EVENT ABSTRACT

REM SLEEP, MEMORY BINDING AND EMOTIONAL CONTEXT

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It is now well established that mood states interfere with memory both at encoding and memory consolidation stages (for review see Hamann, 2001). In 1997, Kenaely observed better recall performances in participants who learned and recalled stimuli in the same mood than in subjects who learned and recalled in different mood states. This phenomenon known as 'mood-State dependent memory' suggests that a change of mood from learning to recall induces retroactive emotional interference and consequently impairment of recall capacities (Bartlett and Santrock, 1979; Kenealy, 1997). We recently showed that sleep unbinds memories (i.e. word pairs) from their emotional context (i.e. the emotional mood context), protecting them from a retroactive emotional interference (Deliens et al., submitted). In this study, subjects learned a list of word pairs after a mood induction procedure, then slept or stayed awake during the post-learning night. After two recovery nights, retroactive emotional interference effects were preserved in sleep deprived participants on the first post-learning night but not in the sleep group, suggesting a protective role of sleep against emotional interference. According to the "Sleep to Forget and Sleep to Remember" model (van der Helm and Walker, 2009), this emotional unbinding process would take place during Rapid-eye-movement sleep (REMS).

To test this hypothesis, we compared here the effects of "early" and "late" sleep periods, dominated by slow-wave sleep and REMS respectively, on resistance to emotional interference. Participants (N=24) learned a list of neutral word pairs after a happy or sad mood induction procedure (combined imagery vignettes and music) then slept immediately afterwards, for 3 hour of early sleep (23:30-02:30) or late sleep (04:30-07:30) under polysomnographic control in a within-subjects counterbalanced design. Subjects sleep 3 hours before learning in the late sleep condition. One hour after waking, half of the list was recalled after a similar mood induction than at the encoding session (NIC; non interference condition), the other half after a different mood induction (IC; interference condition).

As expected, polysomnographic data showed a higher REMS percentage in the late (28.04%) than in early (7.96%; $p<0.001$) sleep condition. Results disclosed a main effect of interference ($p<.05$) with higher recall in NIC than IC. However this interference effect was neither modulated by early or late sleep nor by interaction between moment of sleep (early versus late sleep) and interference (NIC vs IC) (all $p>0.8$). Interference size (NIP minus IP) was not different after early versus late sleep ($p>0.8$). No correlation was observed between REMS duration and interference effect size (all $p>0.16$).

Hence, we cannot conclude on a specific role of REMS to protect memories from emotional interferences. We surmise that the demodulation process initiates during the first post-learning night, potentially during REM sleep, but may need several nights to be achieved. It would explain why Deliens et al. (submitted) observed a demodulation between memories and their "affective blanket" tone after 3 nights of sleep versus one sleep deprivation night followed by two recovery nights. Further studies are needed to investigate the temporal evolution of demodulation process.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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< Back

Back to top

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