Eventscapes: the aural experience of space

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The functional role of hearing

Evolution allocated scarce and expensive neural resources in the brain for a sophisticated auditory system because hearing had survival advantage. While *Homo sapiens* eventually expanded the mammalian auditory system to allow for understanding speech and enjoying music, the auditory system originally arose as a reliable way for sensing dynamic events. A sonic event is some (man-made or natural) activity that produces a sudden impact or periodic vibrations, which then produce sound waves that propagate through the environment. Sound waves are the transport mechanism that brings those external events into consciousness. Because we perceive dynamic events aurally, Schafer's soundscape – consisting of keynote sounds, sound signals and soundmarks – is actually an *eventscape*.[1] The focus of hearing is on dynamic events. In contrast, the focus of vision is on static objects. We are aware of the relatively static world of objects and geometries, which reflect ambient light, through vision. Thus a landscape is actually an *objectscape*.

Among the senses, hearing is unique because of the properties of sound waves. The sonic broadcast of a dynamic event flows around obstacles and through crevices, entering a space without permission. Because hearing is always active, without 'earlids' or a voluntary point of spatial focus, listeners are involuntarily connected to those events that are audible, regardless of their location. For example, an unexpected thump from the roof immediately catches our attention because sound is an early warning system. Auditory events then tell the visual system where to look.

A useful way to understand hearing and vision is to realize that they are both part of an integrated system with overlapping and complementary qualities. The system creates an internal holistic model of an external world composed of eventscapes and objectscapes. The importance of this sensory connection is illustrated by deprivation experiments conducted in the 1950s. Subjects rapidly experienced hallucinations and mental instability when deprived of all sensory connections.[2] Hearing appears to be particularly important in maintaining a functional connection to the external world. The inability to hear events proves to be a larger burden on mental health than the inability to see objects. Martin Roth reported that undiagnosed hearing loss was the primary cause of mental illness in the elderly, and more recently, Philip Zimbardo demonstrated that simulated deafness in normal individuals produced symptoms of paranoia.[3, 4]

Aural boundaries are experiential

We need a framework and vocabulary in order to explore the properties of eventscapes.[5] From the perspective of listeners, a sonic event that can be heard or recognized is located within their *acoustic horizon*. Beyond this acoustic horizon, sound sources are inaudible, as if they did not exist. In the complementary view centred at the sound source, an *acoustic arena* is that area within which a particular sonic event can be heard by the inhabitants of the arena. Acoustic horizons and acoustic arenas define invisible boundaries based on aural experience rather than on tangible physical surfaces; they are functional partitions of a space.

1. Schafer, R. *The Soundscape. Our Sonic Environment and The Tuning of the World*. New York 1977.
2. Cohen, S., Silverman, A., Bressler, B., and Shmavonian, B. 'Problems in isolation studies'. In: P. Solomon, P. E. Kubzanski, P. H Leiderman, J. H. Mendelson, R. Trumbull and D. Wexler (eds). *Sensory Deprivation: A Symposium Held at Harvard Medical School*. Cambridge, MA. 1965.
3. Roth, M. The natural history of mental disorder in old age. *Journal of Mental Science* 101, 1955, pp. 281-301.
4. Zimbardo, P., Anderson, S. and Kabat, L. Induced hearing deficit generates experimental paranoia. *Science* 212 (4502), 1981, pp. 1529-1531.
5. Blesser, B. and Salter, L. *Spaces Speak, Are You Listening? Experiencing Aural Architecture*. Cambridge, MA 2007.

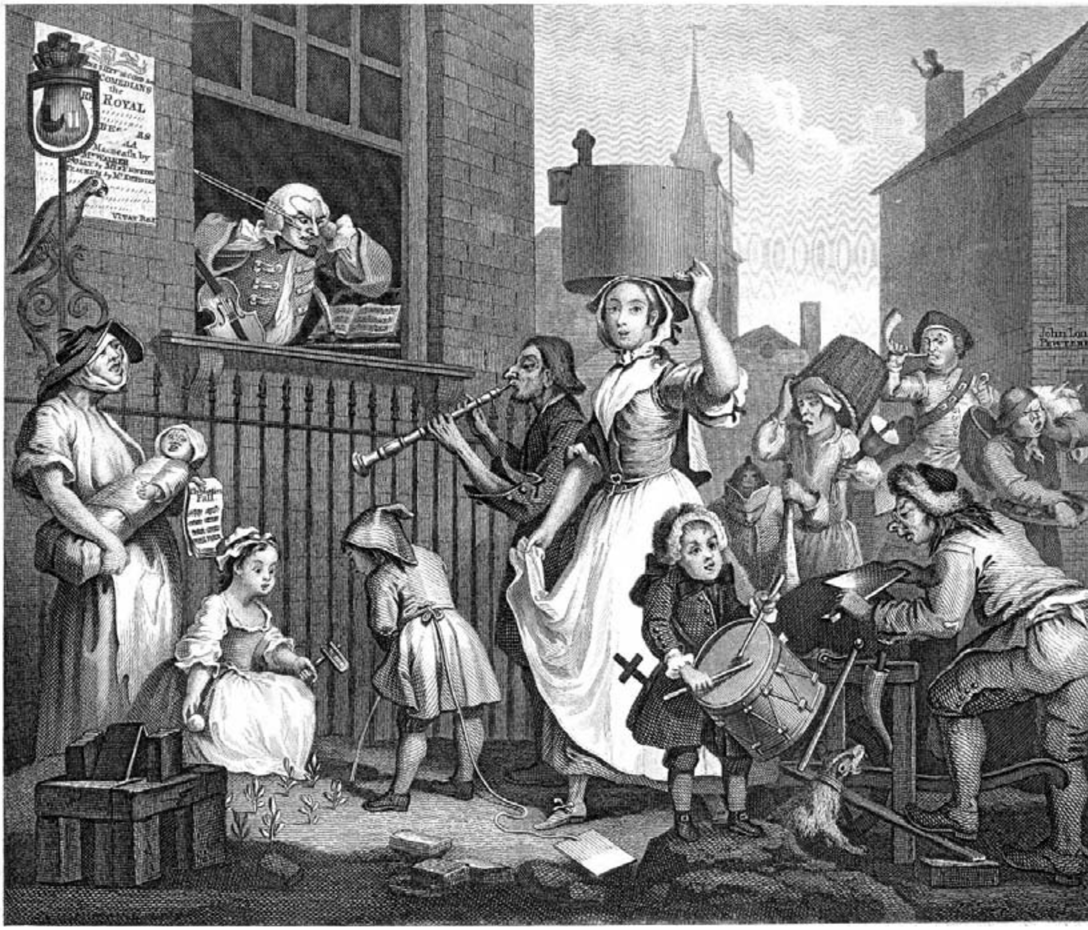

Figure 1. William Hogarth. *The Enraged Musician*, 1741.

How we experience the *eventscape* strongly influences our behaviour. Consider two professional colleagues at a busy restaurant who are discussing a business project. Given their relationship, they have a preferred personal distance, which might be one metre.[6] If a high level of background noise produces a small acoustic horizon, conversation is not possible at this distance. These colleagues have awkward choices: move closer to create an inappropriate intimate social distance, thus including each other in the acoustic arena of their normal voices; shout to expand their acoustic horizon; or remain silent without conversing. Emotional stress results when the acoustic horizon or arena does not match the appropriate social distance.

There have always been conflicts about who 'owns' the *eventscape* in urban environments, and these conflicts were seldom resolved by legal regulations.[7] In the picture below, William Hogarth depicts a conflict between a musician in the parlour of his private home and urbanites whose home is the street. (see fig. 1) From a visual perspective, there are two distinct spaces—street and parlour; but from an aural perspective, the open window creates a single acoustic arena as a shared resource. The creator of the loudest sounds becomes the owner of the arena.

In the 21st century, combat over ownership of the acoustic arena has become more ubiquitous. Advertisers use televisions in the public areas of airports to insert monetized messages into the heads of those waiting for their flights. Similarly, cinema theatres are paid to deliver excessively loud commercial messages to captive audiences waiting for the main feature to begin. As a reaction, individuals often adopt a defensive strategy, using headphones linked to portable sound devices in order to suppress the external *eventscape* and substitute their own. Everyone wants to control the *eventscape*, either for their own private use or for capturing the consciousness of others.

The quality and comfort of an eventscape is based on the relationship of the inhabitants to the events within their acoustic horizon. 'Noise' can therefore be considered as unwanted sonic events that intrude; and conversely, if events are wanted, they are not noise. Based on personal preferences and cultural biases, a given event may or may not be considered to be noise. For example, the eventscape of a natural forest is not intrinsically better or worse than that of a dense urban environment. Aural combat arises from conflicting attitudes towards sonic events. The 'quality' of an eventscape therefore involves not only the sonic content, but also the size, shape and location of the acoustic horizon. Successful strategies for managing combat involve manipulating these aspects of the eventscape.

The contours of an acoustic arena are determined by the interaction between the intensity of sonic events, which depends on the dynamic behaviour of the inhabitants, and the physical properties of the environment, which are relatively static. Physical geography, whether natural mountains and valleys, or man-made halls and walls, modifies the acoustic arenas. Together they determine a region of social cohesion. For example, in 19th-century French villages, citizenship was based on the ability of individuals to hear the bells of the town.[8] The bells broadcast information about events such as time of day, call to church and call to arms. Hearing them contributed to self-esteem, emotional well-being, civic pride and territorial identity. Schafer quotes the resident of a small town who remembers daily sonic events entering her acoustically porous living space.[9] Her acoustic horizon was extended to encompass the larger social sphere. She could identify trades people by the sound of their horses. 'The iceman had a couple of very heavy cobs ... the coalman had a pair of substantial Percherons that always walked ... the dry-goods store had lightweight horses ... and the Chinese vegetable men had very lazy horses.' Inhabitants could hear fishing boats returning to harbour, children walking home from school, the rattling of leaves in the wind and the neighbourhood dog fighting with the cat.

6. Hall, E. *The Hidden Dimension*. New York 1966.
7. Thompson, E. *The Soundscape of Modernity*. Cambridge, MA 2002, p. 115.
8. Corbin, A. *Village Bells: Sound and Meaning in the 19th Century French Countryside*. Trans. by M. Thom from the original French, *Les Cloches de la Terre*. New York 1998.
9. Schafer, R. *The Vancouver Soundscape*. Vancouver 1978.

Figure 2. Whispering gallery in a corridor at Grand Central Terminal.

Physical spaces can have unexpected shapes and sizes, such that the experience of visual and aural spaces diverges. For example, large spaces with domed ceilings and circular walls can produce acoustic arenas called 'whispering galleries'. (see fig. 2) Sound from one location is focused at a physically distant location, combining two widely separated visual regions into a single acoustic arena. Thus, two people standing at opposite corners in the dining concourse of the Grand Central Station in New York can hear each other as if they were standing in close proximity. Similarly, a pair of widely spaced parabolic reflectors at a science museum dramatically demonstrates how a physical distance of 50 metres can be made to have an aural distance of a few centimetres. In these cases, the two senses – vision and hearing – rather than reinforcing a consistent spatial experience, produce quite different spaces. Eventscapes and objectscapes can be experienced in contradictory ways.

Modern technology provides us with the means for creating inconsistent eventscapes and objectscapes. Electronically amplified excessively loud music at a rock concert allows the hearer to be transported to a musical eventscape while remaining in the physical objectscape of the seating area. Teleconferencing allows physically distant objectscapes to be fused into a single eventscape. Individuals separated by large distances can aurally co-exist within the same acoustic arena. Cell phones allow unrelated eventscapes to be superimposed onto each other. Consider an individual talking on a cell phone while driving a car. He is in the eventscape of traffic on a busy road and simultaneously in the eventscape of his conversation partner who is in a business meeting. The talker can perceptually switch between eventscapes without physically moving. What you see is not necessarily where you are.

Sonic events and acoustic space

While the objectscape is usually perceived by the way that visual system interprets ambient reflected light, the auditory system can also perceive objects and geometries by the way that it interprets ambient reflected sound. A listener can hear the way in which physical attributes of the environment change sound. We can hear a low hanging ceiling or nearby wall because the low frequencies are boosted near those surfaces. We can hear an open door, the vast volume of a cavern or cathedral, wood surfaces, the depth of a well and the openness of a beach. In such cases, we hear properties of the objectscape because sonic events illuminate objects and geometries.

Everyone can learn to hear objects and geometries of the environment, but most people never attend to this aspect of hearing. Some blind individuals choose to invest in this skill. Ved Mehta, blind from childhood, described how he rode his bicycle through the streets of Calcutta using an elevated sense of auditory spatial awareness.[10] Ray Charles, the world famous jazz musician, describes how he learned to navigate entirely with his hearing, never using a cane or seeing-eye dog.[11] One individual could identify the shape of a traffic sign by listening.[12] In these cases, the way in which objects and geometries modify sonic events allows listeners to 'visualize' the environment which produced the change in the sonic event. Our auditory awareness of objectscapes augments our aural experience of eventscapes.

10 Mehta, V. A donkey in a world of horses. *The Atlantic Monthly* 200(1), 1957, pp. 24-30.

11 Charles, R. and Ritz, D. *Brother Ray*. New York 1978. Chion, M. *Audio-Vision*. Trans. by C. Gorbman from the original French, *L'Audio-Visual*. New York 1994.

12 Rice, C. Human echo perception. *Science* 155, 1967, pp. 656-664.

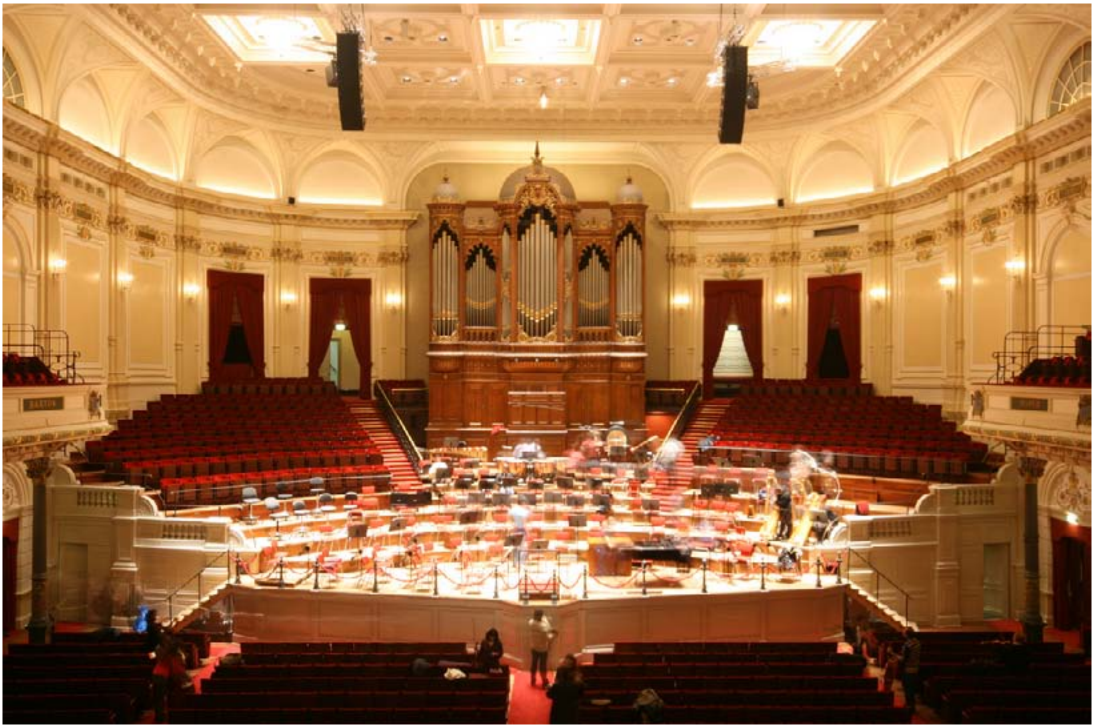

Figure 3. Amsterdam Concertgebouw.

Listeners never hear the original sonic event as it was created at the source. As sound waves propagate from the source to the listener, they are always changed during the transport process by the physical acoustics of the environment. The reflections from side walls in a concert hall add aural mass to musical events. A room with plush carpets and upholstered chairs transforms a harsh sonic event, such as a breaking glass, into a mellow event. The notes of a musical instrument are elongated by the reverberation of a concert hall. The audience never hears a 'pure' musical instrument. The physical properties of the environment always modify the events in an eventscape; each space creates a unique modification of these events.

There is a dual relationship between sonic events and spatial acoustics. On the one hand, a sonic event illuminates objects in a space, such as sensing a wall by the echo that it produces. On the other hand, spatial acoustics changes the perception of sonic events, such as music performed in a concert hall. We hear objects and geometries illuminated by sonic events, and we hear sonic events that have been changed by objects and geometries.

A high-quality concert hall exemplifies the complex relationship between sonic events and the physical environment. (see fig. 3) Research into the interdependence of music and spaces provides an understanding of this duality. A musical performance in an open meadow is not experienced in a way that is comparable to a performance in a concert hall. In an enclosed space, the early reflections from the side walls and ceiling change music notes by giving them more aural mass, larger apparent size and stronger intimacy. Musical events originating on the stage are changed by the enclosing envelope of the concert hall. At the same time, long reverberation envelops the audience in a sea of sound that is not perceived as a sonic event originating from the stage. Cathedrals, with their extremely long enveloping reverberation, allow inhabitants to hear the enormous volume of the space and the hardness of the surfaces regardless of what sonic events are illuminating that volume. For reverberation, listeners are located within the acoustic process itself and they cannot perceive the reverberation as being a source event located at a defined location. The space is made audible by the illuminating sound. Directors of cinema manipulate each of these four components to create a compelling illusion.[13]

Summary and conclusions

We inhabit eventscapes where dynamic sonic events, modified by the static acoustics of the space, are transported to listeners. Eventscapes are described by the virtual boundaries of acoustic horizons and acoustic arenas. Combat over control of the acoustic arena has occurred throughout the ages. Individuals have complex cognitive strategies for determining how eventscapes are controlled and integrated into their daily lives. These strategies depend upon individuals' unique personal choices, cultural standards and the state of technology. Eventscapes (experienced primarily but not exclusively by hearing) and objectscapes (experienced primarily but not exclusively by vision) have a complex, mutually interactive, always changing relationship. Because the brain fuses visual and aural components of eventscapes and objectscapes into a single internal representation of the external world, we seldom recognize these four components as being distinct.