PROACTIVE TASK ENGAGEMENT BLOCKS THE IMPACT OF AUDITORY DEVIANTS: BEHAVIOURAL AND EEG EVIDENCE FOR LATE CONTROL

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Background: Unexpected sounds can disrupt ongoing tasks, yet the mechanisms that determine when distraction emerges remain contested. Early-filtering theories claim that distraction can be prevented by suppressing deviant detection, whereas the Task Activation Late Blocking (TALB) account proposes that deviants are fully processed but blocked later when task engagement is strong.

Aims: To test whether proactive task-set activation shields against distraction and whether deviants are still processed neurally even when behavioural disruption is reduced.

Methods: Participants performed a serial recall task under proactive vs. reactive encoding modes, with occasional auditory deviants. A large behavioural experiment (N=120) measured deviation effects and their relation to working memory capacity (WMC). A complementary EEG experiment (*N*=35) examined deviance-related components (MMN, P2, P3a, RON).

Results: Behaviourally, distraction was reliably reduced under proactive encoding, and higher-WMC individuals showed the smallest deviation effects. EEG data revealed robust deviant–standard differences across MMN, P2, P3a and RON windows, with no modulation by encoding mode. Deviants elicited clear neural signatures and a delayed RON onset even when behavioural disruption was minimal, indicating preserved deviant processing.

Conclusions: The findings support TALB: deviant sounds are fully detected, but strong task-set activation blocks their impact at a later stage. This late control mechanism is stronger in higher-WMC individuals, thus explaining why some people are more resistant to auditory distraction.

Keywords: Auditory distraction, Proactive control, Working memory capacity, Event-related potentials, Task-set activation

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