Sensation and perception by J M Wolfe, K R Kluender, D M Levi, L M Bartoshuk, R S Herz, R L Klatzky, S J Lederman; Sinauer Associates, Sunderland, MA, 2005, 407 pages, Instructor’s Resource CD-ROM available on request, $102.95 (£35.99) ISBN 9780878939381

The authors state in the Preface that their goal in writing the book Sensation and Perception was to produce a comparatively brief book that rouses interest in the typical undergraduate student and teaches the topic in an incremental manner. The book adequately attains the goals that the authors have set themselves and therefore in my opinion it should be a success.

Visual perception is the topic of the first eight chapters of the book, followed by two chapters on hearing, one chapter on speech and music, and one chapter on each of touch, olfaction and taste. The emphasis on vision reflects the fact that more is known about how the brain processes visual information than about how it processes other sensory information, and that more of the human cortex is involved in processing visual information than is involved in processing information from any other sensory modality. The relative weights assigned to the discussion of each sensory modality seem appropriate, since no section of the book is tediously long or overly brief. The numbers of pages assigned to the different sections of the book is well balanced. Also well balanced is the distribution of space between anatomy, physiology, and psychophysics.

My first impression of the book was that this was a low-level book that would attract the interest of the beginner but was less informative than other books available on the topic. However, on reading the book in depth I realised that the first impressions were deceptive. This deceptiveness largely results from how readable the book is. The abundant use of figures permits the text to be presented in a brief and simplified style. The excellent selection of web activities throughout the book simplifies some of the concepts that undergraduates normally have difficulty with, and it adds an interactive component to the learning experience. The web activities also permit learning to occur in an incremental manner, with the book introducing the subject material, the web activities reinforcing the concepts already discussed, and the essays on the web supplementing the information in the book. The book in conjunction with the web activities contains a wealth of information and I was pleased to discover that my early impressions were wrong.

With regard to books with multiple authors, a question of relevance is: how well are the different chapters integrated? As a vision scientist, I was very pleased to note that most of the later chapters, which dealt with non-visual sensory modalities, referred back to the earlier chapters that discussed vision, highlighting similarities between visual processes and processes in other sensory modalities. The chapter on Touch discusses the interaction of this modality with the other modalities. The chapters on Olfaction and Taste cross-reference each other as these modalities strongly influence each other. However, in general, the cross-referencing between the different chapters leaves room for improvement. For example, two-point thresholds were not discussed in the Spatial Vision chapter (thresholds for resolving gratings were discussed), but could have been discussed on account of their similarities with two-point touch thresholds that are discussed in the chapter on Touch. Likewise, some temporal properties of vision, such as the perception of flicker, were overlooked; temporal properties play an important part in audition. Vibrotactile temporal thresholds are discussed in the chapter on Touch, and the discussion of temporal properties in the visual domain would have rounded off the topic. The topic of attention has been reviewed in detail in the chapters titled Attention and Scene Perception and in the chapter titled Touch, but there is little cross-referencing between the two. More co-ordination between the different chapters would make the book more stimulating. Throughout the book, the helpful practice of using the margin to define the technical terms used has been followed, but some chapters (eg chapter 9) make more use of the margins than others (eg chapter 11). Hopefully subsequent editions of the book will see greater integration and consistency of style across the chapters.

In their presentation of the text, as well as in the activities on the web, the authors have gone to great lengths to simplify much of the material covered. This largely makes for very
pleasant reading. However, there are places in the book and in the web activities where material has been oversimplified and could lead to confusion on the part of the reader. For example, in the book, I found the section on Signal Detection Theory in chapter 1 to be very confusing in the way it was presented. Likewise, in the web activities the calculation of visual angles was incorrectly presented initially (Web Activity 3.1; visual angle = target size/viewing distance; though the smaller text stated that a more accurate formula would follow, the smaller text could remain unread on the night before an exam), the simple cell was inaccurately defined (Web Activity 3.4; “Simple cells respond maximally only when the bar of light is in the centre of the cell’s receptive field ...”), and the firing rates of simple and complex cells were difficult to comprehend from the demos (Web Activity 3.4).

In spite of the minor shortcomings listed above the web activities contribute immensely towards the understanding of the subject material. The students in my Visual Perception class were asked to browse through the web activities relevant to chapter 3 (Spatial Vision) and chapter 5 (The Perception of Colour) and they found it extremely useful. The web activities are largely self-explanatory (even without reading the text). The smarter/motivated students in the class were puzzled by the workings of simple and complex cells as illustrated in the activities. However, most students benefited considerably from these interactive activities and my task of explaining some of the more difficult concepts was made considerably easier.

From the instructor’s point of view the web activities are extremely useful, since the students learn interactively and at their own pace. The other useful tool from the instructor’s viewpoint is the Instructor’s Resource CD that accompanies the book. All of the book’s extensive collection of figures is available in high resolution on the CD, saving the inconvenience of scanning the figures for lectures. The lecture outlines available on the CD are extremely timesaving for any instructor preparing new lectures. Even instructors revising their lectures could benefit from the excellent collection of illustrations and from the lecture outlines. The Resource CD is a valuable aid for teaching perception.

The book is reasonably priced. Taking into account the quality of the print, the number and the quality of illustrations, the quality of the binding, and the selection and presentation of the subject material, the book is very good value for money. A first step towards getting undergraduates to read a text is to convince them that the subject matter is interesting and easy to grasp. In this context the book is a huge success. The web activities are extremely useful and the minor shortcomings listed above can easily be fixed. I believe the future of this book is bright and I would highly recommend it as an introductory textbook for perception.

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As an undergraduate, what you need from a textbook changes as you go through your course. When you first start, you want concise, clearly illustrated explanations of the key concepts and methodologies relating to the subject. As you progress, and begin to rely more on journals, a good textbook can help with this transition by providing references to key papers in the relevant areas, and by acting as a reference source when, for example, you need to double check that you really do understand what a receptive field is. This textbook excels in all of these roles.

When you first open the book, what strikes you are the fantastic illustrations. They are used to great effect to explain subjects ranging from the structure of the retina to colour vision to visual attention. The descriptions that accompany the illustrations are of equally high standard, and bring clarity to potentially intimidating topics such as psychophysics. The authors don’t shy away from going into detail where it’s required, but that sense of clarity is always retained, and they use some nice practical examples to prevent the coverage appearing too dense. The chapter on spatial vision, for instance, has some detailed descriptions of contrast sensitivity functions and retinal ganglion cell responses, but also includes a section on how an eye doctor would measure the visual acuity of a patient.

The authors are also skilled at weaving into the descriptions of the topics in the book some of the more technical and mathematical concepts that underpin our understanding of sensation and perception, in a way that makes these concepts very accessible. Take the chapter on the perception of depth, for example. Alongside the material you’d expect to find here about binocular
vision and stereopsis, is a section which presents some contemporary views on how we might combine depth cues, based on a Bayesian approach. This not only provides the reader with a view of some of the latest thinking in the field of depth perception, but also neatly introduces them to Bayes's theory, which is explained in the context of a real example.

The layout of the book is cleverly structured so that the book can be effectively used either as a conventional textbook or as a reference source. Definitions of key concepts are clearly set out at the sides of pages so you can quickly get access to a definition, and, if you want to know more, you can dip into the detailed text alongside. The book is full of references to both classic and recent papers important to this field. These are helpfully listed in the index, should you wish to find how the work of a particular author fits into the subject. The book also has an accompanying website, which provides a number of useful resources. There are interactive activities which help illustrate topics including visual illusions and perception experiments, essays which expand on some of the topics from the book providing more detailed coverage and examples, and study questions for each chapter to test your grasp of the material presented.

In terms of key concepts, from a vision perspective all of the main areas seem to be covered, with sections describing the early part of the visual system, how we perceive depth, colour, and motion, how we recognise objects and visual attention. My experience of perception outside of vision is limited, but the other parts of the book also appear to provide comprehensive coverage, with chapters detailing the remaining four senses. When it comes to methodologies, I’ve already mentioned psychophysics, and there are nicely illustrated explanations of topics including signal detection theory and selective adaptation. The coverage of methodologies is, however, limited mainly to psychophysics, and there is little mention of some of the other important approaches to investigating perception, such as the use of single-cell recording and imaging technologies.

Is there anything else lacking? It would perhaps have been nice to see the inclusion of some of the theoretical issues that have shaped the course of research into perception. In visual perception, for instance, the likes of Marr and Gibson developed theories that have been highly influential in guiding researchers in this field, yet they are relegated to minor mentions on one or two pages.

Neither of these points should put you off this book though. The quality of the illustrations, and the clarity of the descriptions of the fundamental concepts in perception are excellent, and anyone setting out to study this subject would find this book a valuable asset throughout their undergraduate years.

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