

Neural Correlates of the Subjective Aspects of Cognitive Conflict

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Subjective conflict arises during myriad self-control dilemmas (e.g., incongruent Stroop trials, while dieting, regulating emotion, or holding one's breath). In a series of experiments, we found that, as predicted by Supramodular Interaction Theory (SIT), merely sustaining incompatible skeletomotor intentions (e.g., the desire to point left and right) produced stronger systematic changes in subjective conflict than sustaining compatible intentions, even with no motor action. We found these effects in variants of classic interference paradigms (e.g., Stroop and flanker tasks) as well as in a new paradigm that was designed to isolate the essence of the subjective effects of incompatible intentions. According to SIT, this is because the primary function of consciousness is to integrate such incompatible intentions, which usually arise from high-level, supramodular systems that are defined via their concerns (e.g., different bodily needs). In neuroimaging studies, we found that dorsal ACC was engaged by increased subjective conflict, but only when a motor response was required. Left somatosensory and possibly motor areas were uniquely engaged by subjective conflict, regardless of the demand for motor activity. These findings also illuminate the nature of 'voluntary' action and its relationship to the skeletal muscle system. Since the nineteenth century it has been known that, though often functioning unconsciously (as in blinking and breathing), skeletal muscle is the only effector that can be consciously controlled, but why this is so has never been explained. SIT introduces a reinterpretation of this age-old fact: Skeletomotor actions are at times 'consciously mediated' because they are directed by multiple systems that, when in conflict, require consciousness to cross talk and yield adaptive action. More generally, these findings may illuminate the role of these subjective effects in negative affect and failures of self-regulation, where incompatible tendencies play a critical role.

7월 25일 금요일 4시

위당관 B05