

HABILITATION A DIRIGER DES RECHERCHES

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Résumé

This memoire includes four chapters. In Chapter 1, 2, and 3, I present and discuss the core of my latest research advances; in Chapter 4, I present some of the future directions. Chapter 1 addresses my earliest contribution to understanding the spatiotemporal dynamics of social pain, and how these dynamics can be modulated via monetary reward. Using intracranial EEG in drug resistant epileptic patients, this research found that theta waves is the neural signature for social pain, and that different brain areas involved in the processing of social pain have different functional roles. In addition, monetary rewards modulated the social pain process in specific structure, like the anterior but not the posterior insula. Using the Vietnam Head Injury Study (VHIS) dataset, a follow up study found that patients with lesions to the social pain network (PFC and anterior insula) had a lower ability to perceive loneliness. Chapter 2 addresses the causal contribution of brain regions to social functioning, in particular in social beliefs (political and religious) and implicit bias toward aggression. This piece of research defined to key regions in the PFC, the vmPFC for the evaluation system and the dlPFC for the downregulating processing. I will discuss how flexibility, personality and empathy interacts and modulate with social beliefs. Chapter 3 addresses functional recovery and factors that can influence this recovery, such as the grey and white matter contribution to executive function in pTBI, and age at surgery for cerebellum tumor resection in pediatric patients. I will discuss how for extended executive function (verbal fluency) lesions to white matter add a supplemental burden to recovery; and how children operated before the age of 7 have higher cognitive and motor deficits compared to those operated after this age. I will discuss how the cerebellum has a role of learning machine that is placed during a specific time window. Finally, Chapter 4 will introduce ongoing projects and future directions, which follow-up and develop the previous research lines, integrating studies in healthy and neurological populations.