

# MUSIC IN THE HUMAN EXPERIENCE

## AN INTRODUCTION TO MUSIC PSYCHOLOGY

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### Chapter 6

## Musical Hearing

**H**EARING is often considered the most important sense in humans (Carey, 2008). Whether it is or not, a thorough understanding of the physiology of the hearing mechanism is essential to understanding many aspects of musical behavior, because it is primarily the sense of hearing that makes music possible. Three elements are needed for the perception of sound to take place—a source of vibrations, a medium of transmission, and a perceiver. The first two elements were discussed in the previous chapter; this chapter includes a discussion of the third element—the perception of sound. In the following pages, a sound wave will be traced from outside the ear to the brain and the perception of psychological attributes of sound will be discussed.

Throughout this discussion, the reader is urged to keep in mind the incredible sensitivity of the hearing mechanism and its extreme miniaturization. For instance, one can perceive sound when the eardrum has been deformed as little as one-tenth the diameter of a hydrogen molecule (Everest, 1986). The softest sounds we can hear result from air pressure changes of two ten-billionths of atmospheric pressure (Watson, 2009), and the ratio of the loudest sound we can hear to the softest is more than a trillion to one (Schroeder, 1993). Kunchur (2008) found that listeners could discern temporal alterations on a time scale of five <sup>micro</sup>milliseconds. One of the bones of the middle ear, the stirrup, is the smallest in the human body at “about half the size of a grain of rice” (Stevens & Warshofsky, 1965, p. 35) and Reissner’s membrane in the cochlea is only two cells thick (Gulick, Gesheider, & Frisina, 1989). This marvelous engineering should give musicians and all others who enjoy the sounds they hear a feeling of awe and appreciation.



### THE HEARING MECHANISM<sup>MT6.1</sup>

#### Outer Ear

The hearing process begins as sound pressure waves, traveling through the atmosphere, strike the ears. Ears, as one can readily observe, vary considerably in size and shape from species to species. Some animals have muscular control over their ears and can tilt or rotate