Working memory associated differential inhibitions describe categorized negative priming effects

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A broad range of neural and behavioral data suggests that planning complex behaviors, cognitive control, and social behavior has been shown to depend on prefrontal cortex (PFC) [1]. The negative priming (NP) effect is characterized by the apparent slowing down of response time to a stimulus if it has been previously ignored. We differentiated the negative priming effects in the Stroop Task, depending upon the characteristics of two consecutive stimuli into three subgroups, NP1, NP2, and NP3 respectively.

A computational model we constructed in this study, which was refined version of the Parallel Distributed Processing (PDP) model [2], includes compartmentalized prefrontal system functioning. Our model was tested with the Stroop Task to characterize heterogeneity in reaction times in NP1, NP2, and NP3, which was not feasible with previously proposed PDP model. Our model is composed of prefrontal functioning unit that includes additional temporally storage nodes which resemble the working memory aspect of prefrontal cortex functions in addition to PDP model proposed previously [2].

Here, we present a computational model that provides an explanation for the differences in the reaction times for NP effects according to their proportionate stimulus sequences and directions. We propose that the difference in the NPs account for the plurality of PFC functions in human cognitive control, PFC-specific differential inhibitions, and PFC-gating mechanism via dopaminergic innervations. Current computational model is able to capture the extent of categorical differential inhibitions in the working memory to model devoted PFC-specific neural mechanism.

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References