



## Snapshots in the Philosophy of Perception What about Sounds in a Vacuum?

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**Abstract.** In the first *Snapshot in the philosophy of perception*, we tackle the question of whether there are sounds in a vacuum. The answer depends heavily on the metaphysics one is willing to accept. On the one hand, Berkeley points out that there are no empirical, perceptual grounds to settle the issue. On the other hand, realists try to provide reasons to address the question. Mechanistic philosophers believe that there are no sounds in a vacuum, because no sound waves can be found there. Casati and Dokic claim that there are sounds in a vacuum, because they are to be identified with the vibrations of the sound source. O'Callaghan denies the existence of sounds in a vacuum: he submits that the presence of a medium is a necessary condition for the existence of sounds even though he doesn't identify sounds with sound waves. In what follows, we briefly examine these approaches.

**Keywords.** Sounds, Vacuum, Auditory Perception.

In the *Three Dialogues between Hylas and Philonous in opposition to Sceptics and Atheists*, Hylas, a fictional realist philosopher who debates Berkeley's alter-ego Philonous, presents a peculiar argument about sounds: "They don't inhere in the sounding bodies. We know this, because when a bell is struck in a vacuum, it sends out no sound. So the subject of sound must be the air"<sup>1</sup>. Some contemporary philosophers add some details to the thought experiment<sup>2</sup>. For example, Casati and Dokic ask us to imagine "a vacuum jar which has the property of immediately creating a vacuum upon closing the lid and of immediately recalling air upon opening the lid. Take now a sounding object like a tuning fork at 440Hz and have it vibrate, supposing that vibration fades and become inaudible after 10 seconds. What you hear is an A that becomes feebler and feebler until it disappears. Now, place the tuning fork inside the jar, have it vibrate as before, and repeatedly open-and-close the lid of the jar, say once in a bit less than a second"<sup>3</sup>. The main difference between the two thought experiments is that Hylas focuses on the waves traveling in the air, while Casati and Dokic focus on the vibrating tuning fork. This difference depends mainly on historical reasons. In the eighteenth century, the standard mechanistic view was that sounds are vibrations of the medium (air or water) between emitting bodies and listeners, while contemporary distal theories give a prominent role to the resonating source.

According to Hylas and the mechanistic view, there are no sounds in a vacuum, because no vibrations of the medium can be found there. Berkeley rejects Hylas' statement. First, Philonous points out that it is curious to maintain that sounds are vibrations, because vibrations are normally perceived thanks to the senses of touch and sight, not through hearing. This is not a very strong argument. Although it is true that some mechanistic approaches describe vibrations as the proper objects of both hearing and touch, they are compatible with the idea that the two sensory modalities can be distinguished by the different sense organs that elaborate those vibrations, namely, the ears and the skin. To be sure, Berkeley's real target is the thesis according to which sounds may exist independently of any perceiver<sup>4</sup>. Indeed, his metaphysics is based on the principle that we are allowed to claim that something exists only in the presence of empirical, perceptual evidence. To understand this point, we have to approach the second argument offered by Philonous against Hylas. Berkeley rejects the distinction endorsed by Hylas between real sounds, which may exist even if nobody

<sup>1</sup>Berkeley (1713, p. 8).

<sup>2</sup>They are *thought* experiments because no human being has created or encountered a perfect vacuum so far.

<sup>3</sup>Casati and Dokic (2010).

<sup>4</sup>For a more detailed exposition of Berkeley's arguments against materialism and realism, see Togni (2017).

perceives them, and sounds as we perceive them. Of course, Berkeley cannot *prove* that non-perceived sounds don't exist, but he correctly points out that the burden of the proof is on his opponent to show that there are such "real", possibly non-perceived sounds and that those "real" sounds are lacking in a vacuum. Berkeley's argument holds because it is the realist who is affirming the positive thesis that sounds can exist independently of any perceiver. As shown by the question about the existence of sounds in a vacuum, realists try to develop a theoretical view of the metaphysical existence of sounds (and of other perceptual entities or events), but pay less attention to what is perceptually experienced. While Hylas claims that there are no sounds in the absence of a vibrating medium, Philonous and Berkeley submit that *it is not possible to know* whether there are sounds in a vacuum, because we lack empirical evidence to answer the question<sup>5</sup>. Berkeley holds the straightforward view that we cannot say anything about the metaphysical existence of sounds that are not heard. Of course, it is possible to study what happens to the bell, what is the relation between its vibrations and the vacuum, and so on, but these considerations don't say too much about the existence or non-existence of *sounds* in a vacuum: this last point can be settled only at the empirical level, which, in the thought experiment submitted by Hylas, is lacking. Thus, Berkeley's view is not that Hylas' mechanistic position on the non-existence of sounds in a vacuum is wrong, but that it cannot be empirically verified or falsified.

While Berkeley doesn't discuss theories that locate sounds near the vibrating body, it is fair to assume that he would move against them the same criticisms that he moves against Hylas. To claim or deny that a vibrating body emits a sound in a vacuum is to try to address the metaphysical question about the existence of sounds theoretically rather than empirically. From a Berkeleyan perspective, the fact that we *know* that a body is vibrating in a vacuum doesn't tell anything about the existence or non-existence of a *sound* that is not *heard*.

Some contemporary philosophers who defend a distal theory of sounds as events located at their source<sup>6</sup> reject Berkeley's stance and try to give reasons to accept or deny the idea according to which there are sounds in a vacuum. This is clearly shown by the debate between Casati and Dokic on the one hand, and O'Callaghan on the other.

Casati and Dokic consider the presence of the air, or of another medium, as a non-necessary condition for the existence of a sound. Even if the air is required to bring information from the vibrating object to the ears and to reveal

<sup>5</sup>First, a perfect vacuum has never been created. Second, if a perfect vacuum were created, one would hear sounds or she wouldn't: whatever the outcome, philosophers wouldn't be allowed to draw theoretical conclusions regarding "real" sounds that may exist in the absence of perceivers. According to Berkeley, giving the senses the last word is the best strategy when it comes to metaphysics. Thus, if sounds were heard in a vacuum, then they would exist as perceived sounds.

<sup>6</sup>In this paper, we don't address proximal and a-spatial theories of sounds.

sounds to perceivers, it is not essential for the existence of sounds<sup>7</sup>. Instead, O'Callaghan supports a relational event theory: sounds are events where both the sources and the surrounding medium are necessary components. He claims that "a sound is the event of an object or interacting bodies disturbing a surrounding medium in a wavelike manner"<sup>8</sup>.

To stress the difference between their position and O'Callaghan's, Casati and Dokic submit the above-mentioned variation of Berkeley's thought experiment. Their version is more complex and involves two extra elements that are perceptually relevant: the repetition of the open-and-close motion of the lid of the jar and the temporal length of the action. Casati and Dokic suggest that in this case perceivers would have the impression of a revealed sound that persists unheard when the lid is closed. Thus, O'Callaghan's metaphysical position<sup>9</sup> appears counter-intuitive because it implies that the sound of the tuning fork pops into and out of existence every time the lid is opened and closed.

To support their argument, Casati and Dokic articulate three visual analogies<sup>10</sup>. First, they consider a coloured object that is put into a dark room and then brought to the light: normally, it looks like colours are revealed to perceivers. Second, they compare the tuning fork in the jar to other two cases of visual tunnel effect: a circle moving behind a screen and the switching on-and-off of the light in a refrigerator when we open and close its door. Their point is that, if there is nothing wrong in assuming the existence of unperceived visual objects, the same can be said regarding sounds in a vacuum that are not actually heard. Furthermore, they consider the vacuum in the jar as like other ordinary unfavourable conditions of hearing: those adverse circumstances don't affect the nature and the existence of the perceived entities. Hence, the lack of information, deriving from the absence of the medium, doesn't involve the non-existence of a sound.

On the contrary, O'Callaghan's goal is to show that the presence of a medium is not only a condition for veridical sound perception, but also for the existence of sounds themselves. His reasoning<sup>11</sup> can be reconstructed as follow: (i) Casati and Dokic's visual analogies do not work; (ii) A better visual analogy about indistinguishable objects leads to conflicting intuitions; (iii) Those intuitions are not useful at the metaphysical level, but only at the perceptual level; (iv) The functioning of perception is not the issue here; (v) The absence of audible qualities in a vacuum provides philosophical reasons to maintain that the presence of a medium is a necessary condition for the existence of sounds.

<sup>7</sup>See Casati and Dokic (1994, pp. 44-46, 61-64). See also Casati and Dokic (2009, ch. 5).

<sup>8</sup>See O'Callaghan (2007, p. 110).

<sup>9</sup>This is true also for the medial waves theories.

<sup>10</sup>See Casati and Dokic (1994, pp. 42-44), Casati and Dokic (1998, pp. 36-37), Casati and Dokic (2010).

<sup>11</sup>See O'Callaghan (2007, pp. 49-55).

O'Callaghan supports (i) by pointing out that sounds, unlike colours, do not appear as features or properties of objects that persist unchanged in time. In addition, he stresses that silence ordinarily signals the conclusion of a sound and allows the beginning of another. Instead, darkness seems to be a barrier behind which objects and their colours can continue to exist. Obscurity is more akin to a sufficiently intense sound that does not allow us to hear anything else. Also, O'Callaghan suggests to compare the case of the tuning fork in the jar with a situation where an object disappears completely from a perceiver's visual field and, then, an indiscernible copy of it reappears in front of her. Given that this situation does not lead to univocal reactions, O'Callaghan can find support for (ii). It is also possible to argue that the moving circle and the refrigerator light pop into and out of existence, regardless of the fact that they are *perceived* as continuously present behind the white screen and the closed door. Even if we consider these two cases good analogues of the jar situation, O'Callaghan's position that sounds do not exist in a vacuum is not disproved despite Casati and Dokic's opposite perceptual intuitions.

From what we have stated above, it is possible to conclude that studying the reactions to various visual and auditory situations can say something about the functioning of perception, but not so much about the ontological nature of the entities that are perceived (iii). O'Callaghan, like Berkeley, recognises that it is not possible to obtain empirical refutations or confirmations of the presence of sounds in a vacuum, but, unlike Berkeley, he tries to find reasons to deny their existence by focusing on the metaphysical level (iv). For this reason, he focuses on the demonstration of the necessity of a medium, regardless of Casati and Dokic's thought experiment.

According to the standard physical theory and to some common understanding of sounds, the qualities (pitch, timbre and loudness) of sounds depend on the surrounding medium: this implies that a vibrating event without a surrounding material does not present any audible qualities (v). Unless a special category of sounds that has no standard qualities exists, the tuning fork in a vacuum emits no sounds. While the light doesn't change objects' visual qualities, the medium seems to play a more substantial role in defining sounds' properties. This is shown by the fact that it is possible to specify standard visual conditions (the full spectrum of light) that reveal the genuine colours of objects, while a similar set of standard conditions cannot be found for the auditory world<sup>12</sup>. It is important to point out that the necessity of the medium for the existence of sounds does not imply that they exist entirely in the surrounding materials. For this reason, O'Callaghan's theory of sounds does not collapse into a mechanistic medial theory.

Even if the case of sounds in a vacuum is considered a classic argument against

<sup>12</sup>O'Callaghan would have done well to provide more details about these last two points.

mechanistic theories of sounds and it creates problems for a hybrid theory that take into account both the source and the surrounding medium, it cannot be decisive from a metaphysical point of view. Nevertheless, Berkeley's thought experiment and its latter-day versions remain an interesting field where theories and intuitions about hearing can be tested.



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