WHAT SHOULD I (NOT) DO? CONTROL OVER IRRELEVANT TASKS IN OBSESSIVE-COMPULSIVE DISORDER PATIENTS

Eyal Kalanthroff, Gideon E. Anholt, Rotem Keren and Avishai Henik

Abstract

Obsessive compulsive disorder (OCD) is characterized by intrusive and anxiety evoking thoughts followed by repetitive behaviors (compulsions). Accumulative evidence revealed neuropsychological deficits in executive functions, especially in inhibitory mechanisms, in OCD patients. The connection between inhibitory control and the onset and maintenance of OCD is yet unclear. Task control—a mechanism responsible for promoting and maintaining goal directed actions and suppressing irrelevant actions that stimuli associatively and automatically evoke—was found to be contingent upon inhibitory control. Specifically, task control was found to be inadequate in OCD patients. We propose here that deficient task control might function as a mediator between inhibitory control deficit and the development of OCD. The difficulty to inhibit irrelevant behaviors related to intrusive thoughts inflates the perceived importance of these thoughts, which eventually are interpreted as catastrophic and thus should be suppressed by committing compulsive behavior. Paradoxically, these repetitive behaviors increase the anxiety first aroused by the obsessions and a vicious circle is perpetuated.

Key words: OCD, executive functions, inhibitory control, task conflict

Declaration of interest: the authors declare that they do not have any conflict of interest and that APA ethical standards were followed.

Eyal Kalanthroff, Gideon E. Anholt, Rotem Keren and Avishai Henik
Department of Psychology and Zlotowski Center for Neuroscience, Ben-Gurion University of Negev, Beer Sheva, Israel.

Corresponding author
Eyal Kalanthroff,
Department of Psychology, Ben-Gurion University of the Negev, P.O.B. 653, Beer Sheva, Israel 84105.
Phone: 972-8-6477209, Fax: 972-8-6472072,
E-mail: eyalkant@gmail.com

Obsessive-compulsive disorder (OCD) is a highly debilitating anxiety disorder with a lifetime prevalence of 2%-3% (Weisman et al. 1994, Huppert et al. 2009). OCD is characterized by recurrent intrusive thoughts or impulses (obsessions), and repetitive, irresistible behaviors (compulsions) aimed to prevent the feared consequences from happening and to avoid anxiety (American Psychiatric Association 2000). OCD patients’ typical behaviors tend to inflict paradoxical effects—increasing rather than decreasing the anxiety caused by obsessions—effectively perpetuating compulsions (Salkovskis 1999, van den Hout and Kindt 2003, van den Hout et al. 2008). Intrusive thoughts occur in at least 90% of the general population and are not pathological per se (Rachman and de Silva 1978). The cognitive behavioral model for OCD (Salkovskis 1999) indicates that the vicious cycle of obsessions and compulsions begins with giving catastrophic interpretations to such intrusive thoughts.

In a previous paper, we suggested that “impaired response inhibition is related to the development of OCD metacognitive beliefs. The experience of difficulty to inhibit behavior tendencies related to intrusive thoughts may lead to the perceptions of these thoughts as important and likely to occur. As a consequence, these patients may engage in thought suppression as well as compulsive behavior, and become entangled in a vicious circle” (Anholt et al. 2012, p. 74). This suggestion was based on two lines of research: The first refers to the accumulating evidence suggesting that OCD patients demonstrate neuropsychological deficits in executive functions (e.g., Lucey et al. 1997, Penades et al. 2005, for reviews see also Greisberg and McKay 2003, Kuelz et al. 2012) and specifically in inhibitory control (Bannon et al. 2002, Penades et al. 2007). Several researchers even suggested inhibitory control deficit to be a cognitive endophenotype of OCD (Menzies et al. 2007, Morein-Zamir et al. 2010, de Wit et al. 2012). Recently, we found that people with efficient inhibitory control are less likely to experience memory distrust (a core symptom of OCD) following repeated checking (Linkovski et al. 2012). The second line of research refers to a classic psychological theory by William James, who argued that people tend to give emotional meaning to their own behaviors, “we feel sorry because we cry, angry
because we strike, afraid because we tremble” (James 1884/1969, 1890/1950). A growing body of research supports the notion that a variety of motor movements can influence individuals’ thoughts and feelings (e.g., Buck 1980; Stepper and Strack 1993; Förster and Strack 1997, Chandler and Schwartz 2009). Based on these findings, we suggested that people who suffer from deficient inhibitory control have difficulties to inhibit irrelevant automatic responses related to their intrusive thoughts and that these behaviors facilitate fearful appraisals of these intrusions. However, the mechanism by which deficient inhibitory control causes these irrelevant behaviors is not yet fully clear.

Task control

Back in 1979, Gibson proposed the “affordances theory” that suggests that people perceive directly what tools afford in terms of meaningful actions. In that theory, Gibson suggested that when one sees an object in the environment one immediately perceives not only the external features but also its affordances—a feature of the object that clearly identifies how the object could be used. Examples include the grasp-ability of a stick, the lift-ability of an object, the click-ability of a light switch and so on. In other words, we perceive directly what tools afford in terms of meaningful actions. Gibson’s ideas corresponds with Monsell’s (2003) suggestion that task sets can be activated by the perception of a stimulus attribute that is strongly associated with a particular task set (“exogenous activation”). In sum, converging evidence suggests that a stimulus can trigger performance of a task that has acquired a strong association with it (Rogers and Monsell 1995, Allport and Wylie 2000, Waszak et al. 2003).

Automatically triggered irrelevant and unwanted tasks cause task conflict (Goldfarb and Henik 2007, Haggard 2008, Steinhauser and Hubner 2009) and a specific control mechanism is needed in order to suppress those tasks—task control, which has been suggested to be very efficient in healthy adults (La Heij et al. 2010, Kalanthroff, Goldfarb et al. 2013). In other words, stimuli automatically trigger tasks; when these stimuli trigger an irrelevant task, task control is needed in order to suppress these tendencies. Because this control mechanism is usually very efficient, task conflict can only be behaviorally studied in children, since it is not yet fully developed at an early age (La Heij and Boelens 2011), or by using procedures that reduce task control efficiency (e.g., Braverman and Meiran 2010, Kalanthroff et al. 2012, Kalanthroff, Goldfarb et al. 2013, Kalanthroff and Henik 2013a).

Task control can be conceptualized as ‘pro-active’ control that is responsible for keeping constant amplification of the relevant task units and constant inhibition of the irrelevant tasks (see also Braver 2012, MacDonald et al. 2000).

In several recent studies we found that task control is highly contingent upon inhibition control (e.g., Kalanthroff, Goldfarb et al. 2013). In one study, we found significant behavioral evidence for task conflict in adults who performed poorly in a response inhibition task (Kalanthroff and Henik 2013b). As mentioned earlier, OCD is a disorder characterized by deficient inhibitory control. Thus, it is reasonable to assume that patients suffering from OCD will also experience difficulties in effectively activating the task control mechanism.

OCD and task control – integrating basic cognitive science with cognitive behavior theory

The idea that OCD patients suffer from deficient task control makes sense since the disorder is mainly characterized by repeatedly performing irrelevant, though automatically triggered, tasks. Indeed, in recent studies we found indications for deficient task control in OCD patients (e.g., Kalanthroff, Henik et al. 2013). Prevor and Diamond (2005) showed that naming the color of a neutral object takes more time than naming the color of an abstract form and La Heij et al. (2010) showed that this effect occurs due to task conflict between the relevant task (i.e., color naming) and an automatic irrelevant task triggered by the objects. Importantly, this effect is commonly obtained only in young children, under the age of 7 years old, and it was suggested that this is due to their undeveloped task control mechanism. In our study (Kalanthroff, Anholt et al. 2013) we found object interference in adult OCD patients but not in a matched control group. This indicates that OCD is characterized by an inefficient task control mechanism.

We propose here that a pro-active/task control deficit is a potential link between poor inhibitory control and OCD. We suggest that OCD patients experience increased difficulties to inhibit tasks that are associatively evoked. In turn, performing these tasks starts a vicious cycle of compulsive behavior, intrusive thoughts, and attempts to suppress these thoughts (which causes a paradoxical effect). Lhermitte et al. (1986) suggested that people have action plans that are evoked by stimuli. These researchers found that some frontal lobe patients showed a utilization effect—a condition in which patients are unable to suppress these action plans and thus they operate on each stimulus they see (e.g., if they see a syringe they try to use it to inject the physician). Similarly, Cisek (2006) suggested that multiple motor plans are generated automatically across visuo-motor regions of the cortex in response to attended stimuli. Makris et al. (2011) aimed to investigate the “affordances theory” hypothesis that implies that visual objects can potentiate motor responses even in the absence of an intention to act. These researchers showed that physical properties of objects automatically activated specific motor codes in the brain. We suggest that OCD patients suffer from a similar situation on a much smaller scale—action plans are too potent and inhibition is too deficient; hence, some irrelevant behavior occurs.

In recent years, a few researchers have suggested that goal-directed action may be compromised in OCD patients and compulsions may be driven by maladaptive habits (Boulougouris et al. 2009). This is in line with the findings mentioned earlier concerning an executive control deficit in OCD (e.g., Greisberg and McKay 2003, Kuelz et al. 2004). Gillan et al. (2011) tested OCD patients and found that they had a deficit in goal-directed control and an overreliance on habits. This led the researchers to suggest that OCD patients’ urge to perform compulsive acts is mediated by a disruption in the balance between flexible, goal-directed action control and habitual behavior. Moreover, the authors concluded that due to their control deficit, patients with OCD are forced to rely on habits that can be triggered by stimuli, regardless of the desirability of the consequences.

Cognitive behavioral therapy (CBT) is the most efficient psychological treatment for OCD (Rosa-
Acézar et al. (2008), CBT for OCD mainly consists of exposures (to stimuli and situations that evoke compulsions) and response prevention—ERP. In a way, it can be said that ERP is a kind of training program for improving task conflict control; an associative task is evoked and patients are to suppress the automatic behavior. Rosa-Acézar et al. found that there are no indications that cognitive therapy using ERP treatment improves the outcome of OCD patients. This finding is in line with our suggestion that task control deficiency, which relies on inhibitory control, is a core element in the development and maintenance of OCD.

To conclude, we propose that OCD patients, who are known to suffer from inhibitory deficit, experience difficulties in solving task conflicts. Namely, automatically triggered tasks or action plans are not efficiently suppressed. In turn, this causes activation of irrelevant behaviors or compulsions, which lead to irrelevant interpretations that are coupled with intrusive thoughts in a way that perpetuates the compulsive behavior.

References


Clinical Neuropsychiatry (2013) 10, 3, Suppl. 1

Control over irrelevant tasks in OCD

Psychology 71, 421-430.


Kalanthroff E, Henik A., Anholt EG (2013). To do or not to do: Is a task control Deficit the missing link between a response inhibition deficit and Obsessive-Compulsive Disorder? Manuscript submitted for publication.


I turn off the stove? Good inhibitory control can protect from influences of repeated checking. *Journal of Behavior Therapy and Experimental Psychiatry* 44, 30-36.


