

# Table of Contents

<b>INTRODUCTION</b> .....	<b>4</b>	<b>Section I Summary</b> .....	<b>28</b>
<b>SECTION I: INTRODUCTION TO ANIMAL BEHAVIOR</b> .....		<b>SECTION II: THE BIOLOGY OF ANIMAL BEHAVIOR</b> .....	
<b>SECTION I: INTRODUCTION TO ANIMAL BEHAVIOR</b> .....	<b>5</b>	<b>SECTION II: THE BIOLOGY OF ANIMAL BEHAVIOR</b> .....	<b>29</b>
What Is an Animal, and What Is Behavior?.....	5	The Nervous System of Animals .....	29
The Definition of “Animal” .....	5	Vertebrate Animals .....	31
The Diversity of Animals .....	8	The Peripheral Nervous System.....	31
Behavior .....	9	The Somatic Nervous System .....	31
Ecology .....	11	The Autonomic Nervous System.....	35
Taxonomy and the Kingdom of Animalia.....	12	The Central Nervous System.....	36
Understanding Phylogenetic Trees.....	14	The Nervous System of Invertebrate Animals.....	38
The First Animals.....	15	<b>Hormones</b> .....	<b>39</b>
How Animals Are Classified .....	15	What Is a Hormone? .....	39
Survival of the Fittest .....	16	What Do Hormones Do to the Body?.....	40
The Basics of Evolution.....	16	Stress .....	41
The Theory of Natural Selection.....	17	<b>How Animals Tell Time</b> .....	<b>43</b>
The Limitations of Evolution .....	18	The Biology of the Internal Clock.....	44
The Evolution of Behavior .....	18	Daily Rhythms.....	45
<b>The History of Animal Behavior: Past to Present</b> .....	<b>20</b>	Seasonal Rhythms .....	46
The Pioneers of Ethology.....	21	<b>Fixed Versus Adaptive Behaviors</b> .....	<b>46</b>
Charles Darwin .....	21	Instinctual Behavior .....	46
The “Fathers” of Ethology.....	21	The Heritability of Behavior.....	48
Modern Animal Behavior Research .....	22	Learned Behavior .....	49
Tinbergen’s Four Questions.....	22	Nonassociative Learning .....	49
Function (or Adaptation).....	23	Associative Learning .....	50
History (or Evolution) .....	23	<b>The Development of Learning</b> .....	<b>51</b>
Cause (or Mechanism) .....	23	Complex Learning.....	52
Development (or Ontogeny) .....	24	Spatial Cognition .....	52
<b>How Behavior Is Measured and Studied</b> .....	<b>24</b>	Social Learning .....	52
Observational Studies .....	25	<b>How the Environment Changes Behavior</b> .....	<b>53</b>
Laboratory Experiments .....	25	Intergenerational Effects on Behavior .....	54
Ethograms .....	26	Epigenetic Effects on Behavior.....	54
Using Genetics to Understand Behavior .....	27	<b>Section II Summary</b> .....	<b>54</b>
Comparison of Structures .....	27		

by the body and drives it to seek out nutrients. So, for our sandwich-eating example, we can say that humans eat sandwiches in response to hunger.

### Development (or Ontogeny)

The development of behaviors can take many different forms. Animals can either learn a behavior or can be born with the knowledge to engage in the behavior. With regard to the example of eating a sandwich, we can ask if the behavior was learned or if the human started life with the ability to make sandwiches. In this case, it must have been learned because infants don't have the ability to make or eat a sandwich. We can further probe and ask who taught the human the behavior and how the behavior developed. Sandwich-eating behavior in humans looks very different over the course of a human's lifetime. As babies, humans may only eat parts of the sandwich before learning from others how to assemble a sandwich. The first time you made a sandwich yourself, you probably used only one or two ingredients, and then, as you gained sandwich-making experience, you may have made more complex sandwiches. Humans can also learn about different ways to make a sandwich from each other. Sandwich-eating behavior is a learned behavior in this case, and humans are not born knowing how to make sandwiches.

## HOW BEHAVIOR IS MEASURED AND STUDIED

The field of animal behavior requires a lot of planning and consideration to avoid bias. **Anthropomorphism** occurs when the behavior of animals is viewed through the lens of human behavior. Just because we may feel happy being around other people does not mean that all animals will experience the same feeling being around members of their own species. Sometimes, animals perform a behavior that can be interpreted by humans as being similar to a human behavior, but it has different contextual meanings for the animal. For example, chimpanzees (*Pan troglodytes*) bare their teeth as an act of submission when they are fearful while a similar gesture done by humans expresses happiness in a smile (Figure 15). It is common to empathize with animals by comparing their behavior to our own, but this can conflict with factual evidence. This is a form of bias that can cause incorrect interpretations of the behavior of animals.

### FIGURE 15



*Chimpanzees (Pan troglodytes) bare their teeth as an act of submission when they are fearful.<sup>15</sup>*