Philosophy of Sound, Ch. 3 (English translation)

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3. SOUND AND EVENTS

The philosophical analysis of sound comes up against general problems of metaphysics, epistemology and philosophy of mind, because of the decisions it is expected to make concerning the nature and properties of sounds, as well as about the conditions in which our knowledge of sounds takes form; and, moreover, because sounds are perceptual objects, and philosophy of perception is a fundamental branch of the philosophy of mind. As we have shown in the context of the distinction between sensory modalities, decisions in one of these philosophical domains are not without consequence for the other domains.

The object of the present chapter is the metaphysical theory of sounds. We will first tackle the problem of the metaphysical categorization of sounds, and we will suggest that sounds should be considered events. Secondly, we will examine the relationship between this kind of event and the rest of the physical world, by tightly associating sounds to the objects that produce them.

3.1 Sounds are not qualities

The first general problem concerns the categorization of sounds. The relevant question is: what is the category that sounds belong to, what kind of entities are sounds?

According to a well-established tradition, sounds are qualities (or properties) of objects. In fact, each object is associated with a

typical sound: birds of different species sing with different voices, machines and artifacts each produce a distinctive sound. However, if we consider the paradigmatic case of quality: color – which is also typically related to objects – we will see that color stands in a totally different relation to objects than sound. While passive objects still have color, sounds are specifically related to objects that are somehow active. Thus, the presence of sounds testifies that something is going on, an event, and the object is the source of this event: its actor or victim. If we must indicate something that, in the field of audition, belongs to the category of qualities, it would be *sonority*: a particular disposition of objects to produce sounds.

However, classifying sounds as qualities gives rise to a difficulty: if sounds are qualities, then they are dynamic qualities, qualities that change over time; but the ordinary concept of quality rather applies to static entities. It is also possible that no definitive objection exists against the concept of dynamic qualities. A. Quinton (1979), for instance, claims that sounds are examples of individual or particular qualities, C.D. Williams (1953) calls them *tropes*, and E. Husserl *moments (1900-1901, Third logical investigation*)*moments*. By considering events as tropes, the thesis that we are going to defend in this book (that sounds are events) becomes compatible with the traditional position according to which sounds are qualities.

Not only have sounds been considered as qualities, they have also been classified as subjective or secondary qualities (as opposed to objective or primary qualities). Broadly speaking,

secondary qualities depend on the characteristics of the perceiving subject, while primary qualities are independent from perception (see chap. 11). The thesis that sounds are qualities, in fact, is often justified on the grounds of the assimilation of sounds to mind-dependent entities. The ordinary concept of sound is certainly grounded on sensory bases, sounds are mostly considered as audible things, and those who consider audibility as an essential character of sounds are also ready to consider sounds as subjective qualities. The strong version of this thesis identifies sounds with acoustic sensations (this is a commonplace for the modern psychology of perception, starting from Helmholtz 1863, 1990; see Hacker, 1987: chap. 2 and 3). This thesis is exposed to counter-intuitive consequences, such as the fact that different persons could never hear the same sound.

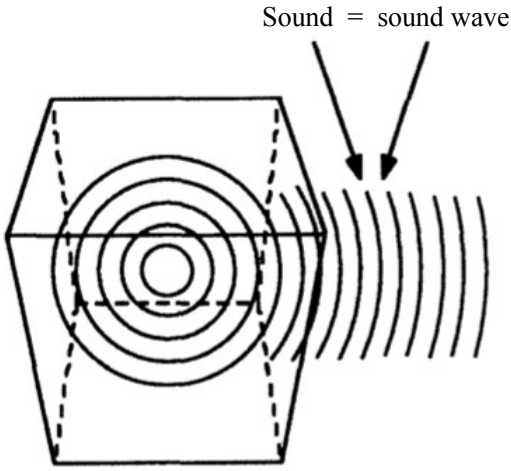
3.2. Events

We have seen above that the presence of a sound manifests the presence of an event. The world's dynamic character thus makes its appearance in the domain of acoustic perception. But the link between sounds and events is clearly extremely tight, stronger than a simple relation of bearing witnessAccording to the thesis that we will defend, sounds *are events.*

We hear objects and we see them. But when audition is involved the most natural and perspicuous objects of perception are events. Moreover, in language, sounds are categorized as events. I.e., when describing objects' shape and color (and in general terms: their properties) we normally use the structure copula + adjective (as in: "the table *is red*"), but when speaking of events we use verbal constructions (John *runs*), or verbal nouns (John's *run*). It is a fact that sentences about the sound dimension of the world have an event-like structure: we say that the car roars

(verbal construction), and we speak of the roaring of a car (verbal noun construction).

Moreover, we learn from acoustics (a branch of physics) that sounds should not be considered as objects' properties, the likes of colors or geometric shapes, but that they should be assigned to a special class of entities: the class of waves or periodic perturbations, a class which certainly shares affinities with the category of events. "A periodic perturbation, called sound wave... crosses air. When it reaches the ear, we perceive this periodic wave as a sound having a determined musical pitch" (Pierce 1983: 20).



It must be noticed that the reference to periodicity is too narrow for a general definition of sounds: a sudden explosion will produce

one and only one wave front, which propagates through the air without any periodic repetition. A *wave front* consists in the compression of a medium which moves from a source.

The movement of the front can be considered as the sound event. So, if we identify waves with the movement of the front, then sounds can be considered as waves. This description does not imply that waves move from one place to another: waves *are* the movement of wave fronts. (The description looks circular. However a wave front can be described in terms that do not make use of the concept of a wave; i.e., in the case of sea waves, the front will be defined in terms of a sudden change of the sea surface's slant.)

3.3 Waves: the Classical Theory

Traditional physicalism (correctly) refuses to consider sounds as qualities, and identifies sounds with sound waves in a medium which includes a resonant object and (maybe also) a hearer. We will call this approach the Classic al Theory. The identification of sounds with sound waves in a medium raises objections and leaves a number of problems unsolved. Firstly, it is difficult to frame with precision the content of the physicalist thesis.
Physics, has a well-defined branch dealing witht he mechanical vibrations of solid bodies, fluids and gases. Acoustics is considered as a sub-field of this branch. It can, for example, provide definitions such as the following:

"Sounds are oscillations or vibrations in the range of

> frequencies between 16Hz et 20kHz, that is, the range human hearing is sensitive to" (see Blauert1983: 2; Hertz, Hz, measures the number of events per second).

Nonetheless, it is also very common to broaden this range, so as to include so-called infrasounds and ultrasounds and to obtain the full range of mechanical vibrations. The justification for this operation comes from the difficulty of distinguishing between audible and non-audible vibrations, the reference to audibility being totally extrinsic to acoustics. In which case, the correct definition would be: "vibrations, some of which are audible".

3.4 Waves and events

There exist two main metaphysical conceptions concerning waves (we are dealing generically with perturbations in an ambient medium, thus including non periodic perturbations that, strictly speaking, are not waves). Let us suppose that sound waves share the same nature of processes and events. In this case, sound waves cannot move from one place to another since, if we accept an argument by Fred Dretske (1967), processes and events do not. The argument runs as follows: consider a dancing party starting, at

dawn, in Sardinia; at midday participants decide to move to an island close to Sardinia, so the party continues in Corsica, where it ends in the evening. We could say that the party has moved from Sardinia to Corsica, and this consideration would justify the idea that events can move from one place to another. But according to Dretske, this idea is not correct because the party was never wholly in Sardinia or in Corsica. A part or phase of the party, the beginning, took place in Sardinia, while another part, the end, took place in Corsica. For an entity to move from A to B, the entity must totally occupy A first, and then B. As a consequence, if we believe that waves in a medium are processes and that processes do not move from one place to another, then we must reformulate certain theses concerning the nature of sounds. For convenience's sake, we will sometimes refer to sound waves as something that moves from one place to another, but we must keep aware that this formula is not perfectly suitable because, in reality, sound waves do not move but the different spatio-temporal segments of the wave are located in different places at different times.

3.5 Sounds and sound waves

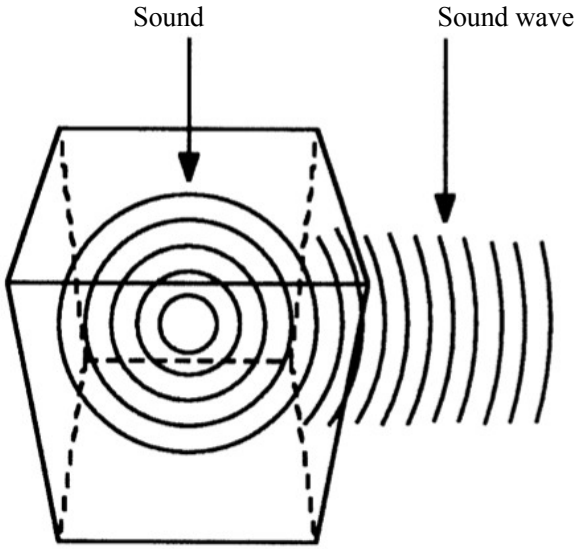
We are going to consider some important arguments in favor of the Classic Theory according to which sounds are sound waves in a medium. These arguments raise a set of objections that we will exploit in order to formulate what we believe is the correct analysis of the nature of sounds.

"Sounds are sometimes loud and sometimes low. We can distinguish between loud sounds that come from afar (S) and low sounds, (S'), that come from close because they have a different

intensity; however, it is sometimes difficult to distinguish between S and S' because all sound waves in the medium (corresponding to S and S' respectively) can have the same intensity in the space close to our ears. Hence it is natural to identify sounds with sound waves in a medium". In fact, the identity of wave intensities explains the fact that it is not possible to distinguish S from S'. However, the *indiscernability* of S and S' can also be explained without identifying sounds with waves. Two sounds that cannot be distinguished can remain distinct. In other words, a loud sound heard at distance, is still loud, even if the amplitude of the related waves in the medium is reduced. So, something that characterizes waves in a medium does not characterize sounds, and this is an argument in favor of the *distinction* between sounds and waves.

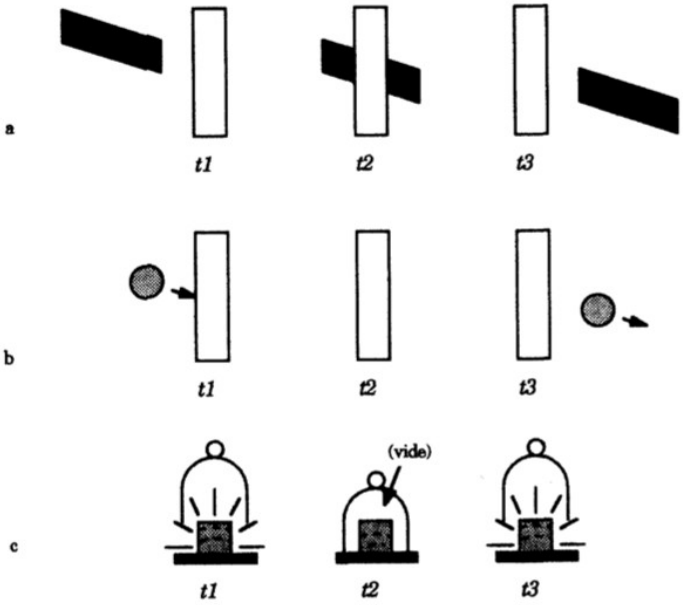
Consider another classical argument in favor of the identity of sounds and sound waves. A tuning-fork vibrates in a vacuum-jar in which a void has been created. When air is introduced into the jar we hear a sound; when the jar is emptied and is void, we no longer hear any sound (let us bracket out the fact that the presence of air can influence the vibration of the tuning-fork). But could we say that the tuning-fork's vibration starts and stops in correspondence with the presence or absence of air? The case produces divergent intuitions, but it is reasonable to describe the situation as follows: independently from the presence or absence of air, the tuning-fork continues to resonate, but the sound of the tuning-fork is sometimes audible and sometimes it is not (in correspondence with the absence of the medium that is required in order to transmit sound information). Of course, if sounds are sound waves in an ambient medium, then we are compelled to accept that the tuning fork intermittingly starts and stops producing sound.

Analogies with vision can help to clarify our position. Let us first consider an object in the dark. The fact of illuminating the object, and of taking away light from it, would be hardly described as identical to creating the object's colors, but rather, as the fact of revealing them, of bringing them to light. This description reminds us of a phenomenon, well-known to psychologists, which is called *the tunnel effect*. Let us see a second example. If a black circle shifts from left to right behind a white screen, and reappears in the right part of the screen, nobody will think that there are two circles (the first one, disappearing to the left, and the second, reappearing on the right of the screen), but one and the same circle which, for a while, is hidden. You have the impression of witnessing one and the same event, which corresponds to the uninterrupted, and partially hidden, shifting of a circle.



A third example of tunnel effect, that we could label "fridge effect" runs as follows: when one opens the door of one's refrigerator a lamp is automatically switched on; however, one could be under the impression that the lamp in the fridge is constantly switched on, even before one opens the fridge.

Of course, the sensation connected to the tunnel effect can be illusory. Nonetheless, its existence suggests that ordinary phenomenology *includes* the notion of non-perceived existence of qualities such as colors, of objects such as circles, as well as of events such as the movement of the circle. The ordinary phenomenology of auditory perception does not seem to be an exception. One would not say that, because of a modification in the listening conditions, what one was listening too has changed; i.e., one is capable of distinguishing between listening a poor execution of a piece of music and the execution of a piece of music in poor listening conditions. Similarly, owing to the fact that the tuning-fork is vibrating in poor listening conditions (because of the suppression of the ambient medium), one is not prepared to assert that the tuning-fork is not vibrating.



3.6 The Event theory

The mainstream theory of sounds, and the claim that sounds are perturbations that happen in the ambient medium, fail s to take into account the possibility that sounds are perturbations that happen to a certain type of object. We propose to consider sounds as events that happen in the resonant object, and we call our approach "Event Theory". For the moment, we will not focus our interest on the question of whether these events are waves. The main point that we want to stress is that *sounds involve primarily the space occupied by the resonant object*, even if, in most cases, the presence of a medium is required for acquiring perceptual information about the sound.

Thanks to the identification of sounds with events it is possible to deal in a satisfactory way with those feaures of sounds that create problems in other theories. Like sounds, sound perturbations that happen in the object do not move in the environment from one place to another. Like sounds, sound perturbations do not propagate from the object to the subject's ears. In contrast to sound waves in a medium, and like sounds, the intensity of perturbations can remain constant through time.

Finally, the consideration that tuning-forks and other vibrating objects resonate independently from their immersion in a medium is compatible with our theory: we do not create sounds by putting objects in a medium, we reveal them.

The Event Theory, and the identification of sounds with events, has an immediate and important consequence: it provides a perspicuous example of the compatibility between an indirect theory of perception and a theory which gives up mental entities such as sense data. Perception can be indirect without mental intermediates: we hear cars and telephones when we hear their sound, that is, when we hear events that happen to the objects. Sounds are physical entities and perceptual intermediates at the same time.

3.7. *Sounds and ultrasounds*

The Event Theory and the Classical Theory are both variants of physicalism, and, as a consequence, they must deal with the following problem: the ordinary concept of sounds seems to imply that sounds are *audibilia*, that sounds must be perceptible, audible, entities. According to the ordinary concept of sound, then, ultrasounds (and of course, infrasounds) are not sounds. For critics of physicalism who believe that sounds have a phenomenal nature, it is impossible to escape this conclusion,

because it stems, analytically, from the definition of sound. In contrast, physicalists will say that the ordinary concept of sound should be revised and a theoretical definition (which is opposed to a conceptual analysis; see section 1.5) should be provided. A theoretical definition of sound, which would be in line with physicalism, would, however, claim that even if sounds have phenomenal qualities, these qualities are not essential to their definition (chap. 11). So, if ultrasounds share the essential qualities of sounds, physicalists will claim that ultrasounds can be included into an extended theoretical concept of sound. However, physicalists will not be forced to claim that the ordinary concept of sound (which includes the characteristic of being audible) is not coherent: they will say that the ordinary concept is suitable for designating a relevant part of the class of sounds, the part constituted by audible sounds.

Appendix: Sound theories in the philosophical and psychological tradition

In this Appendix we will briefly present paradigmatic theories of sound, in order to show analogies and differences between them, as well as how they contrast with Event Theory.

Urmson

J.O. Urmson (1968: 119-121) highlights the following analogies between sounds and material objects; (1) sounds are individuals and can be counted; (2) they have a finite duration, like material objects; (3) they are threedimensional and have boundaries; (4). they can move, together with the resonant object, or independently from the object, as exemplified by echoes. But, (5). sounds are different from material objects because they are

not impenetrable. The Event Theory we propose accepts 1., 2., and 5., but rejects 3. And 4.

Hacker

Hacker (1987: 100 sqq.) shares Urmson's assertions 2. and 5., but rejects 1, 3. and 4.: "Sounds, however, are not three-dimensional objects" they have no spatial dimension, and «The movement of sound … must not be confused with the movement of sound waves " However, "we conceive of sound more or less `under the aspect' of an *object*, not of a wave" , and the case of the echo is well and truly that of a sound that moves and is perceived as moving (this last point is denied by Event Theory).

Blauert

Blauert's text of 1974 (re-published 1983) is a reference for theories of spatial localization of sounds. The text opens with a distinction between sound events and auditory events (pp. 2-4), auditory events being the supposed objects of auditory experiences (which can subsist in absence of sound events). This characterization introduces an ontological distinction between two kinds of sounds: world sounds and perceptual sounds, a form of dualism rejected by the Event Theory.

Helmholtz

In his Physiological theory of music (1863, 1990), Helmholtz presents two ideas, both opposed to the Event Theory under two different aspects: sounds as sound waves belong to acoustics in physics, while sounds as acoustic sensations belong to acoustics in psychology.

Gibson

Psychologist J. J. Gibson repeatedly describes his theory as a form of direct realism. We could thus expect his theory to be close to the Event Theory. Indeed, most of the reasons that are invoked here in defense of the Event Theory are inspired by so-called ecological acoustics, which triesto specify the kind of entities that are present in the sound environment and according to which perception takes its bearings. In fact, Gibson (1966: 87) accepts that the objects of hearing are events; nonetheless, and in contrast with Event Theory, he identifies sounds with vibrations in a medium. Gibson's position has been developed by Handel (1989, chap. 6).