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Models of the Visual System **Vision and the Visual System** **Webvision** *An Introduction to the Visual System* Vision and the Visual System **The Visual System from Genesis to Maturity An Introduction to the Visual System** The Visual System *The Visual System of Work* **Parallel Processing in the Visual System** The Visual System Central Processing of Visual Information A: Integrative Functions and Comparative Data *Evolution of the Eye and Visual System* Clinical Anatomy and Physiology of the Visual System **The Primate Visual System** The Making of a Neuromorphic Visual System **The Visual Neurosciences The Visual System of Fish Pathophysiology of the Visual System** *Development of Perception Clinical Anatomy of the Visual System* **The Cat Primary Visual Cortex Neurology of the Visual System Visual Development** *Visual Perception* **The Vertebrate Visual System** The Primate Visual System Eye, Retina, and Visual System of the Mouse **The New Visual Neurosciences Models of Learning in the Visual System: Dependence on Retinal Eccentricity** *The Visual Brain in Action* **Perceiving in Depth, Volume 1** *Neuronal Operations in the Visual Cortex* The Primate Visual System **Plasticity in the Visual System** *The Visual (Un)Conscious and Its (Dis)Contents* **The Amphibian Visual System** *Neurophysiological Aspects of the Visual System* **Neurons and Interneuronal Connections of the Central Visual System** *Development of the Visual System*

In the primary visual cortex of primates relatively more space is devoted to the representation of the central visual field in comparison to the representation of the peripheral visual field. Experimentally testable theories about the factors and mechanisms which may have determined this inhomogeneous mapping may provide valuable insights into general processing principles in the visual system. Therefore, I investigated to which visual situations this inhomogeneous representation of the visual field is well adapted, and which mechanisms could support its refinement and stabilization during individual development. Furthermore, I studied possible functional consequences of the inhomogeneous representation for visual processing at central and peripheral locations of the visual field. Vision plays an important role during navigation. Thus, visual processing should be well adapted to self-motion. Therefore, I assumed that spatially inhomogeneous retinal velocity distributions, caused by static objects during self-motion along the direction of gaze, are transformed on average into spatially homogeneous cortical velocity distributions. This would have the advantage that the cortical mechanisms, concerned with the processing of self-motion, can be identical in their spatial and temporal properties across the representation of the whole visual field. This is the case if the arrangement of objects relative to the observer corresponds to an ellipsoid with the observer in its center. I used the resulting flow field to train a network model of pulse coding neurons with a Hebbian learning rule. The distribution of the learned receptive fields is in agreement with the inhomogeneous cortical representation of the visual field. These results suggest that self motion may have played an important role in the evolution of the visual system and that the inhomogeneous cortical representation of the visual field can be refined and stabilized by Hebbian learning mechanisms during ontogenes. Vision and the Visual System offers students, teachers, and researchers a rigorous, yet accessible account of how the brain analyzes the visual scene. Schiller and Tehovnik describe key aspects of visual perception while explaining the relationship between eye movements and the neural structures in the brain, which play a central role in how we process visual information. The book discusses various brain areas involved in processing information, focusing on the evolutionary origins and mechanics behind the several parallel pathways that compose the visual system. Later chapters explain how the nervous system processes the perception of color, motion, depth, and patterns. A variety of illusions are on display in Chapter 14, where the authors provide detailed explanations that deconstruct how the visual system operates to create them. The volume concludes with a discussion of recent attempts to build visual prosthetic devices for blind individuals, of which there are more than 40 million in the world. Vision and the Visual System is based on Professor Schiller's more than 40 years of experience teaching vision courses at MIT, and is tailored especially for college undergraduates and graduate students interested in visual perception and the operations of the visual system. The Dynamic Displays posted here for this book are short video clips that would enhance the reader to understand certain areas of vision. They are particular to the chapter they belong within (9 video clips for Chapter 11, 1 video clip for Chapter 12, and 2 video clips for Chapter 14). http://web.mit.edu/bcs/schillerlab/book.html 'Vision and the Visual System' offers students, teachers and researchers a rigorous, yet accessible account of how the brain analyses the visual scene. Schiller and Tehovnik describe key aspects of visual perception such as colour, motion, pattern and depth while explaining the relationship between eye movements and neural structures in the brain. The invitation by the editors of the series "studies of brain function" to contribute a monograph on the visual cortex gives me the opportunity to present in a concentrated manner much of the work I have done on the visual cortical areas of cat and monkey. However, the field of visual cortical physi ology is so active and so diverse that the presentation of only my own work would have given a very incomplete view of visual cortical functioning. Therefore this monograph also reviews most of the studies carried out on the subject in the last two decades. Where possible I have tried not only to describe the cortical machinery but also its possible functional purpose regarding vision. In doing this I have expressed my personal views rather than just reviewing the experimental facts. Much of the work presented in this monograph has been supported by the National Research Council of Belgium and the Research Council of the Catholic University of Leuven. I express my gratitude to them. I have en joyed collaborating in these studies with P. O. Bishop, H. Kato, H. Kennedy, K. P. Hoffmann, H. Maes, J. Duysens, E. Vandenbussche, and H. van der Glas. I am much indebted to all those who have commented on earlier versions of this monograph: J. Allman, H. Barlow, J. BuBier, M. Callens, J. Duysens, O. J. Griisser, P. Heggelund, H. Kennedy, L. C. Orban and L. Palmer. The Amphibian Visual System: A Multidisciplinary Approach is a compendium of articles across a broad range of disciplines within experimental biology focusing on the study of the amphibian visual system. The book presents a survey of the evolutionary history and major taxonomic and ecological adaptations of amphibians; anatomic, physiological, developmental, and behavioral data relating to the amphibian visual system; description of important standards for laboratory amphibians; and the crucial problem of species identification in neurobiological research. Zoologists, experimental biologists, neurologists, and anatomists will find the text very interesting. An essential reference book for visual science. The three-volume work Perceiving in Depth is a sequel to Binocular Vision and Stereopsis and to Seeing in Depth, both by Ian P. Howard and Brian J. Rogers. This work is much broader in scope than the previous books and includes mechanisms of depth perception by all senses, including aural, electrosensory organs, and the somatosensory system. Volume 1 reviews sensory coding, psychophysical and analytic procedures, and basic visual mechanisms. Volume 2 reviews stereoscopic vision. Volume 3 reviews all mechanisms of depth perception other than stereoscopic vision. The three volumes are extensively illustrated and referenced and provide the most detailed review of all aspects of perceiving the three-dimensional world.Volume 1 starts with a review of the history of visual science from the ancient Greeks to the early 20th century with special attention devoted to the discovery of the principles of perspective and stereoscopic vision. The first chapter also contains an account of early visual display systems, such as panoramas and peepshows, and the development of stereoscopes and stereophotography. A chapter on the psychophysical and analytic procedures used in investigations of depth perception is followed by a chapter on sensory coding and the geometry of visual space. An account of the structure and physiology of the primate visual system proceeds from the eye through the LGN to the visual cortex and higher visual centers. This is followed by a review of the evolution of visual systems and of the development of the mammalian visual system in the embryonic and post-natal periods, with an emphasis on experience-

dependent neural plasticity. An account of the development of perceptual functions, especially depth perception, is followed by a review of the effects of early visual deprivation during the critical period of neural plasticity on amblyopia and other defects in depth perception. Volume 1 ends with accounts of the accommodation mechanism of the human eye and vergence eye movements. Building on the successful formula of the first edition, Martin Tovée offers a concise but detailed account of how the visual system is organised and functions to produce visual perception. He takes his readers from first principles; the structure and function of the eye and what happens when light enters, to how we see and process images, recognise patterns and faces, and through to the most recent discoveries in molecular genetics and brain imaging, and how they have uncovered a host of new advances in our understanding of how visual information is processed within the brain. Incorporating new material throughout, including almost 50 new images, every chapter has been updated to include the latest research, and culminates in helpful key points, which summarise the lessons learnt. This book is an invaluable course text for students within the fields of psychology, neuroscience, biology and physiology. This book presents an approach to the construction of a visual system, which is behaviorally, computationally and neurally motivated. The goal is to characterize the process of visual categorization and to find a suitable representation format that can successfully deal with the structural variability existent within visual categories. The book reviews past and existent theories of visual object and shape recognition in the fields of computer vision, neuroscience and psychology. The entire range of computations is discussed, as are region-based approaches and are modeled with wave-propagating networks. A completely novel shape recognition architecture is proposed that can recognize simple shapes under various degraded conditions. It is discussed how such networks can be used for constructing basic-level object representations. It is envisioned how those networks can be implemented using the method of neuromorphic engineering. As the first introductory-level text in its field, Visual Development offers a comprehensive understanding of the development of the visual system and the effects of visual deprivation. The material is treated from the behavioral, anatomical, and physiological points of view. Complete with ample illustrations and a helpful glossary, this text is invaluable for graduate students, optometry students, and ophthalmology residents as well as for experts in related fields. Over the past 25 years, more than 100 companies that were failing, not making enough money or simply struggling to achieve their true potential, turned to David Lord to learn how to make their businesses work better, make more money and generate additional cash. David showed them how to transform their businesses' systems of work into visual ones, resulting in improved employee involvement, quality, productivity and profitability. Now, David's book shows exactly what he does to change struggling businesses into thriving ones, by employing the Visual System of Work. Using a 90-day implementation guide, the author gives practical, step-by-step instructions about how to make the work processes of a business visible, beginning with the collection of concrete data about how a business actually operates in the present time (rather than relying on peoples' perceptions) and ending with ways to review, maintain and continuously improve the business' (now newly transformed and invigorated) visual system of work. In between, the author walks you through each step of clear-cut exercises and assessments designed to revolutionize, revitalize and transform a business. Directives include how to solidify core values, identify key Lead and Lag measures, set up a "war room" and communicate information throughout the organization. David provides eight practical tools for helping a business get better including a Strategic Planning Sheet, a System of Work Diagram, a Scoreboard Sheet and (2) Time Management Sheets. The "7-Step Process of Improving Throughput Performance" helps businesses define and solve problems by identifying constraints ("slowdowns") within the flow of work. Once constraints are recognized, the reasons for them ("interferences") can be reduced or eliminated. A book about visual systems should be visually attractive, and this one is, using plenty of photos and illustrations as well as an engaging variety and size of fonts. Pertinent quotes and interesting factoids are sprinkled among the straightforward information in just the right mix to keep the book flowing, easy to understand and a fast (under two hours) read. Inspiring and practical, this book is a valuable resource for any business interested in working better, making more money and generating additional cash. Mechanisms of neural plasticity enable the encoding and memorization of information based on sensory inputs and can be harnessed to partially restore function after CNS assault such as stroke or head trauma. In the present book, experts from the field of visual system plasticity describe and evaluate the evidence for neural mechanisms proposed to underlie CNS plasticity in the major divisions of the brain dedicated to visual processing, the retina, sub-cortical structures and cortex. We present studies from a wide variety of disciplines that range from molecular biology to neurophysiology and computer modeling. Leading investigators discuss their own work, and integrate this research with colleagues from other specializations. The book points out future applications for this research including clinical uses and engineering within the biomedical sciences. This book is an exciting and thought provoking read for all levels of science enthusiast interested in the physical basis of learning and cognition. A question often asked of those of us who work in the seemingly esoteric field of fish vision is, why? To some of us the answer seems obvious - how many other visual scientists get to dive in a tropical lagoon in the name of science and then are able to eat their subjects for dinner? However, there are better, or at least scientifically more acceptable, reasons for working on the visual system of fish. First, in terms of numbers, fish are by far the most important of all vertebrate classes, probably accounting for over half (c. 22 000 species) of all recognized vertebrate species (Nelson, 1984). Furthermore, many of these are of commercial importance. Secondly, if one of the research aims is to understand the human visual system, animals such as fish can tell us a great deal, since in many ways their visual systems, and specifically their eyes, are similar to our own. This is fortunate, since there are several techniques, such as intracellular retinal recording, which are vital to our understanding of the visual process, that cannot be performed routinely on primates. The cold blooded fish, on the other hand, is an ideal subject for such studies and much of what we know about, for example, the fundamentals of information processing in the retina is based on work carried out on fish (e. g. Svaetichin, 1953). In the mid-sixties, John Robson and Christina Enroth-Cugell, without realizing what they were doing, set off a virtual revolution in the study of the visual system. They were trying to apply the methods of linear systems analysis (which were already being used to describe the optics of the eye and the psychophysical performance of the human visual system) to the properties of retinal ganglion cells in the cat. Their idea was to stimulate the retina with patterns of stripes and to look at the way that the signals from the center and the antagonistic surround of the respective field of each ganglion cell (first described by Stephen Kuffier) interact to generate the cell's responses. Many of the ganglion cells behaved themselves very nicely and John and Christina got into the habit (they now say) of calling them I (interesting) cells. However. to their annoyance, the majority of neurons they recorded had nasty, nonlinear properties that couldn't be predicted on the basis of simple summ4tion of light within the center and the surround. These uncoop erative ganglion cells, which Enroth-Cugell and Robson at first called D (dull) cells, produced transient bursts of impulses every time the distribution of light falling on the receptive field was changed, even if the total light flux was unaltered. The International Society for Clinical Electroretinography provides a link between scientists who are enlarging our understanding of the normal functioning of the visual pathway, and clinicians who investigate and treat visual disturbances. The chief function of the Society is to organise symposia, where, with skill born of long practice, the participants obtain the benefits of both social and scientific contact, without detriment to either. The result ing spread of information is documented both in the society's Newsletter, and by the publication of volumes such as this, the record of the 9th Symposium held at Brighton in 1971. This meeting was a joint Symposium of the ISCERG and the International Union of Physiological Sciences. The subjects covered represent merely the interests of the organisers. The biophysical studies are represented by chapters on such divers topics as the x-ray diffraction of receptor membranes and impedance properties of outer limb suspensions. Other papers deal with the problems of maintaining the retina in vitro in a physiological condition. Papers describing techniques for investigating the functional properties of the visual system shade into those which describe new aspects of human disease. In the past such serendipity has been of value as evidenced by compal-ison between this and previous volumes. In 1965 the physiological section of the Proceedings was largely devoted to a new elec trical response, the evoked potential of the visual cortex. The present volume covers the physiology of the visual system beyond the optic nerve. It is a continuation of the two preceding parts on the photochemistry and the physiology of the eye, and forms a bridge from them to the fourth part

on visual psychophysics. These fields have all developed as independent speciali ties and need integrating with each other. The processing of visual information in the brain cannot be understood without some knowledge of the preceding mechanisms in the photoreceptor organs. There are two fundamental reasons, ontogenetic and functional, why this is so: 1) the retina of the vertebrate eye has developed from a specialized part of the brain; 2) in processing their data the eyes follow physiological principles similar to the visual brain centres. Peripheral and central functions should also be discussed in context with their final synthesis in subjective experience, i. e. visual perception. Microphysiology and ultramicroscopy have brought new insights into the neuronal basis of vision. These investigations began in the periphery: HARTLINE'S pioneering experiments on single visual elements of Limulus in 1932 started a successful period of neuronal recordings which ascended from the retina to the highest centres in the visual brain. In the last two decades modern electron microscopic techniques and photochemical investigations of single photoreceptors further contributed to vision research. Discussing the neural behavior of visuomotor processing in the primate brain, this book synthesizes current knowledge on the anatomical and functional organization of the primate visual system and proposes new directions for research. It describes state-of-the-art methods for investigating the visual system and includes coverage of how the visual system is formed during development. Contributed by a multidisciplinary group of leading researchers, chapters consider a range of topics concerning various primates, including humans, and cover processing from the eye to neural codes for action, and from basic perception to memory. This century has witnessed the creation of new sciences extending the frontiers of knowledge to an unprecedented degree. We have seen the birth of cybernetics and bionics, bringing together such apparently distantly related branches of science as neurohistology and automation, synaptology and electronics. The electron microscope has resolved tissues almost down to the molecular level, and histochemistry has led to the fine analysis of brain structure. However, before these and other new sciences can develop properly and scientifically, a precise knowledge of the structure of the material with which they are concerned is absolutely essential. That is why the need exists at the present time for a detailed study of the larger units, i. e. , the neurons, their interrelationships and the pathways by which excitation is conducted. Biologists, neurologists, physicists, and specialists in other technical disci plines will find this study highly useful. During recent years many advances have been made in knowledge of the central visual system and its pathways. Above all, it has been found that the visual system is very extensive. The optic tract is connected, not only with the lateral geniculate body, but with the superior colliculus and the pulvinar. Besides the discovery of these principal pathways, connections have also been studied with the hypothalamus, the pretectal region, the medial geniculate body, subthalamus, and other parts of the brain stem. The visual system is thus connected with the reflex apparatus, the autonomic nervous system, and the auditory and reticular systems. Visual control of our actions can be unconscious as well as conscious. For example, when a pedestrian steps onto a street and then suddenly steps back, to avoid being hit by an oncoming car, the pedestrian's visual system has been able to detect the car very rapidly. Since the registration of the approaching car in conscious vision could take a few hundreds of milliseconds - possibly too long to avoid being struck by it, the rapid injury-avoiding action has relied on the oncoming car being detected at unconscious levels in the visual system. So how, and at what level in the visual system is a stimulus processed unconsciously? This book explores unconscious and conscious vision, investigated using psychophysical and brain-recording methods. These methods allow microtemporal analyses of visual processing during the interval, ranging from a few 10s to a few 100s of milliseconds, between a stimulus's impinging on the retinae and its eliciting a behavioral response or a conscious percept. By tying these findings to well-known neuroanatomical and physiological substrates of vision, the book presents and discusses theoretical and empirical approaches to, and findings on, conscious and unconscious vision. In addition to presenting an in-depth, integrative review of recent and ongoing scientific and scholarly research, the book proposes several avenues for directing future research in these areas. It also provides a well articulated theoretical and a detailed empirical base that points to the special importance of the processing of surface properties of visual objects to their conscious vision. Aimed at scientists and scholars in visual cognition, visual neuroscience and, more broadly, cognitive science - including that part of the philosophical community that is currently occupied with the mind-brain problem, the book sheds new light on and advances experimental, philosophical, and scholarly research on visual consciousness. Some of the best vision scientists in the world in their respective fields have contributed to chapters in this book. They have expertise in a wide variety of fields, including bioengineering, basic and clinical visual science, medicine, neurophysiology, optometry, and psychology. Their combined efforts have resulted in a high quality book that covers modeling and quantitative analysis of optical, neurosensory, oculomotor, perceptual and clinical systems. It includes only those techniques and models that have such fundamentally strong physiological, control system, and perceptual bases that they will serve as foundations for models and analysis techniques in the future. The book is aimed first towards seniors and beginning graduate students in biomedical engineering, neurophysiology, optometry, and psychology, who will gain a broad understanding of quantitative analysis of the visual system. In addition, it has sufficient depth in each area to be useful as an updated reference and tutorial for graduate and post-doctoral students, as well as general vision scientists. This comprehensive guide to current research captures the first wave of studies in the field, with fifty-nine chapters by leading scholars that demonstrate the usefulness of mouse models as a bridge between experimental and clinical research. The opening chapters introduce the mouse as a species and research model, discussing such topics as the mouse's evolutionary history and the mammalian visual system. Subsequent sections explore more specialized subjects, considering optics, psychophysics, and the visual behaviors of mice; the organization of the adult mouse eye and central visual system; the development of the mouse eye (including comparisons to human development); the development and plasticity of retinal projections and visuotopic maps; mouse models for human eye disease (including glaucoma and cataracts); and the application of advanced genomic technologies (including gene therapy and genetic knockouts) to the mouse visual system. Readers of this reference will see th. All the tissues of the eye, including the lens, the cornea, the ciliary body, the neuroretina and the retinal pigment epithelium must work in harmony for the realization of clear vision.The phenotypic emergence of each of these tissues requires intercellular communication, which is achieved through direct physical contact as well as through diffusion and reception of the molecular beacons.This volume provides an overview of the molecular and cellular biology of eye development and encompasses themes like early gene expression in the surface ectoderm and the optic cup, retinal neurogenesis, signaling molecules and axonal guidance. It presents new findings on the influence of the lens on the development of the visual system and how gene expression in the optic cup controls differentiation of the lens fiber cell while established ideas about the morphogenesis of the ciliary body are challenged. A valuable source of information for developmental biologists and neurobiologists as well as ophthalmologists interested in understanding the relationship between temporally and spatially regulated gene activity and function and cellular interactions in early development and neuronal functions. The last 20 years of research have been marked by exceptional progress in understanding the organization and functions of the primate visual system. This understanding has been based on the wide application of traditional and newly emerging methods for identifying the functionally significant subdivisions of the system, their interconnections, the Written by experts on the forefront of investigations of brain function, vision, and perception, the material presented is of an unparalleled scientific quality, and shows that analyses of enormous breadth and sophistication are required to probe the structure and function of brain regions. The articles are highly persuasive in showing what can be achieved by carrying out careful and imaginative experiments. The Cat Primary Visual Cortex should emerge as essential reading for all those interested in cerebral cortical processing of visual signals or researching or working in any field of vision. Comprehensive account of cat primary visual cortex Generous use of illustrations including color Covers research from structure to connections to functions Chapters by leaders in the field Topics presneted on multiple, compatible levels Many recent developments in the field in recording, staining, genetic and stimulation techniques, in vivo, and in vitro have significantly increased the amount of available data on the primate visual system. Written with contributions from key neurobiologists in the field, The Primate Visual System will provide the reader with the latest developments, examining the structure, function and evolution of the primate visual system. The book takes a

comparative approach as a basis for studying the physiological properties of primate vision and examines the phylogenetic relationship between the visual systems of different primate species. Taken from a neurobiologist’s perspective this book provides a unique approach to the study of primate vision as a basis for further study into the human visual system. Altogether an important overview of the structure, function and evolution of the primate visual system from a neurobiologist’s perspective, written specifically for higher level undergraduate and graduate students taking courses in neuroscience, physiology, optics/ visual science, as well as a valuable read to researchers new to the field. A comprehensive review of contemporary research in the vision sciences, reflecting the rapid advances of recent years. Visual science is the model system for neuroscience, its findings relevant to all other areas. This essential reference to contemporary visual neuroscience covers the extraordinary range of the field today, from molecules and cell assemblies to systems and therapies. It provides a state-of-the art companion to the earlier book The Visual Neurosciences (MIT Press, 2003). This volume covers the dramatic advances made in the last decade, offering new topics, new authors, and new chapters. The New Visual Neurosciences assembles groundbreaking research, written by international authorities. Many of the 112 chapters treat seminal topics not included in the earlier book. These new topics include retinal feature detection; cortical connectomics; new approaches to mid-level vision and spatiotemporal perception; the latest understanding of how multimodal integration contributes to visual perception; new theoretical work on the role of neural oscillations in information processing; and new molecular and genetic techniques for understanding visual system development. An entirely new section covers invertebrate vision, reflecting the importance of this research in understanding fundamental principles of visual processing. Another new section treats translational visual neuroscience, covering recent progress in novel treatment modalities for optic nerve disorders, macular degeneration, and retinal cell replacement. The New Visual Neurosciences is an indispensable reference for students, teachers, researchers, clinicians, and anyone interested in contemporary neuroscience. Associate Editors Marie Burns, Joy Geng, Mark Goldman, James Handa, Andrew Ishida, George R. Mangun, Kimberley McAllister, Bruno Olshausen, Gregg Recanzone, Mandyam Srinivasan, W.Martin Usrey, Michael Webster, David Whitney Sections Retinal Mechanisms and Processes Organization of Visual Pathways Subcortical Processing Processing in Primary Visual Cortex Brightness and Color Pattern, Surface, and Shape Objects and Scenes Time, Motion, and Depth Eye Movements Cortical Mechanisms of Attention, Cognition, and Multimodal Integration Invertebrate Vision Theoretical Perspectives Molecular and Developmental Processes Translational Visual Neuroscience First published in 1995, this book presents a model for understanding the visual processing underlying perception and action, proposing a broad distinction within the brain between two kinds of vision: conscious perception and unconscious 'online' vision. Originally published: Clinical anatomy of the visual system / Lee Ann Remington; with a contribution by Eileen C. McGill. The Visual System Visual Perception explores fundamental topics underlying the field of visual perception, including the perception of brightness and color, the physics of light, and the optics of the eye. Although the text leans heavily on physical and physiological concepts, explanations of the relevant physics and physiology are considered. This book is organized into 16 chapters and begins with an overview of the relationship between information assimilation and the physiology of the visual system based on data gathered both in physiological and perceptual experiments. More specifically, this text discusses the nature of the human perceptual system in terms of the kinds of information that are assimilated from the world, and how this selection of information is governed by the structure of receptors and the neural circuits that are connected to them. The relationships between symbols and their corresponding physical and physiological variables are also examined. Finally, the book addresses the presence of strong lateral inhibition in the visual system and how it fits the concept of evolution. This book is aimed at undergraduate and graduate students, regardless of their academic backgrounds. Building on the successful formula of the first edition, Martin Tovée offers a concise but detailed account of how the visual system is organised and functions to produce visual perception. He takes his readers from first principles; the structure and function of the eye and what happens when light enters, to how we see and process images, recognise patterns and faces, and through to the most recent discoveries in molecular genetics and brain imaging, and how they have uncovered a host of new advances in our understanding of how visual information is processed within the brain. Incorporating new material throughout, including almost 50 new images, every chapter has been updated to include the latest research, and culminates in helpful key points, which summarise the lessons learnt. This book is an invaluable course text for students within the fields of psychology, neuroscience, biology and physiology. - Full color illustrations throughout enhance the anatomical and clinical information.- The only anatomy text written by an optometrist for optometrists and students -- it provides a strong foundation for recognizing and understanding clinical situations, problems, and treatments.

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