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Other Forms of PER Conditioning in Honeybees; 2.6 Conclusion; Appendix A Column: History of a Classical Conditioning of PER in Honeybees; References; Part II: Electrophysiology Chapter 3: Mining Spatio-Spectro-Temporal Cortical Dynamics: A Guideline for Offline and Online Electroencephalographic Analyses: Mining Cortical Dynamics from ECoG Data 3.1 Introduction; 3.2 Offline Analysis; 3.2.1 Independent Component Analysis; Preprocessing Before ICA; Model Order and Component Selections; ICA Algorithms; Reliability of ICA Estimations; 3.2.2 Time-Frequency Representations; 3.2.3 Connectivity Measures; Preprocessing Before Connectivity Measures; Window Length and Model Order Selections; Spectral Functional Connectivity Measures; Spectral Effective Connectivity Measures 3.2.4 Statistical Significance Numerical Approaches for Statistical Significance; Reliability of Connectivity Measures; 3.3 Online Analysis; 3.3.1 Filter Approach; 3.3.2 Wrapper Approach; 3.3.3 Integration Approach; 3.4 Conclusion; References; Chapter 4: Computational Analysis of Behavioural and Neural Data Through Bayesian Statistical Modelling; 4.1 Introduction; 4.2 Bayesian Statistical Modelling; 4.3 Sound Localization in Barn Owls; 4.4 Neural Encoding and Population Vector Decoding; 4.5 Probabilistic Population Codes; 4.6 Correlated Tuning Curves; References Part III: Optical Recording Techniques

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## Sommario/riassunto

The rapid progress of neuroscience in the last decade can be largely attributed to significant advances in neuroethology, a branch of science that seeks to understand the neural basis of natural animal behavior. Novel approaches including molecular biological techniques, optical recording methods, functional anatomy, and informatics have brought drastic changes in how the neural systems underlying high-level behaviors such as learning and memory are described. This book introduces recent research techniques in neuroethology, with diverse topics involving nematodes, insects, and vertebrates (birds, mice and primates), divided into sections by research method. Each section consists of two chapters written by different authors who have developed their own unique approaches. Reports of research in “model animals” including *C. elegans*, *Drosophila*, and mice, which were not typical specimens in conventional neuroethology, have been deliberately selected for this book because a molecular genetic approach to these animals is necessary for advances in neuroethology. Novel methodology including optical recording and functional labeling with reporter genes such as GFP has been actively used in recent neurobiological studies, and genetic manipulation techniques such as optogenetics also are powerful tools for understanding the molecular basis of neural systems for animal behavior. This book provides not only these new strategies but also thought-provoking statements of philosophy in neuroethology for students and young researchers in the biological sciences.

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