Book review: "The Neuroscience of Sleep and Dreams" by Patrick McNamara

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Summary. The Neuroscience of Sleep and Dreams, written by Patrick McNamara, is undoubtedly ambitious: covering, within a single book and in an integrated manner, many psychological aspects of both sleep and dreams. From the multiple forms of sleep across species to the (potential) functions of dreaming, this book addresses outstanding questions on how and why we sleep and dream.
McNamara, P. (2019). The Neuroscience of Sleep and Dreams. Cambridge University Press.

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The Neuroscience of Sleep and Dreams, written by Patrick McNamara, is remarkable. Through 11 chapters, the book covers a tremendous range of topics on sleep and dreams with style and authority, including their functions, related disorders and progression across the lifespan. The structure of the book is straightforward, with the first 6 chapters focusing on sleep while the remaining chapters focus on dreams. The writing is accessible and pleasant whatever our background or level of training, and includes numerous question-and-answer style sections which helps to maintain our attention and interest.

Importantly, the book has a sound educational approach. Each chapter starts with a clear list of learning objectives, helping to highlight the key information to focus on while reading. In addition, each chapter ends with review questions, allowing us to test ourselves on the material that has just been read, and a short list of potential further reading that we might consult for additional or more detailed information of the current topic.

Chapter One presents an extensive definition of sleep and tackles its many aspects, including its behavioral, social, physiological and functional components. At the neural level, the book highlights a specific set of brain areas involved in social cognition, that is called "the social brain network", and how this network may benefit from sleep and vice versa. In addition, the comparison of sleep across species offers an interesting evolutionary perspective and highlights how sleep appears to be fundamental to animal life. It is followed by neurophysiological aspects of sleep in Chapter Two, emphasizing the sleep cycles and how sleep rhythmicity is firmly embedded in the circadian rhythm. The role of the suprachiasmatic nucleus and the homeostatic process are detailed. In addition, the influence of social environment on these biological rhythms are addressed in both normal and pathological conditions.

What is the link between sleep and the quality of the bond between an infant and its parents? Chapter Three is fascinating and describes sleep in the early years of development from an interesting perspective: the expression of sleep characteristics in infants might be shaped by evolutionary forces (e.g., attachment theory) that operate upon human developmental schedules. This chapter continues with a description of sleep in childhood, teenage years, adulthood and finally in the elderly which offers a comprehensive view of sleep patterns and their changes across the human lifespan.

Sleep is a complex biological process that exhibits two major states that are REM and NREM sleep. Chapter Four provides an examination of the behavioral and neural features of these sleep-states. It is followed by a brief review of the major sleep disorders associated with REM and NREM sleep in chapter Five. These descriptions of both the physiology and pathology of REM and NREM sleep lay the foundations to fully comprehend the subsequent and last, but by no means least, chapter dedicated to sleep.

Chapter Six addresses a fundamental question in the science of sleep by providing an overview of the putative functions that sleep may serve. While its functions are still debated, a vast amount of experimental studies and theoretical accounts suggest not one but many functions of sleep. This chapter summarizes the main theories, including the NREM sleep role in regulating immune system, restoring energy, and promoting cognitive functions such as memory consolidation. As for REM sleep, the author discusses its complementary role in memory consolidation, but also considers the role REM sleep plays in emotional balance and in brain development.

From Chapter Seven, the second part of the book is dedicated to dreams. It begins with a definition of what dreaming is and includes a description of its phenomenology, such as emotional involvement, the lack of voluntary control, the predominance of visual imagery, and so on.

Chapter Eight is one of the most intriguing chapters of the book. Dreams are often populated with characters who

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interact with each other and with the dreamer. Here, the author explores this dream feature and addresses the evolution of its content across the lifespan and in relation to social interactions. The author presents the idea that *"dreaming appears to reflect and perhaps promote waking social interactions of the dreamer, from toddlerhood right through to death."* (p.138). The waking attachment relationships that were previously explored in relation to sleep are considered here in relation to dream content.

Chapter Nine addresses the similarities and differences in dream content from REM vs NREM sleep. Not surprisingly, the accent is made on social interactions in the two types of dreams, with both quantitative and qualitative differences highlighted. For example, it is reported that dreamer-initiated aggressive interactions are more characteristic of REM than NREM dreams while dreamer-initiated friendly interactions are more characteristic of NREM than REM dreams (see McNamara et al., 2010).

Chapter Ten sweeps through multiple "atypical" but well-known types of dreams, from lucid dreams to musical dreams and including twin dreams. The variety of dream types discussed in this chapter is refreshing and informative, affording insight into the multiple forms of dreams that can be experienced while asleep.

The final chapter of the book presents the function(s) of dreaming. Many existing theories are addressed, including the social simulation theory that considers dreaming as a simulation of dreamer waking social life (Revonsuo, Tuominen, & Valli, 2015). While debated (e.g., Domhoff & Schneider, 2018), this theory is consistent, at least to some extent, with the dream content and sleep neurobiology studies that have been emphasized in the previous chapters of this book.

To conclude, *The Neuroscience of Sleep and Dreams* does a great job of summarizing contemporary research and theories in a fashion that facilities accessibility for readers, and should be of great interest to anyone seeking a general state-of-the-art of sleep and dream research. In addition, the "social hypothesis" of both sleep and dream that is a consistent theme throughout this book is definitely a major plus. Can the book be improved? Of course, as it is humanly impossible to discuss all aspects of sleep and dream in a single book of 263 pages; Also, the iconography is relatively basic; but *The Neuroscience of Sleep and Dreams* is simply a great read.

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