

Peer Review

Review of: "An Explanation for Dreaming Based on Neuronal Maintenance"

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This is a fascinating perspective on the potential function(s) and proposed purpose of REM sleep and dreaming. The author presents an intriguing narrative for this physiologically identifiable yet theoretically perplexing form of behavior. I commend the authors' novel perspective in this regard. I have a few comments for the authors' consideration:

1. Could the author provide a more detailed definition for the concept of maintenance, i.e., what is their contextual definition of this process? Maintenance could be seen as an umbrella term; thus, a more detailed guide might assist in strengthening the case presented for the explanation of dreams.
2. On page 5, the author describes the activity of the frontal cortex in mentating. Could the author provide some insight into the activity of the pre-frontal cortex in this process? Additionally, if the pre-frontal cortex is only fully developed much later in human life (purportedly around age 25), then how would this affect the mentating aspect of dreams?
3. The author correctly describes the changes in energy requirements of the brain across the sleep-wake cycle, where waking and REM are similar in energy expenditure and NREM is 20% lower. If neuronal maintenance is key to REM and dreaming, it seems counterintuitive for the energy expenditure to remain as high as waking. Could the author further elaborate on this matter?
4. The author briefly touches on other species in the discussion. I agree that cetaceans could be an exception, but the reported lack of REM sleep in cetaceans creates a challenge for the maintenance theory. This is not to say that the author's theory is incorrect, but it does beg the question of when the maintenance is occurring in aquatic mammals and indeed semi-aquatic mammals (e.g., seals, which show similar EEG NREM and REM patterns to cetaceans). Could the author provide some comments?

5. REM sleep in some species is quite short (lasting a few seconds) in some birds (e.g., chickens). Could the author provide some comments on how the neuronal maintenance would work in such species?

Declarations

Potential competing interests: No potential competing interests to declare.