

## The World of Sounds

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1.

A familiar truism holds that humans are *visual* creatures. We look before crossing busy roads, appreciate visual arts, and read texts. The language used to discuss perception – appearances, looks, images – often is explicitly visual. To a great extent, we rely on sight, and a vast amount of the human brain is engaged in visual processing. Philosophical thinking about perception and sensible qualities accordingly has been driven by vision.

Nonetheless, perceiving does not involve vision alone. Though most people express greater fear at the prospect of losing sight than any other sense, we rely on hearing, touch, taste, smell, proprioception, and perhaps less obvious senses to negotiate and appreciate a noisy, textured, flavourful, odorous world.

Among the “other” senses, I find it natural to turn to hearing to make progress in understanding perception. Hearing is a near relative to seeing. Audition, like vision, is a rich source of information about the environment, and we learn a great deal through hearing. Hearing helps us to negotiate our surroundings, to a degree that is obscured by preoccupation with the visual. Hearing sounds allows us to access music and spoken language, and thus holds strong emotional and communicative interest for humans. Hearing and sounds thus promise to inform philosophical thinking about perception and perceptual consciousness by extending it beyond the visual.

2.

What do we hear? The short answer is that we hear sounds. Sounds have sensible characteristics like pitch, timbre, and loudness. You might think that we also hear things other than sounds – for instance, collisions, footsteps, and tubas. But we hear such things by hearing the sounds they make. Perhaps we also hear silence. If so, we hear it without hearing a sound.

What kind of thing is a sound? According to one view, sounds are waves. Vibrating objects make pressure waves. These waves have characteristics such as frequency, amplitude, and “shape”, and they travel outward from their sources over time until they reach our ears.

We don't, however, *experience* sounds to be just like waves. For one thing, it strikes me that we don't auditorily experience sounds to speed through the air like the auditory analog of a missile. Sounds don't seem to travel through space unless the things making them do.

Furthermore, the waves that arrive at your ears weave together information from different sources into a single complex pattern of vibration. However, we sometimes hear *different* sounds, which perhaps come from different directions, at the very same time. In the groundbreaking book, *Auditory Scene Analysis* (1994), auditory researcher Albert Bregman explains how the auditory perceptual system manages to sort out information about different sounds from the complex wave information that reaches our two ears. Bregman likens the problem of auditory scene analysis to determining, just from watching ripples coming up two narrow channels dug from the edge of a lake, the number, sizes, and locations of boats on the lake. Somehow, auditory processes allow us to discern and identify multiple sounds coming from our surroundings at the very same time. For instance, one might be loud, high-pitched, and coming from the left, while another is soft, low-pitched, and coming from the right.

As a result, it seems to me most plausible to hold that sounds are particular *individuals* that have or possess sensible features like pitch, timbre, and location. This account makes them in one respect more like the objects we see than like their features or attributes. If so, sounds are not properly classified with the secondary *qualities*, such as colour, taste, and smell, as Locke famously claimed in his *Essay Concerning Human Understanding*.

Nevertheless, I think there is an important contrast between the objects we see and the sounds we hear. At any given time, we might see and identify three-dimensional material objects, like apples and tubas, and their sensible properties, like colour, shape, and size. But we identify the sounds we hear, such as the sounds of spoken words and sirens, by the ways that they are stretched out in time or by their patterns of variation over time. While visible objects at least seem to be wholly present at any moment at which they exist, it is reasonable to think sounds require more than a mere instant.

I therefore maintain that sounds are a different kind of individual from ordinary objects. In particular, I argue in *Sounds: A Philosophical Theory* that sounds are *events* or *happenings* that *occur* or take place over time. If so, not all perception fits the visual model in which sensible features are attributed to ordinary material objects.

In asking how we hear sounds to be, we have been asking about the *contents* of auditory experience. One reason for thinking auditory experiences have contents is that there can be auditory *illusions*, or cases in which things sound (auditorily seem to be; cf. look) different from how they actually are. One example of an auditory illusion is Diana Deutsch's famous tritone paradox, in which two complex tones separated by a half-octave (tritone) can seem either to ascend or to descend when played in succession (see [http://deutsch.ucsd.edu/psychology/deutsch\\_research6.php](http://deutsch.ucsd.edu/psychology/deutsch_research6.php) for demonstration).

Given that accounts of perception and perceptual experience have been developed mainly to explain vision and visual illusions, one important question is whether they also work for hearing. Thus, one way we can test a theory of perceptual experience is to ask whether it is compatible with or correctly captures the phenomenology of auditory perceptual experience.

3.

Another notable difference between sight and hearing concerns *space*. One of the most striking aspects of visual experience is its rich spatial content. We speak of a visual *field*, a panorama populated in detail with colours and shapes. In contrast, the notion of an auditory panorama is more foreign. Perhaps time is to audition what space is to vision.

Indeed, while vision has a rich spatial structure, philosophers have been more skeptical about whether audition is spatial. What does skepticism about spatial hearing amount to? On one hand, we do seem to *learn* about space thanks to audition. By hearing, we learn that the car is coming from *behind*, or that the smoke detector *overhead* is loud. We know the difference between sitting up close at a lecture and sitting at the rear of the hall. The disagreement concerns *how* we learn such facts.

One very strong claim holds that audition has no spatial characteristics. We simply never auditorily experience space, but instead infer or work out facts about space on the basis of audition. I find this too strong, for I think that we do frequently experience space through auditory means. This is supported by a vast body of empirical research, detailed in Jens Blauert's *Spatial Hearing*.

Another way to put the skepticism is that while vision is inherently or intrinsically spatial, audition is not. That is, audition might somehow inherit or be parasitic upon visual or tactile-kinaesthetic spatial content. This seems to be the view expressed in Chapter 2 of Peter Strawson's *Individuals*, titled "Sound". Strawson imagines a *purely* auditory experience, and claims that it would be entirely non-spatial.

I propose an alternative to skepticism about spatial audition that nonetheless recognises an important distinction between vision and audition. This story appeals to the manner in which space figures into auditory experience. First, spatial hearing is not as accurate or as richly detailed as spatial vision. This relative impoverishment results from how information about space is extracted from signals at the two eardrums; vision, in contrast, extracts spatial information from two densely packed retinal arrays. Second, while sounds are experienced to be located in some direction, and perhaps at a distance, they are not themselves experienced to have a rich internal spatial structure. Compare this to the visual experience of seeing a face. The face seems to comprise different parts – a nose, eyes, lips – that stand in relatively precise and detailed spatial relationships. In part, what you see is determined by this internal spatial structure. In fact, visual objects are individuated and identified in virtue of their inherent spatial characteristics. In contrast, sounds and other things you hear do not auditorily appear to have densely detailed internal spatial structure.

Since sounds are among the primary things we hear, and since sounds are not experienced to have a rich internal spatial structure, perhaps this led Strawson to claim that a purely auditory experience could be non-spatial. That is, an experience of sounds and sounds alone might leave out space entirely. You might try to decide, however,

whether you think that we can imagine a similarly impoverished visual experience.

4.

Audition arguably does have a more fine-grained *temporal* structure than vision – differences and changes over time are detectable at a much lower threshold in audition than in vision. And sounds, as I discussed above, have their own inherent temporal structure.

The temporal characteristics of sounds are evident in music, and the temporal aspects of auditory experience contribute to explaining the aesthetic significance of listening to music. Experiencing music as such requires appreciating not just the qualitative features of sounds, but also their arrangements and patterns in time. Music's contrast with spatially extended visual art thus emphasises the space:time::vision:audition analogy.

You might think all that matters in the experience of listening to *pure* or acoustical music (language introduces its own complications, which I'll consider below) is sounds and their arrangements in pitch-space and time. Perhaps only abstract patterns of sounds contribute to the aesthetic significance of music. Roger Scruton has argued in *The Aesthetics of Music* that sounds alone, considered in abstraction from what makes those sounds, matter in music. Scruton's *acousmatic thesis* holds that the causes of sounds are irrelevant to the aesthetic significance of music. Musical listening thus requires hearing sounds in a way that abstracts from their sources.

In listening to music, do only sounds matter? Is it true that sounds *alone*, considered in abstraction from their sources, are relevant to appreciating the aesthetic significance of music? This raises two concerns. First, why think that appreciating music requires abstracting from such things as the kind of instrument that produced the sound, or the rarity and value of that instrument; the skill of the musician that is required to play a particular passage, independent from what it sounds like; or perhaps even the gestures and showmanship of the performers? You might wonder if only a preference for austerity makes these features of music and its performance aesthetically irrelevant. Here is a compromise: while hearing sounds is necessary to appreciating music, non-acousmatic features might also be aesthetically *relevant*, if unnecessary.

A second concern is whether it is even possible to listen to sounds in a way that abstracts entirely from their sources. If not, musical listening according to the acousmatic thesis is threatened. Since hearing informs us about the environment, including not just sounds but also the things and happenings that produce them, furnishing awareness of sound *sources* might be an ineliminable part of the function of audition. If so, it might be impossible to hear sounds without hearing their sources. That is, hearing a sound that comes from a trumpet could require hearing it as the sound *of a trumpet*, or at the very least as a sound that comes *from something*. In that case, acousmatic experience – experience of sounds alone – is a merely hypothetical sort of listening, one that I am inclined to believe boils down to a way of directing one's attention.

Nevertheless, an intuitive difference remains between music and visual arts, such as painting and sculpture. As Peter Kivy explains in *Music Alone*, it is difficult even with the most abstract paintings and sculptures to see them in a way that is entirely formal or abstract. That is, it is difficult to avoid seeing pictures and sculptures as *representational*. In contrast, it seems easier to listen attentively to the formal acoustical features of musical sounds, without being compelled to think of what makes them.

A further salient difference between music and static visual art such as painting and sculpture concerns the emotions. Many have found an irresistible connection between music's unique aesthetic value and the human emotions. Somehow, the sounds of music are associated with or evoke feelings such as melancholy, infatuation, or exuberance. No adequate account of appreciating music could ignore the fact that music relies not just upon acoustical qualities but also upon engaging the emotions as its source of value. Kivy himself suggests that the sounds of music mirror and thus evoke the contours of expressive speech and gestures.

I believe that one promise of further systematic philosophical work on the nature of sounds and auditory perception, and how they differ from the visual, is a better grip on what makes music such a pervasive part of human culture.

5.

Finally, no complete story about the importance of sounds and hearing could ignore spoken language and its role in communication. Speech sounds are significant due to their role in linguistic communication, rather than just for the information they provide about the environment. Thus, I think the main philosophically interesting questions about the perception of speech concern whether speech in some respect is special. For instance, does listening to speech involve hearing something different from what you hear in ordinary non-linguistic auditory perception? And, given that substantial and perhaps distinctive or dedicated resources are devoted to perceiving speech, does perceiving speech involve a perceptual modality that functions independently from ordinary audition?

One thing that an account of listening to speech should explain is that the experience of listening to speech in a language you know differs from the experience of listening to speech in a language you do not know. Since speech serves its communicative role thanks to a conventional assignment of sounds with meanings, listening to spoken language with understanding in part is a matter of knowing a sort of mapping between types of sounds and meanings. Thus, understanding or grasping the meanings of spoken words must involve cognition and conceptual thought. Since grasping the meanings of words surely contributes to a difference in the overall experience that results from listening to speech sounds in a language you know, that difference is partly cognitive.

Of course, perception also is involved in hearing the sounds of spoken language. While much philosophical attention has been devoted to how we understand meaningful

spoken language, far less work has been done on the perceptual requirements of hearing speech. Do we hear meanings or semantic properties of sounds? Though counterintuitive, this would help to explain why auditory experience itself differs when listening to a language you know.

But I think that more is needed to capture why speech in a language you know *sounds* different. Here are two suggestions that help to bridge the gap. First, perceiving speech involves perceiving distinctive kinds of sounds, such as the language-specific phonemes that words comprise. Second, humans have special sensitivity to sounds of speech from a very young age. Neonates distinguish and prefer speech to non-speech sounds, and infants from 5-9 months discern phonemes distinctive to their own language. So, a special sensitivity to language-specific kinds of sounds adds to our explanation for why the experience of hearing speech in a language you know has such a salient, distinctive character.

6.

While exploring sounds, audition, and sense modalities other than vision contributes to understanding the nature of perception and of its objects, it also reveals difficulties. One thing we learn through considering other modalities is that the different senses interact with each other and do not function as independent or encapsulated units. The senses form a cooperative perceptual system that is unified in a number of respects. The senses are not entirely separate modes of awareness. In light of this, it is natural to ask to what extent the senses rely on each other, such as in the experience of space or ordinary objects and events. We might even become suspicious of the very idea that there are different senses.