



NEUROBIOLOGY

VISUAL POPULATION CODES: TOWARD A COMMON MULTIVARIATE FRAMEWORK FOR CELL RECORDING AND FUNCTIONAL IMAGING. *Computational Neuroscience*.

Edited by Nikolaus Kriegeskorte and Gabriel Kreiman. Cambridge (Massachusetts): MIT Press. \$55.00. xiii + 635 p. + 15 pl.; ill.; index. ISBN: 978-0-262-01624-7. 2012.

This is a welcome collection of articles on neuronal population coding in the visual system. The issue is perennial, multifaceted, and challenging. Population coding (and decoding) is essentially a method, and as such it is applicable to various problems. The papers in this book do justice to the approach and cover a wide range of topics and experimental techniques, from distributed representations to decoding visual consciousness, and from single neuron recordings to fMRI signals. The quality of the material is excellent, and the exposition of the neural or behavioral questions along with their putative population code(s) is typically lucidly presented and critically discussed.

Overall, this is a terrific volume to have prominently displayed in many individual and institutional libraries. Apart from specifics, the more philosophical issue concerns the demarcation of the concept of population coding. The brain is a massively interacting network and, in a way, it is perhaps a trivial statement that information is represented in neuronal ensembles. Even at the extreme of the existence of grandfather cells, they should be more than just literally one cell, so there should be a frequency distribution of functional and morphological and brain location and connectivity properties of such cells, and the variance of those properties should have an impact on behavioral outcomes (e.g., how well and how fast do you recognize your grandfather, how much do you confuse him with his homozygotic twin brother). So, is there something distinctly specific about a "population code"? Or "population codes"?

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PRINCIPLES OF COGNITIVE NEUROSCIENCE. *Second Edition*.

By Dale Purves, Roberto Cabeza, Scott A. Huettel, Kevin S. LaBar, Michael L. Platt, and Marty G. Woldorff; Contributor: Elizabeth M. Brannon. Sunderland (Massachusetts): Sinauer Associates. \$114.95. xxii + 601 p.; ill.; index. ISBN: 978-0-87893-573-4. 2013.

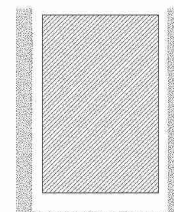
PRINCIPLES OF NEURAL SCIENCE. *Fifth Edition*.

Edited by Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegelbaum, and A. J. Hudspeth; Art Editor: Sarah Mack. New York: McGraw-Hill. \$135.00. 1 + 1709 p.; ill.; index. ISBN: 978-0-07-139011-8. 2013.

In the preface, the editors outline the advances in neuroscience in the intervening 13 years between the fourth and fifth editions. These advances include: the contribution of molecular biology to a range of neurological pathologies (e.g., Huntington and Alzheimer diseases); embryological neural development at the molecular and cellular levels; recent advances in molecular and optical devices for imaging the signaling dynamics of neural pathways and circuits; the increasing impact of these developments on future developments in clinical neurology and psychiatry; the effects of unconscious motor and emotional states on conscious-level cognitive processing; and the increasing contributions of computational neuroscience to modeling motor-level cognitive processing and the effects of such computations on cortical-level computations.

Instead of reviewing the current edition in overall, general terms, I will discuss some of the major continuities and revisions in the nine major topical divisions defining both editions. The three chapters of Part I of the current volume, regarding the neurobiology of behavior, are essentially unchanged. Part II, Cell and Molecular Biology of the Neuron, updates and combines Chapters 7 and 8 into Chapter 6 of this edition. Part III, Synaptic Transmission, is largely continuous with the previous version. Part IV, The Neural Basis of Cognition, adds two new chapters: Cognitive Functions of the Premotor Systems and Functional Imaging of Cognition. Part VI, Movement, is largely unchanged except for the addition of the chapter, Genetic Mechanisms in Degenerative Diseases of the Nervous System.

The title changes of the old and new Part VII from Arousal, Emotion, and Behavioral Homeostasis to The Unconscious and Conscious Processing of Neural Information is an interesting addition. Whereas in the previous edition there were no references whatsoever to "nonconscious states/processing," in the current volume there are now at least 15 pages on this topic distributed between Parts VII and IX. By contrast, there are no references to such states/processing in Zigmond et al.'s *Fundamental Neuroscience* (1999. San Diego (CA): Academic Press), nor in Squire et al.'s *Fundamental Neuroscience* (2012. Fourth Edition. Amsterdam (The Netherlands): Elsevier). Adams and Victor's *Principles of Neurology* (A. H. Ropper and R. H. Brown. 2005. Eighth Edition. New York: McGraw-



Hill) only mentions the unconscious in the context of comas and related disorders of consciousness. For the volume here under review, rather than denoting a coma-like state or “disorder,” the concept reflects: “An emerging realization in the neurobiology of emotion . . . that an unconscious representation of our emotional state by the amygdala can lead to a somatic response that often precedes our cognitive awareness—our feeling—of an emotional state” (p. 1017). The influence here of Damasio’s *The Feeling of What Happens: Body and Emotion in the Making of Consciousness* (2010. Orlando (FL): Mariner Books) should be obvious. Part VIII, Development and the Emergence of Behavior, remains largely intact except for the addition of the chapter Repairing the Damaged Brain.

The appendixes have undergone major changes. First, the additions: Appendix B, The Neurological Examination of the Patient; Appendix E, Neural Networks; and Appendix F, Theoretical Approaches to Neuroscience: Examples from Single Neurons to Networks. Second, the deletion: Appendix D, Consciousness and the Neurobiology of the 21st Century. This volume is highly recommended for cognitive science/neuroscience programs and medical school libraries. It is also a necessary resource to have close at hand for any researcher in cognitive science to keep abreast of current developments in neuroscience regarding “how embodied brains make minds.”

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