cognitive subtypes of OCD; the OC-high subtype which was characterised by relatively high scores on measures of OC-related beliefs, and the OC-low subtype which generally did not differ from most controls on these beliefs. It may well be, therefore, that more consistent patterns would have emerged in the present study if participants were selected on the basis of their beliefs. The identification of six core beliefs in individuals with OCD (OCCWG, 1997, 2001) will help future research to explore this area further.

Secondly, if symptom-based subtypes are deemed as unsuitable grouping criteria, this raises questions for the development of treatments for OCD. That is, rather than attempting to refine treatments to be more specific to symptom-based needs, it may be that treatments need to be *less* specific and focus on individual case conceptualisations of the difficulties instead of aiming for a manualised treatment approach. Research on the effectiveness of psychological therapies continues to identify factors related to outcome that go beyond the type and severity of symptoms. For example, individual differences in cognitive flexibility, motivation, expectations, and intelligence all play a part in how well an individual responds to therapy (Shoham-Solomon & Hannah, 1991). In addition, individuals with OCD (checking subtype) have already been shown to differ in terms of their underlying reasons for checking and the nature of the checking itself (McKay et al. 2004). Future research may need to control for these differences when examining treatment response.

Finally, the lack of support for the research hypotheses in this study does not necessarily have negative implications for cognitive theories and treatment of OCD. Descriptive measures, along with the qualitative information collected during the assessment session, suggested that dysfunctional beliefs play an important role in the development and maintenance of OCD. In addition, inflated responsibility beliefs and intolerance of uncertainty appeared to be particularly relevant, supporting recent theories of checking compulsions (Rachman, 2002). It is also important to acknowledge that participants generally gave low ratings of memory detail and confidence and high ratings of urge to check and anxiety during the experiments which is consistent with the factors identified as important in the maintenance cycle of checking behaviours. In his recent theory, Rachman (2002) highlights the complexity of OCD (checking subtype) through

proposing that there are three main components of treatment: a) a reduction in the core belief of inflated responsibility; b) modification of the maladaptive cognitive misinterpretations of one's out-of-control bizarre behaviour and the impaired confidence in one's memory; and c) use of response prevention tactics. Rachman argues that each component deals with a specific aspect of compulsive checking and it is therefore essential to address all three in order to produce dependable and significant reductions in compulsive checking behaviour (Rachman, 2002). The results in this study, therefore, may not be surprising given that the experiments focused only on one small component of treatment. The suggestion that this study may provide further evidence of the limited value of cognitive treatments in CBT is perhaps premature and it is instead necessary to conduct further research into the effects of different components of treatment highlighted by Rachman (2002). Indeed, the debate around the effectiveness of treatments in the OCD literature may actually be due to the reliance on manualised treatment procedures in research rather than a more individualized treatment programme.

4.3.2 Clinical and research implications of the study.

A major limitation of the current study is the small sample size. It is possible that a larger sample may have found more consistency in the results which would have led to more meaningful conclusions. Recruitment difficulties in clinical populations are common, with larger studies typically using undergraduate samples. However, this usually means that any conclusions related to the theory and treatment of psychological difficulties is limited to non-clinical populations. In the current study, only 33% of participants expressed an interest in the study. Reasons for this are unclear and are further restricted by ethical guidelines on access to information. The rate of suitable referrals to clinical psychology departments was also lower than expected, with a period of approximately two months of no new referrals. It is possible that some of this was due to major changes taking place in the NHS Trust with regard to the waiting list system during the data collection period. However, it may also be that individuals with OCD are either not seeking psychological treatment as often

or are being referred to other services within the Health Service, such as Primary Care Services. Future research would need to investigate this further in order to increase chances of obtaining a larger sample.

The small sample size also limited the statistical conclusions of the study. Although calculation of the change score is seen as a crucial part of the visual analysis in single case design (Franklin, Gorman, Beasley, & Allison, 1996), it is preferable to use statistical methods to determine whether there is a significant difference between scores. However, in order to do this it would be necessary to obtain a sample larger than five. For example, other studies (e.g., Wells & Papageorgiou, 2001; Fisher & Wells, 2005b) have used a sample of at least eight to calculate a Wilcoxon's Signed Rank test, the usual method of analysis for this type of single case data. It would be more appropriate, therefore, for future research to aim for a sample of at least ten people. In addition, an advantage of the single-case design is its ability to allow for a quick change in experimental strategy to immediately track down the sources of intersubject variability (Barlow & Hersen, 1984). Because of recruitment difficulties and time constraints, the current study was not able to take advantage of this flexibility.

The mixed picture presented in this study highlights the complexity of evaluating theories and treatments for a heterogeneous disorder such as OCD. It also suggests that previous Randomised Controlled Trials of Cognitive or Cognitive Behaviour Therapy may have missed important information on the primary processes of change through examining the treatment as a whole. In order to contribute to the advancement of treatment efficacy, therefore, there is a continued need to identify the critical ingredients of treatment (Abramowitz, Taylor, & McKay, 2005). Although it has not been possible to provide any firm conclusions in the current study, the ability to analyse individual data has been invaluable for helping with the interpretation of any change processes and in making the results more meaningful. Single case experimental research would therefore continue to help refine theories and treatments of OCD by identifying the cause-and-effect relationships behind what works for some individuals (Behar & Borkovec, 2003).

Finally, the results in this study appeared to differ to results obtained in clinical practice which has important implications for experimental research. Because experimental manipulations of variables can essentially be seen as a

more systematic method of carrying out behavioural experiments in cognitive therapy, such research is ideal for clinicians to conduct as part of routine clinical practice. However, as the current study suggests, the timing of the experiments during therapy may be crucial to its effectiveness and outcome. For example, brief manipulations can be devised as either a pre-treatment 'mini-intervention' or as part of the treatment phase (McMillan & Morley, in press). The pre-treatment design would allow for an examination of a component of treatment outside of the context of therapy which is similar to the experimental sessions described in this study. The within-treatment mini-intervention, however, is conducted within a treatment context and may therefore be influenced by external factors. McMillan and Morley (in press) propose that the comparison of results from both a pre-treatment and within-treatment mini-intervention would allow for further exploration of any differences found and could potentially be a profitable research strategy for increasing our understanding of how complex treatments work.

4.4 *Final Conclusions*

The current study sought to make a contribution to research on cognitive theories of OCD and has led to some important areas of discussion in what is an often complex issue in the Clinical Psychology field. Two main points can be taken from the results of this study: first, that OCD is an extremely heterogeneous disorder that potentially lends itself to different theoretical models according to its presentation; and, secondly, that cognitive-behavioural treatment of OCD can be effectively refined and advanced through the use of experimental methods to dismantle cause-and-effect conclusions and provide an insight into what works in therapy. There is clearly a need to continue with research in this area, with a particular focus on the suitability of subtyping in OCD and the implications this has for treatment. Further identification of maladaptive cognitive safety behaviours in OCD will not only increase our understanding of the role of dysfunctional beliefs in its maintenance, but also allow for an understanding of how treatments for complex psychological problems work.

5. References

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Appendix A: Participant invitation letter

Version: 2

Date of this version: 15.03.06

Dear

Re: A study examining the effect of different thinking styles on anxiety and urge to check

I am writing to invite you to take part in a research project looking at the different thinking styles involved in checking behaviours. You are being invited to take part in the study because your name is currently on the waiting list for clinical psychology services in Leeds.

Please note that you do not have to take part under any circumstances. The standard of your treatment and care will not be affected if you decide that you do not wish to take part. It will also not affect your waiting time to see a therapist.

I would be very grateful if you would take time to read through the enclosed Participant Information Sheet in order to decide if you are interested in taking part. If you are interested, I can meet with you to go through the information sheet and answer any questions that you may have about the study. You will then be given more than 24 hours to decide whether or not to take part.

I would be extremely grateful if you would complete and return the enclosed slip in the pre-paid envelope provided. Please note that all replies will be kept confidential. Please also note that if you do reply at this stage it does not mean to say that you have to take part, only that you would like to discuss the matter further. If you would prefer to talk to me about the study, I can be contacted on 0113 3432708 or by email (ugmsd@leeds.ac.uk).

I would like to thank you for your time in reading this. It is very much appreciated.

Yours sincerely

Stacey Robson

Psychologist in Clinical Training

A study examining the effect of different thinking styles on
anxiety and urge to check

Participant Response Slip

I am interested in finding out more about the research project and possibly in taking part. YES NO

My name is:

My address is:

Contact details

Home telephone number:

Is it OK to leave a message on your home-number answerphone? YES NO

Is it OK to leave a message on your home number if someone else answers the phone? YES NO

Mobile telephone number:

Is it OK to leave a message on your mobile-number answerphone? YES NO

Is it OK to leave a message on your mobile number if someone else answers the phone? YES NO

The best times to contact me are:

Email address:

Please use the Self-Addressed Envelope to return this response slip to us.

Thank you for your time.

Appendix B: Participant information sheet

LREC no: 06/Q1108/15
15.03.06

version 2

Date

A study examining the effect of different thinking styles on anxiety and urge to check

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this.

What is the purpose of the study?

The urge to repeatedly check something is a common problem which can be distressing for some people. It has been suggested that the ways in which we think about the need to check could be keeping the problem going.

The purpose of the study is to find out whether certain types of thinking make people more anxious and more likely to check. The eventual aim is to develop better psychological treatments for people who repeatedly check.

Taking part in this study is separate to receiving psychological treatment. If you decide to take part in this study, this will not affect your right to receive treatment in any way and your position on the waiting list will not change.

Why have I been chosen?

People who have been referred to clinical psychology services in Leeds are being invited to take part in the study.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time or a decision not to take part will not affect the treatment given by clinical psychology services.

What will happen to me if I do take part?

If you agree to take part, you will be asked to visit the clinical psychology department for an assessment. At the assessment you will complete several questionnaires that will take approximately 45 minutes to complete. If you are suitable for the study, you will be invited to take part in it. Once you agree to

take part I shall write to your GP to inform him or her that you have agreed to take part. This will be for information only and will not affect your position on the waiting list for psychological treatment.

After the assessment meeting you will be asked to attend two sessions, preferably at the clinical psychology department. These sessions will last approximately one hour each and will involve some brief tasks in which clear instructions will be given before you decide to continue. It is likely that what you do as part of these two sessions would be similar to what you would be asked to do as part of routine treatment.

What are the possible disadvantages and risks of taking part?

You may not make improvements in your difficulties during the time you are taking part in the research. However, people who take part in the study will do so while they are on the waiting list to be seen for psychological treatment. The time you spend on the waiting list at the clinical psychology department will be the same whether or not you decide to take part.

What are the possible benefits of taking part?

The strategies you try out in the research sessions may be similar to the strategies you are asked to try out as part of the treatment you receive from clinical psychology. You may find the research sessions help you with your difficulties. However, this cannot be guaranteed.

The information we get from this study may help us to treat other people who are experiencing similar types of difficulties.

What happens when the research study stops?

The results of the research will be written up for publication in a psychology journal.

What if something goes wrong?

If you are harmed by taking part in the research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, normal National Health Service complaints mechanisms should be available to you.

Will my taking part in this study be kept confidential?

All information collected as part of this study will be kept confidential and anonymous. All materials used in the study will be stored in a locked cupboard within a locked room.

What will happen to the results of the research study?

The results of the study will be published as an article in a psychology journal so that other psychologists can find out about the research. Once the results are published you can be given a copy of the article if you want one. It will not be possible to identify who you are from any published results.

Who is organising and funding the research?

The research is jointly organised by:

- The Academic Unit of Psychiatry and Behavioural Sciences, University of Leeds
- The Leeds Mental Health Teaching NHS Trust

Who has reviewed the study?

The study has been reviewed by York Research Ethics Committee

Who should I contact for further information?

If you have any questions about the study please contact Stacey Robson, Psychologist in Clinical Training, Academic Unit of Psychiatry and Behavioural Sciences, University of Leeds (tel: 0113 3432708; email: ugmsd@leeds.ac.uk).

If you agree to take part in the study you will be given a copy of this information sheet to keep.

You will also be asked to sign a consent form, and you will be given a copy of that form to keep.

Appendix C: Weekly Obsession and Compulsion Index – adapted (WOCI; Single Case Research and Practice Group, unpublished).

- Intrusive thoughts are **repeated ideas or images** that are unwanted. You may feel they are senseless or out of place.
- Rituals are **behaviours or mental acts** that you feel an urge to do. You may do them even though you see them as excessive.
- Examples of **behaviours** include washing your hands, checking, and putting objects in a certain order. Examples of **mental acts** include counting repeatedly and saying certain words to yourself.

1. During the last week, how distressing have you found your intrusive thoughts?

0	1	2	3	4	5	6	7	8
Not at all	A little distressing		Moderately distressing		Very distressing		Extremely distressing	

2. During the last week, how strong has the urge been to carry out your rituals?

0	1	2	3	4	5	6	7	8
No urge at all	Slight urge		Moderately strong urge		Very strong urge		Extremely strong urge	

3. During the last week, how many times have you carried out your rituals?

0	1	2	3	4	5	6	7	8
Not at all	Occasionally		About half of the time		Most of the time		All of the time	

4. During the last week, how much have the intrusive thoughts and rituals interfered with your life (e.g., family relationships, work, social life)?

0	1	2	3	4	5	6	7	8
Not at all	Interfered a little		Moderately interfering		Very interfering		Extremely interfering	

5. Please use this scale to rate how much you currently believe each of the listed thoughts:

0	10	20	30	40	50	60	70	80	90	100
Do not believe the thought at all									Completely convinced the thought is true	

a) I must do everything I possibly can to stop harm from occurring.

d) Bad thoughts can make bad things happen.

b) It is important to have certainty in life.

e) Thinking a bad thought makes me a bad person.

c) I should be able to control my thoughts.

f) I must do things perfectly.

6. Please use this scale to rate how much you use each strategy to try to prevent your checking behaviours:

0	10	20	30	40	50	60	70	80	90	100
Do not use this strategy at all to reduce checking							Always use this strategy to reduce checking			

- | | |
|---|---|
| <p>a) Searching your memory for a clear picture _____</p> <p>b) Try to distract yourself from having thoughts _____</p> | <p>c) Try to reason with yourself that you did check correctly _____</p> <p>e) Try to accept that you will never be certain _____</p> |
|---|---|

Other thoughts:

- | | | |
|-----------|--|-------|
| g) | | _____ |
| h) | | _____ |
| i) | | _____ |
| | | _____ |

Appendix D: Rating scales

1. Please put a mark through the following line at the point which represents how **detailed or clear** your memory of the event is **RIGHT NOW**:

0 _____ 100
not detailed *extremely detailed*

2. Please put a mark through the following line at the point which represents how **confident** you are in the **accuracy** of your memory of the event **RIGHT NOW**:

0 _____ 100
absolutely not confident *absolutely confident*

3. Please put a mark through the following line at the point which represents your **urge to check** **RIGHT NOW**:

0 _____ 100
I do not feel the urge *my urge to check could*
to check at all *not be any stronger*

4. Please put a mark through the following line at the point which represents how **anxious** you feel **RIGHT NOW**:

0 _____ 100
not at all *the most anxious/distressed*
anxious/distressed *I have ever been*

Appendix E: Feedback questionnaire

Research code

A study examining the effect of different thinking styles on anxiety and urge to check: Feedback questionnaire

Thank you for taking part in the above study. As discussed in our last meeting, your views on how the study went are very important to me. I would be grateful if you could fill in this questionnaire and return it to me in the pre-paid envelope provided. Any information you provide will be anonymous and used only for the purpose of the study.

Thank you for your participation.

1) How easy did you feel it was to follow the instructions of the researcher?

Very easy

Easy

Neither easy or difficult

Difficult

Very difficult

Further comments:

2) How helpful did you feel taking part in the study was?

Very helpful

Helpful

Neither helpful or unhelpful

Unhelpful

Very unhelpful

Further comments:

3) Have you used any of the techniques that you learnt in the sessions since completing the study?

Yes

No

Further comments:

4) Have things changed for the better or worse since completing the study?

Changed for the better

No change

Changed for the worse

Further comments:

Appendix F: Research protocol

Assessment interview

Participant ID:

Date:

Prior to taking consent: As you are aware, this study will involve taking part in a number of brief tasks that ask you to try out different ideas. Although nothing we do will cause you any harm, they may not necessarily do you any good. I would therefore ask you to not repeat any of the techniques used in this study outside of this research room.

Checklist

Has participant read information sheet?	Yes/no
Has participant had opportunity to ask questions?	Yes/no
Has participant signed consent form?	Yes/no

Psychometric assessment

Mini International Neuropsychiatric Interview:

OCD current:	yes <input type="checkbox"/>	no <input type="checkbox"/>
OCD due to medical condition:	yes	no <input type="checkbox"/> <input type="checkbox"/>
Substance induced OCD:	yes <input type="checkbox"/>	no <input type="checkbox"/>
Other difficulties:	yes <input type="checkbox"/>	no <input type="checkbox"/>

If yes, specify:

.....

Does participant meet criteria for study?	Yes/no
--	---------------

If no: Unfortunately, even though you engage in some checking behaviours, you do not meet the criteria set for this study (complicated and various types. Your type isn't included in this study but is serious enough to be offered treatment). Thank you for taking the time to come today. I would like to remind you that this session is independent of any treatment you will receive from the psychology department and your name will continue to be on the waiting list. You will be contacted by the psychology department once your name moves to the top of the list.

If yes: I would now like you to complete several more questionnaires that look in more detail at some of the problems you may be experiencing. These questionnaires should take approximately 30 minutes to complete.

Repeat questions for other checking behaviours

Fear provoking stimuli 1:

Fear provoking stimuli 2:

Semi-structured interview

(focus on areas highlighted in the WOCD)

Inflated responsibility:

What do you feel would happen if you didn't check (*insert feared stimuli*)?

.....
.....

Prompt - If you didn't check could anything bad happen?.....

Who would be held responsible if something bad happened?

.....
.....

How responsible would you be in percentage terms?

.....
.....

Inflated risk/intolerance of uncertainty:

How certain would you have to be to not go back and check?

If there was a 1 in a hundred chance , would you still need to go back and check?

.....

What about a 1 in a thousand chance?.....

What about a 1 in a million chance?.....

What would you say the likelihood is that (*insert feared stimuli*)?

Thought Action Fusion:

Could anything happen just by having these thoughts?

.....

Does having a thought increase the likelihood of something happening?

.....

Does having these thoughts change how you view yourself (prompt – some people may think that having a bad thought makes them a bad person)?

.....
.....

Controlling thoughts:

Is it possible for somebody to control their thoughts?

.....
.....

Is it possible to stop your thoughts if you worked hard enough?

.....

Checklist 2

Has the participant agreed to continue with the experiments? Yes/no

Has the participant had the opportunity to ask questions? Yes/no

Has a letter been written to the GP? Yes/no

Date of next session:

Experimental session 1

Participant ID:

Date:

Instructions

As I mentioned in the participant information sheet, this session will last about an hour and will involve doing some brief tasks. These brief tasks will involve you being exposed to situations that usually cause you to check. You may therefore expect to feel a little anxious. Clear instructions will be given. You are free to withdraw from the tasks at any time. Is there anything you would like to ask me before we begin?

Am I satisfied the participant is still willing to take part in the study? Yes/no

During the tasks I will ask you till fill in some rating scales (show scales to participant). At three different points in time I will ask you to pause what you are doing and fill in these rating scales. I would like you to read each question carefully and rate them on the scale of zero to one hundred according to how you feel at that particular time. It is very important that you fill in the scales as quickly as possible. It may help if you spend a couple of minutes familiarising yourself with the scales now so that you are able to rate them quickly.

Baseline experiment A

The first task will involve you spending a few minutes in a situation that usually causes you to check. In our last session we discovered that (insert feared stimuli) causes you the most problems and increases your anxiety.

I will shortly be taking you to a room with (insert feared stimuli) and I would like you to spend a few minutes checking that (insert feared stimuli).

We will then return to this room and I will ask you to spend five minutes doing what you normally do when you have just checked something (with the exception of going back to check).

During this five minutes I will give you the rating scales and ask you to rate them according to how you are currently feeling at that time. You will be asked to rate these scales at three points during this five minutes.

Don't worry if you cannot remember all the instructions I have given you just now, I will repeat them as we go along.

Am I confident that the participant has understood what is required? Yes/no

Exposure to feared stimuli

Current time:

I will now take you along to (insert feared stimuli).

Time upon returning to room:

I would like you to spend five minutes doing what you normally do when you have just checked something (with the exception of going back to check).

At three different points in time I will ask you to pause what you are doing and fill in the rating scales (show VAS to participant). Don't spend too long thinking about an answer. Fill them in as quickly as you can. Your first response is likely to be the most accurate.

Do you think you understand what to do? Are you ready to begin the task?

Do I feel this participant understands what is required of them? Yes/no

TIME at start of experiment:

One minute interval:

Please stop what you are doing and rate the scales now

TIME:

Three minute interval:

Please stop what you are doing and rate the scales now

TIME:

Five minute interval:

Please stop what you are doing and rate the scales now

TIME:

We have now completed the task. Shortly I will ask you to move onto the next task.

Counterbalance experiments

We will now repeat the experiment two more times. These experiments will be exactly the same as the one you have just completed; however, instead of spending the five minutes doing what you normally do, I will ask you to take part in two different tasks. I will read out the instructions to you as we go along. Do you understand?

Counterbalance condition B

I will shortly be taking you back to the room with (insert feared stimuli) and I would like you to spend a few minutes checking that (insert feared stimuli).

We will then return to this room and I will ask you to spend five minutes taking part in a simple computer task. This will involve looking at several different pictures and deciding which ones you have seen before.

During this five minutes I will show you the same rating scales that you completed in the first task and ask you to rate them according to how you are currently feeling at that time. You will be asked to rate these scales at three points during this five minutes. It is important that you fill them in as quickly as you can.

Don't worry if you cannot remember all the instructions I have given you just now, I will repeat them as we go along.

Do you feel happy to continue with the task?

Am I confident that the participant has understood what is required? Yes/no

Exposure to feared stimuli

Current time:

I will now take you along to (insert feared stimuli).

Time upon returning to room:

When you are ready, this computer will keep showing different pictures of (insert feared stimuli). Each picture will remain on the screen for five seconds before it changes to the next picture. Each time you see a new picture, I would like you to tell me whether you think is it the same as the (insert feared stimuli) you were exposed to earlier. Do you understand?

Helpfulness rating: how helpful to do you think this strategy will be in managing your anxiety?.....

At three different points in time I will ask you to pause what you are doing and fill in the rating scales (show VAS to participant). Don't spend too long thinking about an answer. Fill them in as quickly as you can. Your first response is likely to be the most accurate.

Do you think you understand what to do? Are you ready to begin the task?

Do I feel this participant understands what is required of them? Yes/no

TIME at start of experiment:

One minute interval:

Please stop what you are doing and rate the scales now
TIME:

Three minute interval:

Please stop what you are doing and rate the scales now
TIME:

Five minute interval:

Please stop what you are doing and rate the scales now
TIME:

We have now completed the task. Shortly I will ask you to move onto the next task.

**Manipulation check: how well do you feel you did in the tasks?.....
to what extent did you manage to focus on the task rather
than checking?.....**

Counterbalance condition C

I will shortly be taking you back to the room with (insert feared stimuli) and I would like you to spend a few minutes checking that (insert feared stimuli).

We will then return to this room and I will ask you to spend five minutes taking part in a memory search. Before you do this, I will read out a description so that you understand what a memory search is.

During this five minutes I will show you the same rating scales that you completed in the first task and ask you to rate them according to how you are currently feeling at that time. You will be asked to rate these scales at three points during this five minutes. It is important that you fill them in as quickly as you can.

Don't worry if you cannot remember all the instructions I have given you just now, I will repeat them as we go along.

Do you feel happy to continue with the task?

Am I confident that the participant has understood what is required? Yes/no

Exposure to feared stimuli

Current time:

I will now take you along to (insert feared stimuli).

Time upon returning to room:

Present rationale 1: Memory searching and answer any questions

I would like you to try this 'memory searching' technique for the next five minutes. Do you think you understand what is required of you?

Helpfulness rating: how helpful to do you think this strategy will be in managing your anxiety?.....

At three different points in time I will ask you to pause what you are doing and fill in the rating scales (show VAS to participant). Don't spend too long thinking about an answer. Fill them in as quickly as you can. Your first response is likely to be the most accurate.

Do you think you understand what to do? Are you ready to begin the task?

Do I feel this participant understands what is required of them? Yes/no

TIME at start of experiment:

One minute interval:*Please stop what you are doing and rate the scales now***TIME:****Three minute interval:***Please stop what you are doing and rate the scales now***TIME:****Five minute interval:***Please stop what you are doing and rate the scales now***TIME:***We have now completed the task. Shortly I will ask you to move onto the next task.*

Manipulation check: how well do you feel you completed the task?.....
to what extent did you manage to focus on the task rather
than checking?.....

Debrief

As I mentioned in the assessment session, the brief tasks completed in this session will not cause you any harm but may also not do you any good. Please do not attempt to use the strategies learnt in this session outside of the research room

Experimental session 2

Participant ID:

Date:

Instructions

This session will last about an hour and will involve doing some brief tasks similar to our last session. These brief tasks will involve you being exposed to situations that usually cause you to check. You may therefore expect to feel a little anxious. Clear instructions will be given before you decide whether to continue. You are free to withdraw from the tasks at any time. Is there anything you would like to ask me before we begin?

Am I satisfied the participant is still willing to take part in the study? Yes/no

During the tasks I will ask you till fill in the same rating scales as in the last session (show scales to participant). At three different points in time I will ask you to pause what you are doing and fill in these rating scales. I would like you to read each question carefully and rate them on the scale of zero to one hundred according to how you feel at that particular time. It is very important that you fill in the scales as quickly as possible. It may help if you spend a couple of minutes familiarising yourself with the scales again so that you are able to rate them quickly.

Baseline experiment A

The first task will involve you spending a few minutes in a situation that usually causes you to check. In the assessment session we discovered that (insert feared stimuli) causes you some of the most problems and increases your anxiety.

I will shortly be taking you to a room with (insert feared stimuli) and I would like you to spend a few minutes checking that (insert feared stimuli).

We will then return to this room and I will ask you to spend five minutes doing what you normally do when you have just checked something (with the exception of going back to check).

During this five minutes I will give you the rating scales and ask you to rate them according to how you are currently feeling at that time. You will be asked to rate these scales at three points during this five minutes.

Don't worry if you cannot remember all the instructions I have given you just now, I will repeat them as we go along.

Am I confident that the participant has understood what is required? Yes/no

Exposure to feared stimuli

Current time:

I will now take you along to (insert feared stimuli).

Time upon returning to room:

I would like you to spend five minutes doing what you normally do when you have just checked something (with the exception of going back to check).

At three different points in time I will ask you to pause what you are doing and fill in the rating scales (show VAS to participant). Don't spend too long thinking about an answer. Fill them in as quickly as you can. Your first response is likely to be the most accurate.

Do you think you understand what to do? Are you ready to begin the task?

Do I feel this participant understands what is required of them? Yes/no

TIME at start of experiment:

One minute interval:

Please stop what you are doing and rate the scales now

TIME:

Three minute interval:

Please stop what you are doing and rate the scales now

TIME:

Five minute interval:

Please stop what you are doing and rate the scales now

TIME:

We have now completed the task. Shortly I will ask you to move onto the next task.

Counterbalance experiments

We will now repeat the experiment two more times. These experiments will be exactly the same as the one you have just completed, however, instead of spending the five minutes doing what you normally do, I will ask you to take part in two different tasks.

These tasks will be different to the ones we completed in the last session. I will read out the instructions to you as we go along. Do you understand?

Counterbalance condition B

I will shortly be taking you back to the room with (insert feared stimuli) and I would like you to spend a few minutes checking that (insert feared stimuli).

We will then return to this room and I will ask you to spend five minutes answering some specific questions that allow you to reason with yourself. Before you do this, I will read out a rationale and provide you with a list of questions.

During this five minutes I will show you the same rating scales that you completed in the first task and ask you to rate them according to how you are currently feeling at that time. You will be asked to rate these scales at three points during this five minutes. It is important that you fill them in as quickly as you can.

Don't worry if you cannot remember all the instructions I have given you just now, I will repeat them as we go along.

Do you feel happy to continue with the task?

Am I confident that the participant has understood what is required? Yes/no

Exposure to feared stimuli

Current time:

I will now take you along to (insert feared stimuli).

Time upon returning to room:

Present rationale 3: 'Reasoning with the self' and answer any questions

I would like you to spend five minutes using these questions as a guide to reason with yourself about whether (insert feared stimuli). Do you think you understand what is required of you?

Helpfulness rating: how helpful to do you think this strategy will be in managing your anxiety?.....

At three different points in time I will ask you to pause what you are doing and fill in the rating scales (show VAS to participant). Don't spend too long thinking about an answer. Fill them in as quickly as you can. Your first response is likely to be the most accurate.

Do you think you understand what to do? Are you ready to begin the task?

Do I feel this participant understands what is required of them? Yes/no

TIME at start of experiment:

One minute interval:

Please stop what you are doing and rate the scales now.

TIME:

Three minute interval:

Please stop what you are doing and rate the scales now.

TIME:

Five minute interval:

Please stop what you are doing and rate the scales now.

TIME:

We have now completed the task. Shortly I will ask you to move onto the next task.

Manipulation check: how well do you feel you completed the task?.....
to what extent did you manage to focus on the task rather
than checking?.....

Counterbalance condition C

I will shortly be taking you back to the room with (insert feared stimuli) and I would like you to spend a few minutes checking that (insert feared stimuli).

We will then return to this room and I will ask you to spend five minutes taking part in a task that involves accepting uncertainty. Before you do this, I will read out a rationale so that you understand what accepting uncertainty is.

During this five minutes I will show you the same rating scales that you completed in the first task and ask you to rate them according to how you are currently feeling at that time. You will be asked to rate these scales at three points during this five minutes. It is important that you fill them in as quickly as you can.

Don't worry if you cannot remember all the instructions I have given you just now, I will repeat them as we go along.

Do you feel happy to continue with the task?

Am I confident that the participant has understood what is required? Yes/no

Exposure to feared stimuli

Current time:

I will now take you along to (insert feared stimuli).

Time upon returning to room:

Present rationale 4: 'accepting uncertainty' and answer any questions

I would like you to try this 'accepting uncertainty' technique for the next five minutes. Do you think you understand what is required of you?

Helpfulness rating: How helpful to do you think this strategy will be in managing your anxiety?.....

At three different points in time I will ask you to pause what you are doing and fill in the rating scales (show VAS to participant). Don't spend too long thinking about an answer. Fill them in as quickly as you can. Your first response is likely to be the most accurate.

Do you think you understand what to do? Are you ready to begin the task?

Do I feel this participant understands what is required of them? Yes/no

TIME at start of experiment:

One minute interval:

Please stop what you are doing and rate the scales now.

TIME:

Three minute interval:

Please stop what you are doing and rate the scales now.

TIME:

Five minute interval:

Please stop what you are doing and rate the scales now.

TIME:

We have now completed the task. Shortly I will ask you to move onto the next task.

Manipulation check: **how well do you think you completed the task?.....**
 to what extent do you feel you managed to focus on the task
 rather than checking to?.....

Debrief

Thank you for taking part in this study. The results of the study will be published as an article in a psychology journal once it is complete. However this may not be for a couple of years. Once the results are published you can be given a copy of the article if you want one. It will not be possible to identify who you are from any published results.

Do you think you would like a copy of the article? Yes/no

This study aims to identify tasks that may be useful for people who repeatedly check. Some of the tasks used in the experiments are predicted to be helpful and some are predicted to be unhelpful. In the first experiment I asked you to do a memory search. It is predicted that this strategy will be unhelpful and increase our anxiety. This is because we do not tend to hold a clear memory of everyday events such as (insert relevant feared stimuli). Deliberately NOT searching our memory may therefore be helpful.

In the second experiment I asked you to reason with yourself by answering particular questions. Again, this strategy is predicted to be unhelpful as it highlights that we are not 100% certain that we performed an action. Instead, we predict that accepting uncertainty will be a helpful strategy for people who repeatedly check. If we accept that there is no such thing as certainty in life then it may help us feel less anxious about whether we have performed an action.

The experiments used in this study are similar to the experiments used in Cognitive Behavioural Therapy when you start treatment. What we often do is manipulate what we think is a problem by making you do more of it and then stopping you from doing it. We then compare the difference between the two. I would be interested to know your thoughts on the tasks in this study that are predicted to be helpful and whether you feel that they may be helpful for you in the future?

As part of the study, I would like to send participants a feedback questionnaire in approximately four weeks time. This questionnaire is voluntary and will ask about your views of how you found taking part in the study. Any information you provide on this questionnaire will be anonymous and used only for the purpose of the study.

Are you happy for me to send you the feedback questionnaire in approximately 4 weeks time?

Yes/no signed.....

I would like to remind you that this research was independent of any treatment you will receive from the psychology department and your name will continue to be on the waiting list. You will be contacted by the psychology department once your name moves to the top of the list.

Appendix G: Consent form

Centre Number:

Study Number:

Patient Identification Number:

CONSENT FORM

(Version no. 2; Date of this version:15.03.06)

Title of Project: A study examining the effect of different thinking styles on anxiety and urge to check

Full title: Maladaptive cognitive processes during exposure in people with OCD (checking subtype)

Name of Researcher:

Please initial box

1. I confirm that I have read and understood the information sheet dated
(version) for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw
at any time, without giving any reason, without my medical care or legal rights
being affected.

3. I understand that my participation will not affect my access to treatment in any way

4. I agree to take part in the above study.

Name of Participant

Signature

Date

Name of Person taking consent
(if different from researcher)

Signature

Date

Researcher

Signature

Date

1 for patient; 1 for researcher; 1 to be kept with hospital notes

Appendix H: GP letter

Version: 2
Date: 15.03.06

Dear Dr

Re:

I write to inform you that the above patient, who was recently referred to clinical psychology, has been invited to participate in a research project and has consented to do so.

The study is examining the effect of different thinking styles on anxiety and urge to check. The study will involve participation in two experimental sessions lasting approximately one hour each. Taking part in this research will neither improve nor worsen the patient's place on the clinical psychology waiting list and is separate to any psychological treatment they will receive

It should be noted that the project has been approved by the relevant local research ethics committee.

If you would like more details about the project, then please contact me either at the above address, by telephone (0113 3432708), or email (ugmsd@leeds.ac.uk).

Yours sincerely

Stacey Robson
Psychologist in Clinical Training

Appendix I: Calculation of the mean change score

The mean change scores for experiment 1 were calculated as follows:

For each participant, the 1, 3, and 5 minute ratings were added together and divided by three to get the mean rating for the baseline condition (A) and the two experimental tasks (B & C):

Participant	Mean ratings of detailed memories		
	Base line	Computer task	Memory search
1	60.67	40.00	56.33
2*	60.00	50.00	50.00
3*	56.67	56.67	73.33
4	90.00	53.33	83.33
5*	70.00	46.67	60.00
Total mean	67.47	49.33	64.6

For ABC (baseline, computer task, memory search) participants, the change score for the computer task was calculated by subtracting the mean rating of the baseline from the mean rating of the computer task. Similarly, the change score for the memory search task was calculated by subtracting the mean rating of the computer task from the mean rating of the memory search.

e.g. participant 1.

Rating	Computer Change score (B-A)	Memory search Change score (C-B)
Detail	-20.67	16.33
Confident	-6.33	13
Urge to check	7.33	-10
Anxiety	5	-8

For ACB (baseline, memory search, computer task) participants, the change score for the computer task was calculated by subtracting the mean rating of the memory search from the mean rating of the computer task. Similarly, the change score for the memory search task was calculated by subtracting the mean rating of the baseline from the mean rating of the memory search.

e.g., participant 2.

Rating	Memory Change score (C-A)	Computer Change score (B-C)
Detail	-10	0
Confident	-10	0
Urge to check	-13.33	-6.67
Anxiety	-16.67	-6.67

A mean change score for the computer task was calculated by adding the change scores for each participant and dividing them by five. The mean change score for the memory search task was calculated in the same way.