



Centro di Neuroscienze Cognitive



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Dipartimento di Psicologia Generale
Dipartimento di Neuroscienze

Symposium - Abstracts

Executive functions: from neural bases to cognitive training

Date: **19 May 2015**, 2.30 pm

Place: **Aula Cesare Musatti** – Psicologia, Via Venezia 8, Padova.

Schedule:

2.30-3.30. **Keynote lecture: Executive functions in the right prefrontal cortex**

Tim Shallice (Institute of Cognitive Neuroscience - University College London, & SISSA Trieste)

***Abstract:** The hierarchical organisation of frontal functions is by now well established. However the degree of lateralisation, other than relating to operations linked to type of material (language versus visuo-spatial), and the nature of sub-functions that might be involved is much less clear. As far as the right prefrontal cortex is concerned, a monitoring function was proposed twenty years ago, and much evidence now supports it. In addition ten years ago it was proposed that the right ventrolateral PFC was involved in response inhibition but a purely inhibitory process is now not the most popular account of a critical function of this region. The presentation will review relevant evidence from the ROBBIA neuropsychological studies on these two positions. In addition more recent neuropsychological evidence will be discussed suggesting that the right lateral PFC is involved in the type of lateral transformations necessary for insightful problem-solving.*

3.30-4.00. **Executive functions in the left prefrontal cortex.**

Antonino Vallesi (Dipartimento di Neuroscienze, University of Padova)

***Abstract:** This talk will plead for the view that complementary executive processes are dissociable not only functionally but also temporally and anatomically, along the left-right axis of prefrontal cortex and related networks. Multi-modal evidence in support of this view of executive functions, including neuroimaging and neuropsychological studies, will be presented for a range of tasks. In particular, the talk will be focused on criterion-setting – the capacity to flexibly set up and select relevant stimulus-response associations or more complex rules. Recent findings will be presented to show that this process tends to be more left-lateralized in fronto-parietal brain regions, although its degree of lateralization also depends on a number of other factors, including the material being used and on the specific task at hand.*

4.00-4.15. Break

4.15-4.45. **Training attention and executive functions through videogame play**

Marco Zorzi (Dipartimento di Psicologia Generale, University of Padova)

***Abstract:** There is growing evidence that videogame play can enhance a wide range of cognitive functions, such as attention, perception and executive control. This suggests a game-based approach to the cognitive rehabilitation of neurological patients, but commercial videogames are unsuitable for patients both in terms of complexity and audio-visual load. It is therefore crucial to design ad-hoc videogames for cognitive training. I will describe design principles and initial validation of a videogame for training attention and executive functions (Labyrinth), which is controlled by a multidimensional adaptive algorithm that calibrates task difficulty on-line based on a model of user performance. A study on healthy adult participants shows the involvement of the cognitive abilities that the game is supposed to enhance and suggests that relatively short training induces cognitive enhancement. Moreover, training increased right frontal gamma-EEG resting-state activity at post-training with respect to baseline measurement. Changes in functional connectivity were correlated with gains in play performance. In turn, gains were larger for participants who had low initial performance, which dovetails with the aim of restoring impaired or declining cognitive skills.*

4.45-5.15. **Improving working memory and related mechanisms in aging: can it really be done?**

Erika Borella (Dipartimento di Psicologia Generale, University of Padova)

***Abstract:** A growing body of research is focusing on assessing whether the age-related decline in basic mechanisms of cognition can be postponed. One such basic mechanism is working memory (WM) given its involvement in higher-order cognitive abilities also relating to everyday life. Although reports on the efficacy of WM training in aging are promising, its benefits in terms of transfer and maintenance effects are still being debated. The aim of this presentation is to illustrate and discuss the efficacy of WM training. It focuses particularly on a training procedure that we have developed, which appears to produce both near and far transfer effects, even on abilities involved in everyday tasks, and in different populations (young-old, old-old and cases of mild cognitive impairment [MCI]). The training gains identified are attributed to the nature of the training, which takes into account not only the capacity to use WM resources and attentional control (by adopting an adaptive procedure), but also the importance of presenting challenging and engaging training activities to sustain motivation and thus favor the training's short- and long-term efficacy, especially in older adults. Crucial variables that can affect the efficacy of WM training in aging - such as training procedure, the age range of older participants, and the nature (verbal or visuospatial) of the training task - will be also discussed in relation to any transfer effects.*

5.15-5.45. General Discussion

Organizers:

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