

## Issues On the Nature of Sounds

### *Abstract*

What are sounds? For a philosopher in particular, they are very tricky objects. In this paper I will go through the many theories about the nature of sounds that have been put forward, trying to see whether there's at least one that "sounds" plausible. Then, I will examine some additional issues useful, in my opinion, to support the view I chose.

### **Sounds: the "state of the art".**

What are sounds? This is one of the most controversial questions one could imagine. Even if you wanted to stick to the most basic intuitions about it and, for example, you answered by saying that sounds are simply what we hear, more than one objection would be waiting for you.

Sounds are very tricky objects. We think we know a vast number of things about them: we think that we perceive them, that they are the immediate and only object of our auditory perception, but we also think that they in some sense are means through which we perceive other objects that are the sources of those sounds. We seem intuitively inclined to believe that material objects "have" sounds and simultaneously we don't easily accept that sounds are themselves properties of those objects. We seem to feel comfortable with the view that a deaf person cannot have experience of sounds (that sounds are not accessible to her, that they don't belong to "her" world) but at the same time we tend to think that Beethoven was able to compose music because he found an alternative way to hear sounds, that is, by paying attention to vibration waves. We have been taught at school that sounds are identical to mechanic waves propagating in a medium, that they are in this sense physical events, but we nonetheless seem to think the "real essence" of sounds to be something more than their physical substrate.

These are just very simplified examples of the incredible amount of issues (some of them identifiable as genuine philosophical problems) that arise as soon as one starts to seriously look for a plausible answer to that first apparently innocuous question.

The most important thing that emerges from this very general landscape, and that is also a fundamental starting point in order to properly understand all the different theories, however, is that the issue concerning the nature of sounds is independent from those that involve their being perceived. Indeed,

as I already, though very superficially, said above, there may be characterizations of the nature of sounds that don't make them the immediate objects of perception, thus not making the fact that we hear sounds something that is really part of their “ontological essence”.

With this last idea clearly stated, I can now turn to drawing a very general sketch of all the theories about the nature of sounds that are currently available, even though some of them result nowadays more “attractive” than others.

After that, I will proceed as follows. I will first try to put forward a further account for the nature of sounds, combining two of the most interesting theories in the landscape in order to obtain a sort of “hybrid” theory. Second, I will take a concrete example of phenomenon involving sounds, the Doppler effect, in which the hybrid I suggested appears to provide us with a good strategy to explain it.

Third, I will go back to some of Matthew Nudds's claims concerning the nature of both sounds and auditory experience, trying to give some further, though perhaps not very ambitious, objections.

### *1. Sounds as sense data.*

Even though the so-called sense data theory has been nowadays almost completely abandoned in its version dealing with perception in general and vision in particular, some theorists think that it could be, at least partially, restored in the debate concerning sounds.

Indeed, in the case of sounds it is quite plausible to claim that we in some sense perceive, say, a car, in virtue of our perceiving its sound. In this sense, then, a sense data-inspired theorist could say that sounds are “auditory appearances”, the entities we are in immediate contact with when acoustically experiencing the objects in the world. Moreover, sounds appear to be also very “ontologically fragile” objects: they overlap one another, they come to existence and after a while they disappear, they seem to fade and a moment later they regain strength, etc. Intuitively speaking, they could be also said as depending, at least with regard to some of their properties, on listeners: think for example about the changes we experience in a sound's pitch due to the Doppler effect, or the phenomenon of echoes. These and others considerations led some people to thinking that sounds might be, after all, private mental objects, pure sensations like the “famous” sense data.

In this perspective, sounds as we commonly conceive them, with their audible qualities like pitch, timbre or intensity, are nothing but intermediaries, mental images which are only ours, which qualitatively enrich our experiences but allow us to “reach” the world only indirectly.

However, this view seem to sharply contrast with how we commonly “make use of” sounds in

everyday life. Were sounds mental objects, what kind of utility in terms of spatial orientation or detection of potential threats would they ever have? Sounds carry reliable information about the spatial and temporal conformation of our surrounding environment, and evolution has preserved our ability to hear them just because of this. If this is so, and we very often form true beliefs concerning what is going on around us on the basis of sounds and their audible properties, then they can't be simply private sensations.

## 2. *Sounds as properties.*

The probably most traditional account of what sounds are is the one which holds that they are properties of objects. In particular, authors like John Locke wanted them to be secondary qualities, as well as colors, smells etc. In turn, secondary qualities are defined by these theorists as dispositions material objects have to somehow influence our perceptual experiences.

Pasnau can be seen as suggesting a similar theory, but with the important difference that, for him, sounds are not dispositions, but rather *intrinsic* properties of the objects we identify as the sources of those sounds. According to this latter view, sounds belong only to objects; they don't "emerge" thanks to the fact that subject and object stand in a determinate relation, as it were from a lockean perspective, in which perceiving was an essentially relational process.

I will present critically both Locke and Pasnau's views, starting from the former.

A first question is: to what extent can an analogy with colors be helpful in order to explain firstly what sounds are, and secondly why we perceive them the way we do?

I believe, like almost every philosopher who discusses this issue nowadays, that sounds and colors are extremely different regarding both the two questions mentioned above (i.e. what kind of "things" they are and how they are perceived by us).

First of all, the secondary qualities that we perceive visually are "inseparable" from the objects that possess them in a way in which sounds are not. When we perceive (i.e. we are perceptually aware of) the color red, for example, we do that always in virtue of our perceiving something as red<sup>1</sup> (a STOP signal, an apple, a traffic light etc.). Sounds are quite different in this respect: when we hear a sound, the very fact that we perceive it detaches it from whatever produced it, and, furthermore, it is precisely in virtue of our considering the sound a "perceptually independent" object that we are able to relate it

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<sup>1</sup> Please notice that I voluntarily used the phrase "*our perceiving something* that is red" to emphasize the difference of this concept from the one also known as "phenomenal principle", according to which each time we perceive a quality, we do so in virtue of *there being something* that has that quality. It is of extreme importance for what is at issue here to keep the two things separated.

with its source, be it an object or an event. An example to clarify this last point: if we perceive the color red, the experience of red is part of a more detailed and complex experience of an object that, among all of its qualities, has also the color red. If we are having a perceptual experience of red, then we can't help being perceiving simultaneously a lot of other features possessed by that same "red-bearer". On the other hand, in hearing the sound of a car passing down in the street, our attention may be focused on the sound and just on it, making it the only intentional object of our experience. This experience of the sound can take place in complete autonomy, and also in a case in which we are simultaneously seeing the car passing, our experience of the sound and its qualities doesn't change in virtue of the presence of further experiences that are spatially, temporally, causally, logically or in other ways connected to that one.

In other words, the "pieces of world" we commonly call sounds don't seem to significantly depend, in how we experience them, on any other object different from themselves.

However, there's an observation that could be misleading: we commonly speak about sounds as sounds *of* something. Indeed, Pasnau appeals to this ordinary way of speaking to argue that sounds are properties, but of a different kind than colors. Generally, a sound's perception is quite spontaneously followed by the formation of a belief about which object or event has to be identified as the source of that sound, that is, to use the previously mentioned way of speaking again, about *whose* that sound is. However, some difficulties arise also in trying to see sounds as primary and not secondary qualities. As Casey O'Callaghan notices, we are also quite naturally inclined not to take for granted that, for each time instant  $t$ , there is one and only one sound that is "possessed" by an object. On the contrary, for other ordinary primary properties, such as shape, it would be very odd for someone to claim that, at time  $t$ , an object can be, say, both hexagonal and square. With sounds things are different, and there is absolutely nothing strange in the fact that a single object or event may be the source of more than one sound and, what's more, that those sound may be grouped together or kept segregated in our experience without the object to play any relevant role in this operation.

Moreover, while when we compare two shapes, in fact we do it by comparing two objects *with respect to their shapes*, making a comparison between sounds doesn't necessarily involve a comparison between sources. Let me explain better this last point. In thinking about the shape square, for example, part of the content of this thought is something square. Otherwise, I don't see how could we think about "the square" as an abstract concept. On the other hand, it's easy to imagine how could we have a mental

state with a sound as its content without also the source of the sound to be necessarily present in it. Another argument against the view of sounds as properties might be the following. First of all, sounds are temporally extended: they start, persist and then vanish, and during their “life”, their audible qualities<sup>2</sup> never remain the same. However, a sound is traceable as a unique sound even though it undergoes sometimes very deep changes in its audible qualities.

Other properties that objects can acquire, maintain and then lose, like colors or shapes, are not able to survive changes in their “perceptual qualities”: a wall that from orange becomes yellow *has changed its color*; it would be a very odd way of speaking to say that the same color has changed its “orangeness” into “yellowness”! The same with shapes: an object which from octagonal becomes square *has acquired another shape*, it is not the shape itself that has changed.

Now consider an ambulance's siren. Although there is a continuous shifting of pitch, it is not perceived as a succession of different sounds with different pitches, but as the same sound that persists through changes in one of its audible qualities.

This capacity to “live through changes” is exactly what makes extremely difficult to define sounds as properties that other objects or events can acquire and lose from time to time.

### 3. *Sounds as waves.*

If, in order to define what sounds are, we relied only on science, no doubt it would tell us that they are *waves*. Waves themselves, however, are not uncontroversially defined entities: it is not once and for all clear yet neither which kind of thing they are, nor the relation they stand in with the medium in which they propagate. The only thing both we and the scientists are sure of is that waves are medium-dependent. This medium-dependence, in turn, can be interpreted in many ways, each one of them entails a different view about what waves themselves are.

A *prima facie* promising way to characterize waves is to see them as physical objects. Waves are, indeed, similar to objects in many respects: here are some examples. First, waves stand in a causal relation both with their sources and our auditory experiences. Second, they seem to have a quite robust “ontological status”, since they can persist through changes of medium (for instance, from air to water). Third, waves possess their own intrinsic spatial features, such as amplitude, frequency, velocity etc. Given these similarities, and considering again all the arguments I have already presented against Locke and Pasnau's views of sounds as properties, waves appear to be more like objects than

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<sup>2</sup> I am referring to pitch, loudness and timbre.

properties.

However, waves are medium-dependent, and this is a kind of dependence that hardly can be found in other ordinary physical objects. A chair can be in a sense dependent on the wood it is composed by, but this is not the proper way to understand waves' dependence on a medium. Indeed, when a wave passes through a medium, this medium somehow “reacts” to this passage, it modifies itself, its molecules move due to the energy transmitted to them by the disturbance constituted by the wave itself, and this movement stops as soon as the wave has moved on.

Therefore, waves have something in common with objects, but this is not sufficient to claim that they are objects: the examples shown above only permit us to conclude that they are *particulars*. Why, then, not to argue that they are a different kind of particular, that is, that they are *events*? That waves are events with a particular temporal extension and which “happen to” the medium is actually the hypothesis that seems to better explain all the characteristics that I have just described.

Following this idea, sounds might be events too, since they are claimed to be identical with waves.

I will entirely devote one of the next sections to the view of sounds as events: for the moment, let us just stay with the intuitive goodness of this hypothesis, and go back to their alleged identity with waves.

There are, indeed, some problems in justifying this identity. One is this: while it is quite permissible for us to say that waves “travel” through the medium (that is, that the event they constitute happens, at different times, at different parts of the medium), it is quite implausible and counter-intuitive to claim that sounds travel in this sense too, from the source to our ears.

I must say nonetheless that attempts to argue that sounds travel just as waves do have been put forward, but, in my opinion, this is not the best way to characterize the location of sounds according to the actual role they play in our perceptual conscious experiences. Sounds, I am inclined to claim, are perceived as located in a precise point of space, generally close to their sources, and they seem to keep that position fixed, unless the source itself is moving<sup>3</sup>. Thus, I suggest to assume from now on the distal theory as the correct account of sound location, in order to properly understand what comes next.

If sounds were able to move independently from their sources, just like actually waves do, it wouldn't make any difference in our perceptual experience whether those sources were moving or not: the only task of the source was to generate waves, which then are able to go wherever they want without the source being minimally involved in it. However, it is undeniable that it actually does make a difference

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<sup>3</sup> More details about the distal theory of sound location are given in O'Callaghan (2007).

in our ordinary experiences of sounds the static or moving condition of sources (think, for example, about the Doppler effect), and it is sounds themselves, through their audible qualities, that allow us to capture such a difference.

To conclude, the reductionist view that sounds are identical with waves has on the one hand some promising implications worth being further developed, such as the idea that sounds are events, but, on the other hand, also some problems: that sounds are just waves it seems definitely not enough in order to explain everything they “mean” for us and the role they play in our perceptual experiences.

#### *4. Sounds as material objects.*

Another kind of physicalism about sounds is the one which suggests that, since waves are a too “weird” kind of particular to be satisfactorily characterized, sounds might be, after all, not very different from ordinary material objects<sup>4</sup>. However, this seems probably the least attractive proposal in the house. Let me make some comments on why is it so.

If sounds were “common” material objects, like tables or cats, they would first of all present spatial features that are “rigid”, at least in the minimal, and perhaps naïve, sense that it would be possible for an object *x* to determine in every moment with a certain precision the portion of space occupied by that object.

Secondly, their presence would have to coincide with their existence. Let me give an example to explain this latter claim. A table is present (= potentially perceivable by a potential perceiver) for the whole time interval in which it exists and, at each instant of its existence, it occupies a quite determined portion of space which, for this same reason, cannot be occupied by any other material object.

On the contrary, sounds may continue to exist even unperceived: our sensory capacities are extremely limited! Moreover, sounds occupy portions of space in a very particular sense, and they certainly are able to share the same location: sounds do overlap, disturb, interfere, replace one another, tables definitely do not.

A further explanation of why sounds hardly can be considered material objects, or rigid bodies, as physics would call them, is given by the fact that sound waves, which, though not identical to sounds, undoubtedly play a fundamental<sup>5</sup> role in sounds' “lives”, are not material at all: they are defined as

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4 Despite all the metaphysical debates around the notion of object, I will here take material objects to be literally “bunches of matter”. Therefore, when I say for instance that the same portion of space cannot be occupied by more than one material objects, I am not considering the possibility that, say, a rectangular piece of cloth and a flag may be two co-located objects: for my present purposes, the piece of cloth and the flag are the same material object!

5 They actually are what keeps sounds “closer” to the material world, what anchors them to the physical events nature is made of, what makes them genuinely “mundane”.

disturbances which carry energy that can make the matter move during their passage, but that do not determine any material permanent change, and, what's more, they're not themselves made up of matter. Since waves are not material objects, and without waves there is no sound, it would be absurd to claim that something material “comes out of” something immaterial.

##### 5. *Sounds as abstract objects.*

Matthew Nudds has a view about what sounds are that has recently grown in success and fame. In particular, he suggests that sounds are objects, particulars, but not objects in the sense in which tables or chairs are: rather, they are *abstract* objects. There are many interpretations concerning what is it exactly like for an object to be abstract, and Nudds seems, though without arguing for it, to accept Kaplan's one regarding words<sup>6</sup>. In Nudds's conception of sounds as abstract objects, a central idea is that *the same sound* can be met more than once. This can be possible only if we think about sounds as types that manifest themselves as particular occurrences, which are in turn constituted by patterns of sound waves with precise physical characteristics (frequency, amplitude etc.). Moreover, it is just when instantiated that sounds acquire their “ontological value”<sup>7</sup>.

Furthermore, Nudds claims that his view is the only one able to properly account for the functioning of auditory perception. By appealing to what psychologists and neuroscientists tell us about our auditory system and about how it elaborates the sensory information carried by sound-waves, Nudds argues that, since auditory perception works thanks to a mechanism called *grouping*, whose “raw material” are the physical properties of waves, it is them and only them, organized in specific patterns, which are involved in “shaping” auditory perception. A further implication of this view, according to Nudds, is that it becomes definitely clear that the real function of auditory perception is not to make us aware of sounds, but rather to enable us to collect information about the (physical and *spatio-temporal*) features of sound sources.

The appeal to the functioning of audition, together with a representational theory of perception in general, allows Nudds to strengthen his philosophical proposal, which rejects the claim that sounds (and their audible qualities) are the primary object of auditory perception. The contents of our auditory experiences are, according to Nudds, made up primarily of sound-producing objects, and we perceive sounds only in order to perceive thereby their sources.

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6 Kaplan (1990).

7 This last claim is what makes Nudds's position different from the more “classical” view called *platonism*. According to platonism, types and tokens have separate, independent but equally “dense” existences. On the other hand, Nudds wants to maintain the more intuitive view that something that is abstract cannot exist in the same sense material things do.



This latter idea is very important in the light of Nudds wider theoretical project in philosophy of perception, that is to reach an account of perceptual experience totally different from the traditional one, for which the division between sensory modalities is central. Nudds wants the perceptual system to be understood as a maximally unified system able to represent the world in the most detailed way possible. Each sensory modality “produces” a certain type of details, which acquire sense and coherence only when they are set in a larger picture.

As an example, take the case of mosaics. Imagine that vision, tact, smell, taste and audition all are tiles of different colors: when placed one close to another in a certain order, the design emerges. The more tiles there are, of course, the more detailed and realistic the design itself will be.

At the end of the day, following this line, Nudds reaches the striking hypotheses that we might abandon the “old” tradition of the five senses to prefer an idea of a unified and generic “Sense”, to describe which even the newly born notion of multimodality becomes limiting and obsolete.

I will go back to Nudds's view, since I have some objections that are worth being developed in more details. For the moment, I leave his proposal aside and move on to the next one.

#### 6. *Sounds as events.*

We have already seen that the apparently most promising way to define what sounds are is to say that they are particulars. However, we also saw that particulars can be of two kinds: objects and events. The idea that they are objects (both material, like tables, and abstracts, like words) doesn't seem to describe them in a satisfactory way, for the reasons I've just mentioned and others, especially regarding Nudds's view. Moreover, we already encountered events in our discussion, namely while talking about waves.

We also reached in that matter the plausible conclusion that, on the one hand, waves can be considered as events, and on the other hand, that sounds stand in a very close relationship with them.

Elaborating the nature of this relationship a bit further, we may say two things. First, in some sense waves and their “behavior” are (at least one of the) *causes* of our hearing sounds. Second, waves themselves are generated when something “happens” to material objects, that is, when another event occurs.

Since sounds seem, in this scenario, to stand in the middle of a causal chain of events, and causality is typically a relation among events, the most logical consequence would be that they are events too.

The plausibility of the hypotheses that sounds are events can be enhanced also by some intuitive

considerations, like for example the fact that sounds have durations, different both from those of the events they are generated by and from those of the waves' "travels".

However, the claim we quite nimbly made about sounds' being *in the middle of* a causal chain of events, is in fact much more controversial than it seems, and can be interpreted in many ways. Here I will consider two of them. The first, by Casey O'Callaghan, interprets this fact more literally, and argues that, since all the other events in the chain are physical events, sounds must be physical events too. The second is a view put forward by Roger Scruton, according to which sounds can be considered event-like particulars, but they cannot be literally seen as belonging to the same physical chain as the other related events. He prefers a more metaphorical way of interpreting sounds' "event-likeness", introducing the notion of *pure event*.

### *6.1 What kind of events? Relational vs. pure events.*

According to the version of the event theory argued by Casey O'Callaghan, sounds are those events which work as causal intermediaries between the event involving the source (or sources) of the sound (for example, a car crashing) and the event of the creation of sound waves which, traveling through the medium (normally, air), cause in turn our auditory experience. In particular, sounds are seen as an object's disturbing of a medium. Thus, sounds are those kind of events which can be called *disturbances*. To explain better the concept of disturbance, we could say that the sound is neither the car crashing itself (or whatever event involving physical objects), neither the immediate cause of our auditory experience (which is caused in fact by sound waves propagating in the medium and reaching our ears). It is, rather, the process in which the objects disturb the medium. Take for example how a tuning fork works. When hit, it starts to vibrate, generating, normally, the 440Hz-A used to tune musical instruments. Well, as O'Callaghan claims, the sound (namely, the A), is the tuning fork's vibration disturbing the air, and this kind of event is, in turn, a *relational event*.

We can now define disturbances as relational events by saying that a relational event is an event which needs the presence of two particulars: the object and the medium. Therefore, it is not identical to vibration, since vibrations are events involving just the object which vibrates, and can occur also in the absence of any surrounding medium. Thus, vibrations do occur also in vacuums, while sounds do not.

This view has been defined a physicalist account because O'Callaghan considers sounds as a constitutive part of a causal chain of physical events happening in the world. These events are the object's vibration, the sound, the generation of sound waves traveling through the medium and their

reaching<sup>8</sup> our eardrums.

On the other hand, Scruton's event theory is initially put forward as an alternative to O'Callaghan and others<sup>9</sup> physicalism. The events Scruton calls “pure” differ from O'Callaghan's relational events mainly in this respect: they are, as well as relational ones, events which occur in the real world (i.e. they're not “mental”, in the sense of private or fictional, or illusory!), but they don't literally happen “to” anything. Pure events don't enter the causal chain linking all the events involving source, medium and perceiver in the “standard” way, thus not being re-describable from other perspectives (which would have been those of the other events in the chain). The only way to describe a pure event is by itself, that is, by saying that it just happened. In the occurrence of a pure event, Scruton claims, no further particular is involved, neither is it any relation among particulars, while this was precisely the case with relational events. When a pure event happens, nothing changes (even provisionally) in the physical world, neither in its objects nor in their properties.

At this point, a perplexity arises quite spontaneously: isn't it true that very often we describe sounds by explicitly referring to their sources or to some kind of particular that we consider involved in the sound-event we are witnessing? This seems both very natural and very common, but it is nonetheless a clear counterexample to Scruton's view as he presents it. Indeed, such a view holds that, as we said earlier, sounds are pure events and pure events are describable only by referring to themselves. Therefore, Scruton labels this natural way of describing sounds as a mere accident, arguing that it is due to our unavoidably imprecise way of using language.

Honestly, I find this answer totally unsatisfying. I guess that this is because it is ultimately difficult to see Scruton's theory of sounds as a fully credible alternative to O'Callaghan's view. Rather, I suggest that the notion of pure event would better show its usefulness when particular phenomena involving sounds, like for example hearing recorded sounds or acoustic effects, may constitute a problem for physicalism. In other words, pure events might not be a full-fledged alternative to relational events, but rather useful “epistemological tools”, lacking an ontological status independent from the one of relational events (which I take to be reasonably considerable the “real” sounds), helping physicalism to account for both our ordinary way of thinking about certain sounds' experiences and certain auditory phenomena the explanation of which may go beyond a merely physical combination of elements.

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8 It is important to keep in mind the (very simplified) definition of wave in physics: a wave is a disturbance able to transport and transmit energy. It is the energy generated by the source's vibration and transported by sound waves that makes our eardrums vibrate. Moreover, from a more philosophical point of view, the propagation of sound waves through the medium can be seen without any particular difficulty as an event involving the medium itself.

9 Another version of physicalist event theory is the one proposed by Casati and Dokic in *La Philosophie du Son* (1994, Nîmes: Chambon).

Sounds, that are what Scruton sees as objects with their own “status”, call them secondary objects or pure events, can be alternatively described as simply the phenomenology of the experience of perceiving a sound-event. I will very briefly explain what I mean before the end of this section. In this perspective, thus, O'Callaghan-like physicalism and Scruton's pure-event theory can work together in giving us the largest understanding possible of the nature of sounds and auditory experience, and I'll give some examples of this in the rest of the paper. Sometimes, in speaking about sounds and phenomena involving (or related to) them, we actually are referring to disturbances (O'Callaghan's “sounds”), whereas in some other occasions we just talk about the phenomenal “appearance” of our experience of sounds, though the terminology we use doesn't change. In this last case, what we are actually referring to is a pure event (or secondary object) which *supervenies*<sup>10</sup> on the physical one will end up being necessary in order to keep the general picture on the one hand internally coherent, and on the other hand empirically plausible. Let's call, from now on throughout the paper, the physical event of disturbance (O'Callaghan) “sound-event” (SE), and the pure event globally supervening on it (Scruton) simply “sound”. In non-philosophical contexts, we normally don't care about the difference, as long as we are “standard perceivers”<sup>11</sup>; however, for instance, a deaf person might be aware of an SE without being aware of the corresponding sound. Thus, when we come to conceptual (and metaphysical) analysis of the nature of sounds, we must distinguish between SEs and sounds, since they have both different “roles” in shaping our perceptual experiences and different ontological statuses.

### **The Doppler effect: illusion or veridicality?**

The Doppler effect is a phenomenon that, thinking more carefully about it, is not only a purely perceptual one, but it can be a genuine “challenge” for a lot of theories concerning the nature of sounds in general. There is, indeed, a sort of “macro-issue” which this phenomenon depends on: the relationship between sound sources (and what “happens” to them) and our correspondent auditory experiences. To begin with, the so-called Doppler effect can be defined as the experience of a variation in pitch (that is an audible quality, thus a quality of the sound perceived) due to the listener's, the source's (or both) being in movement, although the frequency emitted from the source is always the

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10 The notion of supervenience I am relying on here is the one of *Global Supervenience* (cfr. SEP entry “Supervenience”).

11 According to McLaughlin, this is also what happens in our ordinary speaking about colors and their “metaphysical essences”. I am assuming, indeed, McLaughlin's functional theory of colors (McLaughlin, 2003) as analogous to the relation I have in mind between sound-events and sounds (in the previously introduced terminology).

same. The “challenge” for a theory of sounds, then, lies in that it must be explained why a sound can vary in its audible qualities while the physical event that produces it doesn't undergo any change of the relevant kind.

Let's begin by considering an apparently plausible analysis of the Doppler effect, which is the one put forward by O'Callaghan.

In giving an account of a number of sound-related phenomena, among which there is the Doppler effect, O'Callaghan seems to be quite clear and consistent with his general physicalist theory of the nature of sounds. The sound-event of disturbance and the sound waves generated by it are two different things, with physical properties (like frequency) that in some ideal circumstances coincide, but most of the times don't. Since pitch, according to physicalism, is a function of frequency, each variation in the former must have at least a very broad connection with a variation in the latter. Since *ex hypothesi*, in the Doppler effect there is no change in the physical properties of the sound event, and in particular in its frequency, the experience we have of a change in pitch has to be treated as an illusion.

However, there is in my opinion a problem with this view, which emerges by O'Callaghan's account itself. The problem I see is the following. O'Callaghan himself claims that both the disturbance and the waves have frequencies, and these frequencies sometimes don't coincide: this is precisely what allows him to keep sounds ontologically separated from waves. However, it is not clear which kind of relationship, though it seems quite clear that it must be of physical nature, there exactly is between the two frequencies and, consequently, which one of the two is ultimately “responsible” for the audible qualities we experience, or in which proportion the two of them contribute to it. In other words, depending on how we interpret the final “result”, which consists in the audible qualities we hear, as resulting from the properties of the sound event or from those of the waves at some point, we can argue for the Doppler effect's being or not being an illusion. O'Callaghan chooses the first option, and thus one implication is clear: if, say, pitch is a function of the disturbance event's frequency, then it is plausible to see Doppler effect as an illusion. However, in both the case in which experienced pitch depends on waves' frequency and in the one in which it depends on a combination of the two, someone may perfectly claim that Doppler effect involve a veridical experience, as long as waves are directly involved in pitch perception, since they are, eventually, those which literally “carry” the relevant information about sounds and sound-sources to our ears.

Given these difficulties in reaching a satisfactory account of the relationship between SE's and waves'

frequencies, I am more inclined towards looking back at Scruton's idea of pure event, and in particular at the terminological distinction I made between sound-events and sounds, and try a kind of alternative “hybrid” explanation.

First of all, O'Callaghan claims that a kind of perceptual illusion is involved in our experience of the Doppler effect. However, if we try to describe the phenomenon in the light of the new account we suggested at the end of the previous section, I don't believe that considering it an illusion in the traditional sense is the right way to analyze it.

According to my view, what we are primarily aware of in our experiences are sounds, not sound-events, and in turn sounds are defined as “aggregates” of audible qualities. Therefore, since what phenomenologically appears to us cannot be strictly speaking be “correct” or “incorrect”, the only sense in which the Doppler effect is an illusion is not the traditional one. Indeed, we argued on the one hand that sounds are the primary objects of our experiences, but that, on the other hand, they globally supervene on the corresponding sound-events (disturbances). According to the definition of global supervenience, there can't be any change in the arrangement of the audible qualities a sound is experienced to have without a related change in the arrangement of the (physical) properties of the disturbance event. However, since the disturbance event is itself a relational event, and its characteristics depend on a lot of different factors, included the medium, the location of the source, time etc, it straightforwardly follows that if the disturbance event undergoes something “strange”, as in the case of the Doppler effect, when it changes location through time together with its source, then also the resulting experience's phenomenal character will undergo strange modifications too. Technically speaking, then, Doppler effect is an illusion, since movement isn't something intrinsic neither to the source nor to the disturbance event, but it's nonetheless something that clearly plays an active role in influencing the relation between the disturbance and the sound (namely, the audible qualities experienced). In this latter sense, therefore, it seems to me that the Doppler effect involves no illusion, but it is just how nature works.

Let me now re-state my idea as follows. I accept, first, that whichever qualities sounds are experienced to have, they must globally supervene on the corresponding properties of the sound-event. They must, in other words, be “guided” in their existence by the physical properties of the event of disturbance, according to the classical definition of global supervenience. However, the event of disturbance involves, as we already said many times, the presence and the characteristics of the medium which is currently being disturbed in a certain way, and this way may change throughout the development of the

event itself. That's why, if the sound event is changing its location during its occurring, as it is in the case of the Doppler effect (in its version with a moving source and a stationary listener), there is no need to conclude that it is a case of illusion. When, on the other hand, it is the listener who is moving, I don't think things are different anyway, and also this one is not a case of illusion. In this latter case, indeed, the information waves carry about sound-events are correct, but since the listener's experience is determined precisely by how the object disturbs the medium, the fact that she is moving, getting closer or farther from the sound-event's location, is something that concretely influence the audible qualities of the sound, since the characteristics (length, curves, overcoming of obstacles, interferences etc.) of the "path" waves have to walk in order to bring information to our ears are fully part of what determines our experiences.

### **Nudds's theory of sounds: a few critical remarks.**

To begin with, let me repeat briefly Matthew Nudds's view of the nature of sounds and auditory experiences. First of all, he strongly denies that sounds are events. Indeed, his idea of the function of hearing implies that sounds are just the result of how our auditory system *represents* sound sources, their physical properties or the event they are involved in, and for this reason they cannot be independent events in themselves. On the other hand, however, his alternative proposal to analyze sounds as abstract individuals (or particularized types), faces in my opinion some difficulties, both in giving a satisfactorily precise characterization of the view itself and in its theoretical plausibility. I want to start with an attempt of sketching an as charitable as possible interpretation of his view, since there seems to be some inconsistencies from one place in which the theory is put forward to another.<sup>12</sup> I think the most important claim on which Nudds grounds all his theory is the following. Sounds are not the *only* objects of auditory experiences: it represents *both* sounds and sound sources, and to represent sources and their properties is the *primary* aim of auditory perception. What does this mean? Apart from all the considerations, though very interesting and certainly worth being elaborated, concerning this alleged double-intentionality (or "twofoldness") of auditory experience<sup>13</sup>, the crucial point for our present purposes here is that, for Nudds, there is a very tight link between sounds and

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12 In particular, I will focus on two works by Nudds (see Nudds, 2009 and Nudds, 2010), trying to come out with a coherent sketch of his real view.

13 This twofoldness worth of explanation might touch also O'Callaghan's theory, although the relationship he postulates between sounds and sources is in some sense inverted in respect to Nudds's one. Indeed, O'Callaghan claims that sounds have always a priority role on sound sources as objects of auditory perception.

sources from the very beginning, from the moment in which auditory system starts to “codify” particular sounds *in terms of* their sources. Of course, there must be a sort of causal chain linking sources, and thus sounds, and our experiences, and he thinks that almost everything here depend on waves. In which sense? Basically, he claims that waves are, on the one hand, what permits sounds to literally exist and, on the other hand, they carry information about the physical characteristics of sources (when involved in particular kinds of events of vibration), thus making those characteristics auditorily accessible to us through the experience of sounds.

Let me put it in other words. According to the definition of sounds Nudds provides, it seems clear that sounds are very strongly tied to source events, in the sense that the main aim of sound perception is to make us perceive their sources, but they also depend on sound waves, which are actually the material constituents of sounds themselves. An attempt to interpret those relationships between sources, sounds and waves might then be the following. Sound sources (to be precise, their physical properties), together with the medium and other features of the environment in which they vibrate, determine the “shapes” of the structures of frequency components which waves, generated by the source event itself, instantiate. Sounds, then, are just these instances of structures of frequency components, that is, they can be considered as belonging to the metaphysical category of particularized types (or abstract individuals), as Nudds himself states at some point.

This is, basically, what Nudds has in mind regarding the nature of sounds.

However, there are other places in his presentation of his theory in which he seems to argue for something slightly different, making the whole interpretation of what he exactly has in mind quite difficult. More precisely, I think Nudds is quite confusing in claiming that, as he does in one of his articles, that sounds can be defined also as properties of the waves<sup>14</sup>. For the ontological relation between sounds and waves he argues for, a few pages before in the same article, seems to be different from the “classical” object-property one. Indeed, what he seems to have in mind is similar to a relation of constitution, in which sounds are instances of patterns, and those instances are “embodied” by sound waves. The only way to make everything consistent might be this one: sounds are like tropes, that is, properties of a particular kind that exist only in their instantiations. But thus understood, tropes are more similar to particulars (or individuals, broadly speaking) than to properties in the canonical sense. Everything, thus, is very doubtful and lacking a lot of relevant details already from the very beginning. But let's go on: what about the sounds we experience? When he comes to describe what actually goes

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14 « [...] sounds are properties of the pressure waves produced by sound sources; [...] » (Nudds, 2010, p. 292)



on in auditory perception when presented with sounds having a certain phenomenal character (that is, with certain audible qualities), he seems to “lead” those qualities back to the structures waves are instances of, thus making the sounds *as we experience them* directly dependent on the abstract structures of frequency components. In this sense, qualitatively different experiences are due to different structures' being instantiated, and this is what he precisely claims<sup>15</sup>. Now, there are two ways of interpreting this, one more charitable than the other. The charitable one, which we might had better to adopt, since Nudds doesn't give himself a lot of more details about this point, is that the same sound may instantiate different structures or patterns at different point of its spatio-temporal extension. In this sense, it may be non controversial that different structures are instantiated by one and the same particular instance. The less charitable interpretation would, on the other hand, lead to the thought that, since it is quite obvious that two abstract structures, taken as having separated and independent spatio-temporal extensions, cannot be instantiated by the same individual (i.e. the same sound wave), it follows that to two different structures have to correspond different sounds, when those structures are instantiated. Consequently, qualitatively different experiences must in turn be experiences of different sounds.

However, Nudds argues just the opposite, and this is the reason why we should prefer the first interpretation. In particular, Nudds claims that it can be possible, when two people are having qualitatively different experiences, to *still* be experiencing *the same* sound. And he justifies this by saying that sounds are not only dependent on the abstract structures they are instances of, but also, and perhaps in a more constitutive way, on their sources. Thus, as long as the source event is the same in both experiences, the sound remains the same also if it is experienced by the two perceivers as having different qualitative characters<sup>16</sup>. If one wanted to argue against Nudds's view at this point, I think this issue of what it exactly means to hear the same sound could be considered a quite controversial one. However, I don't want to stop here, and I want to concede Nudds that, maybe, the contradiction arises only if one assumes that the possibility to identify auditory experiences as being of the same sound must be something that any perceiver is able to introspectively determine, whereas I think that Nudds would say that hearing the same sound is something objective that perceivers may or may not be explicitly aware of in virtue of the qualitative character of their experiences.

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15 «Suppose we both hear the sound of a gunshot, but I am standing next to the gun and you are much further away. I experience the sound as loud and sharp, you experience it as quiet and muffled. The structure or pattern of frequency components which determines your experience will be different in various respects from the pattern which determines mine.» (Nudds, 2010, p. 291)

16 «[...] normally, two experiences are of the same sound only if, in virtue of hearing the sound, we hear the same source event.» (Nudds, 2010, p. 292).

Now, I want to focus once more on the three-places relation among sources, waves and sounds as Nudds puts it, and I will present two problems I found in it. The first problem regards the “side” of the relation between sounds and sound waves, which is also the core of what Nudds thinks sounds are metaphysically speaking. The second, on the other hand, is located at the other “side” of the relation, regarding namely sounds and sound sources.

I want to start with the last of the two. It concerns, basically, the “step”, crucial in Nudds's view and, in particular, in his definition of sounds, which takes from auditory grouping to the identification of only one source corresponding to each sound. In particular, I have some difficulties in understanding what exactly Nudds is claiming. There are two possible interpretations, it seems to me, of his idea that sounds are identified on the basis of each one's being “associated” to one source. The first interpretation is more “narrow”, and would be that every source can generate, at each time, only one sound, and this in turn would imply that it is impossible for us to perceive different sounds as being produced by one and the same source at the same time. This last implication seems quite false: unless we go very sophisticated and distinguish different components internal to the source (object or event) producing different sounds, thus saying that each component “behaves” as an independent source, it is very frequent, I think, to hear more than one sound simultaneously “coming from” the same source. Let me give a couple of examples. Intuitively, when we attend a car crash, we probably hear more than one sound simultaneously. We might hear a “bump”, a “swoosh” and a “crack” at the same time, and it seems very implausible to me to claim that we don't, in such a circumstance, hear all of those sounds as being produced by the same source, that is, the crash event.

A second example comes from music. People who are very well trained in listening to musical sounds are able to hear separately all the harmonics present in a sound produced by a diapason. But, at the same time, they are all sounds generated by the diapason: the diapason is the one and only source, common to all the single harmonic sounds.

If Nudds's idea has to be interpreted this way, I think it ends up being really hard to accept.

Another and more charitable interpretation of what Nudds wants to claim is this one. He may only want to say that, generally, we are very good at identifying the appropriate source for each sound we hear, just because of the fact that sounds and their sources are linked in an easily detectable way, thanks to some of their reciprocal properties. Following this rougher interpretation, Nudds's claim might be more easily accepted, though I still find it deeply implausible: there is no need to postulate a univocal correspondence between sounds and sources in order to get a satisfying account of our ability to

perceptually link them.

The first problem I mentioned at the beginning of this last part of the paper arises in my opinion due to the characterization in Nudds's view of some properties of sounds (location and duration above all) compared to the corresponding properties of waves. Since Nudds wants to maintain the idea that sounds are instances and, as instances, coincide with the waves which actually are the “body” of those instances, then he is also obliged to accept the consequence that, with respect to all the properties “emerging” from interactions with the surrounding environment, and in particular with space and time, sounds must behave just the way waves do. In other words, this implies that sounds in some sense “inherit” spatial and temporal properties, like location and duration, from waves. This seems quite implausible once we look at the issue more carefully. Concerning location, it really seems that, in our ordinary way to locate sounds, we wouldn't be disposed to say that sounds “travel” from the source to our ears as waves do. Furthermore, Nudds himself repeats many times that the main aim of auditory perception is to provide information about sound sources, and that we hear sounds *because* we hear sources, and this seems to definitely go against the hypothesis that sounds share location with waves. Otherwise, how could it be that we locate a source in a quite precise place *because* we hear its sound, when the sound is actually elsewhere, namely somewhere in between the source itself and our ears<sup>17</sup>? Speaking about duration, what Nudds claims is quite intuitively implausible too. In particular, it seems wrong to me to claim that, in the ordinary way of “dealing with sounds”, their duration coincide with the one of the presence of waves in the environment. Waves' “lives” have a different duration from sounds' ones<sup>18</sup>, at least if we want to use sounds as reliable entities in the external world which help us to make sense of the temporal relations among objects, events etc., that actually is, also according to Nudds, one of sounds' most important “capacities”.

## Conclusions

As I tried to show, a lot of issues should be addressed in a largely more detailed way than I did in this

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17 The debate concerning the location of sounds is one of the most lively ones in the whole discussion about sounds. Of course, I won't be able to develop it further here, but nonetheless I think both Nudds and O'Callaghan have lots of very compelling arguments that are worth being analyzed as they deserve in some future work.

18 Sometimes, indeed, waves can be detected by very precise instruments much after the moment in time we (and any living creature's perceptual system) cease to hear the corresponding sound.

paper. Nevertheless I think that what I said is enough to have a first contact with some of the problems, the theories and the questions which constitute the current debate about sounds and auditory perception.

To sum up, I addressed basically three issues. The first is one of the possible taxonomies of all the theories of sounds present in the debate: I decided to use as a criterion of classification the nature of sounds, that is, the answer to the question “what are sounds?”. Of course, many other criteria would be perfectly acceptable in order to put some order in the available “theoretical supply”, such as the one of the location of sounds, or the one of the object/content of auditory perception, but I decided to focus on the more “metaphysical” one, since I consider it also the more exhaustive one.

The second issue I addressed was the Doppler effect as a very interesting phenomenon related to the nature of sounds, and I tried to put forward a plausible account of it which makes use of both O'Callaghan's notion of sound-event and Scruton's idea of sounds as purely auditory objects.

As the third and last issue, I focused on Nudds's theory in order to shed light on some controversial points in it.

All of these three parts of my paper were finally oriented towards a proposal concerning the nature of sounds that is not yet present in the taxonomy, but nonetheless puts in evidence the fact that, whenever we ask ourselves questions concerning sounds, or we try to find the more plausible theory of them and their “function” in our lives, we first of all have to have clear before the mind what we are talking about: sounds, sound-events, sound sources or something else.

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