

## On Trees and Sounds

By Andreas Bick

“If a tree falls in a forest and no one is around to hear it, does it make a sound?” This koan-like question is often quoted in texts on sound and perception, and the answer given is often a counterintuitive no. The argument is as follows: a sound is something created in our brains when our ears perceive the vibration of molecules. Consequently, a sound is nothing but a mental representation in our nervous system, while the sound waves outside our ears are simply part of a larger physical continuum of vibrations. A sound is a product of our sensory apparatus: without ears to hear, no sound.

A similar case can be made in terms of acoustic communication: the production of a sound runs through the classic stages from sound source via medium to recipient. The movement or vibration of a sound source generates sound waves in a surrounding medium such as air, water or solid objects. The sound waves spread concentrically and reach the recipient, who then translates these fluctuations in pressure and density into electrical pulses and perceives them as sounds. If any one of these stages is missing, then there can be no sound. In the absence of a recipient, as in the abovementioned forest, though it is possible to speak in physical terms of a transfer of energy from the falling tree to the surrounding medium, acoustic communication in the sense of an exchange of information does not take place: without a recipient, no transfer of information, and thus no sound.

One might object that these arguments both sound rather anthropocentric. What would a squirrel have to say, if we were able to ask? In his lectures on physics in 2007, Richard Feynman gave an answer framed in terms of the natural sciences, according to which it must be possible, on close inspection, to find traces such as scratches on the leaves of the fallen tree that point to the fact that a sound was generated. “We might ask: Was there a *sensation* of sound? No, sensations have to do, presumably, with consciousness.” In other words: the sound of the falling tree could be physically measured and proved to be potentially perceivable, even if no one was actually there to experience a sensory perception of it. Finally, we are looking here at two contradictory definitions of the concept of sound: for some, a sound is a mechanical vibration in an elastic medium, for others, it is the subjective sensation of an auditory stimulus. The physical fact of the sound waves as an empirical reality is set against the complex human sensory apparatus which must first transform a diffuse mix of sound into auditory objects (i.e. sounds) before generating a subjective reality.

So what is a sound? Philosophy has traditionally classed sounds among the secondary qualities of objects, a category which also includes colours, smells and flavours, all capable of making a sensory impression on perceiving subjects. A prominent advocate of this notion in the history of philosophy is John Locke, who, in the late 17<sup>th</sup> century, proposed a vision of the world in which objects can exist independently of our experience. For Locke, sensory perception is a potential source of objective knowledge. Irish philosopher and theologian George Berkeley contradicted this view and claimed that such a world independent of human perception does not exist. In *A Treatise Concerning the Principles of Human Knowledge* (1710) he illustrated this by speaking of trees in a garden that are only there as long as someone is perceiving them. Only later did this passage give rise to the philosophical riddle about the falling tree as we know it today, which circulates in various forms and is still credited to Berkeley.

Locke and Berkeley represent two extremes in discussions of the nature of sound. In the still young discipline of the philosophy of sound, both are criticized. Classing sound as a secondary property of things, as Locke did, does not explain the quality of sounds as temporal phenomena that can often not be traced back to a single sound source. Changes to the sound in the transfer medium, such as the Doppler effect or echoes, cannot be derived from the secondary qualities of the source. And although it explains many phenomena such as acoustic illusions and psychoacoustic effects, the definition of sound as a sensory perception fails to resolve the contradiction that we usually perceive sounds as coming from sound sources, so that sounds are not exclusively objects of our inner mental worlds, but also something that reaches us from outside. A way of resolving these

problems is offered by the concept of sounds as events, as events that unfold in time and manifest themselves in sound waves which in turn provide the stimulus for our sensory perception. Casey O'Callaghan explains this in his book *Sounds: A Philosophical Theory* (2007).

Epistemological reflection on sounds is further complicated by the trivial fact that the playback of music and sounds via loudspeakers is now a normal part of our lives. All previous theories of sound were based on simple everyday sounds: dogs barking, a car driving past, a few notes played on a piano. But when these sounds are recorded and played back, what consequences does this have for a theory of sound? This is in fact an obvious objection to Berkeley's philosophical riddle: What if we were to record the sound of a falling tree without being there? When we listen to the resulting recording, do we then actually hear the sound of the falling tree, allowing us to answer Berkeley's question with a resounding yes? Or is what we hear rather the vibration of the loudspeaker membrane, maybe even from high and low frequency speakers as separate sound sources? The answer must be that although we are mostly aware of the playback medium, we willingly surrender to the sensory illusion and perceive the reproduced sounds as if they were coming from their original source. Such banal things as enjoying the recording of a concert or listening to a voicemail message rely on precisely this accepted deception of the senses. The sound as an event remains intact as a sensory perception in spite of this media transmission, even if a degree of quality may be lost in recording and playback. In fact, the everyday sound of the industrialized world is now dominated more by mediated, manipulated sounds separated in time from their source than by "natural" sounds. We are now perfectly able to imagine a future in which we will be listen in on remote locations via live broadcasts to hear what's going on there. Already, the website of the Alfred Wegener Institute offers a live stream of the sounds of the underwater world of the Antarctic near the Neumayer Research Station. And bioacousticians install microphones in forests to monitor changes in habitat: they hear the tree falling without being there.

Berkeley's line of inquiry was actually intended to support his claim that God is the only authority capable of having a comprehensive knowledge of everything. Today, we may be far from possessing a comprehensive or "objective" knowledge of the world, but we do have a well-developed sense of a second-order reality communicated or transmitted by media. We know about things that we have never experienced first hand, but of which we store away a mental image in our brains because we have heard or read about them. A large portion of this communicated second-order reality consists of reproduced sound. In the modern world, sounds have entered a state of flux, becoming a material subject to modulation. Sounds deceive and seduce us, they warn of dangers and transport us to faraway places. We are free to adopt one of the many listening positions between subjectivity and objectivity, experiencing a sound as a purely psychological phenomenon, as a perceptible vibration in a medium, or as something created by manipulating a given sound source in an aesthetically pleasing manner.

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