

Abstract

The human brain constantly process the auditory environmental and detects changes without attention, such ability was called pre-attentive change detection. Temporal cortex was well accepted to conduct the change detection process; however, recent findings also suggested frontal cortex involvement in this process. In some imaging studies, frontal cortex was even found activating before the brain pre-attentively detected the changes i.e., elevated activation in temporal cortex.

Contrast enhancement hypothesis, which referred to amplification of small difference between frequent and infrequent stimuli for pre-attentive change detection, suggested that pre-change detection frontal difference amplification was necessary for later temporal change detection process. This thesis investigated the functional connectivity of fronto-temporal network suggested by contrast enhancement hypothesis using single-pulse transcranial magnetic stimulation (TMS) to disrupt right inferior frontal cortex (RIFC) in processing frequency deviant. Event-related fast optical signal (EROS) was recorded simultaneously from the left superior temporal cortex (LSTC). The results showed that pre-attentive change detection was only affected when RIFC activity was disrupted in the time window before change detection process. This suggested that RIFC was necessary for the later change detection process in LSTC.