Networks of the Brain
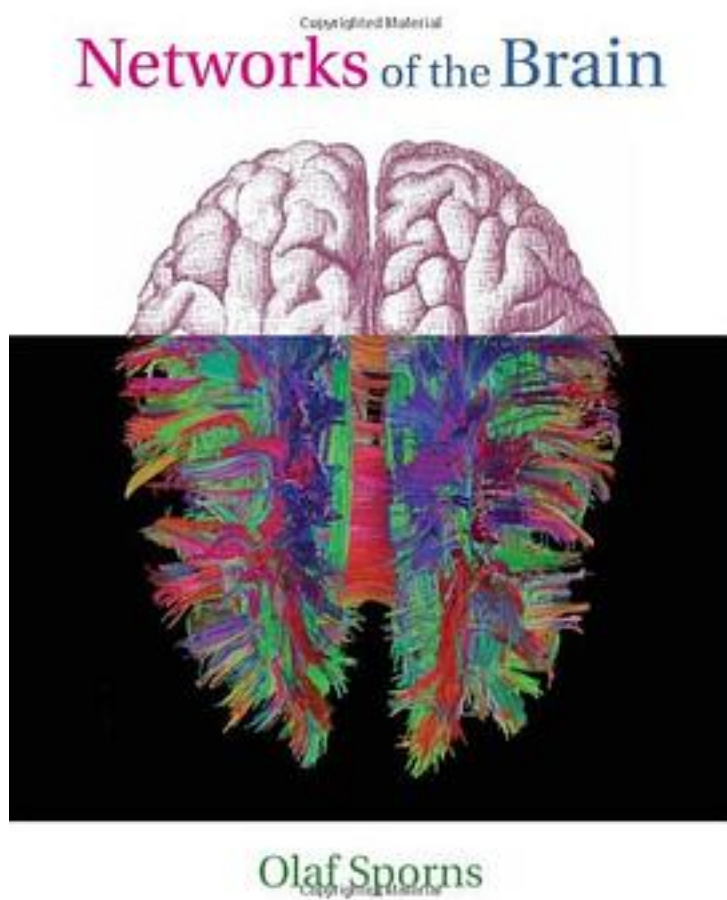
Networks of the Brain_下载链接1_

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Over the last decade, the study of complex networks has expanded across diverse scientific fields. Increasingly, science is concerned with the structure, behavior, and evolution of complex systems ranging from cells to ecosystems. Modern network

approaches are beginning to reveal fundamental principles of brain architecture and function, and in Networks of the Brain, Olaf Sporns describes how the integrative nature of brain function can be illuminated from a complex network perspective. Highlighting the many emerging points of contact between neuroscience and network science, the book serves to introduce network theory to neuroscientists and neuroscience to those working on theoretical network models. Brain networks span the microscale of individual cells and synapses and the macroscale of cognitive systems and embodied cognition. Sporns emphasizes how networks connect levels of organization in the brain and how they link structure to function. In order to keep the book accessible and focused on the relevance to neuroscience of network approaches, he offers an informal and nonmathematical treatment of the subject. After describing the basic concepts of network theory and the fundamentals of brain connectivity, Sporns discusses how network approaches can reveal principles of brain architecture. He describes new links between network anatomy and function and investigates how networks shape complex brain dynamics and enable adaptive neural computation. The book documents the rapid pace of discovery and innovation while tracing the historical roots of the field. The study of brain connectivity has already opened new avenues of study in neuroscience. Networks of the Brain offers a synthesis of the sciences of complex networks and the brain that will be an essential foundation for future research.

作者介绍:

Olaf Sporns is Professor and Associate Chair in the Department of Psychological and Brain Sciences, Adjunct Professor in the School of Informatics and Computing, a member of the programs in Neuroscience and Cognitive Science, and Head of the Computational Cognitive Neuroscience Laboratory at Indiana University Bloomington.

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标签

脑科学

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认知科学

神经科学

心理学

Neuroscience

认知神经科学

Psychology

评论

这本书是华师大心理系相关课程指定读物，其质量的确不错。脑网络研究是connectomics的起点，是复杂科学、网络科学和系统科学在大脑神经领域的重要应用方向之一。建议本科一二年级学习了神经科学基础之后再行阅读此书，毕竟篇幅有限，书中对涉及的生物学和心理学基本概念都不加解释的，如果具备图论之类的数学知识则会更添阅读效率。书中并没有什么数学公式，对神经成像的原理与细节也没有介绍，而进行的全部都是主题叙述，这的确也较为适合大部分数学功底较差的心理学专业学生，帮助他们从不同的角度理解脑结构、脑功能和它们之间的关系等问题。心理学中一些经典问题，诸如结构（功能）独立和功能整合的矛盾、脑发展（发育）中的order和probability、认知障碍的原理可能性…读此书，为学习connectomics做准备。

（假装读过）

动态系统部分写的一般

虽然network本身如同玄学，或者如同修辞，但是作者看待生物系统的角度我很认同。整本书没有什么技术性的内容，基本上是走马观花，不过作为入门也还不错了，每一章展开其实都相当庞大（这个领域规模本身也颇壮观）。况且近几年也已经进入了瓶颈没什么新东西，不懂的地方大家也还是不懂。最值得一看的我觉得是最后两章。我个人比较有用的是最后一章，虽然很科普，但是总结了一些有用的文献，概述也比较全面。network领域可能已经进入了百足之虫死而不僵的阶段，新的突破我觉得应该在于找到biological basis和可以连接这个理论和真实物理模型的方法上。network是很抽象的数学问题，但是因为比较容易被描述所以比较通俗易懂，可也正因如此被严重滥用（比如small world、scale free这些概念）。

老板指定的脑网络教材读物

这本是几年前作为lab
meeting专题报告来学的，一人要报告其中2-3章。算是把我领进了脑网络的门。

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书评

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