



LEX-MEA - Life EXperience Modulations of Executive function Asymmetries

Executive functions are a set of cognitive processes underlying goal-directed behaviour. Two crucial executive functions are criterion-setting, the ability to form new rules, and monitoring, the capacity to evaluate whether those rules are being applied correctly. They differentially engage left and right prefrontal regions. Determining the impact of experience on these key functions will help understand individual differences and, crucially, reveal the available degrees of freedom for active intervention in case of decline or deficit. The central goal of LEX-MEA proposal is to unveil which neural and experiential factors shape these high-level functions across the life-span. The specific aim of the proposal is threefold.

First, by using a multimodal neuroimaging approach, it will unveil how prefrontal hemispheric asymmetries underlying executive functions change depending on the task context, and whether this division of labour is advantageous.

Second, it will study how significant real-life experiences, such as practicing a skill that entails a specific executive function, modulate these functions and their neural underpinning. We will target 2 groups of professionals, simultaneous translators and air traffic controllers, who make extensive use of criterion-setting and monitoring, respectively, to test whether, in different stages of skill acquisition, they show a generalized benefit for the specific executive function trained.

Third, we will test whether having practiced a skill requiring a certain executive function throughout life constitutes a compensatory factor against cognitive aging.

The ultimate objective is to lay the cognitive and neural foundation for a full understanding of these extraordinary abilities not only in normal conditions but also in diverse diseases and to boost particular executive functions with tailored, theory-guided training programs.

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