

The neuropsychology of obsessive-compulsive disorder (OCD)

2015

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Main points

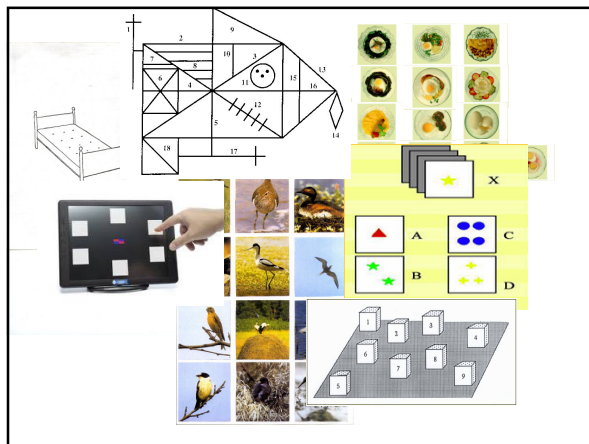
- Neuropsychology
- OCD
- Neuropsychological models of OCD
- Is there a specific cognitive deficit?
- Summary – further directions

Neuropsychology

- is an experimental field of psychology
- studies the structure and function of the brain as they relate to specific psychological processes and behaviors
- aims to understand how behavior and cognition are influenced by brain functioning

Neuropsychological methods

- Observation of behavior
- Anamnesis and heteroanamnesis (the case history of a patient)
- Neuropsychological testing
- Questionnaires (personality; clinical scales)
- Brain mapping techniques (EEG, fMRI, PET etc.)



OCD

- Obsessive-Compulsive Disorder (OCD) is characterized by recurrent, unwanted thoughts (**obsessions**) and/or repetitive behaviors (**compulsions**)
- Lifetime prevalence: 2-3%
- Comorbidity: depression, phobias, bulimia, anorexia, panic disorder, tic disorders

Symptoms

Typical Obsessions

Contamination (with dirt, germs, chemicals etc.)
 Fear of harm to self or others
 Doubting
 Need for specific order, symmetry
 „Just right“ feeling
 Moral, religious
 Disturbing Images (violent or sexual)

Typical Compulsions

Washing, cleaning rituals
 Avoidance
 Checking, needing reassurance
 Counting, ordering, rearranging
 Perfectionism
 Praying, penance
 Saving, hoarding

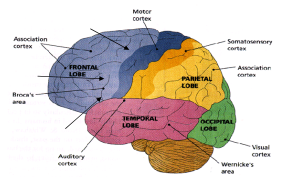
OCD – DSM V

Obsessive-Compulsive and Related Disorders

- **OCD**
- Body Dysmorphic Disorder
- Hoarding Disorder
- Trichotillomania (Hair-Pulling Disorder)
- Excoriation (Skin-Picking) Disorder
- Substance/Medication-Induced Obsessive-Compulsive and Related Disorder and Obsessive-Compulsive and Related Disorder Due to Another Medical Condition
- Other Specified and Unspecified Obsessive-Compulsive and Related Disorders

Cortical structures involved in the pathomechanism of OCD

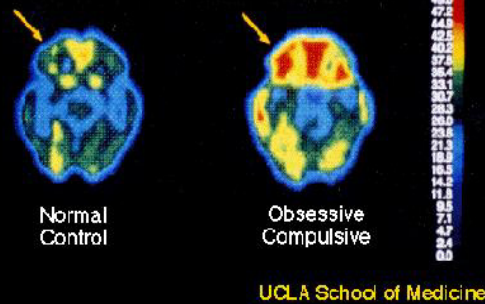
- Orbitofrontal cortex (OFC)
- Dorsolateral prefrontal cortex (DLPFC)
- Anterior cingulate cortex (ACC)
- Nucleus caudatus
- Amygdala
- Thalamus



(Szecsko, 1999; Kang, 2004; Whiteside 2004)

Obsessive Compulsive Disorder

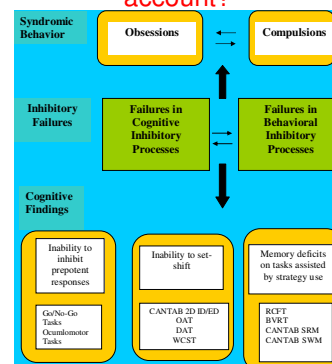
High Orbital Glucose Metabolism



Altered cognitive functions - OCD

- Executive functions
- Inhibition
- Decision making
- Planning
- Memory

Neurocognitive deficits in OCD – A unitary account?



(Chamberlain, et al., 2005)

- ### Our main findings
- (executive functions, nonverbal memory, prospective memory and memory retrieval)
- **Shifting** and **inhibition** components of the executive system is impaired in OCD (Demeter et al. 2008, 2013)
 - Impaired **nonverbal memory** functions in OCD (Demeter et al., in prep)
 - Altered prospective memory functions in OCD – **overactivation hypothesis** (Racsmany et al., 2011)
 - No RIF effect in OCD - **suppression of irrelevant, interfering memories** during competitive recall is impaired in OCD (Demeter et al., 2014)

EREDETI KOZLEMÉNY

INTACT SHORT-TERM MEMORY AND IMPAIRED EXECUTIVE FUNCTIONS IN OBSESSIVE COMPULSIVE DISORDER

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EF RÖVID TÁVÚ MEMÓRIA ÉS KÖZPONTI VÉDELMI FUNKCIÓK ZAVARÁK ÖSSZESENTEGÉSE
 Demeter G, Racsmany M, Csigo K, Harsanyi A, Nemeth A. *Magyar Pszichológiai Szemle* 2013;64(1-2):35-41.

Background and purpose: Frontal executive functions (EFs) are impaired in obsessive compulsive disorder (OCD). The aim of the study was to investigate the presence of deficits in these cognitive domains. A further goal was to describe the distribution of anxiety and depression symptoms for all subjects and clarify the relationship between symptoms severity and cognitive impairments.

Methods: Thirty patients with OCD (DSM-IV) and 30 healthy volunteers were compared using well known neuropsychological tests. We assessed prospective memory with the goal (time) forward and goal (date) backward tasks, short-term visual-spatial memory with the Corsi Block Tapping Task, which we measured the level of executive functions with the Stroop Task and the Wisconsin Card Sorting Test.

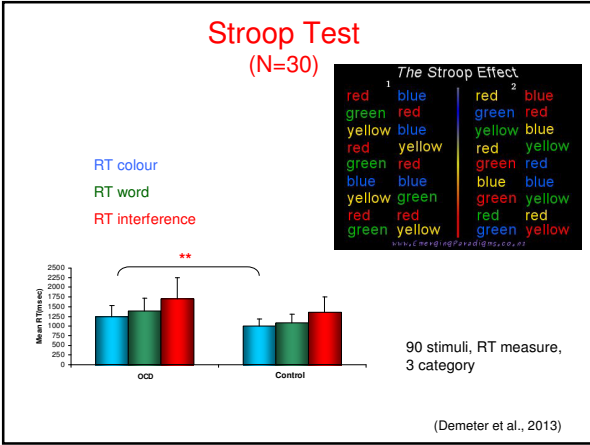
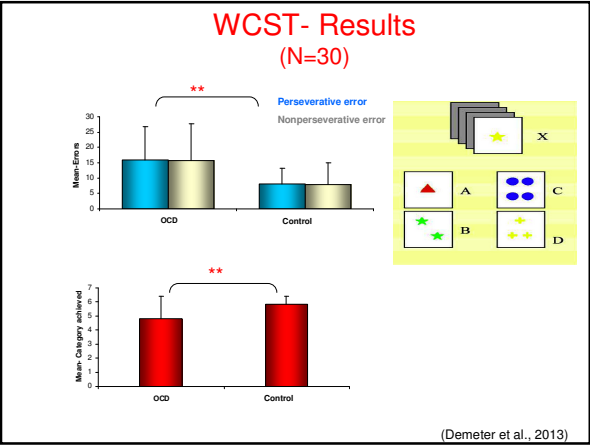
Results: Compared with a matched healthy control group, the performance of OCD patients was in the impaired range only in the executive tasks. We found a significant positive correlation between the Y-BOCS Yale Brown Obsessive Compulsive Scale total score and the number of perseverative errors (2010-01-05, $p=0.03$) and perseverative errors (2010-01-05, $p=0.03$) in the WCST.

Conclusions: Our results give evidence that executive functions are impaired while short-term memory is intact in OCD. This is in line with neurobiological models of OCD that the deficit of cognitive and behavioral inhibition are responsible for the ego-syntonic thoughts of this disorder, that prevent the ego-syntonic thoughts of this disorder from being inhibited.

Keywords: executive functions, inhibition, neuropsychology, obsessive compulsive disorder, short-term memory

Keywords: végrehajtó funkciók, gátolás, neuropszichológia, obszesszív-kompulzív zavar, rövid távú memória

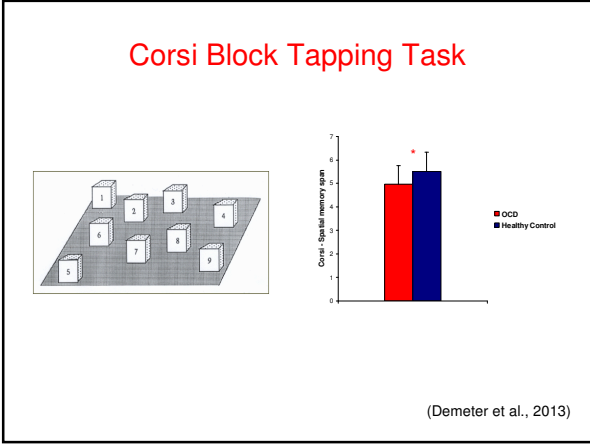
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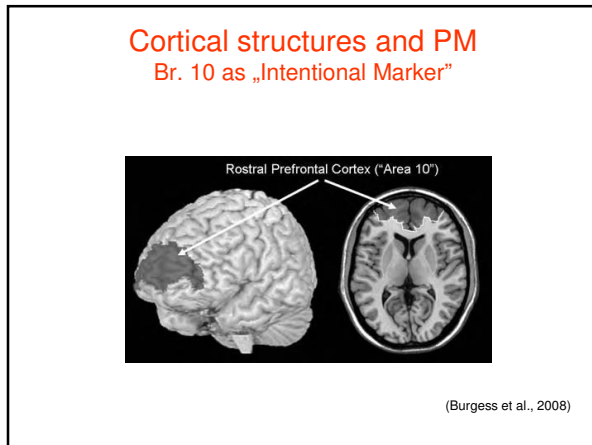
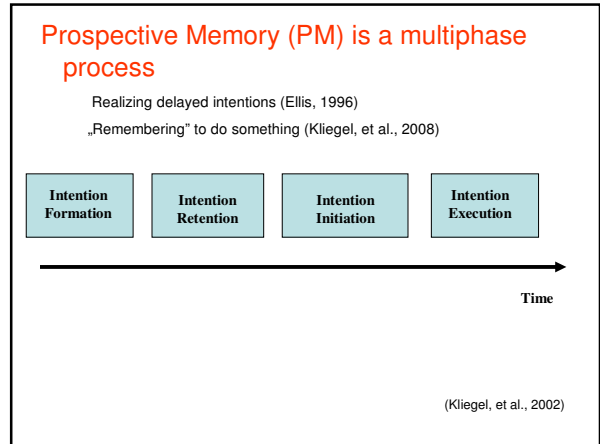
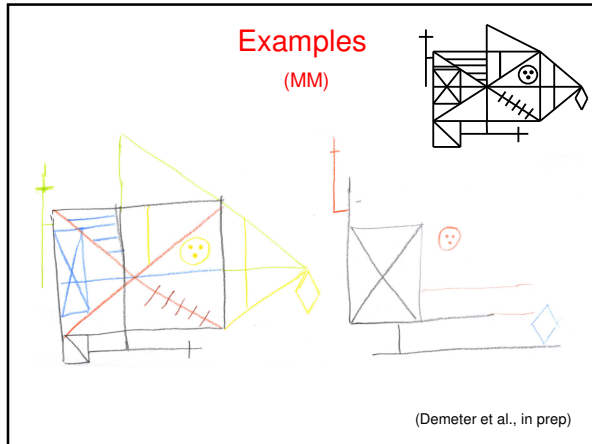


Nonverbal memory - Tasks (Examples)

Corsi Block Tapping Task

Rey Complex Figure Task





JOURNAL OF CLINICAL AND EXPERIMENTAL NEUROPSYCHOLOGY
2010, 31(1), 1-7

Psychology Press
Taylor & Francis Group

An experimental study of prospective memory in obsessive-compulsive disorder

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The aim of the present study was to investigate prospective memory (PM) function in patients with obsessive-compulsive disorder (OCD). An event-based PM task was administered to 30 OCD patients and 30 healthy adult participants. For OCD patients, PM instruction produced significantly more cost in terms of reaction time (RT) during the ongoing task. A significant group × experimental condition interaction in ongoing task RTs was found, which suggests that PM instruction loaded an extra cost onto OCD patients' ongoing activities, and this was independent of the execution of the PM intention. Comparing the PM task RTs between patients and healthy adults also revealed a significant group difference. These results suggest that OCD patients experience difficulties during PM tasks, and these difficulties originate from overmonitoring the stimuli for PM cues.

Keywords: Obsessive-compulsive disorder, Intention maintaining, Prospective memory, Monitoring functions.

The event based PM Task:

Ongoing Task: press the key (left or right) in direction of black arrow

PM Task: if colour bars are the same colour press the uparrow key

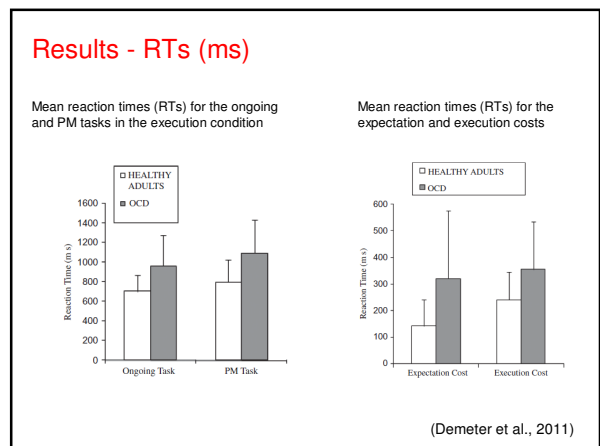
The task was administered in 3 conditions:

- **Baseline condition** – no PM stimuli occurred and were no expectation that they would
- **Expectation condition** – was told that PM stimuli might occur, but non actually did
- **Execution condition** – was told that PM stimuli might occur, and they did

Stimuli:
Colours used: red, green, blue, orange, yellow

Baseline, Expectation conditions: 60 items
Execution condition 80 items, contained 20 PM stimuli pseudorandomly distributed through the trials

The stimuli were subject paced: the onset of the next stimulus was cued by a response by the subject, and stimuli remained visible until that response



Conclusions

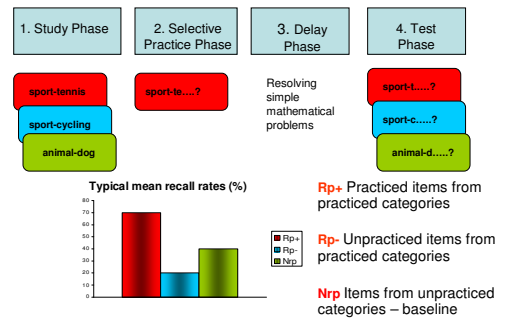
- the OCD group performed **significantly slower** than the control group in all experimental conditions: baseline, expectation and execution
- the OCD group slowed down significantly more than the control group both in the expectation and the execution conditions – **expectation and execution costs**
- the OCD group responded **significantly slower** on the PM task in the execution condition



Retrieval induced forgetting (RIF)

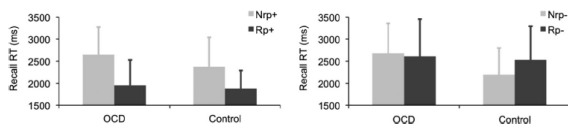
- Selectively retrieving a target memory among related memories requires some degree of inhibitory control over interfering and competing memories, a process held to be supported by inhibitory mechanisms.
- Evidence from behavioral studies suggests that such inhibitory control can lead to subsequent forgetting of the interfering information, a finding called retrieval-induced forgetting (Anderson & Spellman, 1995; Anderson, Bjork, & Bjork, 1994).

The Retrieval Practice Paradigm



Results – RTs (ms)

Average recall RTs in the final test in the two groups



(Demeter et al., 2014)

Conclusions

- retrieval of some memories led to enhancement in both groups (**practice effects**), but forgetting of related memories (**RIF**) occurred only among controls
- it seems that neither **state- and trait anxiety** nor **working memory capacity** influence RIF in OCD (no significant correlation between STAI, n-back and RIF scores)
- we suggest that the lack of RIF effect in OCD is due to the **dysfunction of conflict detection or resolution processes**

Summary

- Specific neurocognitive pattern (?)
- Heterogeneity - identification of different subgroups, cognitive patterns
- Valid neuropsychological tasks + cognitive experimental psychological paradigms
- Biological markers (e.g.: Eye-tracking, Deep Brain Stimulation)