

## Descartes's Resonant Subject

*T*he reception of René Descartes's (1596–1650) work has always been notoriously selective. From the infamous Utrecht debate in 1648 to the intellectual turf battles of our time, few thinkers in the history of Western thought have polarized opinion more than this seventeenth-century philosopher—and few now seem stranger and yet more familiar at the same time. Descartes's proclivity for abrupt, opinionated, and sometimes contradictory statements may have a large role in the almost mythical image posterity has constructed of him as the inventor of not only the infamous mind-body binary but a whole string of stark dichotomies: the opposition between rational thought and aesthetic judgment, the difference between man and woman, and the contrast between vision and hearing. Of these, the latter two oppositions are of particular interest because there exists a surprising parallel between the unstable place of Cartesian thought within the larger feminist project, on the one hand, and the troubled relationship of the emerging field of sound studies to Descartes's views of the sense of hearing, on the other. The fundamental issue at stake in both fields is whether the Cartesian disembodied mind

must be forever renounced as detrimental to these fields' larger agendas or whether, by contrast, certain aspects of the philosopher's work may be salvaged in an effort to develop alternative concepts of consciousness and (gendered or auditory) personhood, demonstrating that some of Descartes's most entrenched views warrant fresh scrutiny. Feminist scholars—traditionally wary of Cartesianism's "masculinization of thought" (Bordo 105)—have been reluctant to reexamine the significance the fetus has for modern concepts of identity in Descartes's work. Despite a partial revision of feminist theory's anti-Cartesian stance, liberal feminists worry that in accepting the philosopher's insistence on the subjecthood of the fetus, they might compromise the philosophical rationale underlying *Roe v. Wade* of birth as the dividing line of individuation, which would put them in rather uncomfortable political company.

For their part, students of sound distrust modern epistemology's Cartesian roots, citing the stereotypical view that Descartes, in yet another act of male hegemony, "fathered" the "modernist visualist paradigm" (Jay 70). Never at a loss in asserting the prenatal and, frequently, the ontological primacy of hearing, these scholars find little in the philosopher's work that might support concepts of subjectivity that transcend modernity's cult of the eye. Indeed, not only did Descartes admit to being tone deaf, he apparently did not even mind. Those most skilled at ordering their thoughts, he was fond of saying, are always the most persuasive, "even if they speak only low Breton" (*Philosophical Writings* 1: 114; AT VI: 7).<sup>1</sup> That is to say nothing of Descartes's musical preferences; if he took an interest in it at all, music for him was little more than a part of the ancient quadrivium whose practical application, if any, was limited to such oddities as a harpsichord with eighteen keys tuned according to ratios of small whole numbers, or just intonation.

The argument of this essay is, first, that sound studies stands to benefit from recuperating the Cartesian legacy in modern aurality. Sound, music, and listening played an important role in the development of Descartes's thought from, in his words, the "uncouth" and "immature" *Compendium musicae* of 1618 (*Compendium musicae* 52; AT X: 140) to the prolonged debate with Marin Mersenne during the 1620s to works from his mature period such as *L'homme*. Over a period of several decades, Descartes frequently revisited and sometimes revised key propositions of his *prima philosophia*—such as the much-debated mind-body split set out in the *Meditations*—by invoking sound. The philosopher conceived of the ear's relationship with rationality and epistemological certainty as the

foundation of modern subjecthood in far more ambiguous terms than the eerie scene of bodily self-domestication in the *Meditations* might suggest.

Even more striking, there exists a previously unacknowledged affinity between the philosopher's forays into the realm of acoustics, physiology, and music theory, on the one hand, and his reflections on the fetus, on the other. Descartes's acoustemology and epistemology of life must be approached in tandem, as two intertwined discourses about one of the most hotly debated issues of the time, resonance. A critical appraisal of Descartes's theory of resonance therefore not only sheds new light on this thinker's significance for sound studies; it may also encourage (and in turn be shaped by) new feminist readings of his work.

### *Resounding Reason*

Resonance, as a quick glance at the *Oxford English Dictionary* shows, is an extremely multifaceted phenomenon, one that traverses numerous semantic fields, scientific disciplines, cultural practices, and discursive genres. Resonance can refer to the "amplification of wave or tidal motion in a body of water when this motion has the same frequency as a natural vibration of the body of water." Physicists speak of resonance when "a particle is subjected to an oscillating influence (such as an electromagnetic field) of such a frequency that a transfer of energy occurs or reaches a maximum." And in general language use, resonance denotes "the power or quality of evoking or suggesting images, memories, and emotions; an allusion, connotation, or overtone." In the acoustic realm, resonance in the most general sense describes the "condition in which an oscillating or periodic force acting on an object or system has a frequency close to that of a natural vibration of the object." Most significantly, however, resonance is also the concept at the heart of an influential theory of hearing according to which the perception of pitch ensues from certain structures deep inside the cochlea vibrating in phase with the oscillations of the outside air. Commonly labeled "the place resonance theory of hearing" (because the sensation of pitch is produced in a one-to-one correspondence between the frequency of the outside airwaves and specific parts of the inner ear), this concept of resonance was the dominant model for the biomechanics of the human ear between 1683 (when Joseph-Guichard Duverney first introduced it) and 1928 (when Georg von Békésy replaced it with a place nonresonance theory) (Wever).

But it is in philosophy that resonance has perhaps given rise to the most conflicting interpretations. To Cartesians, resonance simply smacked of magic *tout court*, of things like astral influx and the like. As such, it was the exact opposite of the concept of the mind as a mirror. By contrast, Denis Diderot openly flirted with the image of the philosopher who “listens to himself in silence and darkness” while his ideas make each other “quiver” in the way the strings of a harpsichord “make other strings quiver” (879). Meanwhile, Immanuel Kant, ever wary of any form of determinism, rejected as “barbaric” the claim that aesthetic pleasure requires the “addition of stimuli and stirring [*Rührung*]” (§13). It was only with the publication of Martin Heidegger’s *Being and Time* in 1928 that resonance was embraced as a cornerstone of the way philosophy might relate to its other. As Jacques Derrida recognized, Heidegger may be the first philosopher to reject philosophy’s obsession with “absolute properness,” or the difference, epitomized by the tympanum, between what is proper to oneself and what is the realm of the other (*Tympan x*). Heidegger’s “otophilology” reorganized philosophy by admitting into its discourse a “privileged metonymy” of ear and friend, a simultaneity of domains previously thought of as dichotomies (Derrida, *Heidegger’s Ear* 164).

Yet it is precisely these conflicting interpretations of resonance that invite us to revisit the Cartesian project in the hope that it might shed new light on contemporary debates about the precarious interrelations among aurality, cognition, subjectivity, and embodiment and their significance within sound studies and feminist theory. Because resonance names the other against which thought is privileged as philosophy’s core operation and possibility, and because at the same time it denotes the materiality of auditory perception, resonance is eminently suited to dissolve the binary of the materiality of things and the immateriality of signs that have historically preoccupied feminist discourse (as, for instance, in Luce Irigaray’s critique of Western epistemology as a logic that figures the feminine as an essence to which thought might return) and now troubles the field of sound studies. Resonance calls into question the notion that the nature of things resides in their essence and that this essence can be exhausted by a sign, a discourse, a logos. An account of something such as resonance must therefore situate itself in a kind of echo chamber together with other things—signs, discourses, institutions, and practices.

It is the quest for this resonant space, for the convergence of reason and resonance, that shaped Descartes’s entire work. While he

rarely tackled the issue of the union of body and mind head on (and then only when he was assured a sympathetic reception, such as in the correspondence with Princess Elizabeth of Bohemia or his Utrecht sympathizer Henricus Regius), Descartes did broach the subject indirectly, in fields as diverse as physics, physiology, obstetrics, and music theory. In numerous remarks scattered throughout his oeuvre, he rehearses the idea of a person as a single substance composed of body and *res cogitans* by exploring resonance and its interconnections with three terms that recur in his work with remarkable regularity: *resonare*, *concutere*, and *sympathia*.

### *A Man Opens His Mouth*

“The human voice seems most pleasing to us because it most directly conforms to our souls,” Descartes writes on the first page of his first known work, the *Compendium musicae*. He continues: “By the same token, it seems that the voice of a close friend is more agreeable than the voice of an enemy because of sympathy or antipathy of feelings—just as it is said that a sheep-skin stretched over a drum will not give forth any sound when struck if a wolf’s hide on another drum resonates at the same time [*lupina in alio tympano resonante*] (11; AT X: 90). Descartes had written the *Compendium* at the behest of the Dutch philosopher Isaac Beeckman, who had taken the eighteen-year-old, freshly graduated scholar under his wing and monitored his acoustic experiments. The short work was meant as a dedication to Beeckman, as a “token of our friendship,” and as such to be kept forever under lock by its recipient (Descartes, *Compendium musicae* 53; AT X: 141).

Resonance, then, occupied a firm place in Descartes’s work from the outset, a place it was never to leave again until the philosopher’s death. Small wonder that orthodox commentators ever since have considered Descartes’s reference to *sympathia* and *resonare* as bothersome intrusions into the purity of philosophical discourse: a “strange remark” harking back to Renaissance medicine (AT X: 90, n.a.) and one patently at odds with the laws of physics (*Compendium of Music* 11). Yet the point for Descartes is actually not the property of sounds as such. These, he goes on to state in the following sentence, “concern the physicists [*agant Physici*]” (AT X: 89). It is therefore not the factual basis of the “remark” (or lack thereof) that ought to be of interest to us but the epistemological work it does in Descartes’s text. Resonance and sympathy, Descartes seems to suggest, are if not the essence then the condition of philosophy. Without

resonance, a voice will fail to find a sympathetic reception. Similar to the principle operating between the skins of two drums (*tympanum*), the voice requires an eardrum (*tympanum*) that is tuned to the same frequency to be heard. If the voice and the eardrum of the other are, almost literally, not on the same wavelength, the speaker's words will be misunderstood, or worse, they will not be heard at all. There will be no possibility for discourse or even the recognition that such discourse ever took place.

Of course, all this stands in marked contrast to the philosopher's famous assertion that the only "indubitable foundation of truth" rests in the fact that I am a thinking thing and that this *res cogitans* is "entirely and truly" distinct from the body and "can exist without it" (Descartes, *Philosophical Writings* 2: 54; AT IX: 62). Although the word *indubitable* has become commonplace in modern translations, Descartes's preferred Latin term is *inconcussum* (unshakable). Derived from the root *-cutere* (to shake violently)—which itself is based on the Indo-Germanic *-kwat*—the term *inconcussum* is embedded in a rich semantic field. From astrophysics and Descartes's theory of "tourbillons" to Galileo's experiments with pendulums to Marin Mersenne's work on the mechanics of strings, various cognate forms of *-cutere* permeated scholarly discourse during the Scientific Revolution.<sup>2</sup> But it is especially in two partly overlapping fields of acoustic inquiry that terms such as *percutere* or *concutere* recur with remarkable frequency: in the relationship between the frequency of vibration and pitch and in the theory of musical consonance.<sup>5</sup> Not coincidentally, both fields also figure prominently in the fierce controversies that accompanied Descartes's career from start to finish, such as the dispute that took place in Utrecht during the 1640s over the alleged anti-Christian implications of Descartes's philosophy and that pitted the philosopher and his ally Henricus Regius against the theologian Gisbertus Voetius and his pupil Martin Schoock (aka Martinus Schoockius). The latter had published *De Natura Soni et Echus* (*On the Nature of Sound and of the Echo*), a work in which he distanced himself from the Peripatetics and, on a superficial reading, even adopted a mechanist view of auditory perception. Sound, according to Schoock, is not a "sensible quality [*qualitas sensibilis*]," separate from the mechanical process of aerial transmission. For if sound were a quality, it would differ from the movement of the bodies themselves, and air in motion would be one thing and sound another. So what is the purpose of this quality, "as if air, when it is moved and prompted in a certain way, does not already itself move the eardrum?" What else is there to say about sound but that it is "air in motion itself [*sonus sit ipse*

*aër motus*],” or rather, “repercussed air [*repercussus*]” that is perceived by the soul (Schoockius 8)?

Schoock’s critique did not dispense with qualities entirely, though. Might there be the possibility, he wondered, that while such qualities do not inhere in the material objects themselves, they are at least produced by the motion of air? To Schoock’s ears, this was impossible; the perception of sound was instantaneous. Because the sound of a cannon is heard the moment it is fired, “who would say that sound, as a quality, is produced by a motion and fraction of the air when it has already been heard?” (Schoockius 4).

Descartes found Schoock’s position unacceptable. Although he, too, accepts certain qualities, these reside entirely in the mind of the perceiver. Furthermore, such qualities are not the result of a relationship of unmediated resonance between air and soul and therefore bear not the slightest resemblance to the physical force causing them. “A man opens his mouth, moves his tongue, and breathes out: I see nothing in all of these actions which is in any way similar to the idea of the sound that they cause us to imagine” (Descartes, *World* 5).

Another area in which *-cutere* played an important role is musical pitch. Ever since Pythagoras (c. 570–497 BC), pitch had been determined by establishing the ratios of musical intervals in relation to the length of a string on a monochord. An interval was deemed most consonant when the number of divisions of the string necessary to obtain the consonance could be expressed by a “simple,” inverted proportion. An octave, for instance, was considered the most consonant interval for the simple reason that it is produced by dividing the string into two halves, which gives a ratio of 2:1. A fifth, accordingly, corresponds to a ratio of 3:2 and a fourth to one of 4:3. By contrast, intervals such as the major third or second are obtained by dividing the string according to ratios of 5:4 and 9:8, respectively, and were therefore considered dissonances.

By the second half of the sixteenth century, the conception that music was “born of mother arithmetic,” as one anonymous ninth-century tract had put it, increasingly came to be regarded with suspicion (*Musica* 65). One of the first attempts to link pitch to the frequency of vibrating bodies was Girolamo Fracastoro’s discussion of resonance in his *De sympathia et antipathia rerum* (*Of the Sympathy and Antipathy between Things*) of 1546. Pitch, the Veronese physician argued, depends on the frequency of impulses (*impulsionones*) transmitted through the air. Because air is “matter that is dense in itself,” its forceful compression through a blow

(*ictus*) results in the condensation (*addensatio*) where previously there had been rarefaction (*rarefactio*), the series of alternating condensations and rarefactions producing a wavelike motion (*more undarum*) (qtd. in Crombie 786).

Though it remained unconfirmed for several centuries, Fracastoro's theory of condensation and rarefaction signaled the possibility of a major reversal of Pythagorean dogma, paving the way for a new type of empirical inquiry into pitch in which the physics of vibrating bodies merged with the study of the perception of consonance and dissonance on the basis of coinciding pulses of air. Furthermore, as Hendrik F. Cohen has shown in his classic study *Quantifying Music*, the first serious attempts at defining consonance through coincidence were made at the same time as Descartes was elaborating his new epistemology. Over a period of less than three decades, natural philosophers such as Johannes Kepler, Galileo, and Mersenne had linked consonance to the observation that the ear judges those intervals to be the most consonant in which the pulses of air produced by two strings coincide most frequently. As Galileo reasoned at the end of the First Day of his seminal *Discorsi* (1638), if a string of a certain length is struck, it regularly pulsates back and forth perpendicular to its axis, thus displacing—or “percussing,” as he and other scholars preferred to call it—the surrounding air (104–8). But since the frequency of these pulsating movements determines pitch, it follows that strings of varying lengths, tension, and thickness also “percuss” the air at different frequencies and consequently yield different pitches. When two strings of the same pitch (which is called “unison”) are sounded together, their percussions obviously coincide at the same time, which is the beginning and end point of each complete swing. By contrast, when strings of different pitches are sounded together, their percussions coincide only in an inverse proportion to the respective length of the string. For example, if two strings are tuned an octave apart, the higher string will vibrate twice as fast as the lower string and therefore will have completed its first complete swing while the lower string has completed only half of its swing. Put another way, the pulses of two strings tuned an octave apart coincide every second pulse; in a fifth, they coincide after the higher string has completed three swings and the lower one two, and so on. Consequently, for Galileo and other thinkers of the early modern era, the pleasure we experience in hearing an octave is a function of the greater coincidence of percussions, and the experience of dissonance in turn is a function of the greater scarcity of such coincidence.



Needless to say, sympathetic resonance is key to this “coincidence theory,” as Cohen labels these findings. The observation that a plucked string is able to set in motion another string nearby tuned to the same pitch or an octave or fifth higher was proof that the perception of consonance is based in percussions.

### *The Physiology of the Beautiful*

But how set was Descartes really on opposing mind and ear? Why did he invoke resonance to refer to the pursuit of knowledge through friendly discourse in the *Compendium*, while in the *Meditations* the same referent names the perils that threaten the acquisition of certainty through disembodied reasoning? After going to great pains to create the image of the mind as something “so withdrawn from corporeal things that it does not even know whether any people existed before it” (*Philosophical Writings* 2: 249; AT VII: 361), why did he risk blurring this sharp distinction by hinting at the possibility that domains he considered to be otherwise incommensurable could only be figured within and around the semantic space of “resonance”?

Several answers are possible. The first might take as its point of departure the standard narrative about the origin of rationalist philosophy in the famous dreams of 1619 in which Descartes saw the outlines of a “marvelous science” based on the exclusion of the bodily realm from that of reason. As a supplement to this narrative, one might argue that one of Descartes’s first attempts at casting this moment of rupture in a scholarly mold did not involve an epistemological argument as much as it turned on an aesthetic problem. In a series of letters written between January and March 1630 to his chief correspondent, Mersenne, Descartes famously took issue with Mersenne’s lament that in music, “experience and reason are in conflict with one another.” By this the Jesuit priest meant that the majority of musicians were holding thirds to be more pleasurable than fourths, even though the fourth is actually in accordance with reason on account of its ratio of 4:3 being “closer to the octave and unison” (Mersenne, *Propositions* 22–23). The beautiful, Descartes countered, cannot be determined rationally because it lacks any objective content. The separation of the beautiful from the rational is in reality a physiological issue or, more precisely, a question of auditory perception. Therefore, he writes, the way around Mersenne’s problem is to distinguish between consonances that are “accordant” and others that are pleasant. As for the accordant

consonances, mathematical “calculations serve only for showing which consonances are the simplest, or, if you prefer, the sweetest and the most perfect ones” (Descartes à Mersenne. janvier 1630; AT I, 108).

In order to determine what is most pleasing, he goes on to state, we must consider the hearer’s capacity, and this, like taste, varies from person to person. From this it follows that the beautiful and the pleasant only signify the relationship of our judgment to the object. It makes more sense to speak of the beautiful in relative terms, in the sense that those things that appeal to the multitude are simply “the most beautiful” (Descartes à Mersenne. 18 mars 1630; AT I, 135). In short, the beautiful and the pleasant do not have any specific measure, and as such no truthful statements can be made about them.

But there is a second part to this narrative of the birth of aesthetics (and, indirectly, of Cartesian epistemology) in the act of listening, one that is often overlooked but is of special interest to us here because in it the relationship between reason and experience is beginning to be figured positively. According to this narrative, the early history of aesthetic theory is one of a progression from Cartesian dualism to Gottfried Wilhelm Leibniz’s reworking of the relationship of consciousness and the senses along more flexible lines. Descartes’s strategy of shifting the beautiful from its accustomed place in rhetorics or Pythagorean-style cosmologies to the realm of the senses—and, concurrently, of banishing sensory experience from the sphere of the mind—might be said to instantiate auditory resonance as the arbiter of the beautiful. A person’s power to override the rule of reason in judging a third to be more pleasant than a fourth defines the aesthetic sphere as the realm of resonance *tout court*. But by the same token, this act also constitutes the rational as a resonance-proof sphere, as that which cannot be linked to the body by way of resonance.

In contrast, Leibniz’s seminal move consisted in reinstating resonance as a principle bridging the Cartesian divide. His theory of “perceptions” is based on the notion that monads constantly produce “perceptions” as a result of what he calls an “inner principle or *appetitus*” that propels the soul’s transition from one perception to the next. In contrast to Descartes, however, Leibniz does not reduce this dynamic force to ego’s ability to become its own nonresonant foundation through cogitation. Leibniz’s “inner principle” includes unconscious forces: the famous “petites perceptions” such as, for instance, the sound of each single ocean wave that we hear without being aware of doing so. Unlike Descartes, Leibniz does not believe that this *je ne sais quoi* of our unconscious perceptions can be fully

distinguished from rational thought. It overlaps—or resonates, one might say—with thought in that it enables us to grasp things such as the sound of the ocean in their totality even while it simultaneously draws us into a sequence of “confused” images. Ultimately, then, it is by recognizing the proximity of reason and the senses within this inner principle that Leibniz is able to introduce resonance as a legitimate object of knowledge and, more importantly, as constitutive for the very possibility of philosophical discourse.

Descartes's invention of the aesthetic as the antithesis of the rational and Leibniz's theory of perceptions set the parameters of the fundamental conflict that shapes aesthetic debate to this day. On reflection, however, the two positions are less opposed than they appear. Descartes himself grappled with the consequences of the antinomy he had created. By suspending sound studies' anti-ocular, anti-Cartesian stance and attending to the epistemic ambiguity of *-cutere* in Descartes's work, it may be possible to reassess Descartes's project of reconciling the mind and the body. To do so, however, it is necessary to go beyond the *Passions of the Soul* and the philosopher's well-known statements to Princess Elizabeth of Bohemia and to focus on the finer points of Descartes's otology: on those “epistemic things,” in other words, that are closest to “resonance,” such as the material ear and its parts.<sup>4</sup>

As is well known, Descartes took a lively interest in anatomy. He dissected countless animals (which he obtained from Amsterdam's butcher shops) and read widely on medical topics. It is also safe to assume that he possessed a working knowledge of the anatomy of the human ear. His *Principles* and his posthumously published anatomical excerpts included short descriptions of the ear and several crude sketches (copied from the lost originals by Leibniz) of the cochlea, the stapes, and the tympanum (AT XI: 581–82). Descartes also liked to quote from *Institutiones anatomicae* by Gaspar Bauhin (1560–1624), a professor of anatomy at Basel University. Published in 1604 and enjoying wide circulation throughout the European medical establishment, Bauhin's work was less an original work than a synthesis of state-of-the-art knowledge produced during the latter half of the sixteenth century by what is sometimes called the Italian school of anatomy. Its leading figures, scholars such as Gabriele Falloppio (1523–62), Bartolommeo Eustachio (1510–74), Fabrici Acquapendente (1533–1619), and Guilio Casseri (c. 1552–1612), had also made major discoveries in otology, describing (and in some cases even producing some of the first, meticulously illustrated plates of) such key components of the ear as the

aqueduct, the tensor tympani, the membranous labyrinth, and the tube linking the middle ear to the throat.

In contrast to the anatomy of the ear, however, the physiology of hearing during the first half of the seventeenth century rested on much shakier foundations. It clustered around two key concepts: *aer innatus* or *aer implantatus*, and echo. Known since the pre-Socratics, the “innate air” or “implanted air” was said to originate in the maternal womb, from where it found its way into the fetus’s middle and inner ears. Its substance was of an ethereal kind, different from ordinary air and more akin to the Platonic *pneuma* blowing through the universe. Doubts about this special quality of the *aer innatus* were first voiced by Volcher Coiter (1534–76), author of the first monograph on the ear, *De auditus instrumento* (1573). Because of its direct communication with the outside air via the Eustachian tube, Coiter reasoned, the innate air had to be plain air after all, ill suited for the Platonic qualities attributed to it. Instead, the mediating role of the innate air had to be understood in mechanical terms, as a form of *actio et passio* between the sentient thing (the ear) and the thing sensed (air). Yet even though this mutual agreement is mediated by “the interposition of the membrane [*tympanum*] and of certain ossicles” as well as the “twisting and turning windings” of the cochlea, resonance does not come into play. The role of the cochlea, in Coiter’s view, is to absorb surplus sound such as echoes and to “carry” the sound “without any disturbance” to the auditory nerve (qtd. in Crombie 386).

Descartes’s chief authority on the ear, Gaspar Bauhin, differed with Coiter on the role of echo. Instead of reducing echoes, he argued, the ear is designed to take advantage of them. Since the tympanic cavity consists of openings of different shapes and sizes, echoes also contain an element of selective resonance: lower tones are received in larger spaces, higher tones in the narrow ones. Elsewhere, however, Bauhin leaned more toward the view advanced by Coiter that the proper organ of hearing is not the cochlea as such but the endings of the auditory nerve.

In summary, while the study of vision during Descartes’s lifetime (and in no small measure due to Descartes’s own work) progressed more rapidly than research on the other senses, otology did witness something of a paradigm shift during this era. After centuries during which the tympanum held sway as a kind of corporal *tertium comparationis*, otologists shifted the focus of attention farther inward, toward the cochlea and the auditory nerve. Although the physiology of these parts continued to elude scientists until well into the nineteenth century, the

shift was an important step in granting listening a modest autonomy by unmooring the sensation of sound from a form of unconscious calculus of divinely ordained harmonic proportions. But above all, the new anatomy and, with certain restrictions, physiology of hearing offered to Descartes a welcome terrain on which to pursue his lifelong project of rethinking the mind-body relationship.

### *The Quill and the Nerve*

One prominent place where this project appears to have reached something of a turning point is a section in the *Treatise of Man* in which Descartes offers one of his more developed discussions of the ear:

*As to the filaments [filets] that serve as a sense organ of hearing [. . .] it suffices instead to suppose: [a] that they are so arranged at the back of the ear cavities that they can be easily moved, together and in the same manner, by the little blows [secousses] with which the outside air pushes a certain very thin membrane [the tympanum] stretched at the entrance to these cavities; and [b] that they [these filaments] cannot be touched by any other object than by the air that is under this membrane. For it will be these little blows which, passing to the brain through the intermediation of these nerves, will cause the soul to conceive the idea of sound. (45–46; AT XI: 149)*

Elsewhere Descartes had made similar propositions, albeit with minor modifications. Thus in a short section of his *Anatomica* he describes the auditory nerve as consisting of three “branches” (*ramus*) (AT XI: 581). In the *Principles* he also mentions the three ossicles and what he calls the “surrounding air” (*Philosophical Writings* 1: 282; AT VIII: 319). What is striking in the passage above, however, is the complete absence of either the middle ear or the cochlea. And so the question is why the philosopher here seems to fall behind his considerably more advanced otological knowledge as evinced in the *Anatomica* sketches. As a closer look at the passage reveals, there is something more original and potentially more far reaching in this passage, despite its awkward prose and weak empirical base. The absence of the cochlea is less a sign of ignorance on the philosopher’s part than a shrewd move bolstering Descartes’s larger project of reconciling resonance with reason.

To Descartes, nerves were tubes, which he called filaments (*filets*), that were filled with very thin threads that transmitted physical motion to the brain, where small pores would open containing the *esprits animaux*, or animal spirits. These, in turn, would move back to the muscle that first experienced the sensory stimulation, inflating it and thus causing it to move. But although in this theory nerves generally were held to be passive matter and hence just another form of *res extensa*, as the main operators in the interchange of body and mind, they also occupied a liminal position between physiology and psychology, a position crucial for Descartes's later work on the biology of emotions.

The auditory nerve had an even more liminal status. Thus the first feature to be noted about the auditory nerve is that apparently there is not one nerve, but many *filets*. Second, these filaments are agitated by the *secousses* of air "together and in the same manner." Finally, to produce the idea of pitch, the soul selects the sensations it receives by arithmetically matching the frequency of the vibrations to the concepts of order lodged at its core.

There are clear advantages to this theory, sparse though it may be. What Descartes may be arguing for is a resonance theory in which a great deal more autonomy is granted to nerve fibers than in his physiology in general. Contrary to the concept of the nerves as passive transmitters of animal spirits and the subsidiary idea that the entire nerve responds to a stimulus in much the same way as the top of a quill pen moves during writing, the philosopher seems to entertain the possibility of the auditory nerve being subject to an altogether different form of movement. As he argues in the *Meditations*, nerves produce the same sensation regardless of the point at which they are stimulated. Since the nerves in our feet, for example, go "right up to the brain," we feel pain even when these nerves are touched in some intermediate parts, such as the calf or lumbar region, and "the more distant part does nothing" (*Philosophical Writings* 2: 60; AT VII: 86). In modern terms, if the sciatic nerve is affected in the lumbar region (by a herniated disc in the spinal vertebra, for instance), it will produce pain and muscle weakness in the extremities. Analogously, the auditory nerve will produce sound, no matter whether it is struck by "blows" of air at its alleged endpoint in the tympanum or somewhere else along its path toward the brain. In both cases, the ensuing sensation of sound will fail to provide reliable information on the exact nature and location of its source.

By the same token, the soul is being downgraded to an ancillary role. In a section following the one quoted above, Descartes invokes the coincidence theory of consonance:

*[W]hen many [blows] succeed one another, as one sees in the vibrations [tremblements] of strings and of bells when they ring, then these little blows will compose one sound which [a] the soul will judge [to be] smoother or rougher according as the blows are more or less equal to one another, and which [b] it will judge [to be] higher or lower according as they succeed one another more promptly or tardily, so that if they are a half or a third or a fourth or a fifth more prompt in following one another, they will compose a sound which the soul will judge to be higher by an octave, a fifth, a fourth, or perhaps a major third, and so on. And finally, several sounds mixed together will be harmonious or discordant according as more or less orderly relations exist [among them] and according as more or less equal intervals occur between the little blows that compose them. (Treatise 47; AT XI: 150)*

No longer the supreme arbiter it had been in the scholastic tradition of how “several sounds mixed together” match up with the absolute truth enshrined in mathematical ratios, the soul’s role is reduced to that of a mere observer, monitoring the “structural” equivalence—the “according as”—linking the objective coincidence of physical “blows” to the subjective experience of consonance and dissonance.

In many ways, all of this might be seen as clashing with the assertion that the *secousses* of air “pass” to the brain in some form of temporal sequence. But it might also be read as an early incarnation of Johannes Müller’s concept (developed almost two centuries later) of the nervous system as a self-referential system rooted in what he called “sense energies.” “Individual nerves of the senses,” the nineteenth-century physiologist maintained, have “a special sensibility to certain impressions by which they are supposed to be rendered conductors of certain qualities of bodies, and not of others.” Or, more floridly, the “nervous system here illuminates itself, there sounds itself, here feels itself, there again smells and tastes itself” (59). In fact, when we put Descartes’s model of noncochlear hearing side by side with other propositions in which the philosopher draws on nonacoustic forms of vibration to argue for the relative autonomy of sensation, we begin to grasp the ambiguity of his larger quest for a more

resonant form of reason than the one grounded in the purity of cogito. One of these propositions is a section in the *Regulae ad directionem ingenii* in which Descartes sets up a contrast between reason and the senses (or, as he puts it, *ratio* and *phantasia*) by comparing them to the movements of a quill during writing. In the former, the tip of the quill transmits its movement to the entire quill. The imagination, by contrast, can generate many different images that then result in “quite different” and “opposite movement” at the top of the quill (*Philosophical Writings* 1: 42; AT X: 415).

As Christoph Menke has shown, this passage highlights the ambiguous place of the imagination within Descartes’s epistemology (16). Although it is capable of producing divergent “images,” sensory perception remains the handmaiden of reason at best. At the same time, however, the passage anticipates Leibniz’s distinction between dark and clear perceptions. The soul, Descartes seems to imply, knows something even though it cannot know exactly what it is that it knows because by definition the beautiful has no knowable content. The soul’s knowledge thus is unconscious knowledge that is gained from experience, from the ability to use equivalence as a means of relating things to each other that cannot be related on the basis of reasoning.

### Sympathia, *Again*

Contrary to conventional belief, Descartes held that each human being, from the first moments of life in the maternal womb, is an individual who is endowed by some “miracle” or act of God with a soul and who is thus capable of conscious thought (Descartes à Regius; AT III: 461). The fetus’s auditory capabilities, by contrast, possess no such temporal antecedence; like the other sense organs, they only form in the last phase of fetal evolution.<sup>5</sup> But this phased development of our cognitive and auditory capabilities in utero does not necessarily imply an ontological domination of the former over the latter. Nor does the separate development of the fetus’s mental and corporeal qualities mean that in Descartes’s view the separation persists for the rest of our lives and that we cannot become something *in addition to* being two beings in one. In fact, the possibility of resonant thought becoming the operative principle shaping the unity of body and mind—a possibility Descartes invoked often but never fully explicated—is part of our natural, prenatal makeup in much the same way that the intimacy of reason and resonance forms the ground on which we continually reaffirm our personhood after birth.



Descartes elaborates two conditions of such intimacy, one natural, the other cultural. The first is discussed at length in a collection of fragments that were written between 1630 and 1648 and posthumously published as *Cogitationes circa generationem animalium* and as *Description du corps humain: De la formation du fœtus*, Descartes's last work on a medical topic. What is striking in these texts is the recurrence throughout of *sympathia*, the same "strange" term invoked in the *Compendium musicae* to denote the resonant qualities of drums and friendly voices and that functioned as the companion term of *resonare* and *concutere* used in several other works. Even more noticeable is the fact that, contrary to the claim that the early reference to *sympathia* was a sign of the philosopher's "juvenile credulity" vis-à-vis hermetic theories of astral influx or *actio in distans* (Buzon 647) (a naïveté that is said to have been supplanted by a more sober outlook in his mature work), Descartes never quite settled on a clear definition of *sympathia* as either the work of occult forces or a matter of plain physics. There is nothing in magnetism, for instance, that remains outside of the sphere of science and that cannot therefore be "referred to purely corporeal causes, i.e., those devoid of thought and mind." To think otherwise would be tantamount to accepting the existence of a "miracle of sympathy or antipathy" (*Philosophical Writings* 1: 279; AT VIII: 314–15).

This position contrasts with several fragments of the *Cogitationes* in which Descartes invokes *sympathia* to elucidate the formation of the fetus. Here the philosopher constructs a sympathetic relationship between those body parts that are linked by dint of symmetry, such as the correspondence between the testicles and the brain (or the eyes). But despite the reminiscences of Bauhin and other Renaissance medical authorities, the force driving this overall sympathy between symmetrical parts is anything but occult. It is the mother's heart that, though independent from that of the fetus, impacts the formation of individual body parts via the maternal blood. In fact, this "rapport" between all the movements of the mother and those of the child (*Philosophical Writings* 3: 76; AT XI: 429) is so strong that it even comprises the mother's thoughts, such that from "damaged maternal thoughts the fetus receives monstrous members" (AT XI: 518). While Descartes here simply recapitulates basic tenets of preformation theory, and even though the only specification he offers about the nature of the transformation of maternal thoughts into blood is that these "pass" (AT VI: 129) and "radiate" (*Philosophical Writings* 1: 341; AT XI: 354) from their center in the pineal gland, the point is that *sympathia* clearly operates through physical matter.

The second, cultural, requirement for the unity of reason and resonance is, to use Descartes's preferred term, "training" (*entraînement*). Descartes invokes it frequently, and often in relation to animals and rote learning. While still in the uterus, animals are said to be exposed to certain situations that "train" them how to respond to similar situations later in their lives (AT XI: 520). Lutenists, for their part, often learn a piece of music not by remembering the sound but by memorizing the fingering they use to produce these sounds. Statements like these have led scholars to suspect an element of determinism in the philosopher's views on those forms of learning that do not occur on a higher plane. But even where learning does require the intervention of a high level of intellectual comprehension, a certain degree of routine is inevitable. Contrary to the image of the peasant expressing himself rationally in low Breton, clarity of thought cannot dispense with sensory perception and convention entirely. The ability to communicate one's thoughts is based on the experience of similar situations in which the relationship between perceived objects and ideas has previously made sense. We are able to recognize the similarity between the two situations not because we necessarily know what a color, sound, or other such sensory impression is but because we have faith in the stability of the relationship between signifier and signified. Even though the production of such knowledge through a combination of sensory perception and experience does not yield the same degree of specificity and certainty as does rational thought, it is acquired in a way that can be said to be structurally akin to rational thought.

### *Permeating Boundaries*

Contrary, then, to the entrenched view of Descartes as the arch-ocularcentrist and foe of the senses, grappling with the biomechanics of auditory resonance may well have enabled Descartes to rehearse the fragile proximity of reason and sensation. As material *sympathia*, resonance reminds us of our past history of intrauterine dependency; as culture, such resonance holds the promise that we might make ourselves anew each time we listen, realizing our prenatal potential to become, at some point in our postnatal lives, reasoning minds who resonate with their own bodies and those of others.

Yet there are limits to how far we can—and perhaps should—take Descartes's tentative recuperation of resonance in rethinking the foundations of modern rationality. There is in fact no illustration more

compelling of the perils of using resonance to question feminism's or sound studies' anti-Cartesian stance than one of feminism's most evocative statements, Irigaray's *Marine Lover of Friedrich Nietzsche*. No stranger to accusations of essentialism herself, Irigaray in this book invokes sound, the voice, and the ear to articulate a critique of the female as the "exemplary echo chamber" (3). In fact, the book opens—much like Descartes's *Compendium musicae*—with resonance:

*I was your resonance.*

*Drum [tympan]. I was merely the drum in your own ear sending back to itself its own truth.*

*And, to do that, I had to be intact. I had to be supple and stretched, to fit the texture of your words. My body aroused only by the sound of your bell. (3)*

In this and similar passages in *Marine Lover*, Irigaray may well be addressing what she considers to be Nietzsche's figuration of woman as a "physical setup that goes into vibration, amplifies what it receives all the more perfectly because the stimulating vibration comes close to the system's 'natural frequency'" (109). At the same time, the motif of resonance allows her to turn against poststructuralism's and especially Derrida's elision of femininity under the guise of an all-out assault on essence *tout court*. It is as though these lines are turning Derrida's critique of phonocentric "hearing-oneself-speak" back on itself. What Irigaray seems to imply is that as long as it fails to recognize the feminization of aurality inherent in the metaphysics of presence, Derrida's critique of philosophy's self-referentiality will not succeed in "puncturing" the philosopher's master organ, the tympanum (Derrida, *Tympan* xii). Phonocentrism to her is more than a mere "indissociable system" through which "the subject affects itself and is related to itself in the element of ideality" (Derrida, *Grammatology* 12). And the tympanum's role as the organ of "absolute properness" (Derrida, *Tympan* xix) requires more than its being capable of resonance and of casting back philosophy's logos on itself. Phonocentrism involves the prior reduction of the female to a mere "vocal medium," to a "perpetual relay between your mouth and your ear" (Irigaray 3). The very possibility of thought requires an essential, resonant femininity.

Clearly resonance in Irigaray's view is doubly ill suited for challenging philosophy's autism. It cannot be the "ruse not belonging to reason" that would "prevent philosophy from still speaking of itself" (Derrida, *Tympanum* xii). But by the same token, as the indispensable, feminized condition of the philosopher's truth, resonance's usefulness to the feminist

critique of the Cartesian roots of modern rationality is limited. Hence to render more permeable the boundaries between reason and resonance remains a task as urgent today as it was for Descartes.

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## Notes

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| 1 | In accordance with Descartes scholarship, citations of modern editions of Descartes's works will be followed by the corresponding reference in the <i>Oeuvres de René Descartes</i> edited by Charles Adam and Paul Tannery (abbreviated as AT followed by volume and page number). | 3 | An excellent overview of seventeenth-century vibration theories is offered in Dostrovsky. See also Truesdell.                                  |
| 2 | On the etymology of <i>concutere</i> , see <i>Thesaurus Linguae Latinae</i> 4.1: 118–21. For <i>percutere</i> , see 10.1, fasc. 8: 1234–50.   | 4 | The phrase “epistemic things” is Hans-Jörg Rheinberger's. It denotes a biological entity or function that embodies as yet unsecured knowledge. |
|   |   | 5 | AT XI: 261/30 and 262/25–263/25; Descartes, <i>Écrits</i> , Fragment [8]; AT XI: 513/3–5; Fragment [7]; AT XI: 510/21.                         |

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