A causal involvement of the left supramarginal gyrus during the retention of musical pitches

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Brain stimulation studies using transcranial direct current stimulation have shown that the processes involved in memorising pitch rely on activity within the left supramarginal gyrus (SMG). Building on this, the present study investigated which of the main phases of pitch memory processing may depend on the left SMG: retention or encoding. Repetitive transcranial magnetic stimulation (rTMS) was used to modulate the retention stage of a pitch memory task in Experiment 1 and the encoding phase in Experiment 2. Participants completed a pitch memory recognition task in which they had to decide whether two six tone long sequences were the same or different. Using a blocked design 5Hz rTMS was applied for 3 seconds on a trial-by-trial basis over either the left SMG (targeted site) or the Vertex (control site) during the retention phase (Experiment 1) or during encoding of the first sequence (Experiment 2). A baseline block (without rTMS) was also completed. For Experiment 1, a repeated measures ANOVA with stimulation condition (rTMS over left SMG vs rTMS over Vertex vs no stimulation) as the within-subject factor and reaction times as the dependent variable revealed a main effect of stimulation condition. Contrasts showed that only rTMS over the left SMG during retention led to significantly increased reaction times. In Experiment 2 no modulation effects were found when applying rTMS during encoding. Taken together, these findings highlight a phase-specific involvement of the left SMG for the retention period of pitch memory only, thereby indicating that the left SMG is involved for the perpetual storage of pitch information.