

UNDERLYING MECHANISMS OF
MEMORY DISTRUST AS A FUNCTION OF REPEATED CHECKING
IN NONCLINICAL STUDENT SAMPLE

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TALAT DEMİRSÖZ

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Prof. Dr. Sencer Ayata
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Prof. Dr. Nebi Sümer
Head of Department

I certify that we have read this thesis and in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

Assoc. Prof. H. Belgin Ayvaşık
Supervisor

Examining Committee Members

Assoc. Prof. H. Belgin Ayvaşık (METU, PSY) _____

Assoc. Prof. Tülin Gençöz (METU, PSY) _____

Assoc. Prof. Ayşegül Durak Batıgün (A.Ü., PSY) _____

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Name, Last name: Talat Demirsöz

Signature:

ABSTRACT

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Talat Demirsöz

M.S., Department of Psychology

Supervisor: Assoc. Prof. H. Belgin Ayvaşık

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The purpose of the present study was to examine the underlying mechanism of memory distrust as a function of repeated checking in a nonclinical student sample. Recent literature proposes that repeated checking increases familiarity with the material checked. Then, familiarity makes the recollections less vivid and detailed. Afterwards, this condition promotes distrust in memory. Before the experimental phase of the study, Padua Inventory- Washington State University Revision (PI-WSUR) and demographic information form were applied to the 381 students (232 female, 149 male) university students. Then, 84 students were selected according to their PI-WSUR scores. The students scored half standard deviation below the mean of the group were assigned to the low OCD group (N= 42) and the students scored half standard deviation above the mean were assigned to the high OCD group (N= 42). In the experimental phase of the study, an interactive computer animation was developed to test repeated checking behavior. Before the experiment, participants were randomly assigned to two groups: primed with feedback group and primed with no feedback group. In the experiment, participants were all asked to carry out checking rituals on a virtual gas ring. Each participant performed turning on, turning off and checking processes for 15 trials. However, half of the participants in the primed with feedback group were given feedback indicating that the checking activity was successful and complete and half of the participants in the primed with no feedback group were not given any feedback. The data are analyzed by 2

(Group: Low OCD group - High OCD Group) X 2 (Feedback condition: Primed with Feedback Group - Primed with no Feedback Group) Between Subjects ANOVA. Results showed that participants in the primed with feedback group had significantly higher scores on both memory confidence for the last checking trial of the gas rings and overall outcome confidence for all fifteen checking trials than participants in the primed with no feedback group. There was no significant group main effect and interaction effect (group x feedback condition) for the level of memory confidence and overall outcome confidence. There were also no significant group and feedback condition main effects and interaction effect for the level of vividness and detail of the recollections of the last checking behavior. Results are discussed in the light of the related literature.

Key words: Repeated checking, memory confidence, obsessive-compulsive disorder, doubt, distinctiveness.

ÖZ

KLİNİK OLMAYAN ÖĞRENCİ ÖRNEKLEMİNDE TEKRARLI KONTROL ETME DAVRANIŞINA BAĞLI OLARAK BELLEĞE OLAN GÜVENİN AZALMASININ TEMELİNDEKİ MEKANİZMALAR

Talat Demirsöz

Yüksek Lisans, Psikoloji Bölümü

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Bu çalışmanın amacı klinik olmayan öğrenci örnekleminde tekrarlı kontrol etme davranışına bağlı olarak belleğe olan güvensizliğin temelindeki mekanizmaları incelemektir. Son yıllarda konu ile ilgili literatür tekrarlı kontrol etme davranışının kontrol edilen materyal ile ilgili aşinalığı arttırdığını ileri sürmektedir. Daha sonra, bu aşinalık hatıraların daha az canlı ve ayrıntılı olmasını sağlamaktadır. Bu ise daha sonra belleğimize olan güveni azaltmaktadır. Araştırmanın deneysel bölümünden önce, 381 üniversite öğrencisine (232 kız, 149 erkek) Padua Envanteri-Washington Eyalet Üniversitesi Revizyonu (PE-WEÜR) ve Demografik Bilgi Formu uygulanmıştır. Daha sonra grubun PE-WEÜR puanlarına göre 84 öğrenci seçilmiştir. Grup ortalamasının yarım standart sapma altında puan alan öğrenciler düşük Obsesif-Kompulsif Bozukluk (OKB) grubuna (N= 42), grup ortalamasının yarım standart sapma üstünde puan alan öğrenciler yüksek OKB grubuna (N=42) atanmışlardır. Araştırmanın deneysel bölümünde tekrarlı kontrol etme davranışını test etmek için, etkileşimli bilgisayar animasyon programı geliştirilmiştir. Deneyden önce, her iki gruptaki katılımcılar seçkisiz olarak iki farklı deneysel koşula atanmışlardır: geribildirim verilen grup ve geribildirim verilmeyen grup. Deneyde katılımcıların hepsinden sanal gaz ocaklarını açıp kapayarak kontrol etme davranışını yerine getirmeleri istenmiştir. Herbir katılımcı gaz ocaklarını açma, kapama ve kontrol etme işlemini 15 kez tekrarlamıştır. Geribildirim verilen gruptaki

katılımcılara, kontrol etme davranışı sonunda gaz ocaklarını başarılı bir şekilde ve doğru olarak kapattıklarına yönelik geri bildirim verilirken, diğer gruba bu şekilde bir geribildirim verilmemiştir. Araştırmanın verileri 2 (Grup: Düşük OKB Grubu - Yüksek OKB Grubu) X Geribildirim (Geribildirim Verilen Grup - Geribildirim Verilmeyen Grup) gruplar arası ANOVA ile analiz edilmiştir. Araştırmanın sonuçlarına göre, geri bildirim verilen katılımcıların son denemedeki gaz ocağı ve 15 denemedeki tüm gaz ocaklarına ilişkin olarak belleklerine olan güvenleri geri bildirim verilmeyen gruptaki katılımcılara göre istatistiksel olarak daha yüksektir. Ayrıca, son denemedeki gaz ocağına ve 15 denemedeki tüm gaz ocaklarına ilişkin olarak belleklerine olan güvenleri hakkında düşük ve yüksek OKB grupları temel etkisi ile grup X geribildirim ortak etkisi için anlamlı fark bulunmamıştır. Son kontrol edilen gaz ocağının ne kadar canlı ve ayrıntılı bir şekilde hatırlandığına ilişkin grup ve geribildirim temel etkileri ile ortak etki anlamlı değildir. Sonuçlar ilgili literatür ışığında tartışılmıştır.

Anahtar kelimeler: Tekrarlı kontrol etme, belleğe güven, obsesif-kompulsif bozukluk, şüphe, farklılaşma.

To my dear family,
To my best friend Mehmet Akif Güzel,
and
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CHAPTER 1

INTRODUCTION

Obsessive compulsive disorder (OCD) is generally characterized by obsessions, compulsions or both (Taylor, 2005; Rachman, 1998). Obsessions are defined as intrusive, repetitive thoughts, images or impulses that are unacceptable and/or unwanted. They are also intrusive, attributed internally, and difficult to control (DSM-IV, 1996). Aggression, sex and blasphemy are accepted as the main themes of obsessions (Rachman, 1997). Moreover, intrusive thoughts of being contaminated, harming the self/others, doubts related to turning off the gas stove could be thought to be common examples of obsessions (Taylor, 2005). Besides, obsessions result in marked distress or anxiety (Greisberg & McKay, 2003). This situation gives rise to the urge to neutralize the obsession and its accompanied feelings of discomfort or anxiety. These neutralizing behaviors usually take the form of compulsions. When we come to compulsions, they are defined as repetitive and intentional behaviors aimed to avert feared event or reduce distress caused by the obsessions. Moreover, persons feel force onto themselves about carrying out the compulsions often with a sense of subjective resistance as similar to the obsessions (Salkovskis & Kirk, 1997). Examining the compulsions in a more complicated way give us an opportunity to see that these behaviors to neutralize anxiety or distress caused by obsessions are performed in a stereotyped way or with the light of idiosyncratically defined rules (Rachman, 2002).

The content of obsessional thoughts usually represent the fears of contamination, fears of harm to self or others, sexual themes, aggressive thoughts, religiosity, somatic concerns and urge for symmetry or exactness (Hollander, 2005). Compulsions, on the other hand, classically are in the form of washing or checking (Rachman, 2002). Also compulsions can be mentioned as repeating, touching, ordering, and hoarding (Libby, Reynolds, Derisley, & Clark, 2004). However, most

common presentations of OCD are cleaning compulsions associated with contamination obsessions and checking compulsions accompanied by doubting (Rasmussen & Eisen, 1989; cited in Yorulmaz, Karancı, & Tekok-Kılıç, 2006).

Concerning the prevalence of obsessions and compulsions, it is asserted that the majority of the population experiences occasional intrusive thoughts, accepted as normal obsessions. They occur in 80-88 % of individuals (Rachman & de Silva, 1978) and specifically 54.7% of the sample of normal participants experience ritualistic behaviors (Muris, Merckelbach & Clavan, 1997). When looking at the prevalence rates of OCD, it could be stated that it varies. Lifetime prevalence of OCD was between 1.9 - 2.5 % and annual prevalence rate was between 1.1 - 1.8 % in different cultures (Weissman et al., 1994; cited in Fontenelle, Mendlowickz, Versiani, 2006).

Upon this commonness of the intrusions in the normal population, there emerges a categorization as clinical and normal obsessions based on the different types of interpretation styles of those intrusions. For instance, it is asserted that catastrophic misinterpretation of these intrusions could lead to clinical obsessions (Rachman, 1997). Additionally, normal obsessions are less frequent, shorter in duration and, associated with less distress (Rachman & de Silva, 1978). Moreover, the content and themes of normal and clinical obsessions such as violence, contamination and doubt are similar (Rachman, 1997). Therefore, it is proposed that with the help of these similarities, the study of normal obsessions and compulsions could help understand the underlying mechanisms of OCD (Taylor, 2005).

1.1. Specific Belief Domains in OCD

It is proposed that six domains of maladaptive beliefs are thought to characterize OCD. These are inflated responsibility, importance of thoughts, control of thoughts, threat estimation, tolerance of uncertainty, and perfectionism (Tolin, Worhunsky, & Maltby, 2006).

“Inflated responsibility”, an accepted specific domain of OCD, is proposed and advanced by Salkovskis (1985). He suggested that people experiencing an intrusion feels mood disturbance mediated by appraisal of the intrusion and this

leads to compulsive behavior. In the mediation process, one could see himself/herself as being responsible for the intrusion and also for its perceived harmful consequences by means of having the belief such as “If one has any influence over an aversive event, then one has complete responsibility for preventing the event” (Salkovskis, 1985). “I often think I am responsible for things that go wrong” and “If I do not act when I foresee danger, I am to blame for any bad consequences” are the representative statements reflecting the beliefs of inflated responsibility (OCCWG, 1997, p. 678).

“Importance of thoughts” is the other concept discussed in the literature as a specific belief domain in OCD. It is proposed that the role of beliefs about the mere presence of a thought shows the importance of the thought (OCCWG, 1997). Related to this domain, thought-action fusion (TAF), having two related component as Moral TAF and Likelihood TAF, appears to become the underlying mechanism of OCD (Rachman, 1993). Moral TAF is explained as having the belief that the thoughts are morally equal to actions (e.g., thinking is as bad as doing). Likelihood TAF is reflecting the belief that thinking about something has an influence over its likelihood of occurrence, either to oneself or others. Examples of such statements referring the beliefs are: “If an intrusive thought pops into my mind, it must important” and “Having an unwanted thought means I really want to do it” (OCCWG, 1997, p. 678).

“Control of thoughts” is another specific belief domain discussed in the OCD literature. It is argued that beliefs about the consequences of one’s thoughts could result in beliefs about the importance of controlling one’s thoughts (OCCWG, 1997). It is also suggested that individuals with OCD have difficulty in inhibiting the threat-relevant information (Tolin, Hamlin, & Foa, 2002). Additionally, recurrent nature of obsessions is thought to be underlying factor for this inability to inhibit such kinds of thoughts (Rachman, 1998). Sample statements including the beliefs are as follow: “I must know what is going on my mind at all times so I can control my thoughts” and “I would be a better person if I gained control over my thoughts” (OCCWG, 1997, p. 678).

Another specific belief domain is “threat estimation”. It is suggested that people with OCD have troubles with epistemological reasoning because they evaluate situations as dangerous until it is proven safe (Foa & Kozak, 1986).

Examples include “I believe that the world is a dangerous place” and “Bad things are more likely to happen to me than to other people” (OCCWG, 1997, p. 678).

“Tolerance of uncertainty” is another belief domain. Behavioral attempts to control the future and avoid uncertainty and belief that uncertain cognitive interpretations reflect badly on a person are thought to be characteristics of this domain (Freeston, Rheaume, Letarte, Dugas & Ladoceur, 1994). Furthermore, people with OC symptoms seem to be more cautious; they take longer to categorize objects and more frequently request information to be repeated when compared to the controls (e.g., Frost, Lahart, Dugas & Sher, 1988; cited in OCCWG, 1997). Besides, people with OCD show more doubt about the correctness of their decisions (Frost & Shows, 1993). Represented beliefs include statements as “It is possible to be absolutely certain about the things I do if I try hard enough” and “I must be certain about the answers to questions that concern me before I can put them to rest” (OCCWG, 1997, p. 678).

Perfectionism as a specific belief domain of OCD is thought to play a major role in understanding OCD (Mallinger, 1984). It is defined as the inclination to believe that there is a perfect solution to every problem, doing something perfectly is possible and at the same time necessary and even minor mistakes would have severe consequences (OCCWG, 1997). Illustrated beliefs related to perfectionism include, “It is important to keep working at something until it is done just right” and “For me, failing partly is as bad as failing completely” (OCCWG, 1997, p. 678).

1.2. Theoretical Approaches of OCD

Among the last three decades, two distinctive and promising theoretical approaches emerged related to the phenomenology of OCD: conditioning models and cognitive models (Taylor, 2005).

OCD is firstly understood in the framework of conditioning models based on the Mowrer’s 2-factor theory, proposed in 1960s. It states that fears in obsessions and compulsions are obtained by classical conditioning and maintained by operant conditioning, containing learned avoidance or escape responses. For example, the obsessional fear of acquiring a serious illness from doorknobs would happen after a traumatic experience in which a loved one acquired such a disease (the unconditioned stimulus) from contact with a “dirty” doorknob in a public place

(the conditioned stimulus). Obsessional fears were thought to be maintained by negative reinforcement. To illustrate, avoidance of doorknobs or compulsive washing after touching the doorknobs is negatively reinforced by the decrease in discomfort and by a reduction in the perceived probability of feared consequences such as becoming contaminated (Taylor, 2005). Although this explanation has some strength, the questions about the cause of obsessions and the repetitive and persistent nature of compulsions are unanswered in the boundaries of conditioning models (Gray, 1982; cited in Taylor, 2005).

After these conceptualizations, it is suggested that ritualistic behaviors could be regarded as a form of learned avoidance which is based on the animal models of compulsive behavior by Meyer in 1966. By this account, a transition towards the cognitive approaches has been occurred in the OCD literature since the focus has been shifted from the conditioning to the anticipation of harm and expectations (Salkovskis & Kirk, 1997).

Cognitive-behavioral approach of OCD consists of a number of models. Cognitive models could be divided into two broad categories as one category refers the phenomenon to the dysfunctions in cognitive processing and the other one suggests specific dysfunctional beliefs are responsible for obsessions and compulsions (Taylor, 2005). For example, one cognitive model in the former category is Reed's cognitive structural model proposed in 1985. This model puts forward that malfunction and difficulty in categorizing and structuring one's experiences (and memories) brings about a compensatory over-structuring. For instance, doubting, indecision, rumination, and particular compulsions like checking rituals are the results of one's difficulty in categorizing his/her experiences (Wroe, Salkovskis, 2000). Contrary to the models suggesting general dysfunction in cognitive processing, Beck (1976)'s cognitive specificity hypothesis, widely accepted one, proposed that different types of dysfunctional beliefs leads to different types of psychopathology. Among these theories, one suggested that obsessional patients have excessive risk appraisals and dysfunctional beliefs regarding the unacceptability of certain thoughts, which could inherently involve the possibility of resulting in catastrophe, or which inherently suggests that certain types of rumination of rituals could avert the catastrophic consequences (McFall & Wollersheim, 1979; cited in Wells, 1997).

When we look at the Salkovskis (1985, 1989)'s cognitive-behavioral theory of OCD, his theory could be classified into the latter category suggesting that specific dysfunctional beliefs are the reason of OCD. He generates the notion that there is a key factor underlying the mechanism of OCD which is the interpretation and appraisal style of intrusive cognitions. In order to examine his model in a more holistic manner, one should mention that Salkovskis focused on the significance of appraisals of intrusions rather than focusing on the content of intrusion in a vapid manner. On the subject of importance of appraisals of intrusions, it is proposed that the occurrence of negative appraisals resemble to negative automatic thoughts. Therefore, the accessibility to negative schemata is increased in depressed mood states and the negative appraisals of intrusions are thought to be strengthened (Salkovskis, 1989).

For OCD sufferers, the theory proposes that there is an “inflated perception of responsibility” of possible harm and this increases the awfulness of any harmful consequences. Additionally, intrusions and subsequent negative interpretations and appraisals such as feeling responsible for harm to oneself and others lead to adverse mood and motivation to engage in neutralizing behaviors (Salkovskis, Wroe, Gledhill, Morrison, Forrester, Richards, Reynolds, & Thorpe, 2000). Moreover, these dysfunctional beliefs about responsibility concept (e.g. 'If I have any influence over an outcome then I am responsible for that outcome') are important for development of obsessions because they bring about the negative appraisal of the thoughts (e.g. 'Having this thought means I want to do it') (Purdon & Clark, 1999).

Salkovskis, Shafran, Rachman and Freeston (1999) stated that these appraisals lie in the learned assumptions formed as adaptive ways of coping with early experiences, and these assumptions are triggered by critical incidents. Moreover, it is suggested that beliefs about harm and responsibility and also beliefs about the nature of intrusions involved in these assumptions (Salkovskis et al, 2000). “If I don't act when I can foresee danger, then I am to blame for any consequences if it happens”, “I must always think through the consequences of even the smallest actions”, “I feel responsible for things that go wrong” are the specific examples of the assumptions that OCD patients hold (Wroe & Salkovskis, 2000, p. 1142).

Then, occurrence of intrusive thoughts could lead to negative appraisals and efforts for prevention of these thoughts. Along with the view, therefore, responsibility assumptions could be thought as facilitative construct for responsibility appraisals. Responsibility appraisals, then, would increase the likelihood of actions in order to diminish the perceived risk of harm. Consequently, compulsive behavior could be accepted as a method to decrease the potential harm and danger to self or others, avert blame, and reduce one's sense of responsibility (Salkovskis et al, 2000).

Adverse mood and neutralizing behaviors, in turn, could result in further intrusions (Salkovskis et al., 2000). These neutralizing behaviors (e.g. suppression, seeking reassurance, avoidance, and compulsive acts) perpetuate beliefs about responsibility regarding protection others from harm and beliefs about the success of the neutralizing acts. In addition to that, the salience of the intrusive thoughts is increased by the neutralizing activities; therefore, this situation is interpreted as an evidence for meaningfulness and helpfulness of the intrusive thought (Purdon & Clark, 1999).

Another formulation for the mechanism of OCD, particularly of obsessions, comes from Rachman (1997, 1998). Rachman is also formulated his theory on dysfunctional beliefs and thoughts. His formulation begins with an observation that the themes of obsessions and intrusive thoughts are reflected by the themes of all moral systems such as aggression, blasphemy, and sex. It is suggested that these types of thoughts are susceptible to being experienced as sinful, disgusting, alarming and threatening. Regarding the development of obsessions, it is asserted that when person believes that an intrusive thought is warning for a negative event would come true or that this intrusive thought is an indication for an individual is in danger of losing control, then the obsessional problem arises. Concerning the persistence of the obsessions, it is proposed that as long as an intrusion is interpreted catastrophically then it persists (Rachman, 1998). When an intrusive thought is interpreted as such then an active resistance comes into the scene like thought suppression, avoidance and neutralizing activities; yet, they lead to perseveration of the catastrophic misinterpretation of the obsessions. It is proposed that cognitive biases like "thought-action fusion" (TAF) also serve to promote the misinterpretations of the significance of intrusions (Purdon & Clark, 1999). During

the identification of the TAF, it is suggested that some patients believe that their unwanted thoughts could influence the events. There are two kinds of components for TAF. As mentioned before, one is Likelihood TAF which is the belief that having an unwanted intrusive thought increases the probability of the occurrence of an adverse event. The other component of TAF is Moral TAF. It is the beliefs that having an unaccepted intrusive thought is the almost moral counterpart of the performing this specific act (Shafran & Rachman, 2004). Moreover, it is proposed that beliefs about the term of Salkovskis' inflated responsibility are derived from the TAF cognitive bias (Purdon & Clark, 1999).

Regarding the inflated responsibility construct as a key factor for the mechanism of OCD, Rachman also suggested the term of "perceived inflated responsibility" in his theory (Rachman, 1993). After his clinical observations, he examined the decreased level of compulsions of inward patients when they first came to the hospital. Rachman inferred that when they became a member of the hospital their compulsions were increased to pre-hospitalization level and he referred this phenomenon to the increased sense of responsibility of patients when they became a member of hospital setting (Ladouceur, Rheaume, & Aublet, 1997).

On the other hand, there is another branch of conceptualization among the cognitive approach about OCD, which is called meta-cognitive model. Chronologically, this is the last proposed model after the mentioned models. This model identifies two subcategories of beliefs about the maintenance of OCD. These beliefs are metacognitive beliefs about meaning and significance of intrusive thoughts (Fisher & Wells, 2005). In other words, it is stated that model focuses on the beliefs about importance, meaning, and power of thoughts and beliefs about the need to control thoughts and carry out rituals (Myers & Wells, 2005). Regarding the metacognitive processes and beliefs, it could be suggested that they are attempts to regulate thoughts and beliefs about thoughts and thought processes (Purdon & Clark, 1999). Within the meta-cognitive framework, these mentioned beliefs are consistent with the TAF introduced by Rachman (1993) but they go beyond it with the introduction of other metacognitive beliefs such as thought event fusion referring that a belief that thought could cause an event has occurred and thought object fusion referring that belief that thoughts, feelings and memories could pass to the persons or objects (Fisher & Wells, 2005).

For instance, TAF is a new notion that consists of beliefs about thinking something is equal to acting. Regarding such beliefs, it could be proposed that they involve features related to the metacognitive beliefs in the flow of the literature of OCD. These metacognitive beliefs possibly cause persons take actions about the intrusions such as controlling one's actions or thinking (Wells, 1997). In the framework of this proposed system, it could be asserted that this model produces internal and external experiences and at the same time determines the significance of thoughts to direct attention allocation and cognitive processes. In addition to that, in this model, attention is directed more toward thought and other internal processes. Thus, coping capabilities diminishes and it results in the incomplete processing of threat stimuli (Wells & Mathews, 1996).

Cognitive approach suggests that if a person does not consider the occurrence and content of intrusive thought as having a special significance then an intrusion does not escalate into obsession. However, people with OCD appraise intrusive thoughts as being meaningful and significant on the basis of dysfunctional beliefs; therefore, the intrusions develop into obsessions (Rachman, 1998). Nevertheless, in the metacognitive framework, it is advocated that this kind of development is possible when individuals appraise the failures in thought control strategies as violating the self-view and as expectations about the controlling these thoughts (Purdon & Clark, 1999). Whereas cognitive and metacognitive models converge the notion that negative interpretations of intrusions are the core element of the psychopathology of OCD, metacognitive model change the origin of the development of OCD from the beliefs about inflated responsibility to the metacognitive beliefs for the explanation of the development of OCD (Myers & Wells, 2005).

Within the boundaries of the contribution of metacognitive processes to the development of obsessional symptoms, Meta-Cognitions Questionnaire was developed (MCQ; Cartwright-Hatton, & Wells, 1997). The fifth factor of this questionnaire, cognitive self-consciousness (CSC), assesses the degree to which persons focuses on their own thinking processes. Moreover, based on the result of the studies, CSC is found to be correlated to obsessional symptoms (Cohen & Calamari, 2004) and most elevated in OCD patients when compared to the other anxious patients and normal controls (Janeck, Calamari, Riemann, & Heffelfinger,

2003). In addition to this conceptualization, negative and positive beliefs about the rumination or reprocessing the intrusions or neutralizing behaviors are also associated with understanding OCD as in the example of a patient believing that neutralizing is beneficial or intrusive thoughts are the signs of reality (Wells, 1997).

1.3. Information Processing Approach of OCD

The information processing paradigm is a conceptual framework. It supposes that many aspects of human behavior and experience could be understood with the help of the processing style of both external and internal information. It focuses on how the human system select, interpret, encode, store, and retrieve information. Also, it deals with the generation and execution of the behavior (Bijttebier, Vasey, & Braet, 2003). It is suggested that information processing approach provides methodology for theorizing (Anderson & Bower, 1973). From a different viewpoint, when talking about cognitive approaches to any kind of psychopathology, information processing approach is accepted as being one of the important *tools* for understanding the mentioned phenomenon (as a method for assessing OCD-related cognition) (Taylor, 2005).

Information processing approach examines three kinds of bias of OCD: attentional, memory, and interpretation bias (Amir & Kozak, 2005). In terms of attentional bias, upon the clinical observations, it could be stated that OCD individuals have difficulty in inhibiting information including negative thoughts. Attentional inhibition then refers to the way of a person's selectively attendance towards relevant information and the way of that person's minimization of irrelevant information. Based on the literature of psychology, it is suggested that the central deficit of inhibition in OCD "may" be central to our understanding of the disorder. Failure to inhibit undesirable and irrelevant stimuli could be thought to be a basis of OCD. Those stimuli may pre-consciously bring about the person being attacked by recurrent unwanted and disturbing thoughts and images (Muller & Roberts, 2005). Regarding that situation, negative priming paradigm is used to examine the inhibitory abnormalities of persons with OCD. Negative priming is the increment in latency to identify a given item if that item is previously ignored (May, Kane & Hasher, 1995). However, not all studies converge upon the same finding that OCD individuals have a deficit concerning the inhibition of information

(MacDonald, McLeod, Antony, & Swinson, 1999). Therefore, there is not any compromise in the literature of OCD about the attentional bias related to the inhibition of incoming information.

It is proposed that since OCD is an anxiety disorder similar attentional bias could be expected for OCD that anxious persons may perform poorly on difficult tasks as their cognitive systems selectively process task-irrelevant information related to threat. Moreover, it is found that clinically anxious patients exhibit an increased ability to encode emotionally threatening information (e.g., Burgess et al., 1981). Dichotic listening task and emotional Stroop paradigm are some techniques used to examine this proposal. The results of the studies using these methods suggested that OCD patients attend threatening information selectively; specifically they attend information that is related to their particular *concerns*. It is also proposed that this selective attention issue could result in overrepresentation of threat relevant information in the stream of consciousness, contributing to the development and maintenance of intrusive and obsessive thoughts in OCD (Muller & Roberts, 2005).

The second bias proposed by information processing approach is memory bias. Under this bias, researchers examine doubt about the memory. Three hypotheses were generated related to mechanisms of doubt. The first one suggests that individuals with OCD have a general memory deficit. Second hypothesis, on the other hand, proposes that there is a deficit in memories of individuals with OCD for only threat-relevant material. The third hypothesis is related to lack of confidence in memories of persons with OCD (Tolin, Abromamovitz, Brigidi, Amir, Street, & Foa, 2001). About the last memory bias, more elaborations will be discussed towards the end of this chapter.

Mechanism of forgetting is another central topic in the literature of OCD in relation with the processing of memories. In directed-forgetting paradigm, participants are presented with the words each has an accompanying cue directing them towards either remembering or forgetting these particular words. In this paradigm, participants take the free recall test and they are asked to remember all the words. It is found that they remember more of the to-be-remembered (TBR) words than the to-be-forgotten (TBF) words (e.g., Zacks, Radvansky, & Hasher, 1996). At the end of discussions revolving around either in the focus of encoding or

retrieval processes about the explanation of this situation, it is proposed that performance differences are attributed to the differential encoding of the TBR words than the differential retrieval inhibition of TBR words (Amir & Kozak, 2005, p. 170-171).

The third examining bias is interpretation bias for threat. Clinical observations yielded that responsibility for harm to others is assumed to be a kind of interpretation bias of people with OCD. Particularly, Rachman (1993) states that many patients, especially patients with checking compulsions, have urge to ritualize only when they assume personal responsibility for safety. Salkovskis (1985, 1989) proposed the concept of excessive sense of responsibility for negative thoughts and anticipated negative events in order to explain the psychopathology of OCD as mentioned before.

The relationship between the responsibility and the performance of compulsions are tried to be explored by manipulating the degree of responsibility. It is expected that participants in high responsibility condition show more checking behavior than the low responsibility condition. However, no group difference is found on self-report of doubting and urges to check (Ladouceur et al., 1995). In one study, three levels of responsibility conditions are constructed in that in high responsibility condition participants take the full responsibility for checking activity, in low responsibility condition the experimenter takes the responsibility for checking activity and after one week participants watch the videotaped checks and this condition is no responsibility condition. The results show that as the responsibility for the outcome of checking decreases, and then confidence in memory increases (Radomsky, Rachman, & Hammond, 2001).

In another study, there emerge three groups for manipulating the responsibility level as high responsibility, low responsibility and control instructions. It is expected that heightened responsibility would increase the urge to check and the degree of discomfort experienced. Yet, this expectation could not be verified that only low responsibility instructions had an effect over the reduced urge to check and subjects' discomfort (Lopatka & Rachman, 1995). Another study inspects the responsibility issue in OCD by using Obsessive Compulsive Responsibility Scale (OCRS) consisting of 27 high-risk, low-risk and OCD-relevant risk situations and participants as anxious controls with social anxiety, non-anxious

controls and individuals with OCD. Individuals are asked to rate each situation through choosing one of the three responses: (a) the urge to rectify the situation; (b) the degree of distress felt upon leaving the situation unrectified; and (c) the degree of personal responsibility felt if the unrectified situation later resulted in harm. According to the results of the study, individuals with OCD reported more urges to rectify situations, distress upon leaving such situations unrectified, and responsibility if the unrectified situations resulted in harm in low and OCD-relevant risk conditions compared to the individuals with social anxiety and non-anxious individuals. Thus, it is inferred that control participants differentiate between the situations which merit concern and which do not merit concern better than individuals with OCD (Foa, Amir, Bogert, Molnar, & Przeworski, 2001).

Another crucial dimension related to the interpretation bias is the concept of thought-action fusion (TAF) which is defined as “the psychological fusion of thoughts and actions is a fundamental part of the catastrophic misinterpretation” (Rachman & Shafran, 1999, p.80). This concept is examined experimentally, for example, by constructing two groups of participants one of which is instructed to distract themselves after the presentation of the intrusive thought and the other group is instructed to neutralize. It is found that the latter group of participants expressed more discomfort and greater urges to neutralize when asked not to neutralize (Salkovskis, Westbrook, Davis, Jeavons, & Gledhill, 1997). This concept is also examined by constructing two groups of participants one of which receives educational message about the (in)validity of TAF in general terms and the other group receives a placebo message and the results suggest that the former group shows less TAF statements, less anxiety, and less urges to neutralize (Zucker, Craske, Barrios, & Holguin, 2002).

1.4. Compulsive Checking and Memory Confidence

As mentioned before, the third proposed hypothesis of information processing approach in OCD is that there is memory distrust in OCD patients. Therefore, in this part of this chapter, the relationship between memory confidence and compulsive checking will be discussed.

When we firstly look at the checking phenomenon, cognitive theory of checking, which is the proliferating method of approach in recent times, proposed

that checkers have an inflated responsibility and they use checking ritual for preventing harm (Salkovskis, 1985). Specifically, according to the cognitive theory of compulsive checking, these compulsions are then associated with doubt. The checking behavior is performed to prevent obscure future misfortunes; however, it has no natural terminus; checking is accepted as *sans frontiere*. Checking compulsions are also starting with subjective resistance. However, gradually they turn out to be stylized and streamlined. Also, its temporary anxiolytic features repeatedly reinforce compulsive activity. Main characteristics of compulsive behavior are that most checking activity happens when the people are their own home and when they are alone. Moreover, compulsions seem to increase when the person is depressed and when the person feels responsible for the act concerned (Rachman, 2002).

It is proposed that there are self-perpetuating mechanisms in the compulsive checking activity. The first one is unsuccessful search. It is because the perceived threats can be general, obscure, and unlimited. The second one is tarnished memory because of the checking activity: the more you do, the less confidence you have. The other one is a cognitive bias that when one is responsible, then, the likelihood of harm is increased. The last proposed mechanism is again a cognitive bias that persons experience an increase in responsibility when one performs a check for safety. The last issue in cognitive theory of compulsive checking is “multipliers”, the factors that multiply checking. Inflated responsibility is one of the multiplier; if it increases, then the checking increases. Perceived probability of the harmful event is another multiplier; if it increases, then the checking activity increases. The third multiplier is the perceived cost of the harmful event. An increment in perceived cost of the harmful event results in the increase in compulsive checking activity. Changes in these multipliers lead to changes in the checking activity; however, perceived responsibility is crucial among the multipliers, as independent from the other two multipliers (Rachman, 2002). Empirical evidence is also consistent with this hypothesis. Manipulation over perceived responsibility in terms of increasing or decreasing results in increase or decrease in the urges to check in OCD checkers (Lapotka & Rachman, 1995).

Here, after investigating the compulsive checking behavior, we would visit the first, second, and specifically the third hypothesis regarding memory bias of

OCD. However, at first, we could look at the exodus of these proposed hypotheses. The starting point is the concept of pathological doubt. When we examine the literature of compulsive checking behavior in the OCD, pathological doubt is often observed in OCD patients (Rasmussen & Eisen, 1989; cited in Tolin et al., 2001). It is suggested that this pathological doubt is the reflection of the uncertainty about the properties of the stimulus, situation, or action (Reed, 1985; cited in Tolin et al., 2001). Moreover, it is asserted that there is a strong relationship between pathological doubt and checking rituals (e.g., returning home to make sure that the front door is locked, calling relatives to check that they have not been harmed) in order to reduce the doubt (Rachman & Hodgson, 1980; cited in Tolin et al., 2001).

So as to explain the source of doubt, the hypothesis that OCD patients (OCs) have general memory deficits hypothesis has been proposed (cf. Reed, 1977; cited in Tolin et al., 2001). However, studies related to this hypothesis seem to produce mixed results regarding the overall memory deficit. For instance, in one study, individuals with subclinical checking symptoms and individuals with no OCD symptoms are compared. They were instructed to read the statements about actions. Then, they were instructed to perform, write or observe these actions. Afterwards, they were asked to write all the actions they remember on a sheet of paper and also to indicate whether they performed, wrote or observed these actions. It is found that the checkers recalled fewer actions and they were more confused about whether they performed, wrote or observed these actions. However, in terms of assessment of actions in the cartoon they previously watched or words they remembered from a list, there are no memory differences between two groups. It is concluded that impairment may be in the recall performance of their actions, particularly their own actions. Consequently, general memory deficit is not observed (Rubenstein, Peynircioğlu, Chambless, & Pigott, 1993). However, in another study, it is found that when compared with subclinical checkers and normal controls, OCD patients show impaired recall and recognition performance. This finding is thought to support general memory deficit in OCD (Tuna, Tekcan, & Topçuoğlu, 2005). Besides, some studies show that there are deficits in nonverbal memory in OCs compared to non anxious controls (NACs) (Savage et al., 1996; Zeilinski, Taylor, & Juzwin, 1991). Nevertheless, there are many studies which have failed to show an overall memory deficit among OCs (Brown, Kossly, Breiter, Baer, & Jenike, 1994;

MacDonald, Antony, MacLeod, & Richter, 1997; McNally, Kohlbeck, 1993).

Then, another hypothesis is proposed in order to explain this mysterious phenomenon. This hypothesis is that OCs has memory deficits for threat-related stimuli or actions. That is, if a person fears to leave the oven on, then this person would show poor memory performance about whether the oven is on or not. However, memory performance for non-feared events would be normal (Tolin et al., 2001). However, few studies found bias in the opposite direction; that is, OCs show enhanced memory for threat-relevant stimuli. In the studies related to this opposite bias, it is found that OC checkers show superior recall for previously completed actions only if these actions elicit anxiety (Constans, Foa, Franklin & Mathews, 1995; Radomsky & Rachman, 1999).

Upon these, the third hypothesis is generated saying that the main issue is the low confidence in OCs' memories and that results in pathological doubt (Tolin et al., 2001). This issue is started with studies using "reality-monitoring paradigm". In this paradigm, participants are asked to determine some actions either if they had engaged in, or merely imagined engaging in. In one study, it is found that OCs' reality monitoring ability is as good as NACs; however, they expressed less confidence in their ability (McNally & Kohlbeck, 1993). In the framework of the reality-monitoring paradigm, Hermans and his colleagues studied this paradigm using ideographically selected and anxiety related stimuli. The findings of the study show that participants with OCD reported less confidence in their memory for actions, in their ability to discriminate actions from imaginations and in their ability of keeping attention focused (Hermans, Martens, Cort, Pieters & Eelen, 2003). Therefore, there seems to be converging literature establishing the low confidence hypothesis of OCD.

Studies on low-confidence hypothesis of OCD have been investigated different methodological issues in the experimental settings. Repeated presentation of the stimuli, ecological validity of the stimuli, and type of the stimuli are the examples of these methodological issues.

Specifically, there is a problematic and crucial situation in the compulsive checking literature in that studies prefer not to use repeated presentations of the stimuli when examining memory accuracy and confidence (Tolin et al., 2001). Moreover, to illustrate, there is a study of MacDonald & Davey (2005) suggesting

an explanation within the mood-as-input model for the perseverative nature of Obsessive Compulsive behavior. In the experimental manipulation to test this model, there is a task consisting of correcting errors in a 41-line text containing 100 errors in spelling, punctuation and grammar. Moreover, there were two groups namely *feel like continuing* and *as many as can*. In the first group, participants were instructed to continue to check the text until they reach the goal of finding and correcting as many errors as they can. However, in the second group, participants were instructed to continue to check the text until they felt that they did not want to continue. This model says that perseveration occurs when people they are in bad mood and additionally when they ask themselves “did I do as much as I can?” (A question related to the condition of participants in the first group). Moreover, van den Hout, Kindt, Luigjes and Marck (2006) proposed that the task used in “Mood as Input” model is not OCD-relevant and also it is quite complex and requires concentration and effort; therefore the inference that the Mood as Input model explains the perseverance in clinical checking seems to be in trouble (van den Hout et al., 2006).

Ecological validity of the target stimuli means the degree of the approximation of the stimulus to the real-life situations (Tolin et al., 2001). Many studies used words or sentences (e.g., Sher, Frost, & Otto, 1983); other studies used OCD-unrelated activities like tape recorded task consisting recounting the details of the participants’ last vacation and another task involving the description of the type and amount of imagery recalling the trips (e.g., McNally, Kolhbeck, 1993; Rubenstein et al., 1993).

To test the ecological validity of the stimuli, OCD patients selected safe, unsafe, and neutral objects from a pool of everyday objects. They were presented with these objects six times to stimulate a checking ritual. Then, they were asked to recall as many as they can and indicate their confidence rates. OCD patients were compared to NACs and anxious controls (ACs) in terms of both memory and metamemory ratings. It is found that in terms of memory accuracy, there is no difference among the groups; however, memory confidence for unsafe objects exhibits a progressive decline over repeated presentations in OCD patients (Tolin et al., 2001). So that it could be concluded that there is no low performance regarding accuracy of memory but there is low performance in confidence in memory.

Upon the Tolin et al. (2001)'s claim about insisting to use the repeated presentation of the stimuli in order to examine the memorial and metamemorial components in compulsive checking, it could be stated that there seems to be profound effort to have a strong basis for this low confidence hypothesis. It is done with the initiation of the prolific works of van den Hout and Kindt (2003 & 2004). In these studies, in a general manner, both cognitive theory and general memory deficit theory are criticized for the lack of power to explain the nature of compulsive checking behavior. Specifically, it is asserted that cognitive theory does not have power in explaining the persistence of doubt after checking. The cognitive theory seems to explain the occurrence of compulsive checking; yet, it could not have power to clarify the persistence of doubt after checking behavior (van den Hout & Kindt, 2003).

A possible explanation for "low confidence hypothesis" comes from van den Hout & Kindt (2003). They argue that confidence in memory depends on vividness and detail (Wolters, 2000; cited in van den Hout & Kindt, 2003). Moreover, familiarity has an impact on vividness and detail of the recollected event: if the event becomes more familiar, the recollection then becomes less vivid and detailed (Johnston & Hawley, 1994; Roedinger, 1990; cited in van den Hout & Kindt, 2003). It is asserted that this processing style brings about the familiarity among materials. Next, it gives the priority to the higher level semantic aspects by inhibiting lower level perceptual processing and this in turn results in decreased vividness and detail. Then, it is advocated that by this processing, memory confidence decreases about the checking episode, which ends in repeated checking episodes (van den Hout & Kindt, 2003).

The theoretical explanation of van den Hout and Kindt (2003) was tried to be tested empirically by using a computer animation program. It consists of virtual gas rings and light bulbs as stimuli. The task is to turn on, turn off, and check the gas rings and light bulbs.

In the experimental phase of the study, participants were distributed to two conditions for the experiment phase; half to the relevant checking condition (gas ring checking condition) and the other half to the irrelevant checking condition (light bulbs checking condition). Participants in their own conditions had 20 trials of checking for gas rings or light bulbs accordingly.

After 20 trials of checking gas rings or light bulbs, in the 21th trial, all participants were asked to turn on, turn off and check the three out of six gas knobs and the participants were asked questions about the accuracy, confidence, vividness, detail, and outcome confidence level of the recollections of the participants regarding the last checking episode. In order to assess memory accuracy, on a sheet of paper, participants were asked to indicate which gas rings they checked on the very last trial of the experiment. Moreover, they were asked to indicate their level of confidence, vividness and detail of the recollections about the answer given for the question of memory accuracy. Outcome confidence was assessed by asking them to indicate how confident they were that all the gas rings were really off in the last checking episode (van den Hout & Kindt, 2003).

The findings of this study showed that there is a significant level of decreased vividness, detail, and memory confidence among participants in the relevant checking condition compared to those in the irrelevant checking condition. However, there is no difference among conditions in terms of memory accuracy and outcome confidence (van den Hout & Kindt, 2003).

There is another study which tries to replicate the findings of van den Hout & Kindt (2003) with ecologically valid stimuli, a real kitchen stove in relevant checking condition and a real kitchen faucet in irrelevant checking condition. In this experiment, participants are asked to open/turn on, close/turn off and check either faucets or gas knobs throughout 19 trials. Then, in the last trial, they all turn on, turn off, and check gas knobs. Meanwhile, burner lights on the electric stove were covered up. Therefore, there were no visual cues helping the participants indicating the end result of the checking activity whether the gas knobs were really off or not. Additionally, in this study, there is audible “click” sound used when stoves are checked. In this study, it is found that the level of detail, vividness and confidence of the participants in the relevant checking condition were significantly lower than those of the participants in the irrelevant checking condition. Therefore, it could be suggested that similar memory performances were obtained with van den Hout & Kindt (2003) study. Yet, regarding memory confidence, this replication study has more elevated memory confidence level than van den Hout & Kindt (2003) study. Regarding these results about the memory confidence, it is proposed as an explanation that real checking environment provides richer encoding environment

in terms of vividness and detail of the recollections. Therefore, since memory confidence is based on vividness and detail of the recollections, it would be richer so that confidence in memory in relevant condition may not be affected so much (Radomsky, Gilchrist, & Dussault, 2006).

In the literature, “low confidence issue” is tried to be investigated in terms of time course of the repeated checking conditions using the same paradigm by looking at the phenomenon at the second, fifth, tenth, and fifteenth checking episodes. Then it is suggested that a relatively number of checking trials have an impact on confidence in memory in the relevant checking condition and that the strongest impact is in between second and tenth trials (Coles, Radomsky, & Horng, 2006).

Regarding the low confidence and doubt in OCD patients’ checking rituals, there is a study aiming at reducing doubt. In this study, the author used image formation as a mediator in order to reduce doubt in three participants who are diagnosed with OCD. In his case studies, after giving exposure and response prevention technique, Tallis (1993) provides 5x5 colored cardboard figures and their sizes are 10, 8, 6, 4 and 2 cm in height. These figures are accepted as distinctive stimuli in the encoding process and it is thought to “stand out” in memory. Then, he asked his participants to associate their checking activity with these figures. When the patients feel the urge to check, he asked them to remind themselves that their activity is completed successfully by imagining the figure’s color and shape that they looked at previously. Then in the next step, he also asked them to use a more small size of the figure. Finally, in a 25 trial period, the training is finished and the results of this study are fascinating. At the 6-month follow-up, participants maintained all treatment gains and there is no subjective report of doubt thereafter among three participants.

Appreciating Tallis’ technique in reducing doubt, we would like to propose methodological manipulation over the conditions, particularly over the relevant condition of the study of van den Hout and Kindt (2003) in order to try to make sense of the compulsive checking phenomenon.

In the relevant condition of van den Hout and Kindt (2003)’s study, participants repeatedly turn on, turn off and check the gas rings during the 21 successive trials. However, if participants are given feedback indicating that they

are successful at turning off the gas rings completely at the very last trial and if they are asked to remind themselves that they would have confidence on their checking activity is complete, then this situation becomes similar to the application of Tallis (1993) for his three OCD patients. Since the pathological doubt is fueled checking activity a positive feedback saying that the checking activity is complete could be thought to reduce doubt like in the Tallis (1993)'s study.

It is worthwhile stating that attempting to give "positive feedback" could be accepted as the basis for this current study and the procedure of giving a positive feedback is enlightened in the method section.

Upon all these theoretical conceptualizations, we would like to introduce our own viewpoint and hypotheses related to the checking ritual based on van den Hout & Kindt (2003) study. Using the very same paradigm, we would like to modify it so as to try to explain low confidence in memory of participants and also of OCD patients.

1.5. Aims of the Current Study

The purpose of the present study is to investigate the underlying mechanism of the compulsive checking behavior in a non-clinical student sample by using the computer animation developed and used by van den Hout and Kindt (2003). More specifically, the aims of the current study could be summarized as follows. At first, it is aimed at examining the mechanism for the *maintenance* of compulsive checking behavior. Another aim is to find out an innovative perspective for this phenomenon by giving a positive feedback after checking behavior is performed. Next purpose of the study is to test whether giving a feedback "indicating that the specific checking activity is successful and complete" has an effect over the level of confidence, detail, vividness, and overall outcome confidence of the participants.

1.6. Hypotheses

1) Hypotheses for memory confidence

a) It is hypothesized that participants in primed with feedback group have significantly higher scores on memory confidence than participants in primed with no feedback group.

b) It is hypothesized that high OCD group would have significantly lower

scores on memory confidence than low OCD group.

c) It is hypothesized that high OCD group primed with no feedback would have significantly lower scores on memory confidence than low OCD group primed with no feedback.

d) It is hypothesized that there would be no significant difference between high OCD group primed with feedback and low OCD group primed with feedback in terms of memory confidence.

2) Hypotheses for level of detail of the recollections of participants

a) It is hypothesized that participants in primed with feedback group have significantly higher scores on level of detail of the recollection than participants in primed with no feedback group.

b) It is hypothesized that high OCD group would have significantly lower scores on level of detail of the recollection than low OCD group.

c) It is hypothesized that high OCD group primed with no feedback would have significantly lower scores on level of detail of the recollection than low OCD group primed with no feedback.

d) It is hypothesized that there would be no significant difference between high OCD group primed with feedback and low OCD group primed with feedback in terms of level of detail of the recollection.

3) Hypotheses for level of vividness of the recollections of the participants

a) It is hypothesized that participants in primed with feedback group have significantly higher scores on level of vividness of the recollection than participants in primed with no feedback group.

b) It is hypothesized that high OCD group would have significantly lower scores on level of vividness of the recollection than low OCD group.

c) It is hypothesized that high OCD group primed with no feedback would have significantly lower scores on level of vividness of the recollection than low OCD group primed with no feedback.

d) It is hypothesized that there would be no significant difference between high OCD group primed with feedback and low OCD group primed with feedback in terms of level of vividness of the recollection.

4) Hypotheses for overall outcome confidence

a) It is hypothesized that participants in primed with feedback group have

significantly higher scores on overall outcome confidence of the recollection than participants in primed with no feedback group.

b) It is hypothesized that high OCD group would have significantly lower scores on overall outcome confidence of the recollection than low OCD group.

c) It is hypothesized that high OCD group primed with no feedback would have significantly lower scores on overall outcome confidence of the recollection than low OCD group primed with no feedback.

d) It is hypothesized that there would be no significant difference between high OCD group primed with feedback and low OCD group primed with feedback in terms of overall outcome confidence of the recollection.

5) Hypotheses for memory accuracy

a) It is hypothesized that there would be no significant difference between low OCD group and high OCD group in terms of memory accuracy.

b) It is hypothesized that there would be no significant difference between primed with feedback group and primed with no feedback group in terms of memory accuracy.

CHAPTER 2

METHOD

2.1. Study I: Identifying the Groups of the Experiment

2.1.1. Participants

The aim of this phase was to identify the participants based on their scores about obsessive-compulsive symptomatology. Participants were 397 undergraduate students from various departments in Middle East Technical University (METU). When examined the current psychiatric conditions, 16 students were excluded from the analysis because of the fact that they reported psychiatric medication such as antidepressant, anxiolytic and/or antipsychotic drugs. In the final analysis, 381 students were left.

Regarding the demographic characteristics of the students participated in the screening phase of the current study, mean age of 381 students was 20.57 ($SD=2.50$) and age range was between 17 and 44. Among the students, 232 were female (60.89%) and 149 were male (39.11%). The mean age of the females was 20.73 ($SD=2.04$). The mean age of the males was 20.31 ($SD=3.07$) (See Table 1).

Table 1. Sample Characteristics in Study I

Variables	Mean	SD	Min.	Max.
Age (Overall)	20.57	2.50	17	44
Age (gender groups)				
Female	20.73	2.04	17	29
Male	20.31	3.07	17	44

2.1.2. Materials

In order to identify the groups for the experimental phase of the study, Padua Inventory-Washington State University Revision (PI-WSUR) with demographic

information form were used.

2.1.3. Padua Inventory-Washington State University Revision (PI-WSUR) (Burns, Keortge, Formea, Sternberger, 1996)

The PI-WSUR is an abbreviated version of the Padua Inventory (Sanavio, 1988). PI-WSUR is a self-report questionnaire assessing the frequency and severity of obsessions and compulsions (Burns, Keortge, Formea, & Sternberger, 1996). On the 39 items of the PI-WSUR, scores in each item range from 0 (not at all) to 4 (very much). Five subscales of PI-WSUR are Obsessional Thoughts of Harm to Self/Others Subscale (7 items), Obsessional Impulses of Harm to Self/Others Subscale (9 items), Contamination Obsessions and Washing Compulsions Subscale (10 items), Checking Compulsions Subscale (10 items), and Dressing/Grooming Compulsions Subscale (3 items) (Jonsdottir & Smari, 2000). The PI-WSUR has acceptable reliability ($\alpha = .92$; Burns et al., 1996; cited in Cohen & Calamari, 2004), and test-retest reliability ($\alpha = .72$) (Jacobi, Calamari & Woodard, 2006).

Turkish adaptation of this scale has been made by Yorulmaz, Dirik, Karancı & Burns (2006). It is stated that the scale and its subscales show high internal consistency ($\alpha = .93 - .73$) and high test-retest reliability ($\alpha = .91 - .77$) (Yorulmaz, Dirik, Karancı & Burns, 2006). Moreover, the reliability of the scale in the current study is found as $\alpha = .92$. The sample items of the scale are presented in Appendix A.

2.1.4. Demographic Information Form

Demographic information form was to be administered in order to have information about age, gender, education level of participants and whether they were having psychotropic medication and/or psychological intervention. The form is presented in Appendix B.

2.1.5. Procedure and Results

Students from various departments at METU filled Padua Inventory-Washington State University Revision jointly with the demographic form. Students were given an informed consent before the application of the inventories. They signed the informed consent in order to specify their voluntary participation. Besides, participants were asked for giving their METU-IDs and frequently used e-

mail addresses for later contact in the experiment phase of the current study.

After analyzing the data for missing values, the group mean for PI-WSUR was 30.04 ($SD= 17.21$). For identifying the groups as “low OCD group” and “high OCD group”, one standard deviation around the mean score of PI-WSUR was partialled out. Participants scored half standard deviation above the mean of the PI-WSUR scores were assigned to the “high OCD group” and participants scored half standard deviation below the mean of the PI-WSUR scores were assigned to the “low OCD group”.

Taking the PI-WSUR scores for the differentiation of the groups, participants in the high OCD group had a score of 39 or above on PI-WSUR and the participants in the low OCD group had a score of 21 or below on PI-WSUR. One hundred and four (27.30%) students were identified as probable high OCD group and 137 (33.96%) students were identified as probable low OCD group.

2.2. Study II: Experimental phase

2.2.1. Participants

277 students were contacted via e-mail to ask to participate in the experiment; however, eighty-five students agreed to participate in the experimental phase of the study. After controlling the accuracy of the data file on the basis of normality and linearity assumptions, one case was found to be univariate outlier due to the having z-score above the 3.29. It was detected and excluded from the analysis. Therefore, the data obtained from 84 participants were used for further analysis. The mean age of participants was 21.36 ($SD= 2.32$) and the range was between 17 and 28. Of the participants, 64 (76.2%) were female and 20 (23.8%) were male.

Subjects were randomly assigned to the four conditions of the experiment: (a) high OCD group primed with feedback, (b) high OCD group primed with no feedback, (c) low OCD group primed with feedback, (d) low OCD group primed with no feedback. The age and gender of the subjects in the four groups was presented in Table 2.

Table 2. Sample Characteristics in Study II

Variables	(n)	Mean	SD
High OCD Group			
Primed with Feedback Group	21		
Age		21.05	2.38
Gender			
Female	14		
Male	7		
Primed with no Feedback Group	21		
Age		21.86	1.85
Gender			
Female	16		
Male	5		
Low OCD Group			
Primed with Feedback Group	21		
Age		21.10	2.26
Gender			
Female	17		
Male	4		
Primed with no Feedback Group	21		
Age		21.43	2.77
Gender			
Female	17		
Male	4		

When the PI-WSUR score of the high and low OCD group has been compared with an independent t-test in order to make sure that these groups were differentiated based upon the PI-WSUR scores, high OCD group significantly had higher scores than the low OCD group ($t(82) = 20.811, p < 0.001$). However, the scores of the subjects in the high OCD group primed with feedback were not significantly different than those in primed with no feedback ($t(40) = -.30, p > .05$). As similar, the scores of the subjects in the low OCD group primed with feedback were not significantly different than those in primed with no feedback ($t(40) = -.30,$

$p > .05$). The mean and standard deviation of PI-WSUR scores of the four different groups of the study were presented in Table 3.

Table 3. Descriptive Statistics of PI-WSUR scores of the groups

	N	Mean	SD
PI-WSUR			
High OCD Group	42	56.40	12.80
Primed with Feedback Group	21	55.81	12.64
Primed with no Feedback Group	21	57.00	13.43
Low OCD Group	42	12.91	4.15
Primed with Feedback Group	21	12.19	4.60
Primed with no Feedback Group	21	13.63	3.62

2.2.2. Materials

2.2.2.1. A Computer Animation Program for Assessing Compulsive Checking

A computer animation program has been used to test compulsive checking behavior. The original program has been developed and used by van den Hout and Kindt (2003) to draw inferences about the compulsive checking behavior. The program has been modified according to the purpose of the present study by the permission of van den Hout via e-mail.

The program briefly consists of gas stoves. The task of the subjects was to turn on, off and check the gas stoves whether they have been correctly turned off. In the training phase of the program, firstly, the content of the program has been explained. Then, the gas stove was introduced on the computer screen, including the 6 gas rings (circles) and gas knobs. In the training, all subjects are trained to learn the matches between the gas rings and gas knobs. In other words, they are instructed to turn on and off all gas knobs to see which one is controlling which gas ring. Gas rings are on by turning the gas knobs moving them with mouse to either left or right. Turning the gas knobs to the right opens the gas rings and a flame is seen on the corresponding gas ring; however, turning the gas knobs to the left closes the gas rings and the flame is disappearing from the screen.

The example of the gas stoves is presented in Figure 1. Bigger circles are representing the gas rings and smaller circles are representing the gas knobs and the

arrows are indicating which gas knob operates on which gas ring (See Figure 1).

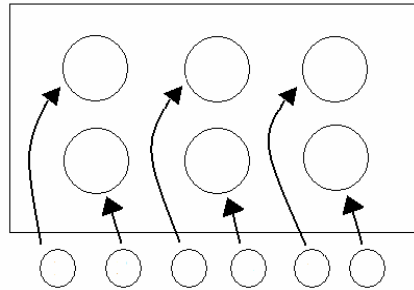


Figure 1: Schematic Drawing of the Gas Rings and Gas Knobs

After the training, the experimental phase of the program has been presented. In this phase, firstly, the schematic representation including the 6 circles which three of them were black and three of them were white was presented for 4 sec. It indicates that these black colored circles will be turned on on the next screen. After 4 sec. presentation, the gas rings and gas knobs are presented; and the subjects are asked to turn on the gas rings marked by black color on the previous screen, using appropriate gas knobs. When the subject turned on the gas ring, a flame has been displayed on the gas ring. They are also instructed that whenever they want to pass to the next screen, they would press the “OKEY” button. On the next screen, the gas rings are presented as open with flames. The subject now is instructed to turn off the gas rings and check them until becoming confident that the gas rings are completely turned off. Then, the subject passes through the next screen by pressing the “OKEY” button. In this step, the subject is asked to check the gas rings whether they are on or off, using the gas knobs. Then, the subject could pass to the next trial comes after all these operations.

There are 15 different trials on the program. In each trial, different combinations of three out of six circles representing the places of the gas rings for the following trial were presented. The combinations of three gas rings are

randomly defined. Out of 14 trials, the combinations of the three gas rings are different from one subject to another. However, the last trial (15th trial) is the same for all subjects.

Participants in primed with feedback condition, on the other hand, were kept on being instructed before passing the experiment phase. On their next screen, they were informed that sometimes they would be given a feedback. Regarding the feedback, it was told via the instruction that a red circle would display in the corresponded places of the combination three out of six gas rings after the trial indicating that this specific checking activity was definitely successful and complete. The primed with feedback group participants were instructed to remind themselves that the feedback in the form of red circle pointed out that the checking activity was complete and successful.

Reminding both orally and literally on the screen, it was stated that from now on in the experiment phase there would be an aid in the form of red circle mentioned above. They were informed that they would be not always but *sometimes* given that feedback after the trials they had turned off the gas rings completely. Therefore, not each trial that they turned off completely the gas rings they would be given this feedback. Consequently, it was stated orally that if they were not given this feedback then that meant either they turned the gas rings off completely or they did not turn them off completely; however, it was clearly stated that if they were given the feedback, then they would be *confident* that they turned the gas rings off completely and successfully.

Moreover, participants were instructed that there were two kinds of information within the given feedback. The first one was its appearance (as mentioned above concerning its nature, color, etc.) and the second one was the places of the three red circles in each specific trial.

In 14 trials, the number of trials presented feedback is 5; additionally, all subjects in this group are given the positive feedback on the last trial. The order of trials with the positive feedback among 14 trials is randomly determined for each subject.

On the other hand, regarding the number of trials, based upon the study of Coles, Radomsky, Horng (2006), it is limited in fifteen trials because it is found that the expected effect of the repetition starts to be developed and arisen between the

second and the tenth trial. Therefore, number of trials is limited to the fifteen trials instead of twenty-one trials like in van den Hout and Kindt (2003)'s study.

2.2.3. Procedure of the Experiment Part and Computer Animation (van den Hout & Kindt, 2003)

Participants scored half standard deviation above and below the mean score of PI-WSUR were contacted via e-mail to participate in the experimental phase of the study. When the students answered the e-mail, they were given an appointment to join the experiment. When a student came to the experiment, s/he was randomly assigned either to "primed with feedback" or "primed with no feedback" group.

After explaining the procedure of the study, participants sit in front of table with a PC in the psychology laboratory at the Social Sciences Building at METU. Participants were tested in a dimly lit and sound attenuated room. Each participant was individually tested and the experiment was approximately completed in 15-25 minutes.

During the experiment, each participant took the experiment on his/her own. However, experimenter was also in the laboratory room standing on the corner, out of the participants' vision. The rationale of the presence of the experimenter in the same room is in order to instruct the participants if there was anything not understood.

Immediately after the experiment, during the assessment section, for assessing memory accuracy, participants were given a schematic drawing with six gas rings on a page of paper to show which three of them they checked at the very last checking episode by crossing the corresponded circles for gas rings upon this paper. Moreover, for assessing vividness, detail and confidence in checking for the last trial of the checking behavior, participants were asked to indicate these variables on 100-mm Visual Analog Scales which 0 means not detailed, not vivid, and absolutely not confident; and which 100 means that extremely vivid, extremely detailed and absolutely confident about the answers of the participants related to the crosses that they put on the schematic drawing. Furthermore, for assessing the overall outcome confidence of the checking related to all fifteen trial, the question of "how confident are you that now all the gas stoves are really off throughout the experiment?" was asked to the participants again on 100-mm Visual Analog Scales

which 0 means not confident and which 100 means that extremely confident.

Regarding the current study, independent variables were group (high OCD group vs. low OCD group) and feedback condition (primed with feedback vs. primed with no feedback). Dependent variables were memory accuracy, memory confidence, detail and vividness of the recollection of the participants regarding the last checking episode and overall outcome confidence of the recollection of the participants regarding the whole experiment phase.

CHAPTER 3

RESULTS

Before statistical analysis, the data examined for missing values and outliers. One case was deleted due to being univariate outlier. Then, the data were analyzed using 2 (group: high OCD group vs. low OCD group) X 2 (feedback condition: primed with feedback vs. primed with no feedback) between subjects ANOVA separately for each dependent variable. Chi-square analyses were also conducted for assessing the memory accuracy of the participants regarding the very last trial of the experiment.

3.1. ANOVA Results

2 x 2 Between Subjects ANOVA was conducted for memory confidence related to the last checking episode. Means and standard deviations are presented in Table 4 and ANOVA results in Table 5.

Table 4. Descriptive Statistics for Memory Confidence

Group	Feedback Condition	N	Mean	SD
High OCD Group	Primed with feedback	21	83.33	22.77
	Primed with no feedback	21	70.71	28.78
	Total	42	77.02	26.41
Low OCD Group	Primed with feedback	21	80.48	32.13
	Primed with no feedback	21	59.86	36.74
	Total	42	70.17	35.65
Total	Primed with feedback	42	81.90	27.54
	Primed with no feedback	42	65.29	33.06
	Total	84	73.60	31.37

Table 5. ANOVA Results for Memory Confidence

Source	df	MS	F	Sig.	η^2
Group	1	987.43	1.06	0.31	0.01
Feedback Condition	1	5800.05	6.22	0.02	0.07
Group X Feedback Condition	1	336.00	0.36	0.55	0.00
Error	80	932.19			

The results showed that there was only a main effect of feedback condition ($F(1, 80) = 6.22, p < .05, \eta^2 = .072$). Participants in the primed with feedback group was found to have higher ($M = 81.90$) memory confidence than the participants in primed with no feedback group ($M = 65.29$). However, group main effect and interaction effect were not statistically significant.

2 x 2 Between Subjects ANOVA was conducted for the level of detail of the recollections for the last checking episode. Means and standard deviations are presented in Table 6 and ANOVA results in Table 7.

Table 6. Descriptive Statistics for Level of Detail

Group	Feedback Condition	N	Mean	SD
High OCD Group	Primed with feedback	21	77.62	23.70
	Primed with no feedback	21	72.38	26.77
	Total	42	75.00	25.11
Low OCD Group	Primed with feedback	21	74.76	28.44
	Primed with no feedback	21	58.43	31.74
	Total	42	66.60	38.89
Total	Primed with feedback	42	76.19	25.89
	Primed with no feedback	42	65.40	29.85
	Total	84	70.80	28.30

Table 7. ANOVA Results for Level of Detail

Source	df	MS	F	Sig.	η^2
Group	1	1483.44	1.92	0.17	0.02
Feedback Condition	1	2442.96	3.16	0.08	0.04
Group X Feedback Condition	1	646.30	0.84	0.36	0.01
Error	80	773.54			

According to the results, main effect of feedback condition is “marginally” significant ($F(1, 80) = 3.16, p < .08, \eta^2 = .004$). Participants with feedback group were found to have more detailed recollections regarding the last checking episode ($M = 76.19$) than participants in primed with no feedback group ($M = 65.40$). Moreover, there was not a significant main effect of group and an interaction effect.

2 x 2 Between Subjects ANOVA was conducted for level of vividness of the recollections for the last checking episode. Means and standard deviations are presented in Table 8 and ANOVA results in Table 9.

Table 8. Descriptive Statistics for Level of Vividness

Group	Feedback Condition	N	Mean	SD
High OCD Group	Primed with feedback	21	82.90	21.65
	Primed with no feedback	21	71.19	27.56
	Total	42	77.05	25.19
Low OCD Group	Primed with feedback	21	73.43	31.20
	Primed with no feedback	21	64.14	32.79
	Total	42	68.79	32.05
Total	Primed with feedback	42	78.17	26.95
	Primed with no feedback	42	67.67	30.22
	Total	84	72.91	28.95

Table 9. ANOVA Results for Level of Vividness

Source	df	MS	F	Sig.	η^2
Group	1	1443.44	1.74	0.19	0.02
Feedback Condition	1	2315.25	2.82	0.10	0.03
Group X Feedback Condition	1	30.96	0.04	0.85	0.00
Error	80	822.24			

Results showed that main effect of feedback condition is “marginally” significant ($F(1, 80) = 2.83$, $p < .10$, $\eta^2 = .003$). Participants in primed with feedback group were found to have more detailed recollections regarding the last checking episode ($M = 78.17$) than participants in primed with no feedback group ($M = 67.67$). However, there was not a significant main effect of group and the interaction effect.

2 X 2 Between Subjects ANOVA was conducted for overall outcome confidence for all checking episodes of the experiment. Means and standard deviations are presented in Table 10 and ANOVA results in Table 11.

Table 10. Descriptive Statistics for Overall Outcome Confidence

Group	Feedback Condition	N	Mean	SD
High OCD Group	Primed with feedback	21	87.86	12.14
	Primed with no feedback	21	75.95	22.17
	Total	42	81.90	18.65
Low OCD Group	Primed with feedback	21	87.05	12.00
	Primed with no feedback	21	82.52	22.66
	Total	42	84.79	18.05
Total	Primed with feedback	42	87.45	11.93
	Primed with no feedback	42	79.24	22.39
	Total	84	83.35	18.30

Table 11. ANOVA Results for Overall Outcome Confidence

Source	df	MS	F	Sig.	η^2
Group	1	174.30	0.54	0.47	0.01
Feedback Condition	1	1416.96	4.37	0.04	0.05
Group X Feedback Condition	1	286.01	0.88	0.35	0.01
Error	80	324.02			

Results showed that there was not a significant main effect of group. The only significance was found for the main effect of feedback condition on overall outcome confidence ($F(1, 80) = 4.37, p < .05, \eta^2 = .052$). Participants in primed with feedback group was found to have higher ($M = 87.45$) overall outcome confidence scores than the participants in primed with no feedback group ($M = 79.24$). However, there was not a significant interaction effect for the analysis.

3.2. Chi-Square Analysis

In order to examine the accuracy of answers of participants to the question about which three out of six gas rings they checked on the last checking episode, a chi-square analysis was carried out. Participants accurately indicated the gas rings scored one and participants inaccurately indicated the gas rings scored zero. It was found that participants in two different groups were statistically significant in terms of their answers in accuracy ($\chi^2(1, N=84) = 6.57, p < .01$) when taking group into account. While 17.9% of the participants gave inaccurate answers, 82.1% of the participants gave accurate answers to the question mentioned above. Furthermore, in order to examine whether the accuracy of the answers varied as a function of the group, a post-hoc chi-square analysis was performed. Results of that analysis showed that high OCD group gave significantly more accurate than inaccurate answers ($\chi^2(1, N=42) = 30.86, p < .001$) and similarly that low OCD group gave significantly more accurate answers than inaccurate ones ($\chi^2(1, N=42) = 7.71, p < .01$).

However, related to our first hypothesis concerning the memory accuracy, more specifically, it is found that when only accurate answers are taken, answers of participants in low OCD group and in high OCD group is not differentiated significantly ($\chi^2(1, N=84) = 1.17, p > .05$) in terms of memory accuracy (See Table

12. Moreover, the results also showed that when only inaccurate answers are taken into consideration, participants in the low OCD group had significantly more inaccurate answers than participants in the high OCD group in terms of memory accuracy ($X^2 (1, N=84) = 5.40, p < .05$).

Table 12. Crosstabulation of Group and Memory Accuracy

Group	Accuracy		N
	Inaccurate	Accurate	
High OCD Group	3 (3.6%)	39 (46.4%)	42
Low OCD Group	12 (14.3%)	30 (35.7%)	42
Total	15 (17.9%)	69 (82.1%)	84

Specifically, when taken feedback condition into account, as a result of analysis of chi-square independence test, the results indicated that participants gave more accurate answers than inaccurate answers ($X^2 (1, N=84) = 3.98, p < .05$). While 17.9% of the participants gave inaccurate answers, 82.1% of the participants gave accurate answers to the question mentioned above. Furthermore, in order to examine whether the accuracy of the answers varied as a function of feedback condition, another chi-square analysis was performed. It was found that analysis showed that participants in primed with feedback group gave significantly more accurate than inaccurate answers ($X^2 (1, N=42) = 27.52, p < .001$) and in the same way that participants in primed with no feedback group gave significantly more accurate answers than inaccurate ones ($X^2 (1, N=42) = 9.52, p < .01$). Moreover, related to our second hypothesis regarding memory accuracy, when only the accurate answers are taken, the results show that answers of participants in primed with feedback group and primed with no feedback group is not differentiated significantly ($X^2 (1, N=84) = 0.71, p > .05$) in terms of memory accuracy (See Table 13).

Table 13. Crosstabulation of Feedback Condition and Memory Accuracy

Feedback Condition	Accuracy		N
	Inaccurate	Accurate	
Primed with feedback	4 (4.8%)	38 (45.2%)	42
Primed with no Feedback	11 (13.1%)	31 (36.9%)	42
Total	15 (17.9%)	69 (82.1%)	84

CHAPTER 4

DISCUSSION

In this chapter, firstly, the main findings of the current study are tried to be summarized and in accordance with this, evaluations of these findings are tried to be proposed. Upon those declarations, the next step would be contributions and future suggestions of the present study shall be asserted accompanied by the limitations related to the current study are delivered.

4.1. Summary of Main Findings

Remembering the assessment procedure of the current study, there are two groups of questions asked to participants. The first group is related to the very last checking episode regarding the vividness, detail and confidence of the recollections of participants. The results of the current study revealed that there was only a significant main effect of the feedback condition upon the confidence level of participants regarding the very last checking episode. Specifically, participants primed with feedback group had significantly higher scores on level of confidence than participants primed with no feedback group. Hence, the hypothesis about the main effect of feedback condition was confirmed. Furthermore, it was found on the contrary of the expectation that there were both no significant group main effect and interaction effect between feedback condition and group over the confidence level concerning the very last checking episode. Parenthetically, participants in the high OCD group had higher level of detail, level of vividness and memory confidence scores than participants in the low OCD group even the difference was not significant. Moreover, based on the observation of the experimenter, it is asserted that participants in the high OCD group spent more time to complete the task than participants in the low OCD group. Yet, this time difference was not measured. Regarding these findings and observation, it could be suggested that participants in

the high OCD group seems to be benefitted from their condition if they are classified as subclinical OCD group based on their high scores on the PI-WSUR. Besides, concerning the memory accuracy it was also found that participants in the low OCD group had significantly more inaccurate answers than participants in the high OCD group.

According to the findings of the current study about the level of detail of the recollection of participants, it was found that there were no significant main effects of either feedback condition or group. There was also no significant interaction effect for level of detail of participants' recollections about the very last checking episode. Therefore, hypotheses regarding the level of detail were not confirmed.

Concerning the level of vividness, very similar scene was come into being. Based on the results of the current study in relation with the level of vividness, it was found that there was neither significant main effect of feedback condition nor main effect of group. Accordingly, there was no significant interaction effect for the level of vividness of participants' recollection. Therefore, hypotheses regarding this issue were also not confirmed in the framework of the current study.

In terms of overall outcome confidence, there was a significant main effect of feedback condition as expected. Specifically, participants in primed with feedback group had significantly higher scores on overall outcome confidence level than the participants in primed with no feedback group. Therefore, hypothesis about the main effect of feedback condition was confirmed. Moreover, there was no significant main effect of group or interaction effect over overall outcome confidence level of participants. Thus, hypotheses about the main effect of group and interaction effect over overall outcome confidence were not confirmed.

Regarding the memory accuracy, it was found that there were no significant differentiations between both low OCD group and high OCD group and primed with feedback group and primed with no feedback group in terms of memory accuracy.

4.2. Evaluations and Proposals Regarding Main Findings

Before passing to the proposal of the present study regarding this finding, it is worthwhile to repeat the basic aim of the current study. The basic aim was to ameliorate reduced level of confidence in the face of repeated checking observed in

the computer animation by giving a positive feedback after the trial indicating that the checking operation is successful and complete. It is also meaningful to remember the conditions and results of van den Hout and Kindt (2003)'s study. In their study, there was relevant condition in which the participants repeatedly turn on, turn off, and check gas rings throughout twenty trials and there was irrelevant condition in which the participants turn on, turn off, and check light bulbs throughout twenty trials. Then, without any delay, all participants turn on, turn off, and check gas rings for one trial as a last checking episode. Here, it could be asserted that relevant condition of their study and primed with no feedback group is similar in that participants repeatedly turn on, turn off, and check virtual gas rings on the computer animation. According to the results of their study, there was significant differentiation between two conditions in terms of level of confidence, detail and vividness of the recollections of participants. However, there was no differentiation between these conditions regarding the level of outcome confidence.

At this point, we could also remember the explanation of van den Hout and Kindt (2003) about the distrust experienced in the face of repeated stimuli. They proposed that the operations of participants in the computer animation is similar to the way checkers check. Moreover, they argue that repeated checking observed in compulsive checking behavior is stem from the fact that checking increases familiarity with the checked material. Then, increased familiarity resulted in decreased vividness and detail and consequently reduced memory confidence. Meanwhile, it is asserted that increased familiarity favors conceptual processing and simultaneously hinders the perceptual processing. Reduced vividness and detail is a result of inhibited perceptual processing. However, in the framework of the present study, distrust experienced in the face of repeated stimuli is tried to be explained from a relatively different viewpoint.

Upon the finding concerning the main effect of feedback condition over memory confidence and overall outcome confidence of participants, it would be suggested that giving a positive feedback saying that checking activity was complete and successful was beneficial. At what respects could utilization of feedback be beneficial in participants in primed with feedback group?

The basic proposal of the current study for this beneficence would be that giving feedback would make the trials more distinctive. That is, trials in primed

with feedback condition could be perceived more distinctive from each other than trials in primed with no feedback condition because in primed with feedback condition given feedback tells them that they would trust that this specific episode is successful and complete. By this provided information, trials would be differentiated from each other. Meanwhile, it is proposed that this kind of differentiation is not in primed with no feedback condition. Hence, with the help of this differentiation giving feedback to participants could elicit a classification or category in the minds of participants in primed with feedback group. Regarding the assumed classification or category, it is proposed that by the utilization of feedback there emerged two alternatives in the minds of participants in primed with feedback group about the checking episodes: “This specific checking activity was complete and successful” or “the deduction about the inference of specific checking activity was uncertain –it could be complete or incomplete”. Meanwhile, it should be remembered that giving feedback includes two kinds of information. The first one is its appearance accompanied by its meaning that the checking episode is successful and complete and the second one is specific places of red circles in particular checking episode. Therefore, it could be summarized that giving feedback would result in differentiation among trials by preventing the trials being perceived in a confused manner; then, it would bring about distinctiveness and subsequent increased level of memory confidence and also overall outcome confidence.

Before all else, in order to obtain support and establish this proposal firmly, we should examine the literature of the clinical psychology and specifically the literature of compulsive checking behavior. At first, in order to emphasize the group of concepts such as differentiation, distinctiveness, classification, etc. which are the basic elements of proposal of the present study, we should repeat the study stating that control participants differentiate between the situations which merit concern and the ones which do not merit concern better than individuals with OCD (Foa et al., 2001). Furthermore, it is asserted that people with OC symptoms seem to be more cautious; they take longer to categorize objects and more frequently request information to be repeated when compared to the controls (e.g., Frost et al., 1988; cited in OCCWG, 1997). Besides, people with OCD show more doubt about the correctness of their decisions (Frost & Shows, 1993). Regarding these kinds of

decision-making difficulties, it is proposed that beliefs about the need for certainty may lead to those difficulties (OCCWG, 1997). The results appear to imply that persons with OCD have a difficulty in discriminating and sorting situations (and experiences) they face.

Another support for the current study's proposal comes from Reed's cognitive structural model proposed in 1985. Although his model is criticized and ignored in the literature, it seems to be quite effective at focusing the concept of categorization. It asserts that malfunction and difficulty in categorizing and structuring one's experiences (and also memories) result in a compensatory over-structuring. For instance, doubting, indecision, rumination, and particular compulsions like checking rituals are the outcomes of one's difficulty in categorizing his/her experiences (cited in Taylor, 2005). It is also proposed related to this specific subject matter of current study that doubt relating past actions could be cured by increasing the distinctiveness of past actions (Tallis, 1997; cited in Hermans et al., 2003).

Along with proposal of the present study, checking is defined as counter-productive coping strategy in order for enriching memory episodes to make them more distinctive (Moritz, Jacobsen, Willenborg, Jelinek, & Fricke, 2006). Consistent with the view above, it is advocated that OCD patients are thought to profoundly dependent on visual information (Encker & Engelkamp, 1995; Reed, 1985; Tallis, 1997; cited in Moritz et al., 2006). Thus, checking could be understood as it being a *personal stamp* on an act to increase its vividness and retrievability in episodic memory. Yet, it is suggested that this strategy may not help one distinguish successive memory episodes in the long run and it blurs the distinctiveness of the current episode because of the fact that chain of rituals look increasingly alike (Tolin et al., 2001; van den Hout & Kindt, 2003; cited in Moritz et al., 2006). From the same viewpoint, it could be stated that Moritz et al. (2006)'s explanation about the compulsive checking could be an answer to the situation why many OCD patients change their rituals- compulsive scripts- over time. That is, compulsive scripts are changed to reach distinctiveness.

Moritz et al. (2006)'s conceptualization looks as if being totally in the different way with the explanation of low confidence in compulsive checking behavior proposed by van den Hout and Kindt (2003). It seems to be different and

sound because it argues that as repetition occurs in checking activity sensory vividness decreases (as a normal consequence). Also, it would be suggested that this account involves distinctiveness issue, which could be thought as central for the compulsive checking literature within the current study.

Consistent with the view that distinctiveness is blurred by repeated checking, it is asserted that checking behavior, as the main characteristics of compulsive behavior, occurs as the people are their own home and when the people are alone (Rachman, 2002). This valuable information seems to imply that circumstance of checking behavior does not involve any discriminative stimulus. That is to say, if one mostly engages in checking behavior in his home, then it could be stated that there is no any condition which he is not familiar. Also, if one does this behavior when he is alone, then it could be argued that there is no one interrupts and generate any different stimuli around him. Upon these conceptualizations, it could be said that compulsive checking activity often occurs when there is minimum level of distinctiveness in terms of cue/clue around. Also, it could be asserted that in the condition of increased compulsive checking clues turn out to be similar to each other. The only distinctiveness source could be the internal world of the person with the compulsive checking activity.

From a relatively different viewpoint, it could be stated that many patients show considerable “loss of uncertainty” and “decrement of compulsive checking problems” only when they are on holidays and during the first days in the inpatient wards (van den Hout, Emmelkamp, Kraaykamp, & Griez, 1998). However, when they become adapted to relatively novel place, then it is observed an increment in compulsive checking behavior. Based upon this observation, one could state that changing the environment of the checking contexts would have a fleeting but positive effect on checking behavior due to the fact that the chain of similarity would be broken with the help of the different perceptual scene and/or different cognitions/emotions either in holiday or in inpatient ward. However, after adaptation occurs, chain of similarity seems to be reconstructed. It seems that the literature of clinical psychology converges upon the same point repeatedly: “distinctiveness”.

Furthermore, related to relationship between distinctiveness together with classification and memory performance, there is a growing body of literature which

the current study could benefit. Here, this literature is tried to be summarized with the link to the present study.

Upon the cumulated literature of psychology related the importance of distinctiveness, it is concluded that the human system appears to base upon the process which constructs distinctive representations of individual objects like visual attributes, meaningful identity and function when coding the semantic and visual information (Cooper & Schacter, 1992). Moreover, it is suggested that distinctiveness may lead to increased retrievability (Bunting, 2006). Furthermore, it is declared that when to be remembered item is more elaborated, distinctiveness is changed or modified and consequently memory improved (Mandler, 2002). Along with the view of the discrimination amongst the stimuli, it is asserted that learning to categorize objects often results in acquired distinctiveness between categories or acquired equivalence within categories about the way to discriminate (Livingston et al., 1998; cited in Preminger, Sagi, & Tsodyks, 2007).

Consistent with the point of view stated above about the distinctiveness among the stimuli, more importantly, it is found that experience with stimuli is thought to increase their perceived similarity and decrease their discriminability. Therefore, it is concluded that changes in perceived similarity would correlate with changes in identification and recognition in that increase in perceived similarity would result in decrease in identification and recognition (Preminger, Sagi, & Tsodyks, 2007).

Concerning the repetition of the stimuli (it could also be stated that as the stimuli is presented repeatedly the experience with stimuli increased); there is a study which is more related to the concern of the current study. According to this study, it is also argued that by means of repetition a sequence of correlated memory patterns may collapse into a single unified representation (Blumenfeld, Preminger, Sagi, & Tsodyks, 2006; cited in Preminger, Sagi, & Tsodyks, 2007).

All in all, it would be proposed that the human system could be thought as being an active searcher reeking off distinctive category to make sense of his environment using the clues around him. However, imposed similarity appears to have an adverse effect upon this proposed system.

In order to integrate this cumulated literature with our subject matter, it could be urged that “similarity and distinctiveness matter” is very closely associated

with and analogous to both the situation in the relevant condition of the computer animation used in van den Hout and Kindt's studies (e.g., 2003, 2004) and primed with no feedback group in the current study in that each trial turns out to be similar to each other over trials. That is, as experience with stimuli is increased over trials in the experiment in relevant condition and primed with no feedback group, similarity between the trails is increased and the correlated memory patterns appear to be collapsed into a single unified representation. Thus, finally, distinctiveness amongst the trials appears to vanish.

In the mentioned relevant checking condition in van den Hout and Kindt (2003)'s study and in the primed with no feedback group in the present study, one could argue that there are some clues as physical characteristics of the experiment room which could be used as helper in checking rituals; however, these suggested clues could be thought to be too much similar that human system could not operate on them without any reference point to make them distinctive. Furthermore, it should be stated that in the environment of current experiment setting there is little stimuli and these stimuli on each computer screen are similar to each other except the combination of the indicated circles from trial to trial.

In summary, within the results of the current study, it could be suggested that giving a positive feedback to the participants in the primed with feedback group which indicated that they could trust that the specific checking activity is successful and complete was helpful in constructing a reliable and valid classification based on the distinction between the "in this specific checking episode, gas rings are off" and the "in this specific checking episode, the outcome is not definite". Parenthetically, it should be remembered that giving feedback includes two kinds of information. The first one is its appearance combined with its meaning indicating that the checking activity is successful and complete and the second one is specific places of red circles in particular checking episode. Furthermore, it would be asserted that instructions about giving such a feedback would clarify the participants' minds that they construct a body of information which is categorized into two distinctive dimensions. Then, it could also be suggested that participants assimilate information involved in feedback into this body of information provided within the instructions.

Moreover, it is suggested that feedback usage prevented the increased

similarity over trials. It seemed also enable participants to behave uniquely towards each trial instead of behaving in a unified manner. This process was thought to eventuate with the help of classification and thus reached distinctiveness. Finally, by this distinctiveness captured, participants in primed with feedback group report significantly higher scores over confidence in their memory and overall outcome confidence than the participants in primed with no feedback group.

Related to the current findings, a particular question could be useful: Why did giving positive feedback seem to be helpful for both confidence and overall outcome confidence level of participants in primed with feedback group while unhelpful for level of detail and vividness of participants in primed with feedback group -which was contrary to the expectation?

In order to answer this question in a valid manner, it is worthwhile to remember the literature of psychology more closely. It is proposed that mental images are transformed into words or another type of representation; therefore sensory vividness is reduced (Horowitz, 1983, cited in Hodes, 1994). When looking at the compulsive checking, particularly, it is suggested that reduced vivid encoding is a (normal) result of repetitive checking (Moritz et al., 2006). Therefore, in both the condition of repetition and non-repetition, reduced vividness is a normal consequence. That is, giving feedback is beneficial for the level of memory confidence and overall outcome confidence but not for level of detail and vividness since level of vividness and possibly level of detail is already reduced in the face of repeated checking normally.

In order to unite the viewpoints and findings of van den Hout and Kindt (2003)'s study and the current study, it may possibly be suggested that participants in the relevant condition of the van den Hout and Kindt (2003)'s study and participants in the primed with no feedback group faced similar experimental design as mentioned in elsewhere throughout these elaborations and conceptualizations. Examined the current study specifically, when feedback was utilized upon the participants in primed with feedback group level of confidence and also overall outcome confidence of recollections of participants were elevated significantly but feedback utilization had not any impact over level of vividness and detail of the recollection of participants compared with the scores of participants in the primed with no feedback group. Here, let ourselves remember the irrelevant condition of

the van den Hout and Kindt (2003)'s study for a while. In that specific condition, not only in terms of level of confidence but also in terms of level of detail and vividness of participants' recollections were found to be significantly higher than the scores of participants in the relevant condition.

For seemingly differential results caused by different experimental manipulations, these crucial questions emerge at this point: What kind of a mechanism deserves to be investigated for the differential effect of these experimental manipulations? Specifically, what is the difference between these two experimental manipulations? That is to say, what is the inadequacy of feedback utilization and at the same time what is the adequacy of irrelevant condition in generating the significantly elevated scores in terms of level of vividness and detail of the recollections?

If the focus of discussion is converted to the differential results between relevant and irrelevant conditions of van den Hout and Kindt (2003)'s study, then it could be stated about significantly more elevated scores in terms of both level of detail, vividness and confidence participants regarding the very last checking activity in the irrelevant condition than in the relevant condition that the main point would be the unexpected 21st checking episode in the irrelevant condition of van den Hout and Kindt (2003)'s study. It seems to detach the participants sharply from the stream of repetition of the "20 trials of repeated light bulb checking activity". This detachment could also be benefited from the inherent differential characteristics of visual stimuli. That is, the characteristics of the visual stimuli are indeed different in that the processes of turning on, turning off and checking the light bulbs and gas rings were quite unlike upon the screen in the computer animation. That is, turning on and off gas ring in the computer animation requires behavior with mouse on the computer which is very close to the real practice done in real gas stoves. However, turning on and off light bulbs requires behavior with mouse moving the sliding panels right and left. Moreover, positioning of gas rings and light bulbs are quite different in that six gas rings are positioned in a horizontal axis in two lines; yet, six light bulbs are positioned in semicircular line. Therefore, it could be asserted that perceptually they are different and this difference would serve this proposed detachment. Consequently, this proposed detachment process would produce adequate level of distinctiveness that the human system could act

upon.

When the focus is converted to the differential results between the primed with feedback group and primed with no feedback group, it could be suggested that feedback utilization might have detached the participants from the stream of repetition only in terms of level of confidence and overall outcome confidence. Yet, cue utilization appeared not have enough power in the detachment process of participants in terms of detail and vividness of the recollections.

Assuming that distinctiveness could be reached by categorization or classification, there seems to be classification in primed with feedback group as “this checking episode is definitely successful and complete” and “the result of this episode is not define”. It could be advocated that participants in primed with feedback group elaborated upon the given feedback (firstly they see the red circles, they remember the instructions related to its meaning, they infer that this checking activity is successful and complete) and then they reach this kind of classification. However, participants in irrelevant condition do not need have such kind of elaboration that the assumed classification between the twentieth and twenty-first trial seems to be already available without any cognitive operation. Upon all these, it would be suggested that while primed with feedback group is cognitively distinctive from primed with no feedback group, irrelevant condition is perceptually distinctive from relevant condition. This proposed differential level of distinctiveness could bring about such seemingly different results.

This somewhat differential consequence could be illustrated with the help of an imaginary scene. In order to build that imaginary scene we should think an imaginary person with compulsive checking symptoms. For instance, think that he has intrusions and doubts about the locking his home’s door. He spends approximately half an hour everyday for his checking activity. Based on the literature discussed, it could be inferred that both level of detail, vividness and confidence level of his recollections about the very last door locking activity is decreased. If, in this imaginary picture, someone or something helps him as Tallis (1993) tried to reduce the source of doubt or as the current study tried to do so by indicating that the door is locked completely, then he would be self-confident about the last checking activity. Yet, the level of vividness and detail would not be benefited from this aid. However, if we change the imaginary scene after one of his

checking episodes, for example, if the color of his door is changed all of a sudden from, for instance, brown to pink then both level of vividness, detail and confidence of his recollection about the last checking activity would probably elevate. In other words, in that second imaginary scene the aid is in the form of changing the perceptual environment which presumably diffuses all the components of the memorial processes, namely both level of detail, vividness and confidence of the recollections. It could be proposed that by changing the perceptual environment the adequate level of distinctiveness regarding level of detail and vividness is reached.

Meanwhile, it should be stated that this second imaginary scene resembles to the irrelevant condition of the study of van den Hout and Kindt (2003) in that they both seem to be designed in order to detach people from the recursive stimuli. However, we should specify that we would not easily come across a situation in real life like in our second imaginary scene or like in irrelevant condition mentioned above. That kind of situations seems to be somewhat fictional in that although this sort of sharp change could be constructed virtually, for example in computer screen or our imaginary scene or even during our dreams, the perceptual environment in real world does not generally change all at once.

It could be summarized that human system can act upon predominantly confidence component in everyday life. Acting upon detail and vividness components seem to be somewhat difficult. Confidence seems to be different from the components of level of vividness and detail. Regarding confidence, it is suggested that it is a kind of mental end products (van den Hout & Kindt, 2003). Also, it would be said that confidence is a branch of inferential process. When examining the inferential process, it appears to diffuse all capillaries of our lives in a sophisticated way. For example, when we see an outlook with snow on roof of houses, roads, vehicles and above the trees, etc., then we review this scene as being a *winter* scene instead of reporting all the detail about that outlook. Also, experiencing the trouble with our friend on a trivial topic could make us feel annoyed and we might report that he or she makes me crazy again instead of stating whole quarrel fully with the time, place of this quarrel and/or with the words said each other. It could be advocated that this conglomerating kind of process summarizes the whole perceptual and consequently memorial and emotional experiences and at the end, an inference is reached. Specifically speaking related to

subject matter of the current study, therefore, level of confidence seems to be a sort of inference arrived at the end of the repeatedly checking episodes in a life of a person with OC symptomatology or in a person participated in the studies mentioned above.

Although the main effect of feedback condition over level of vividness and level of detail is found to be marginally significant, this effect would not be concrete in terms of its significance. Therefore, regarding the insignificant results of the group main effect and interaction effects in the present study, it could be asserted that perhaps due to the fact that half standard deviation above and below the mean is selected to identify our groups. It could be possible that this selection is faulty that it is not adequate for dividing the groups as high and low OCD groups that there does not emerge any significant effect.

Concerning the results for the memory accuracy, it could be proposed that low confidence hypothesis is again supported. That is, there is intact memory accuracy in primed with feedback group and primed with no feedback group; however, confidence level is reduced in primed with no feedback group. Within the framework of the current study, it would be suggested that results related to the memory accuracy is replicated.

4.3. Limitations and Directions of the Current Study

As for the limitations of the current study, it could be suggested that target population is non-clinical student sample. Therefore, generalization of the results to the clinical population is difficult since the current results are based on the non-clinical population. Moreover, it could be suggested related to the computer animation that we should examine the degree of the reliability of the measurement of the computer animation. That is, participants are forced to turn on, turn off and check the gas rings with instructions in an experiment environment. This circumstance may affect the reliability of the findings of the present study in a negative way.

Regarding the identification of the groups, another limitation was that only PI-WSUR was used to identify the participants. There were no other questionnaires and/or inventories to identify the groups. Moreover, PI-WSUR was not applied to participants after the experiment. Also, participants might give answers to this

inventory in a socially desirable way. These mentioned factors might impact the current study negatively.

There also emerge some suggestions for further research upon the methodology of the current study. A clinical population could be added to the design of the study as OCD group. In addition to that, some control groups could be used from the other groups of anxiety disorders population such as generalized anxiety disorder, post-traumatic stress disorder, social phobia, etc. in addition to OCD population.

Besides, in addition to using gas rings, more neutral material than gas ring like light bulb would be used in the computer animation. The rationale of using light bulb checking would be in the proposal that as exposure to any material increased, confidence in memory is decreased (van den Hout & Kindt, 2003). The extent of the reduced confidence in memory could be evaluated by using light bulbs in the computer animation compared with usage of gas rings in the primed with no feedback or primed with feedback conditions of the current study.

Moreover, in primed with feedback groups, participants are given six feedbacks out of fifteen trials. The number of given feedbacks could be diversified. Moreover, in order to be in parallel with the studies in the literature, time course would be another fundamental variable that further studies could deal with. For instance, the number of trials could also be diversified that the effect of feedback would be understood more profoundly. Feedback, on the other hand, could be given in an auditory format. Also, it could be given in both visual and auditory format. Besides, participants would be asked to say out loud the meaning of the feedback given. That is, after they see the feedback on the computer screen, then they would be asked to say out loud that this specific checking activity is complete and successful. Furthermore, participants would be asked to indicate how they used the given feedback. Besides, participants in primed with no feedback group could be asked to tell if they generate a clue for later remembering.

Moreover, outcome confidence component in van den Hout and Kindt (2003)'s study is not assessed in the current study. If this methodological deficiency is fixed, then much more sound inferences could be drawn upon. That is, in van den Hout and Kindt (2003)'s study, participants in relevant condition are not significantly less confident about both the places of gas rings that they checked

in the very last trial and the outcome of the last checking episode about whether the gas rings are really off compared with participants in the irrelevant condition. Moreover, participants in the irrelevant condition were relatively confident about the places of the gas rings that they checked in the last episode; however, they are not adequately confident about the outcome of the checking operation in the very last checking trial when compared with participants in the relevant condition.

In the current study, on the other hand, participants in all conditions are asked to indicate only their confidence level about the last checking episode. That is, the level of confidence about the places of the gas rings in the last trial is asked. Instead of outcome confidence, overall outcome confidence is asked. One could argue that keeping in mind that participants in primed with feedback group are significantly more confident for the end result of turning off the gas rings throughout the fifteen trials than participants in primed with no feedback group, then it would be suggested that if outcome confidence level regarding the last checking episode was asked, then participants in primed with feedback group would have significantly higher scores than participants in primed with no feedback group. However, outcome confidence level was not asked. For a more clear inference to be drawn upon these findings, outcome confidence should also be asked for participants to indicate. It could be a supplementary suggestion for further studies.

As a clinical application inferred from this specific study, moreover, it could be argued that the contribution of the current study's standpoint would help the treatment process of compulsive behavior. A person would generate a positive feedback about his/her compulsive behavior during checking activity (regardless of whatever it is either gas knobs checking or locking the door) would be valuable for the confidence level of that person. That is, for example, if one has a compulsive act of locking his door repeatedly due to the doubt felt, then saying out loud that "the door is locked completely" could elevate his confidence level adequately that his doubt would be reduced.

REFERENCES

- Amir, N. & Kozak, M. J. (2005). Information Processing in Obsessive Compulsive Disorder. In *Cognitive Approaches to Obsessions and Compulsions: Theory, Assessment, and Treatment*, Frost R. O. & Steketee, G. (Ed.), 165-181.
- Anderson, J. R. & Bower, G. H. (1973). *Human Associative Memory*. Washington, DC: Winston.
- Beck, A. T. (1976). *Cognitive Therapy and the Emotional Disorders*. New York: First Meridian Printing.
- Bijttebier, P., Vasey, M. W., & Braet, C. (2003). The information-processing paradigm: a valuable framework for clinical child and adolescent psychology. *Journal of Clinical Child and Adolescent Psychology*, 32 (1), 2-9.
- Brown, H. D., Kosslyn, S. M., Breiter, H. C., Baer, L., & Jenike, M. A. (1994). Can patients with obsessive-compulsive disorder discriminate between percepts and mental images? A signal detection analysis. *Journal of Abnormal Psychology*, 103, 445-454.
- Bunting, M. (2006). Proactive interference and item similarity in working memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 32 (2), 183-196.
- Burgess, J. S., Jones, L. N., Robertson, S. A., Radcliffe, W. N., Emerson, E., Lawler, P. et al. (1981). The degree of control exerted by phobic and nonphobic verbal stimuli over the recognition behavior of phobic and nonphobic subjects. *Behaviour Research and Therapy*, 19, 223-234.
- Burns, G. L., Keortge, S. G., Formea, G. M., Sternberger, L. G. (1996). Revision of the Padua Inventory of obsessive compulsive disorder symptoms: distinctions between worry, obsessions, and compulsions. *Behaviour Research and Therapy*, 34, 163-173.

- Cartwright-Hatton, S. & Wells, A. (1997). Beliefs about worry and intrusions: The metacognitions questionnaire and its correlates. *Journal of Anxiety Disorders, 11* (3), 279-296.
- Cohen R. J. & Calamari, J. E. (2004). Thought-focused attention and obsessive-compulsive symptoms: an evaluation of cognitive self-consciousness in a non-clinical sample. *Cognitive Therapy and Research, 28* (4), 457-471.
- Coles, M. E., Radomsky, A. S., & Horng, B. (2006). Exploring the boundaries of memory distrust from repeated checking: Increasing external validity and examining thresholds. *Behaviour Research and Therapy, 44*, 995–1006.
- Constans, J. I., Foa, E. B., Franklin, M. E., & Mathews, A. (1995). Memory for actual and imagined events in OC checkers. *Behaviour Research and Therapy, 33*, 665-671.
- Cooper, L. A. & Schacter, D. L. (1992). Dissociations between structural and episodic representations of visual objects. *American Psychological Society, 1* (5), 141-146.
- Fisher, P. L. & Wells, A. (2005). Experimental modification of beliefs in obsessive-compulsive disorder: a test of the metacognitive model. *Behaviour Research and Therapy, 43*, 821-829.
- Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin, 99*, 20-35.
- Foa, E. B., Amir, N., Bogert, K. VA., Molnar, C., & Przeworski, A. (2001). Inflated perception of responsibility for harm in obsessive-compulsive disorder. *Journal of Anxiety Disorders, 15*, 259-275.
- Fontenelle, L. F., Mendlowicz, M. V., & Versiani, M. (2006). The descriptive epidemiology of obsessive-compulsive disorder. *Progress in Neuro-Psychopharmacology & Biological Psychiatry, 30*, 327-337.
- Frost, R. O., & Shows, D., (1993). The nature and measurement of compulsive indecisiveness. *Behaviour Research and Therapy, 26*, 275-277.
- Greisberg, S. & McKay, D., (2003). Neuropsychology of obsessive-compulsive disorder: a review and treatment implications. *Clinical Psychology Review, 23*, 95-117.

- Hermans, D., Martens, K., Cort, K. D., Pieters, G., & Eelen, P. (2003). Reality monitoring and metacognitive beliefs related to cognitive confidence in obsessive-compulsive disorder. *Behaviour Research and Therapy*, 41, 383-401.
- Hodes, C. L. (1994). Processing visual information: Implications of the dual code theory. *Journal of Instructional Psychology*, 21 (1), 36-43.
- Hollander, E. (2005). Obsessive compulsive disorder and spectrum across the life span. *International Journal of Psychiatry in Clinical Practice*, 9 (2), 79-86.
- Jacobi, D. M., Calamari, J. E., & Woodard, J. L. (2006). Obsessive compulsive disorder beliefs, metacognitive beliefs, and obsessional symptoms: relations between parent beliefs and child symptoms. *Clinical Psychology and Psychotherapy*, 13, 153-162.
- Janeck, A. S., Calamari, J. E., Riemann, B. C., Heffelfinger, S. K. (2003). Too much thinking about thinking?: metacognitive differences in obsessive-compulsive disorder. *Journal of Anxiety Disorders*, 17, 181-195.
- Jonsdottir, S. D., & Smari, J. (2000). Measuring obsessions without worry: Convergent and discriminant validity of the revised padua inventory in an icelandic student population. *Scandinavian Journal of Behaviour Therapy*, 29 (2), 49-56.
- Ladouceur, R., Rheaume, J., & Aublet, F. (1997). Excessive responsibility in obsessional concerns: a fine grained experimental analysis. *Behaviour Research and Therapy*, 35 (5), 423-427.
- Libby, S. Reynolds, S., Derisley, J. & Clark, S. (2004). Cognitive appraisals in young people with obsessive-compulsive disorder. *Journal of Child Psychology and Psychiatry*, 45 (6), 1076-1084.
- Lopatka, C., & Rachman, S. (1995). Perceived responsibility and compulsive checking: an experimental analysis. *Behaviour Research and Therapy*, 22, 673-684.
- MacDonald, C. B., & Davey, G. C. L. (2005). A mood-as-input account of perseverative checking: the relationship between stop rules, mood and confidence in having checked successfully. *Behaviour Research and Therapy*, 43, 69-91.

- MacDonald, P. A., Antony, M. M., MacLeod, C. M., & Richter, M. A. (1997). Memory and confidence in memory judgments among individuals with obsessive compulsive disorder and non-clinical controls. *Behaviour Research and Therapy*, 35, 497–505.
- MacDonald, P. A., McLeod, M. M., Antony, C. M., & Swinson, R. P. (1999). Negative priming for obsessive-compulsive checkers and non-checkers. *Journal of Abnormal Psychology*, 108 (4), 679-686.
- Mallinger, A. E. (1984). The obsessive's myth of control. *Journal of the American Academy of Psychoanalysis*, 12, 147-165.
- Mandler, G. (2002). Organisation: What levels of processing are levels of. *Memory*, 10 (5/6), 333–338.
- May, C. P., Kane, M. J., & Hasher, L. (1995). Determinants of negative priming. *Psychological Bulletin*, 118, 35–54.
- McNally, R. J., & Kohlbeck, P. A. (1993). Reality monitoring in obsessive-compulsive disorder. *Behaviour Research and Therapy*, 31, 249–253.
- Moritz, S., Jacobsen, D., Willenborg B., Jelinek, L., & Fricke, S. (2006). A check on the memory deficit hypothesis of obsessive-compulsive checking. *Eur Arch Psychiatry Clin Neurosci*, 256, 82-86.
- Muller, J., Roberts, J. E. (2005). Memory and attention in obsessive-compulsive disorder: a review. *Journal of Anxiety Disorders*, 19, 1-28.
- Muris, P. Merckelbach, H., & Clavan, M. (1996). Abnormal and normal compulsions. *Behaviour Research and Therapy*, 35 (3), 249-252.
- Myers, S. G. & Wells, A. (2005). Obsessive-compulsive symptoms: the contribution of metacognitions and responsibility. *Journal of Anxiety Disorders*, 19, 806-817.
- Obsessive Compulsive Cognition Working Group (1997). Cognitive assessment of obsessive-compulsive disorder. *Behaviour Research and Therapy*, 35 (7), 667-681.
- Preminger, S., Sagi, D., & Tsodyks, M. (2007). The effects of perceptual history on memory of visual objects. *Vision Research*, 47, 965–973.
- Purdon, C. & Clark, D. A. (1999). Metacognition and obsessions. *Clinical Psychology and Psychotherapy*, 6, 102-110.

- Rachman, S. & de Silva, P. (1978). Abnormal and normal obsessions. *Behaviour Research and Therapy*, 16, 233-248.
- Rachman, S. & Shafran, R. (1999). Cognitive distortions. *Clinical Psychology and Psychotherapy*, 6, 80-85.
- Rachman, S. (1993). Obsessions, responsibility, and guilt. *Behaviour Research and Therapy*, 31, 149-154.
- Rachman, S. (1997). A cognitive theory of obsessions. *Behaviour Research and Therapy*, 35 (9), 793-802.
- Rachman, S. (2002). A cognitive theory of compulsive checking. *Behaviour Research and Therapy*, 40, 625-639.
- Rachman, S., (1998). A cognitive theory of obsessions: elaborations. *Behaviour Research and Therapy*, 36, 385-401.
- Radomsky, A. S. & Rachman, S. (1999). Memory bias in obsessive-compulsive disorder (OCD). *Behaviour Research and Therapy*, 37, 605-618.
- Radomsky, A. S., Gilchrist, P.T., & Dussault, D. (2006). Repeated checking really does cause memory distrust. *Behaviour Research and Therapy*, 44, 305-316.
- Radomsky, A. S., Rachman, S., & Hammond, D., (2001). Memory bias, confidence and responsibility in compulsive checking. *Behaviour Research and Therapy*, 39, 813-822.
- Rubenstein, C. S., Peynircioglu, Z. F., Chambless, D. L., & Pigott, T. A. (1993). Memory in sub-clinical obsessive-compulsive checkers. *Behaviour Research and Therapy*, 31, 759-765.
- Salkovskis, P. M. (1985). Obsessional –compulsive problems: a cognitive-behavioural analysis. *Behaviour Research and Therapy*, 25, 571-583.
- Salkovskis, P. M. (1989). Cognitive-behavioural factors and the persistence of intrusive thoughts in obsessional problems. *Behaviour Research and Therapy*, 27, 677-682.
- Salkovskis, P. M., & Kirk, J. (1997). Obsessive-compulsive disorder. In D. M. Clark & C. Fairburn (Eds.), *The science and practice of cognitive behaviour therapy*. Oxford: Oxford University Press, 129-168.

- Salkovskis, P. M., Wroe, A. L., Gledhill, A., Morrison, N., Forrester, E., Richards, C., Reynolds, M., & Thorpe, S. (2000). Responsibility attitudes and interpretations are characteristics of obsessive-compulsive disorder. *Behaviour Research and Therapy*, 38, 347-372.
- Salkovskis, P. M., Westbrook, D., Davis, J., Jeavons, A., & Gledhill, A. (1997). Effects of neutralizing on intrusive thoughts: an experiment investigating the aetiology of obsessive-compulsive disorder. *Behaviour Research and Therapy*, 35, 211-220.
- Salkovskis, P.M., Shafran, R., Rachman, S.J., & Freeston, M.H. (1999). Multiple pathways to inflated responsibility beliefs in obsessional problems: possible origins and implications. *Behaviour Research and Therapy*, 37, 1055-1072.
- Sanavio, E. (1988). Obsessions and compulsions: The Padua Inventory. *Behaviour Research and Therapy*, 26, 169–177.
- Savage, C. R., Keuthen, N. J., Jenike, M. A., Brown, H. D., Baer, L., Kendrick, A. D., Miguel, E. C., Rauch, S. L., & Albert, M. S. (1996). Recall and recognition memory in obsessive–compulsive disorder. *Journal of Neuropsychiatry*, 8, 99–103.
- Shafran, R. & Rachman, S. (2004). Thought-action fusion: a review. *Journal of Behavior Therapy and Experimental Psychiatry*, 25, 87-107.
- Sher, K. J., Frost, R. O., & Otto, R. (1983). Cognitive deficits in compulsive checkers: an exploratory study. *Behaviour Research and Therapy*, 21, 357–363.
- Tallis, F. (1993). Doubt reduction using distinctive stimuli as a treatment for compulsive checking: an exploratory investigation. *Clinical Psychology and Psychotherapy*, 1 (1), 45-52.
- Taylor, S. (2005). Cognition in Obsessive Compulsive Disorder: An Overview. In *Cognitive Approaches to Obsessions and Compulsions: Theory, Assessment, and Treatment*, Frost R. O. & Steketee, G. (Ed.), 1-8.
- Taylor, S. (2005). Treatment of obsessive-compulsive disorder: Beyond behavior therapy. *Cognitive Behavior Therapy*, 34 (3), 129-130.

- Tolin, D. F., Abromamovitz, J. S., Brigidi, B. D., Amir, N., Street, G. P., Foa, E. B. (2001). Memory and memory confidence in obsessive-compulsive disorder. *Behaviour Research and Therapy*, 39, 913-927.
- Tolin, D. F., Hamlin, C. & Foa, A. b. (2002). Directed forgetting in obsessive-compulsive disorder: replication and extension. *Behaviour Research and Therapy*, 40, 793-803.
- Tolin, D. F., Worhunskya, P., Maltby, N. (2006). Are “obsessive” beliefs specific to OC?: A comparison across anxiety disorders. *Behaviour Research and Therapy*, 44, 469–480.
- Tuna, Ş., Tekcan, A. İ., & Topçuoğlu, V. (2005). Memory and metamemory in obsessive–compulsive disorder. *Behaviour Research and Therapy*, 43, 15-27.
- van den Hout, M. A., Emmelkamp, P., Kraaykamp, H., & Griez, E. (1988). Behavioral treatment of obsessive–compulsives: inpatient vs. outpatient. *Behaviour Research & Therapy*, 4, 331–332.
- van den Hout, M., & Kindt, M. (2003). Repeated checking causes memory distrust. *Behaviour Research and Therapy*, 41, 301-316.
- van den Hout, M., & Kindt, M. (2004). Obsessive-compulsive disorder and the paradoxical effects of perseverative behaviour on expected uncertainty. *Journal of Behavioral Therapy and Experimental Psychiatry*, 35, 165-181.
- van den Hout, M., Kindt, M., Luigjes, J., & Marck, C. (2007). Compulsive perseveration: Empirical criticism on the mood-as-input model. *Behaviour Research and Therapy*, 45 (6), 1221-1230.
- Wells, A. & Mathews, G. (1996). Modeling cognition in emotional disorder: the S-REF model. *Behaviour Research and Therapy*, 34, 881-888.
- Wells, A. (1997). *Cognitive Therapy of Anxiety Disorders: A Practical Manual and Conceptual Guide*. John Wiley & Sons, Inc., New York, USA.
- Wroe, A. L. & Salkovskis, P. M. (2000). Causing harm and allowing harm: a study of beliefs in obsessional problems. *Behaviour Research and Therapy*, 38, 1141-1162.

- Yorulmaz, O., Dirik, G., Karancı, A. N., Burns, L., (2006). Padua envanteri-Washington eyelet üniversitesi revizyonu (PE-WEÜR): Türkçe versiyonunun psikometrik değerlendirmesi. 14 th Ulusal Psikoloji Kongresi Bildirisi. Ankara/Türkiye.
- Zacks, R. T., Radvansky, G. A., & Hasher, L. (1996). Studies of directed forgetting in older adults. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 22, 143-156.
- Zielinski, C. M., Taylor, M. A., & Juzwin, K. R. (1991). Neuropsychological deficits in obsessive-compulsive disorder. *Neuropsychiatry, Neuropsychology, and Behavioral Neurology*, 4, 110-126.
- Zucker, B. G., Craske, M. G., Barrios, V., & Holguin, M. (2002). Thought action fusion: can it be corrected? *Behaviour Research and Therapy*, 40, 653-664.

APPENDICES

APPENDIX A

Padua Inventory-Washington State University Revision (PI-WSUR)

Sample Items in PI-WSUR

Aşağıdaki ifadeler, günlük hayatta herkesin karşılaşabileceği düşünce ve davranışlar ile ilgilidir. Her bir ifade için, bu tür düşünce ve davranışların sizde yaratacağı rahatsızlık düzeyini göz önüne alarak size en uygun olan cevabı seçiniz. Cevaplarınızı aşağıdaki gibi derecelendiriniz:

0 = Hiç 1 = Biraz 2 = Oldukça 3 = Çok 4 = Çok fazla

	Hiç	Biraz	Oldukça	Çok	Çok Fazla
1. Paraya dokunduğum zaman ellerimin kirlendiğini hissederim	0	1	2	3	4
2. Vücut sıvıları (ter, tükürük, idrar gibi) ile en ufak bir temasın bile giysilerimi kirleteceğini ve bir şekilde bana zarar vereceğini düşünürüm	0	1	2	3	4
3. Bir nesneye yabancıların ya da bazı kimselerin dokunduğunu biliyorsam, ona dokunmakta zorlanırım	0	1	2	3	4
4. Çöplere veya kirli şeylere dokunmakta zorlanırım	0	1	2	3	4
5. Kirlenmekten ya da hastalanmaktan korktuğum için umumi tuvaletleri kullanmaktan kaçınırım.	0	1	2	3	4
6. Hastalıklardan veya kirlenmekten korktuğum için umumi telefonları kullanmaktan kaçınırım	0	1	2	3	4

APPENDIX B

Demographic Information Form

ÇALIŞMA ÖNCESİ KATILIMCI BİLGİ FORMU

Az sonra katılacağınız çalışma, Doç. Dr. Belgin Ayvaşık ve Psk. Talat Demirsöz tarafından yürütülmektedir. Çalışmanın amacı, katılımcıların genel duygu durumları ile ilgili olarak bilgi toplamaktır. Bu çalışmadan elde edilecek veriler temelinde araştırmanın 2. aşaması olarak deneysel bir çalışma yürütülecektir. Sizleri çalışmanın deneysel bölümüne davet edebilmemiz için kişisel bilgi olarak **en sık kullandığınız e-posta adresiniz ve okul numaranız istenmektedir.** Vereceğiniz bilgiler tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir; elde edilecek bilgiler ise sadece bilimsel yayınlarda kullanılacaktır.

Çalışmaya katılım tamamıyla gönüllük temelinde olmalıdır. Anket, genel olarak kişisel rahatsızlık verecek soruları içermemektedir. Ancak katılım sırasında sorulardan ya da herhangi bir başka nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda anketi uygulayan kişiye, anketi tamamlamadığınızı söylemek yeterli olacaktır. Anket sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Şimdi lütfen, eğer bu çalışmaya tamamen gönüllü olarak katılıyorsanız aşağıdaki formu doldurunuz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayınlarda kullanılmasını kabul ediyorum.

İsim Soy isim
Ders

Tarih

İmza

Alınan

GENEL DUYGU DURUMU DEĞERLENDİRME ANKETİ

Orta Doğu Teknik Üniversitesi

2007

YÖNERGE:

Bu araştırmanın amacı, sizlerin genel duygu durumunuza ilişkin olarak bilgi toplamaktır. Cevaplarınız tamamıyla gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecektir. Anketi doldurmadan önce lütfen gönüllü katılım formunu imzalayınız. Anket sonunda ise çalışmaya yönelik sorularınızı ankete uygulayan kişiye sorabilirsiniz.

Bu anket iki farklı ölçekten oluşmaktadır. **Lütfen her bir ölçeğin başındaki yönergeyi çok dikkatli okuyunuz ve her bir soruya sizin genel duygu durumunuzu yansıtan en doğru cevabı vermeye çalışınız. Sayfaların arkalı önlü olduklarını lütfen unutmayınız.**

Çalışmaya yönelik sorularınızı Klinik Psikoloji yüksek lisans öğrencisi Talat Demirsöz'e iletebilirsiniz. (İletişim için e-posta: talatdemirsoz@gmail.com)

Bu çalışmaya katıldığınız için çok teşekkür ederiz!

Anketi doldurmadan önce lütfen aşağıdaki boşlukları doldurunuz.

Okul Numaranız: _____

En sık kullandığınız e-posta adresiniz:

(Araştırmanın 2. aşamasındaki deneye çağrılabilmeniz için okul numaranız ve en sık kullandığınız e-posta adresiniz bizim için çok önemlidir)

Yaşınız: _____

Cinsiyetiniz: _____

Bölümünüz / Sınıfınız: _____

Her hangi bir psikiyatrik ilaç kullanıyor musunuz? Evet _____ Hayır _____

Cevabınız evet ise hangi tür psikiyatrik ilaç kullanıyorsunuz? Lütfen işaretleyiniz ve ilacın adını yanındaki boşluğa yazınız.

Antidepresant: _____

Anksiyolitik: _____

Antipsikotik: _____

Diğer: _____

Cevabınız evet ise ne kadar süredir kullanıyorsunuz? _____

KATILIM SONRASI BİLGİ FORMU

Bu çalışma daha öncede belirtildiği gibi Doç. Dr. Belgin Ayvaşık ve Psk. Talat Demirsöz tarafından yürütülmektedir. Araştırmanın temel amacı bir sonraki adımdaki deneysel çalışmaya çağırmak için, katılımcıların günlük hayattaki ısrarcı düşünce ve davranışlarını belirlemektir. Bu amaçla, “Padua Envanteri-Washington Eyalet Üniversitesi Revizyonu” kullanılmıştır.

Bu çalışmanın verilerinin Nisan 2007 sonuna kadar elde edilmesi amaçlanmaktadır. Elde edilen bilgiler sadece Psk. Talat Demirsöz’ün yüksek lisans tezinde ve/veya bilimsel kongre ve yayınlarda kullanılacaktır. Çalışmanın sonuçlarını öğrenmek ya da bu araştırma hakkında daha fazla bilgi almak için Psk. Talat Demirsöz’e başvurabilirsiniz. (İletişim için e-posta: talatdemirsoz@gmail.com)

APPENDIX C
(Assessment Form for Memory Accuracy)

En son kontrol ettiğiniz gaz ocaklarını aşağıdaki şemada işaretleyiniz

☐	☐	☐
☐	☐	☐

APPENDIX D

(Assessment Form for Level of Detail, Level of Vividness, Memory Confidence and Overall Outcome Confidence)

En son kontrol ettiğiniz ocak gözlerini gözünüzün önüne getirdiğinizde ne kadar “ayrıntılı bir şekilde” hatırlayabiliyorsunuz? (% olarak aşağıdaki düzlemde belirtiniz)

0 _____ 100
Hiç ayrıntılı değil Fazlasıyla ayrıntılı

En son kontrol ettiğiniz ocak gözlerini gözünüzün önüne getirdiğinizde ne kadar “canlı bir şekilde” hatırlayabiliyorsunuz? (% olarak aşağıdaki düzlemde belirtiniz)

0 _____ 100
Hiç canlı değil Fazlasıyla canlı

Kâğıt üzerinde işaretlediğiniz ocak gözlerinin son denemede söndürüp söndürmediğinizi kontrol ettiğiniz gözler olduğuna ne kadar eminsiniz? (% olarak aşağıdaki düzlemde belirtiniz)

0 _____ 100
Hiç emin değilim Kesinlikle eminim

Bu çalışma boyunca bütün gaz ocaklarını söndürüp söndürmediğiniz konusunda ne kadar eminsiniz? (% olarak aşağıdaki düzlemde belirtiniz)

0 _____ 100
Hiç emin değilim Kesinlikle eminim