



## Evaluating the Use of “The Behavior of the Laboratory Rat: A Handbook with Tests” in Graduate-Level Education: A Book Review

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Article Info	Abstract
<b>Article History</b> Received: 15 May 2026  Accepted: 08 June 2026	This book review evaluates the educational and scientific value of <i>The Behavior of the Laboratory Rat: A Handbook with Tests</i> , edited by Ian Q. Whishaw and Bryan Kolb. The book provides a comprehensive overview of rat behavior by covering multiple domains, including natural history, sensory and motor systems, regulatory mechanisms, development, social behavior, cognition, and experimental models. The book's strong focus on behavioral methodology and experimental paradigms make it particularly valuable for understanding research design in the laboratory. Certain sections of the book lack sufficient detail on the implementation of experimental protocols, which may require readers to consult additional sources. This is an important addition to the graduate education of students in behavioral neuroscience, animal physiology, and experimental biology. It is beneficial in both developing the theoretical and experimental thinking skills.
<b>Keywords</b> Behavior, Experimental methods, Graduate education, Laboratory rat	

### INTRODUCTION

Laboratory animals, in particular rats (*Rattus norvegicus*), have been fundamental for the development of behavioral neuroscience and experimental biology. Because of their physiological closeness to humans, rats are widely used as model organisms to study the neural bases of behavior (Whishaw & Kolb 2005; Ellenbroek & Youn 2016). Therefore, the research into animals' behavior helps in basic biology and experimental practice of science teaching. In this sense, “The Behavior of the Laboratory Rat: A Handbook with Tests”, edited by Ian Q. Whishaw and Bryan Kolb, 2005, Oxford University Press, is an exhaustive resource for the students of behavioral neuroscience. Although first published in 2005, “The Behavior of the Laboratory Rat: A Handbook with Tests” continues to maintain its relevance in contemporary neuroscience and behavioral science education. Many of the behavioral paradigms and methodological approaches described in the book remain fundamental tools in experimental research and are still widely employed in studies investigating learning, memory, anxiety, depression, motor function, and neurodegenerative disorders. Furthermore, the book provides a comprehensive and systematic framework that facilitates the integration of theoretical

knowledge with practical applications, making it a valuable resource for graduate students and researchers. Its enduring scientific value stems from the fact that, despite remarkable advances in neuroscience, many core behavioral assessment techniques and experimental paradigms have remained conceptually unchanged and continue to serve as essential components of preclinical research. In addition, the book contributes to the training of young researchers by providing detailed methodological guidance on rodent models, experimental design, and translational neuroscience approaches, thereby preserving its educational and scientific significance across generations of neuroscience research. The book is divided into eight sections and has 4 chapters that show its dimension and multidisciplinary aspect. In this book, which is intended to give both a theoretical background and practical experience, a special attention is given to the experimental and methodological aspects. From the scenario of many specialists, it gives a panoramic view about the rat's behavior, from a basic biological to a complex cognitive functioning.

The first section of this book, entitled "Natural History", is divided into four major chapters that offer a solid background on the biology and ecology of laboratory rats. The chapter on "Evolution", written by Andrew N. Iwaniuk, provides an organized description of mammals, rodents, and rats, to highlight the phylogenetic relationships. This point of view raises important issues concerning the evolutionary context from which behavior can be understood. There is one table and five figures that aid the reader in understanding the presented concepts. The chapter on "Ecology", written by S. Anthony Barnett, is dedicated to the environmental conditions, feeding behavior, and habitat structure of rats. Attention is given to the intricate social interactions of these subjects, and examples are provided to deepen readers' understanding of their behavior. There are five figures. Grampians and Steven L. Britton discuss genetic variability and inbreeding in laboratory rats in the chapter on "Strains". The coefficient of inbreeding is considered an important parameter in experimental studies, particularly those conducted in the controlled environment of laboratory animals. The present chapter contains six figures. In conclusion, the chapter entitled "Individual Differences", authored by Guy Mittleman, examines the variability observed among rats, with a particular emphasis on both physiological and behavioral diversity. The chapter is supported by five figures and one table, which enhance the section's overall clarity.

The second section of the book, entitled "Sensory Systems", explores the mechanisms through which rats perceive and interact with their environment. The chapter on "Vision", authored by Glen T. Prusky and Robert M. Douglas, provides a detailed account of experimental approaches used to assess visual function in rats, particularly the visual water task. Four figures support the present chapter. The chapter entitled "Somatosensation", authored by Linda Hermer-Vazquez, Raymond Hermer-Vazquez, and John K. Chapin, provides an in-depth examination of complex tactile processing mechanisms. Four figures support the present chapter. The chapter on "Pain", authored by Daniel Le Bars and Samuel W. Cadden, discusses behavioral responses to acute and chronic pain, including widely used experimental methods such as the tail-flick, paw withdrawal, and hot plate tests. Three figures support the chapter. The chapter, entitled "Vibrissae", written by Richard H. Dyck, focuses on the development and functional significance of whiskers in rats, with particular attention to the barrel cortex, a structure specific to rodent sensory processing. Four figures support the present chapter. The chapter entitled "Olfaction", authored by Burton Slotnick, Heather Schellinck, and Richard Brown, does not include any figures or tables. Still, it provides valuable insights into the importance of olfaction in rats. Furthermore, it introduces experimental paradigms such as the unconditioned preference test and simple associative learning tasks. This chapter, entitled "Taste," by Alan C. Spector, highlights the importance of taste not only for rat behavior but also

for the methodologies they developed, including the brief-access taste test. Four figures support the present chapter. This chapter provides a complete picture of the sensory systems in rats by combining methodologies essential to both the experimental researcher and the graduate student.

The third section of this work, entitled "Motor Systems", is devoted to the organization and functional importance of motor behavior in the rat. The chapter on "Posture" by Sergio M. Pellis and Vivien C. Pellis examines the functional importance of proper posture control in a behavioral context. It emphasizes a specific behavioral state: immobility. Three figures illustrate and support the chapter's content. The following chapter, entitled "Orienting and Placing", by Tim Schallert and Martin T. Woodlee, demonstrates the importance of environmental enrichment and describes several experimental paradigms, namely, the bilateral tactile stimulation test, the limb-use asymmetry test, and tests of forelimb and hindlimb function. Additionally, six figures support the chapter's content. The chapter on "Grooming" by J. Wayne Aldridge explains the details of grooming behavior and shows that this simple action is actually highly organized and sequential. The chapter contains two figures. In a similar way, the chapter entitled "Locomotion", by Gillian Muir, illustrates the importance of locomotor function as a fundamental component of behavioral analysis in experimental tasks. Three figures support the chapter. The "Prehension" chapter by Ian Q. Whishaw addresses the rat's grasping skill and examines interspecies differences. This is an important area for research on fine motor control. Five figures support the chapter. In addition, this chapter of the work contains a detailed description of "Locomotor and Exploratory Behavior". Ilan Golani and his colleagues analyze a wide range of behavioral variables, including lateral, vertical, and forward locomotor activity in Long–Evans rats. Eight figures and one table support the content of the chapter. The "Circadian Rhythms" chapter by Michael C. Antle and Ralph E. Mistlberger addresses the temporal organization of behavior, focusing on the timing of major physiological and behavioral processes, such as feeding, thermoregulation, and reproduction. A total of 4 figures illustrate the chapter's content. This section offers an in-depth understanding of motor systems in the rat. It offers important methodological information for experimental research. It is particularly useful for laboratory and postgraduate teaching.

The fourth section of the book, entitled "Regulatory Systems", addresses the physiological and behavioral mechanisms that maintain internal balance in rats. The chapter "Eating," almost entirely devoted to feeding behavior, is written by Peter G. Clifton and includes a discussion of food intake control and neophobia. It is noteworthy that a figure or table is absent from this chapter. The chapter "Drinking," written by Neil E. Rowland, is a valuable source of information on the mechanisms of fluid regulation, with a focus on homeostatic control of water balance. The cumulative information may be useful as a guideline for fluid regulation in the laboratory. It is expected that the reader will deepen their understanding of this subject. The chapter includes 3 figures and 1 table. The chapter "Foraging," written by Ian Q. Whishaw, deals with foraging behavior. These behaviors are then used as a basis for describing experimental paradigms, such as the food-carrying task, and for investigating the combination of motivation and motor activity. Six figures accompany this chapter. The chapter "Thermoregulation," written by Evelyn Satinoff, deals with physiological responses to changes in temperature, including heat and cold stress. Three figures accompany this chapter. The chapter "Stress," written by Jaap M. Koolhaas and colleagues, describes acute and chronic stress models and includes behavioral and physiological aspects. It should be noted that this chapter does not include any figures or tables. The chapter on the "Immune System", authored by Hymie Anisman and Alexander W. Kusnecov, offers a comprehensive overview of immune physiology and its interaction with behavioral processes. A single figure supports the present chapter. This section provides a comprehensive perspective on regulatory systems

by integrating the functions of feeding, hydration, thermoregulation, stress, and immune function. It is particularly valuable for facilitating understanding of the influence of internal physiological mechanisms on behavior, as well as for the design of experimental studies in behavioral neuroscience and laboratory-based education.

The fifth section of the book, entitled "Development", examines behavioral and physiological changes across the lifespan of the laboratory rat. The chapter on "Prenatal Behavior", authored by Scott R. Robinson and Michele R. Brumley, focuses on fetal development and early behavioral organization. Four figures support this chapter. Jeffrey R. Alberts takes it further with the "Infancy" chapter, wherein the developmental period from postnatal day 1 to postnatal day 28 is further subdivided. This chapter meticulously characterizes age-specific behavioral and physiological patterns. The present chapter comprises three figures. In the "Adolescence" chapter, Russell W. Brown provides an in-depth analysis of the developmental transitions during adolescence. The author stresses the importance of these changes for predicting behavioral outcomes in the future. Three figures support the chapter. In the chapter named "Maternal Behavior", the authors Stephanie L. Rees, Vedran Lovic and Alison S. Fleming give special attention to posture-related patterns of caregiving and their influence in the development of the offspring. The present chapter contains a single figure. The topic of social interactions can be pursued in the chapter named "Play and Fighting" by Sergio M. Pellis and Vivien C. Pellis, which describes a structure for analyzing play and aggressive behaviors. Two figures support the present chapter. The reproductive part of the chapter named "Sex" by William J. Jenkins and Jill B. Becker is discussed. This covers the estrous cycle and sex-related behavioral patterns. The present chapter contains four figures and one table. Moreover, the chapter named "Environment" written by Robbin L. Gibb, focuses on the influence of housing conditions, including temperature, humidity, noise, ventilation and illumination. The present chapter contains a single figure. Taken together, this section offers a holistic approach to rat development. It highlights the importance of this approach for interpreting data and for designing controlled experiments, especially in graduate level teaching.

The sixth section of the book, entitled "Defense and Social Behavior", focuses on survival strategies and social interactions in rats. The chapter on "Antipredator Defense", authored by D. Caroline Blanchard and Robert J. Blanchard, examines species-specific defensive behaviors and the mechanisms underlying threat responses. The chapter is accompanied with one figure and one table. The same theme is discussed in more detail by Klaus A. Miczek and Sietse F. de Boer in the chapter "Aggressive, Defensive, and Submissive Behavior", which explores aggression in the context of social dominance and conflict. The chapter comes with seven figures. A sophisticated behavioral reaction following aversive stimulation (electric shock) is precisely defined by Dallas Treit and John J. P. Pinel as "Defensive Burying", then stressing its value for experimental modeling in the field of behavioral sciences. One figure and one table accompany the chapter. "Social Learning", written by Bennett G. Galef, Jr., deals with the role of the rat in gathering information from conspecifics and stresses the relevance of social behavior transmission. The chapter is accompanied with four figures. Moreover, a comprehensive chapter on the physiological and anatomical aspects of acoustic communication entitled "Vocalization", by Greta Sokoloff and Mark S. Blumberg, is appropriate as it offers a detailed insight into the mechanisms of vocal signal usage in social behavior. Two tables back up the present chapter. The section offers a comprehensive picture of defensive and social behaviors of the rat, stressing their importance in interpreting rat behavior and in developing experimental models for a graduate- and lab-level research.

The seventh section of the book, entitled "Cognition", focuses on higher-order behavioral processes in rats, including learning, memory, and decision-making. The chapter on "Object Recognition", by Dave G. Mumby, describes the object recognition test as the most general paradigm used to measure memory and recognition in rodents. Four figures illustrate the present chapter. The chapter on "Piloting" by Etienne Save and Bruno Poucet focuses on the study of spatial learning using well-known experimental designs, i.e., the T-maze, cross-maze, radial arm maze, and Morris water maze. The present chapter occupies four figures. The chapter on "Dead Reckoning", by Douglas G. Wallace and Ian Q. Whishaw, is a study of navigation strategies and food hoarding by the stimulation of internal spatial-mapping mechanisms. Five figures illustrate the present chapter. The chapter, named "Fear", is written by Matthew R. Tinsley and Michael S. Fanselow. The present chapter deals with fear-related processes, including predator-based experimental models and the neuroanatomy of fear (e.g., studies of the amygdala and related brain regions). The present chapter comprises three figures. The chapter, entitled "Cognitive Processes", authored by Robert J. Sutherland, provides a comprehensive overview of attention and memory systems, eschewing the use of supplementary visual aids such as figures or tables. There is also a chapter entitled "Incentive Behavior" by Bernard W Balleine, which deals with motivational processes in relation to conditioning frameworks such as classical conditioning and Pavlovian paradigms. Three figures illustrate the chapter. This chapter provides a useful overview of cognitive function in the rat. It arranges behavioral paradigms with the underlying neural mechanisms. It will be of great interest to experimental work and it is especially suited for graduate studies in behavioral neuroscience.

The final section of the book, entitled "Models and Tests", deals with the experimental systems used in behavioral neuroscience: neurological and psychiatric models and neuropsychological tests. The chapter entitled "Neurological Models", authored by Bryan Kolb, introduces key approaches for investigating brain function and dysfunction, and is supported by one table. Similarly, the chapter entitled "Psychiatric Models", authored by Henry Szechtman and David Eilam, presents experimental paradigms developed to model psychiatric conditions in rats. The present chapter comprises two tables and one figure. Moreover, the section entitled "Neuropsychological Tests" has been authored by Gerlinde A. Metz, Bryan Kolb, and Ian Q. Whishaw, who provide a comprehensive overview of the behavioral assays utilized to evaluate cognitive and neurological functions. Ten tables support the chapter. While these chapters offer a comprehensive and informative perspective on experimental models, they provide limited detail regarding the step-by-step implementation of test protocols. It is clear, however, that the methodologies governing the neuropsychological tests described in this section are not described in enough detail to be directly applied. As such, graduate students and researchers who wish to use these procedures in their own work may need to look elsewhere for a more comprehensive methodology. Regardless, the contents of this section are valuable as an introductory overview that acquaints readers with the nature of these important experimental paradigms and the necessity of standardizing behavioral testing.

In summary, as indicated in the title, this book, *"The Behavior of the Laboratory Rat: A Handbook with Tests,"* is a comprehensive, methodologically based work that integrates normally disparate aspects of rat behavior into a cohesive context. The book review has collated contributions from leaders in the field, thereby giving the reader a wide yet integrated perspective on the subject, ranging from natural history to complex aspects of cognition to experimental models. With nominal caveats due to the degree of detail of the methodological aspects in some chapters, especially the experimental ones, the volume is of value for the student and researcher. With its multidisciplinary approach and specific emphasis on behavioral

paradigms, it is especially recommended for graduate courses in animal physiology, behavioral neuroscience, and experimental biology. The volume reviewed can be considered as almost a basic reference for those who want to learn and implement behavioral approaches in the laboratory. The book is unique in that it helps to consolidate theory and experiment within one context, which allows the development of experimental thinking, and thus is extremely useful with regards to future research activities and learning projects.

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