1 Introduction to Aural Architecture

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sauna

We shape our buildings, and afterward our buildings shape us.
—Winston Churchill, 1943

architecture is concerned with the design,.....

architecture
verb

Architecture, which has been called the "mother of all arts," is concerned with the design, arrangement, and manipulation of the physical properties of a space. Unlike other art forms, architecture provides spaces for the daily activities of life; when more than simply utilitarian, it also appeals to our aesthetic sensibilities. By choosing and combining materials, colors, and shapes, architects embed their respective artistic messages in structures that we see, hear, and feel. Like poets with their specialized language, architects communicate their worldview with a vocabulary of spatial elements that often contain symbolic meaning reflecting their culture.

To communicate the artistic, social, emotional, and historical context of a space, however, architects almost exclusively consider the visual aspects of a structure. Only rarely do they consider the acoustic aspects. The native ability of human beings to sense space by listening is rarely recognized; indeed, some people think such an ability is unique to bats and dolphins. But sensing spatial attributes does not require special skills—all human beings do it: a rudimentary spatial ability is a hardwired part of our genetic inheritance. For example, when blindfolded, nearly all of us can approach a wall without touching it just by attending to the way the wall changes the frequency balance of the background noise. Similarly, the sounds of our footsteps hint at the location of stairs, walls, low ceilings, and open doors. To make this more obvious, walk through your home while listening to loud music through headphones; then do it again without the headphones. Notice how the clear sounds of your shoes on uncarpeted stairs provide navigational confidence, especially when your eyes are focused elsewhere. When crawling through underground caves, spelunkers can gauge the depth of a dark passageway by its resonances. But even nonspelunkers have acoustic awareness. It is available to all of us.

Observing that ordinary people can hear passive objects and sense spatial geometry requires an explanation. As a simple illustration of how we hear an object that itself

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does not produce any sound, consider a flat wall located at some distance. When the sound wave from a hand clap is reflected from that distant wall, we hear the reflection as a discernible echo. The distance to the wall determines the delay for the arrival of the echo, the area of the wall determines the intensity, and the material of the wall's surface determines the frequency content. These physical facts relate only indirectly to perception. Our auditory cortex converts these physical attributes into perceptual cues, which we then use to synthesize an experience of the external world. On the one hand, we can simply hear the echo as an additional sound (sonic perception) in the same way that we hear the original hand clap (sonic event). On the other hand, we can interpret the echo as a wall (passive acoustic object). The echo is the aural means by which we become aware of the wall and its properties, such as size, location, and surface materials. The wall becomes audible, or rather, the wall has an audible manifestation even though it is not itself the original source of sound energy. When our ability to decode spatial attributes is sufficiently developed using a wide range of acoustic cues, we can readily visualize objects and spatial geometry: we can "see" with our ears.

A real environment, such as an urban street, a concert hall, or a dense jungle, is sonically far more complex than a single wall. The composite of numerous surfaces, objects, and geometries in a complicated environment creates an *aural architecture*. As we hear how sounds from multiple sources interact with the various spatial elements, we assign an identifiable personality to the aural architecture, in much the same way we interpret an echo as the aural personality of a wall. To illustrate that we are aware of aural architecture, consider displacing familiar sounds to unfamiliar environments. Transported to an open desert, urban traffic would not have the aural personality of a dense city environment. Moved to a forest, a symphony concert would not have the aural impact, intimacy, and immediacy of a concert hall. Nor could the aural personality of singing in the bathroom, which takes advantage of the resonances of small spaces, be duplicated in a large living room. In each contrasting space, even if the sound sources were to remain unchanged, the aural architecture would change. Every space has an aural architecture, which will be defined more extensively in chapter 2.

In addition to providing acoustic cues that can be interpreted as objects and surfaces, aural architecture can also influence our moods and associations. Although we may not be consciously aware that aural architecture is itself a sensory stimulus, we react to it. We may experience a living room as cold or warm independent of its actual temperature, or a train station as lonely and forbidding independent of its actual appearance. The acoustics of a grand cathedral can create an exalted mood; those of a chapel can enhance the privacy of quiet contemplation; those of an elevator can produce the feeling of encapsulation and, in the extreme, claustrophobia. The acoustics of an open area can produce feelings of either freedom or insecurity.