

Preface

As we write, today's newspaper announces the discovery of a gene that may account for sociability in many species. A TV program claims that a specific molecule can improve memory. Last week's newsmagazine featured an article on a "diet pill" that may help people to overcome obesity. Other recent news articles have dealt with the following questions:

- Can experience increase the capacity of the brain?
- Is sexual orientation inherited?
- How much sleep do we really need?

These are important questions, but the basic issues they address and the research being conducted to answer them cannot be reduced to "sound bites." A meaningful approach to questions like these requires an understanding of the bodily systems that underlie behavior and experience. Our aim in *Biological Psychology* is to provide a foundation that places these and other important problems in a unified scientific context.

This book explores the biological bases of our experience and behavior: the ways in which bodily states and processes produce and control behavior and cognition, and—just as important—the ways in which behavior, cognition, and the environment exert their influence on bodily systems. We treat biology in a broad sense. As in most textbooks of this sort, there is substantial coverage of the proximate, physiological underpinnings of behavior, but we have attempted to give due attention to ultimate causes by placing these discussions in an evolutionary framework whenever possible. The focus of the book is human behavior, but we include numerous discussions of other species' solutions to the problems of survival as well.

Many scientific disciplines contribute to these themes, so we draw upon the research of psychologists, anatomists, biochemists, endocrinologists, engineers, geneticists, immunologists, neurologists, physiologists, evolutionary biologists, and zoologists. In order to gain a panoramic view of the questions that concern biological psychologists, we have tried to rise above the limits of any single specialty.

Throughout, the text employs a five-fold approach to biological psychology—descriptive, comparative/

evolutionary, developmental, mechanistic, and applied/clinical. Finally, we emphasize neuroscience research, whether conducted by psychologists or non-psychologists, that aims to inform our understanding of behavior, and we also give great attention to work that explores the remarkable plasticity of the nervous system; a final chapter drives home the particular importance of plasticity in the psychological approach to neuroscience.

In our experience, students enrolled in biological psychology courses can be quite diverse in terms of their academic backgrounds and their personal interests, so we have taken pains to make the subject as accessible as possible to the widest spectrum of students by providing both the behavioral and biological foundations for each main topic. Some students will feel comfortable skipping or skimming some of this background material, but others will benefit from studying it carefully before moving on to the core of each chapter.

We have given considerable thought to the ordering of the chapters and in this revision have made what we believe are positive changes in that regard. However, we realize that some instructors may still prefer to teach topics in a different order or to omit some chapters entirely, so we have written each chapter as a relatively self-contained unit. Recognizing that courses also vary in length from a single quarter or semester to two semesters, we wrote the text with the intent that it could be reasonably covered in a single quarter by omitting a few chapters, but the text provides enough material for a two-quarter or even a two-semester course. Specific suggestions for creating syllabi with different emphases can be found in the *Instructor's Resource Book*. For example, in a two-semester course the instructor can take advantage of the additional material cited as Special Topics and found on our Website (www.biopsychology.com). We have successfully taught the course using the book in each of these formats.

Many features of the text are designed to enhance students' mastery of the material:

- We have created what we believe is the finest full-color illustration program in any current biological psychology text. The acclaimed art program from the first edition has undergone hundreds of addi-

tions and refinements, always with a clear pedagogical goal in mind. Data from original sources have been recast in ways that are designed to aid the student's understanding. All-new photographs of the human brain—clear, detailed, and consistent—are another feature of this edition.

- Each chapter opens by laying the groundwork for the content by placing it in a “real-world” context, and concludes with a concise Summary and list of Recommended Reading.
- Key terms are set in boldface type where first defined, and are also included in an improved, more comprehensive Glossary.
- “Boxes” describe interesting applications, important methods, sidelights, or refreshers on theoretical concepts relevant to biological psychology, or place the findings in the chapter in a historical perspective.
- A brand-new *Student Study Guide*, by Neil V. Watson of Simon Fraser University, offers a complete chapter outline, a review of general concepts, a list of study objectives, illustrations from the text with study questions, chapter tests, self-evaluation exercises, concept applications, and answers to questions and exercises.
- Icons in the margins call attention to five special aspects of the text:

Competing hypotheses



We frequently underscore the point that science is a process, and that it advances by continually testing competing hypotheses to account for observations. As examples in the text illustrate, sometimes further research indicates which of a group of hypotheses is correct; sometimes all the hypotheses are rejected for a new, more adequate hypothesis.

Important method



Many of the stunning advances in neuroscience in recent years are due to the introduction of powerful new methods that have made it possible to make progress on previously intractable problems. This icon highlights these new methods as well as more venerable research techniques.

Animal model



Students are reminded of the importance of animal research in biological psychology by the identification of important animal models, which often enable investigators to make progress on questions that have significant implications for both human and animal welfare.

Genes and behavior



The revolution in molecular biology is clarifying many of the mechanisms involved in genetic influences on behavior, and this icon highlights important examples.

As noted above, plasticity of the nervous system is a repeated theme in the text. This icon calls attention to particularly robust examples of plasticity.



Neural plasticity

- Two other icons integrate ancillary materials into the discussion:

Sylvius is an interactive neuroanatomy tutorial on the CD-ROM packaged in this text. Developed by S. Mark Williams of Duke University Medical Center, it is based on stunning sections of one human brain. This icon identifies places in the text where reference to *Sylvius* will be of particular help in visualizing and understanding particular neural structures.



Sylvius

Students and instructors have the option of reading additional material that enriches the discussion on the *Student CD-ROM* or at the www.biopsychology.com Website. The Special Topics icon is a pointer to this resource.



Special topic

Some of the most satisfying experiences in writing—and revising—this book have been the lively and creative discussions among the three of us. Each of us has a different research focus, and each of us is involved in certain fields more fully than the others. Pooling our experiences and discussing the relevance of findings in one area to other aspects of biological psychology has been a rewarding experience, and we believe that this integration of knowledge from diverse but complementary fields has enriched the book.

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