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THE EFFECTS OF CIRCADIAN RHYTHMS AND SLEEP DEPRIVATION ON ATTENTION AND COGNITIVE FLEXIBILITY: EVIDENCE FROM THE ATTENTIONAL DEMANDS TASK

Thursday, September 11, 2025 2:10 PM (20 minutes)

This study explores the influence of circadian rhythms and total sleep deprivation on the components of attention - selective, divided, and switching - using the Attentional Demands Task (AD-Task).
The research consisted of two phases, during which subjective indices of sleepiness, vigor, and affect were monitored, in addition to sleep quality and individual chronotype. Regarding the AD-Task, performance was evaluated in speed (RTs) and accuracy (HIT RATE, FA RATE, d').

In the first phase, 32 participants (19f, age 24.9/3.14) were assessed by administering the AD-Task at four times of the day to analyze diurnal fluctuations in attentional performance. The results showed a progressive deterioration in performance in selective attention ($F_{3,93}=3.188$; $p=0.027$; $\eta^2p=0.093$) and a clear slowing of reaction times in the morning in divided attention ($F_{3,93}=7.3134$; $p<0.001$; $\eta^2p=0.191$), suggesting a significant influence of the circadian rhythm on the regulation of attentional resources.

In the second phase, 8 participants (4f, age 24.4/2.20) participated in a total sleep deprivation condition, completing the AD-Task on two consecutive days. The sleep loss induced a marked deterioration in performance, with slower reaction times ($F_{11,77}=1.948$, $p=0.046$, $\eta^2p=0.218$) and a reduction in discriminative ability (d'; $F_{11,77}=13.438$, $p<.001$, $\eta^2p=0.657$), especially in the switching component. The vulnerability was due to the increased reliance on executive functions, with the prefrontal cortex being particularly affected by sleep deprivation.

These results confirm that circadian and homeostatic factors significantly affect attention and cognitive flexibility, further confirming the validity of the AD-Task as a reliable instrument for detecting these variations under ecologically relevant conditions.

If you're submitting a symposium talk, what's the symposium title?

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No

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