Hearing Silence: The Perception and Introspection of Absences

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In the course of demarcating the senses, Aristotle defined sound in *De Anima* as the proper object of hearing: ‘sight has color, hearing sound, and taste flavor’ (II.6, 418b13). Sound cannot be seen, tasted, smelled, or felt. And nothing other than sound can be directly heard. (Objects are heard indirectly by virtue of the sounds they produce.) All subsequent commentators agree, often characterizing the principle as an analytic truth. For instance Geoffrey Warnock (1983: 36) says ‘sound’ is the tautological accusative of the verb ‘hear’.

I shall argue there is a single exception. We hear silence, which is the absence of sounds. Silence cannot be seen, tasted, smelled, or felt. Only heard.

1. How Hearing Silence Differs from Not Hearing

Hearing silence is successful perception of an absence of sound. It is not a failure to hear sound. A deaf man cannot hear silence.

A parallel comparison holds for seeing darkness (Sorensen 2008: ch. 13). A blind man cannot see the darkness of a cave. His sighted companion can. Darkness conforms to Aristotle’s principle that color is the proper object of sight. Aristotle (correctly) regarded black as a color. Indeed, he thought the chromatic colors were derived from the achromatic colors of black and white. Contemporary color scientists treat blackness as the appropriate color response to the absence of light (Hurvich 1981: 61).

Is hearing silence just a matter of inferring an absence of sound from one’s failure to hear? No, a wounded soldier who wonders whether he has gone

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deaf can hear silence while being neutral about whether he is hearing silence. He hopes he is hearing silence but neither believes nor disbelieves that he is hearing silence.

Some eccentrics make the wrong inference from silence. They think that when they appear to hear silence, they are actually hearing the music of the spheres. They believe this sound is always present. The eccentrics’ belief that there is no silence does not prevent them from hearing silence. In the terminology refined by Fred Dretske (1969: 88), people can ‘non-epistemically’ hear silence. Hearing in the epistemic sense requires belief. Hearing in the non-epistemic sense is compatible with belief but is also compatible with the absence of belief about what is being perceived. That is why we can be surprised by what we hear and even the very fact that we are hearing it. On August 27, 1883, people on the island of Rodriques heard the explosion of Krakatoa 4,800 kilometers away. They only later believed that the sound was that of Krakatoa exploding. The grammatical mark of the epistemic sense is the propositional attitude construction ‘hears that p’. The radar operator hears that a sonic boom is approaching by hearing a beep from equipment monitoring an incoming jet. He hears the beep, not the boom.

Hearing silence does not depend on reflective awareness of the silence. Sometimes we become aware of a lengthy silence only after it has been broken. A marginal kind of sensitivity suffices for hearing silence. Turning off a radio awakens listeners who have fallen into a dreamless sleep.

One may dream a silence that is unreal. Even a match between a real moment of silence and dreamed silence is not sufficient for hearing that silence. There can be veridical hallucinations of silence. Consider a man who experiences auditory hallucinations as he drifts off to sleep. He ‘hears’ his mother call out his name, then wait for a response, then call again. The cycle of calls and silence repeats eerily. As it turns out, his mother has unexpectedly paid a late night visit and is indeed calling out in a manner that coincidentally matches the spooky hallucination. The hallucinator is not hearing the calls and silence of his mother.

2. Hearing Silence Differs from Detecting Silence by Ear

Like other animals, human beings evolved to detect sounds and to detect the absence of sound. However, detection of silence is not enough for hearing silence.
You can detect the electric charge of a nine-volt battery with your tongue. But an electric eel can sense the electric charge (Keeley 1999). The eel has an organ dedicated to this form of energy.

Human beings have ears that are dedicated to sounds. The nose is devoted to odors, the tongue to flavors. Ordinary people spontaneously demarcate the senses by their corresponding sense organs.

Is using your ears to detect a sound sufficient for hearing it? No, when my neighbor blows a dog whistle, I infer by ear (from the puffing noise) that there is an ultrasonic sound. But I do not hear the ultrasonic sound.

Are your ears necessary for hearing sound? Hearing aids show that people hear with defective ears—thanks to mechanical assistance. As the substitute components improve, the entire ear may become dispensable. Technological progress suggests that, in principle, ears are not needed to hear.

This extrapolation carries over to hearing silence. The hearer of silence can rely on a hearing aid or a stethoscope. When an unconscious pilot leaves his microphone on, flight controllers can hear silence in the cockpit.

The perception of silence must be direct in other respects. For instance, one cannot hear silence by listening to a remote sound meter that sounds an alarm when there is silence at a monitored location. You can hear that it is silent by means of a sound. But you cannot hear silence by means of a sound. There is a difference between hearing silence and hearing the effects of silence.

3. Silence Does Not Sound Like Anything

Are you seeing this sentence or are you hearing it? You can easily answer without checking whether you are using your eyes rather than your ears. You can tell by introspection. This suggests a second strategy for demarcating the senses: appeal to the characteristic experiences of the senses (Smith 1990: 239).

The appeal to characteristic experiences explains why future people may see and hear with prostheses. It also handles the perception of darkness. There is a color experience dedicated to darkness. Black is commensurable with other colors. For instance, black (visually) resembles purple more than pink.

Sense datum theorists were naturally attracted to this mode of demarcating the senses. In the original edition of Perception owned by Dartmouth College, H. H. Price (1933: 39) proceeds to its logical conclusion: 'We are never destitute of tactual data; and very rarely (if at all) of auditory ones, for what we call “silence” can be heard'. 'What?' has been scribbled in the margin. The reader's puzzlement was not quieted by Price's footnote: 'When I say, "There
was silence’’ I mean something like ‘‘My auditory data were of faint intensity and none of them differed greatly from any other’’’. The reader balked because silence does not auditorily resemble any sound. Silence has no loudness, timbre, or pitch.

Westerners are amused by shiiin, the Japanese onomatopoeia for silence. But English has shush, hush, and shhhhhhh. Perhaps we are imitating white noise in lieu of a sound of silence.

Silence does acoustically resemble white noise; there is an absence of discriminable tones. When you turn on a hotel fan to mask the conversation in the next room, you mix sounds. Just as white light combines all of the frequencies of visible light, white noise combines all the frequencies of sound. Hearing white noise is hearing all sounds; hearing silence is hearing no sound.

White noise varies in loudness. Silence is invariant. White noise sounds different from silence. When you eventually halt the hotel fan, you are relieved by the silence. You can hear the difference between white noise and silence.

The experience of silence has a qualitative aspect. A hypothetical scenario featuring an acoustic scientist Audrey can bring this out. She lives in a noisy environment and so has never experienced silence. Audrey knows the physical aspects of silence. But she wants to experience silence and so constructs a sound-proof chamber. When she enters the chamber, Audrey learns something; what it is like to hear silence. She closes her eyes to listen more intently. She enjoys the silence as others might enjoy the burble of a brook or the jug-o-rum of bullfrogs.

Audrey is introspecting an absence of auditory sensations while perceiving an absence of sound. A patient with an ear problem can introspect gaps in his auditory sensation of a rising tone. Audrey wanted more than the gap in her sensations. She wanted an auditory gap that originates through healthy hearing of an external state of soundlessness.

Austen Clark prefaces A Theory of Sentience (2000) with a thought experiment. Suppose your senses are discreetly incapacitated, step by step, so as not to disturb your meditation on an abstract issue (which you are conducting with closed eyes to avoid the distraction of the senses). At the end of the subtractions, you are conscious but sense nothing. Clark draws the lesson that consciousness without sentience is conceivable. But his thought experiment can be diverted to make a different point. When you become aware that you are blind, deaf, and generally senseless, you are introspecting an absence of sensations. For you no longer perceive anything. Introspection is your only remaining means of detecting the absence.

Perhaps we approximate Clark’s scenario during sleep. If there is a stage of sleep in which there are no sensations, we might introspect this absence. The
introspection of absences is continuous in Clark’s scenario. But in a ‘dead sleep’, introspection also stops. The gap in consciousness could still be sensed after the fact. This awareness may be what we are appealing to when we compare death to sleep. If experience requires sensations, then one cannot know what death is like (at least from a first-person perspective). However, if there is a qualitative aspect of experiencing absences, then we do have an inkling of what it is like to be dead. Our experience with intermittent losses of consciousness gives us a basis to extrapolate to the permanent loss of consciousness.

It does seem overly modest to say that a man knows nothing more of death than a toddler or a turtle or a termite. The man has a better understanding of what it is like to be dead because he has more experience of mental gaps and better means to learn from those experiences.

Parmenides characterized death as the brother of sleep. A man’s thought is a ratio of light and night in his body. With sleep as in death (and aging), that ratio changes in the direction of night.

For according as the hot or the cold predominates, the understanding varies, that being better and purer which derives from the hot… But that he [Parmenides] also attributes sensation to the opposite element in its own right is clear from his saying that a dead man will not perceive light and heat and sound because of the loss of fire, but that he will perceive cold and silence and the other opposites. And in general, all being has some share of thought. (Robinson 1968: 124)

I have three disagreements with Parmenides’ development of the analogy between sleep and death. First, the dead do not continue to have experience (even at a low order). Second, the perception of the dark, the cold, and silence is perception of what is not rather than what is. (Absences are not at the low end of a hierarchy of being.) Third, Parmenides fails to privilege silence. Hearing silence is the most negative of perceptions: there is nothing positive being sensed and no positive sensation representing that absence.

Clark’s scenario has a haunting resemblance to death. The introspected absence of sensation is global. Audrey’s scenario is the more typical introspection of a local absence of sensation.

Audrey might want to share her chamber’s silence with her husband. Audrey’s husband could get the same type of experience from another soundproof chamber. But his attachment to Audrey makes him want to hear the silence she arranged and to jointly experience the same particular silence she is hearing.

Audrey’s silence differs from the silence of others because it is caused differently. The darkness of caves varies the same way.
When you see the darkness of a cave, you can introspect the visual sensation of darkness. When you feel the cold (which is the absence of heat) there is a different sensation to introspect. The qualitative aspect of the cold sensation explains our surprise at the burning sensation of dry ice.

Introspection may help us correct confusions between absences. Many people believe that it is darkest before the dawn. But they are actually experiencing the extremity of another privation. The landscape cools off all night making it coldest just before dawn. (It is darkest at midnight when the sun is farthest from sunrise and sunset.)

Synesthetes have experiences that trespass between sense modalities. They ‘see’ sounds and ‘hear’ colors. Possibly there is synesthesia for the perception of absences. A synesthete who can ‘see’ coldness might have a special impetus for asserting, ‘It is darkest before the dawn’.

When you hear the silence of Audrey’s chamber, there is no sensation of silence to introspect. You instead introspect the absence of auditory sensations. Just as you can perceive the blanks between the words of this sentence, you can introspect gaps between sensations. Just as blanks can sometimes be organized into a gestalt pattern, gaps can form patterns that can be introspected holistically.

Pauses are used to chunk speech into perceptual units. But pauses themselves can be unified within sounds. Musicians exploit these higher order forms of silence perception.

In addition to having neurons that fire in recognition of tones, we have neurons that fire in recognition of pauses and gaps in tone sequences (Hughes et al. 2001). Perhaps this is the neurological basis for the introspection of missing sensations.

One can say pauses sound like something in the guarded way one can say that blanks look like something. You can show someone a blank by pointing at one on a page. You can exhibit a pause by having the learner listen to a specimen. The difference between seeing a blank and hearing a pause is psychological. We are primed to see letters and so see the absence of letters. We are primed to hear sounds and so hear the absence of sounds. Absences are relative. They draw their identity from their relata.

The differences between absences are nonetheless objective. Members of the British National Antarctic Expedition were killed in 1912 by the cold. They were not killed by silence or the dark.

Empiricists trace all of our knowledge of the world through the senses. Sensationalists further say that sensations are the basic elements of experience. But there is no auditory sensation of silence.

Sensationalists overestimated the role of introspection. We hear mostly without introspection. That includes hearing silence. There may be creatures
that hear silence despite their total inability to introspect. Audrey can savor silence because she can attend to the workings of her own mind.

4. Silence Can Last Indefinitely

Pauses depend on sounds just as the hole of a doughnut depends on the doughnut. If the sound does not return, then the pause does not last indefinitely.

Sounds are generally short-lived and this makes pauses even briefer. There are exceptions. J. O. Urmson claims, ‘the sound of Niagara Falls outdates our most cherished antiquities’ (1968: 119).

One complication is that the roar of Niagara Falls has not been continuous. On March 30, 1848, the flow was stopped for more than 24 hours by an ice jam upstream. Those who believe that sounds cannot survive interruption will date the present roar to no earlier than 1848. Surely there have been longer pauses in the 12,000-year history of Niagara Falls. Silence can have an impressive duration.

Indeed, there is no upper bound on how long silence can last. Imagine Seshat, the Egyptian goddess of mathematics, is counting one number per second. She utters the prime numbers out loud but silently counts the composite numbers. Thus there are moments of silence in Seshat’s oral recitation:

\[ 2, 3, \ldots, 5, \ldots, 7, \ldots, \ldots, 11, \ldots, 13, \ldots, \ldots, 17, \ldots \]

There are infinitely many prime numbers but they become sparser and sparser down the number line. Thus the stretches of silence become longer and longer without limit.

Can silence be infinitely long? First, let us consider whether a sound can be infinitely long. Aristotle believes that infinity is always potential, never actual. So he would reject an example of Apollo continuously playing his lyre. At any point in the future, the immortal Apollo is finitely old and so his music is always finitely long.

However, Aristotle appears to have believed that species have an infinite past. So consider the murmur of a hive of bees. The murmur is the collective effect of many bees. None of these sources is essential; a bee can leave while the murmur continues. Indeed, the murmur can continue through the gradual replacement of all the bees. Since we are imagining the species has an infinite past, the murmur could be infinitely old while each bee is only finitely old.

The murmur of the innumerable bees illuminates the metaphysics of sound. If sounds are dependent on a particular source (O’Callaghan 2007: ch. 5), then no sound is older than its source. Yet the murmur is older than any bee.
Given the Big Bang theory of the origin of the universe, no sound is infinitely old. It could still be the case that there are sounds older than any source. And there could be silences older than any sound. A pause can take place between distinct sounds.

5. Silence is a Proper Object of Hearing
The third strategy of demarcating the senses is by what they sense. Common sensibles (number, shape, magnitude, motion, and so on) are available to more than one sense. Proper objects (flavor, odor, sound, color, tactile qualities) can only be directly accessed by a single sense.

Contemporary defenders of this demarcation strategy face two problems. First, proper objects seem like an obsolete, arbitrary grouping. They fail to mesh with the natural kinds that have come to light through modern physics and chemistry.

A second classic problem is specifying the proper objects for sight and touch. Theorists have trouble coping with the sheer variety of what we see and feel (Sanford 1976).

In contrast, the specification of the proper object for hearing seems straightforward. That is why proponents of the proper object strategy, such as George Berkeley, model sight on sound. They are drawn more strongly to sound than to odor and flavor because sound better approximates the spatiality and informativeness of what we see.

However, silence shows that the proper object of hearing is, in one respect, trickier to specify than the object of vision. There is a color corresponding to the privation of light. But there is no sound corresponding to the privation of sound. Silence presents a new anomaly for those who wish to demarcate the senses by their proper objects.

6. Odorlessness is Not a Proper Object of Smell
We detect that a rhododendron flower is odorless by smelling it. But do we smell its odorlessness? We detect that tofu is flavorless by tasting it. But do we taste its flavorlessness?

These perceptions of absences are less clearly sensings than seeing darkness or hearing silence. The reason is that odorlessness and flavorlessness are of only marginal significance to human beings.
Obviously, odors and flavors are important to us. Loss of the sense of smell or taste merits medical attention. But our encounters with odorlessness and flavorlessness are dispassionate. We do not savor the flavorlessness of tofu. We do not stop to smell the odorlessness of the rhododendrons.

There are characteristic emotions (such as disgust) and behaviors (nose wrinkling) associated with odors. Odors also interact with other sense modalities. Much of what is ascribed to taste is actually odor.

The emotional significance of odors is a legacy of our hunter-gatherer past. Odors provide clues to food, sex, and health. Odorlessness did not betoken opportunity or danger. That makes odorlessness emotionally flat.

Contemporary people make use of unprecedented substances that are dangerous because they are odorless. Natural gas must be adulterated with mercaptan (which stinks like sulfur) to make leaks noticeable to homeowners. If odorlessness, in the Paleolithic Era, had been an exploitable sign of danger or opportunity, we would have evolved behavioral responses to odorlessness and emotions that organize those behaviors. As it stands, odorlessness scores low on criteria we use to distinguish between sensing and detecting.

Silence scores much higher. There are characteristic behaviors to generate and detect silence. There are also characteristic emotional reactions to silence. Moreover, the perception of silence is integrated with the rest of the perceptual and cognitive systems.

7. Silence Interacts

Primitive predators quiet down to listen. Their prey freezes to avoid making a sound.

Sophisticated animals find silence instructive at a meta-level. Hush is a sign that conspecifics have acquired information. Just as animals stop and orient to an unexpected sound, they stop and orient to an unexpected silence. When a group is wary of predators or other enemies, silence may serve as an alarm.

What begins as a natural sign can develop into a conventional sign. Pauses punctuate conversation, playing a variety of grammatical roles. ‘Signs of omission’ are easier to see in written language (Sorensen 1999). We can afford to demarcate written words with blanks. Inscriptions last for a while. Spoken words linger only in working memory. To get the message across quickly, the speaker runs his words together. He merges some of the phonetic components of a word into a single sound. Hearers are equipped with a module that unpacks these co-articulated phonemes.
Small silences have a phonetic effect (Dorman et al. 1979). For instance, insertion of a gap makes the difference between hearing a sound as 'split' as opposed to 'spit'. I conjecture silence also has intermodal effects. Studies that show how sound affects vision generally feature a baseline condition of silence. I interpret some of these studies, such as the motion bounce illusion (Sekuler et al. 1997), as evidence that silence affects vision. In the silent condition, two moving dots pass through each other in an ‘X’ pattern. When a ‘ping’ sound is inserted at the point of intersection, subjects instead see the dots as bouncing off of each other. The usual interpretation is that the intermodal effect is restricted to the sound condition. My speculation is that the silence condition also features an intermodal effect. The silence encourages us to interpret the dots as shadows.

Our emotional reactions to silence are shaped by what silence signified to our hunter-gatherer ancestors. Silence is a sign of abandonment or ostracism. This may be at the root of our fear of silence. In his Pensées, Blaise Pascal writes, ‘The eternal silence of these infinite spaces frightens me’ (2003: 61). Why be afraid of nothing? Because silence is associated with disapproval and estrangement.

Since silence conveys nothing on its own, it is usually sensitive to context. Depending on the circumstances, silence can convey assent, dissent, or uncertainty. Its message is heavily context-dependent. Silence can be an expression of respect. One of the rituals of Armistice Day is a two-minute silence held at 11 a.m., ‘the eleventh hour of the eleventh day of the eleventh month’ (the time at which the 1918 armistice went into effect, bringing World War I to a close).

The gesture of silence can be amplified by darkness. In Poland, the death of Pope John Paul II was commemorated on the evening of April 8, 2005. The lights were switched off in homes throughout the nation to reinforce five minutes of silence.

Signs for silence are conventional. Egyptian statues represent the child Horus as a naked boy with his finger on his mouth. This incarnates the hieroglyph for ‘child’. However, the Greeks and Romans misinterpreted the finger placement as a gesture for silence. Thus was born Harpocrates, the god of Silence and Secrecy.

The meaning of silence is also colored by its physiological effects. Silence is welcome when it betokens the resolution of a crisis: blood pressure ebbs, heart rate declines, muscles relax. Silence is conducive to concentration. Seneca trained himself to philosophize amidst the hubbub of ancient Rome. But most thinkers require a refuge from noise.
8. Silence has a Location

Peter Strawson (1959: 65–6) denies that sounds have an intrinsic location. We can correlate sounds with various locations. For instance, I was taught to calculate my distance from the source of thunder by counting the seconds between the lightning strike and the thunder. I was told that one second equals one mile. (Much later I got the bad news that this rule involves a five-fold underestimate of the proximity of the electrical discharge.) Strawson concedes there are contingent connections between sound and locations. He denies there is an auditory field comparable to the visual field. A purely visual concept of space is possible (even if impoverished). A purely auditory concept of space is impossible.

Matthew Nudds suggests that Strawson’s point is that we can see a portion of space as empty. When you look at a ring, you are aware of the hole. Your awareness does not depend on seeing anything in the hole. It is this visual awareness of places where there is nothing which has no auditory equivalent. We are simply not auditorily aware of empty places—there’s no difference between not experiencing a sound at some place, and experiencing no sound there. One may hear nothing at some place, but in doing so one never comes to be aware of a place at which there is no sound—one is simply unaware. (Nudds 2001: 213)

But a teacher can hear the silence of her classroom while also hearing a lawnmower outside. She thinks, ‘It is silent in here but noisy out there’. A conductor can hear silence from the left half of the choir while hearing the right half singing.

To develop the import of these counter-examples, I rely on the principle that the location of silence is parasitic on the location of sound. Just as a shadow borrows the shape and volume of a material object that might have filled its space, silence borrows the direction and location of a possible filler sound. This draws me into controversy about the location of sounds.

Most sounds have a location and a direction. Hearing a sound in your right ear and silence in your left ear can help you pinpoint the location of faint noise. This is just a limiting case of exploiting the sound shadow formed by your head. Your head blocks incoming sound waves like an island blocks ocean waves. If the waves are strong enough to make it around the head, there will be an informative time delay and an informative change in amplitude.

The location of a sound does not have the same qualitative status as loudness, pitch, and timbre. We postulate the property of timbre because sounds that have the same pitch and loudness can sound different. For instance, a cello is
mellower than a flute even when the two have the same pitch and loudness. Two sounds from different locations can sound alike (Clark 2000: 60). If identical watches are placed on either side of your ears, the tick-tock of one watch will be heard as coming from the left and the tick-tock of the other watch will be heard as coming from the right. But it will be the same type of sound. The same goes for a gap in the tick-tock. You will simultaneously hear a brief silence on the left and a brief silence on the right.

Just as there is nothing intrinsic to a tone to indicate its location, there is nothing intrinsic to a silence. Yet we can locate silence. After a building collapse, rescuers sometimes only hear silence from the rubble (Clark 2000: 61).

Chapters on sound location are standard fare in textbooks on hearing. Robert Pasnau (1999) says these chapters conflict with the chapters identifying sound with waves in a medium. If sounds are in the medium (typically for human beings, the air), then they are all around us. Sounds would lack the specific, differential locations we commonly attribute to them. The sound waves are actually moving away from the source. So Pasnau thinks that those who identify the sound with sound waves must say hearers are overly narrow when locating sounds. The sound waves caused by a loon are not just at the loon; the sound waves are all around you.

To avoid postulating an illusion, Pasnau denies that sounds are sound waves. He argues that sounds are vibrations of the source (or, more cautiously, that sounds supervene on these vibrations). Objects have sounds in the way they have colors. The sound of a tuning fork is more intense as you approach it. But this is no more a change in the sound than a change of its look as you approach it. The tuning fork’s image size increases but it does not really look bigger. A tuning fork sounds better in a concert hall than in a meadow in the same way it looks better in daylight than twilight. In the dark, we cannot see the color of the tuning fork but its color still exists. In a vacuum, we cannot hear the sound of the vibrating tuning fork but it still has a sound. The conditions are just bad for hearing the sound.

Casey O’Callaghan (Chapter 2; 2007) agrees that Pasnau has shown incoherence in the acoustic textbooks and in common sense. However, he tries to preserve insights from the wave theory of sound by characterizing sounds relationally as events in which a source disturbs a medium. Since there is no medium to disturb in a vacuum, O’Callaghan denies that a vibrating tuning fork makes a sound in a vacuum.

Whereas Pasnau thinks each sound is a property of the source (like the redness of a rose), O’Callaghan agrees with the wave theorist that sound is a particular. O’Callaghan believes that sounds depend on their sources; each sound must have a source, is always located at its source, and can never switch
sources. The wave theorist acknowledges that sounds have sources, but grants autonomy to sounds. The wave theorist is impressed by the linearity of sounds. Instead of rebounding, our voices pass right through each other.

Pasnau and O’Callaghan grant that the wave theory of sound is endorsed by both science and common sense. However, they are so impressed by the problem of locating sound that they are willing to take on both of these authorities.

Since the critics of the wave theory concede its positive merits, my defense of the wave theory is restricted to defusing the appearance of locational inconsistency. I will rely on the traditional method of semantic ascent. Instead of immediately discussing the location of sound, I discuss how we answer ‘Where is it?’ questions.

Many things are located by their edges. But we also locate by centers. American football players tackle a deceptive runner by concentrating on his center of gravity (or a salient spot that tends to project from that location such as the runner’s navel). When edges are indiscernible, we have no choice but to use interior features (the eye of a hurricane, the foci of an elliptical orbit, the solar system’s center of mass). Authors of acoustics textbooks describe sound as a train of waves emanating from a source in all directions. In a uniform medium, the shape of the sound will therefore be a sphere. Discussants of a sound are talking about a big, rapidly expanding phenomenon that envelops them. Since the edges of the sound are unknown, orientation by the boundary is forbidden by H. P. Grice’s (1975) maxim of quality (‘say only what is true’). Grice’s conversational maxim, ‘Be informative’, rules out the true but trivial remark that the sound is in the air. So if anything is to be said about the location of sound, it must be in terms of its source. The speed and invisibility of the sound prevent us from experiencing the sound like an approaching water wave. Any attribution of movement to the sound will be based on movements of the source.

The linguistic aspects of locatedness are more pronounced in an example that is free of the phenomenology of locatedness. Seismology textbooks have a chapter that defines an earthquake as a series of shock waves caused by failure of brittle rocks in the Earth’s crust. The same textbook will have a chapter explaining how to locate an earthquake by triangulating to the hypocenter of the failure. The hypocenter (also called the focus) is below ground and so not readily recognized by us surface dwellers. So seismologists refer to the point on Earth’s surface directly above the hypocenter: the epicenter.

Are the seismologist’s assertions jointly consistent? The earthquake cannot be located at just the epicenter and just at the hypocenter. If the earthquake is the train of seismic waves emanating from the hypocenter, then the quake is in its medium and so encompasses a wide area. These waves are moving away from
the hypocenter. One wave front briefly heads toward the epicenter but then spreads out from there.

One might try to avoid seismic incompatibilism by claiming that 'earthquake' is ambiguous. Disputes over 'Where is New York located?' are dissolved by noting that 'New York' is ambiguous between Manhattan, the City of New York (which includes Manhattan as a borough), and New York State. However, disputes over 'Where was earthquake?' cannot be dissolved in the same way. For all seismologists agree that there is no sense in which an earthquake is its epicenter. The epicenter is a physically insignificant point. Despite the belief that earthquake is not its epicenter, seismologists truthfully answer 'Where was earthquake?' by locating its epicenter. (An earthquake without an epicenter is geometrically possible. Suppose the hypocenter is at the center of Earth, or, more plausibly, near one of the bulges of Earth—at the poles or along the equator. In these cases, there is no unique point closest to the surface.)

Seismic incompatibilism is less attractive than acoustic incompatibilism. First, we have no seismic phenomenology of locatedness that orients our perception to a central source. Second, the effects of pragmatics are salient for earthquake location. The term 'epicenter' was obviously introduced in the same instrumental spirit as 'arctic circle'. Answers to 'Where was earthquake?' will vary with our purposes. The feeling of inconsistency is being generated by our failure to relativize to these interests.

We need a uniform treatment of the acoustic and seismic cases because their phenomena overlap. If the primary wave of an earthquake refracts out of the rock surface with a frequency of more than 20 hertz, human beings will hear that earthquake as a low rumble. Seismologists search for a mechanism to explain how acoustic sand dunes manage to boom (Nori et al. 1997). Blind mole rats communicate by thumping their heads on tunnel walls (Nevo et al. 1991). The seismic waves are conducted through their bones and processed by their auditory system. (Deafened mole rats stop thumping.)

If we had a phenomenology of earthquake location, it would resemble our phenomenology of sound location. We would feel earthquake as being at a central point. For the phenomenology of locatedness is governed by perceptual counterparts of Grice’s maxims of quality and informativeness. It is true but trivial to say the quake is inside Earth. The edges of the quake were never accessible during the evolution of our perceptual systems. So we would have no choice but to orient toward the center.

Since silence is an absence of a sound, it has a location where the sound would have been. Pragmatic factors will dictate whether we locate in accordance with the absent sound waves or the inactive source.
Since I identify sound with acoustic waves, I think silence is the absence of acoustic waves. Waves are positive phenomena that depend on a medium. Silence is equally dependent but negative.

When silence is a missing sound, it will be at the place normal for sound. Consequently, the location of silence is as predictable as the location of sound. Even so there are surprises. On May 18, 1980, there was silence around the 60-mile blast zone of Mount Saint Helens. Since sound waves travel faster in warmer air, they bend toward cooler air. The volcano’s sound was bent up to the higher altitudes. About 15 miles up it was refracted down again. Thus the sound had the shape of an expanding doughnut. The silence was the hole of the doughnut.

The dramatic, deceptive effects of refraction, wind, and temperature move some scientists to speak of sound mirages. In the early twentieth century, physicists interested in foghorn design became alarmed by how sound can skip over areas near the coast and land at amazing distances from the foghorn. More ominous than these ‘false alarms’ was the inaudibility of the foghorn at the zone targeted for warning. Physicists carefully plotted the boundaries of this dangerous area of silence (Mallock 1914: 73–4).

Are there silence mirages? Given that all mirages work by refraction, silence mirages are impossible because silence cannot refract. Given that all echoes work by reflection, silence cannot echo. However, silence does abide by almost all the laws of refraction and reflection. In earlier work on light, I have called this parasitic behavior ‘para-refraction’ and ‘para-reflection’ (Sorensen 2008: chs. 6, 7). Although there cannot be silence mirages or silence echoes, silence may have para-mirages and para-echoes.

Transmission devices enhance our ability to hear silence at a distance. One of Jack Benny’s radio skits was designed to underscore his miserliness. A mugger confronts Benny: ‘Your money or your life!’ After a prolonged pause, members of the audience begin to laugh. They realize that Benny must be thinking it over. To get the joke, the audience must not interpret the absence of noise as a failure of transmission. They must interpret the absence as being conveyed from the radio station.

One cannot hear the difference between silence from a source and silence from an absent source. This indeterminacy is explored in Harold Pinter’s 1959 radio play, A Slight Ache. The play appears to have three characters: Edward, Flora, and a match-seller invited into their home. Edward and Flora confide much to the match-seller. But he never speaks. Eventually the audience begins to wonder whether Edward and Flora have just invented the match-seller. The play is propelled by the unresolved question of whether the silence is coming
from anyone. That is why the play is difficult to televise and very difficult to stage.

The composer Leopold Stokowski is reported to have once reprimanded a noisy audience: ‘A painter paints his pictures on canvas. But musicians paint their pictures on silence. We provide the music, and you provide the silence’. The silence of the audience does not mean that the auditorium is silent. The whole point of refraining from making sounds is so that the musicians can fill the hall with music.

9. Silence is Not a Limiting Case of Sound

One might protect the generalization that we directly hear only sounds by characterizing silence as a zero-value sound. There are determinables such as temperature that have zero-value determinates. Temperature is defined as a measure of the average amount of molecular motion. The absence of all motion is not an absence of temperature. It is a temperature of zero degrees on the Kelvin scale. Yuri Balashov (1999) argues that some key physical properties conform better to a zero-value hypothesis than to an absence hypothesis: spin, electric charge, and perhaps mass (to cover photons).

If silence is a zero-value sound, then what does it have zero of? We cannot answer that it has zero decibels because zero decibels is the softest sound audible to average, young human beings. This is about the softest sound that any creature perceives. The vibrational amplitude of the air at zero decibels is only about the diameter of a hydrogen atom. It is counterproductive to make the ear more sensitive than this. Creatures hear by virtue of systematic variations in air pressure. Variations below zero decibels become random because of the thermal agitation of molecules (Brownian motion). If the sensitivity were set too low, the hearer would be distracted by a meaningless, ambient hiss.

Some speculate that young children can hear the hiss. If so, they might lose this useless capacity in the way they lose the capacity to discern phonemes that are not used in their language.

But let us suppose that we can make sense of zero loudness in some other way. Does silence have a zero-value pitch? Is silence very low or very high? Can two silences of equal loudness and pitch differ in timbre? Unlike loudness and pitch, timbre cannot be scaled from high to low.

Two sounds can cancel out because of destructive interference. But the interpenetrating sound waves still exist. They are superimposed at the ‘dead spot’ and will become audible as they move beyond this area. If the destructive
interference is perfect, then the hearer will report hearing nothing. Or he might take himself to be hearing silence. But he is actually hearing two sounds that sum to zero. The listener can be shown that he is not hearing silence by deactivating one of the sources of the sound waves. He will then hear one sound that has always been there.

A loud sound differs from silence by its magnitude. Lowering the sound decreases this difference. However, a quiet sound still differs from silence in the way a slightly dirty sheet differs from a clean sheet. To be clean is to have no dirt, so it is not a kind of dirtiness.

10. Challenges to the Possibility of Silence are Misguided

What counts as ‘no dirt’ depends on the domain of discourse. The knife emerging from your dishwasher is clean but not by surgical standards. What counts as silence in a classroom does not count as silence in a recording studio.

Restricted quantification is common. Silent movies have no sounds from the recorded events but do have accompanying music. ‘Silence’ is an absolute term like ‘flat’ and ‘certain’. There is a tendency to privilege the strictest standard—to let the quantifiers be ‘wide open’. One is then apt to conclude that there is very little silence.

The impossibility of silence is a popular thesis in literary philosophy. Maurice Blanchot (1986: 11) writes, ‘Silence is impossible. That is why we desire it.’ Georges Bataille (1988: 16) characterizes ‘silence’ as a ‘dipping’ word because it is ‘the abolition of the sound which the word is; among all words it is the most perverse, or the most poetic: it is the token of its own death’.

The impossibility of silence is most methodically championed by philosophical commentators on music, especially since John Cage’s 4′33″ (Davies 2003: ch. 1). The first performance was at the Maverick Concert Hall in 1952. The pianist opened and closed the piano at the end of each movement but did nothing else. The performance lasted four minutes and thirty-three seconds. Most of the audience interpreted the performance as a period of silence—or perhaps three periods to correspond to the three movements in Cage’s program notes. Of course, there was the usual coughing and shuffling plus noises that wafted in from outside. But the audience did not count these sounds as part of the performance, just as these sounds do not count as part
of the performance in the case of conventional music. According to Cage, the original audience

...missed the point. There’s no such thing as silence. What they thought was silence, because they didn’t know how to listen, was full of accidental sounds. You could hear the wind stirring outside during the first movement. During the second, raindrops began pattering the roof, and during the third the people themselves made all kinds of interesting sounds as they talked or walked out. (Kostelanetz 1988: 65)

Cage claims that 4′33″ was inspired by a trip to the soundproof anechoic chamber at Harvard University. Although he expected silence, he heard a high noise and low noise. The engineer explained that the high noise was the sound of his nervous system in operation and the low noise was the blood in circulation.

More precisely, the high noise is tinnitus—‘ringing in your ears’. Prolonged exposure to loud noise (greater than 90 decibels) accelerates the degradation of hearing associated with aging. Students are rightly alarmed by how much hearing damage is revealed by their visit to an anechoic chamber.

Just as the skeptic lowers the standards of doubt to show that certainty is impossible, Cage lowers the standards of sound to show that silence is impossible. He does this quantitatively by letting very faint sounds count as sounds. He does this qualitatively by letting a wide variety of phenomena count as sound (even the auditory sensations that are not due to sound waves).

‘Silence’ echoes the semantic unclarities of ‘sound’. Is ‘sound’ the vibration of an object? Or does it consist of the waves produced by the object? Or is it the auditory sensation produced by those waves?

The skeptic is notoriously difficult to refute. Cage is more vulnerable. The sounds he mentions are observer-dependent. An anechoic chamber is silent when unoccupied.

But can silence be heard? Yes, because we can overcome observer effects. A microphone can be installed in the chamber and we can listen from outside. The sounds we make in the listening booth are not in the empty anechoic chamber.

Can silence be directly heard? Yes, engineers could drill an ear-sized hole into the anechoic chamber so that only Cage’s pinna fits. Cage’s head and torso would still be outside the chamber.

In any case, tinnitus and the sound of circulating blood are logically contingent aspects of human observers. There could be less intrusive observers.

Mark Nyman summarizes Cage’s project:

It is a well-known fact that the silences of 4′33″ were not, after all, silences, since silence is a state which it is physically impossible to achieve... 4′33″ is a demonstration of the non-existence of silence, of the permanent presence of sounds around us, of the
fact that they are worthy of attention, and that for Cage environmental sounds and noises are more useful aesthetically than the sounds produced by the world’s musical cultures. \(4'33''\) is not a negation of music but an affirmation of its omnipresence. (Nyman 1974: 22)

\(4'33''\) fails to prove any of these theses. True, if we set standards high, silence is hard to achieve—as is flatness, straightness, and cleanliness. But there is no reason to privilege high standards. A high standard is appropriate for special purposes (surveying, pharmaceutical production, and so on). But normally a high standard conflicts with our master goal of being informative. Engineers raise standards only when new technology makes it feasible to meet them.

When John Cage sets a high standard for silence, we are naturally inclined to set a high standard for other absolute terms. Cage says that sound is omnipresent. Given unrestricted quantification, ‘omnipresent’ means everywhere in the universe. The vast majority of the universe is empty. And empty space is silent. As Cage grew older, he expressed optimism about the future of music. He took solace in the conviction that there will always be sound. But given high standards, ‘always’ means every time. The laws of thermodynamics doom the universe to heat death. Everything, everywhere, will end in silence.

References


