**Chapter Summary**

to accompany

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**Chapter 4**

**The Neural Basis of Behavior**

1. The operating rules of neural mechanisms constitute proximate causes of behavior. Receptor cells acquire sensory information from the environment, interneurons relay and process that information through neural circuits, and other nerve cells in the central nervous system—often located in the brain—order appropriate motor responses to the events an animal can detect. Different species have distinct neural mechanisms and therefore perform these tasks differently, providing proximate reasons for why species differ in their behavior.

2. At the ultimate level, animals differ in their neurophysiology because their proximate mechanisms have been shaped by different selection pressures, as can be seen in the highly specialized sensory cells possessed by different species. For example, because of their auditory receptors, moths and other ultrasound-detecting species can hear sounds humans cannot sense, while certain bees, birds, fishes, and lizards, among others, easily detect ultraviolet radiation that is invisible to us.

3. In addition to adaptively specialized sensory receptors, stimulus filtering (the selective processing of potential stimuli) is apparent in all the components of nervous systems. Sensory receptors ignore some stimuli in favor of others, while interneurons relay some, but not all, of the messages they receive from receptor cells. Within the central nervous system, many cells and circuits are devoted to analyzing certain categories of information, although this means that other inputs are discarded. As a result, animals focus on the biologically relevant stimuli in their environments, increasing the odds of a prompt and effective reaction to the items that really matter.

4. The cognitive abilities of humans and other animals are also based on the evolved properties of nerve cells and nervous systems. Species that live with others in a competitive social environment may possess special problem-solving skills associated with this environment—another demonstration of the power of natural selection in shaping the proximate neural mechanisms of behavior.