Unfelt

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The mid-eighteenth-century philosophical language of sentiment and sensibility inherits and intensifies the close attention paid by John Locke and other earlier writers to the material bases of feeling, its temporal flows in consciousness, and (increasingly important) its role in associating ideas. These emphases quietly carry along the insensible into this new language too. Philosopher, theologian, and physician David Hartley, long seen as an important elaborator of the theory of sensibility, begins his *Observations on Man, His Frame, His Duty, and His Expectations* (1749), published by Samuel Richardson, by announcing the foundations of his system: “the Doctrines of Vibrations and Associations.” He credits Isaac Newton and Locke, respectively, as sources for these. The former influences his account of the materiality of feeling much more than any Lockean doctrine of qualities. But Hartley has his own notion of vanishingly miniscule particles that fundamentally affect the mind. He discreetly borrows the term *infinitesimal* from Newton’s differential calculus and uses it to mean something much more elaborate than just extremely small. (Samuel Johnson would define it in his *Dictionary of the English Language*, 1755, as “Infinitely divided.”) In his account of the nervous system, Hartley uses the term to reduce the bodily place of feeling to a ghostly medium, unperceivable yet physical. It is the instrument by which Newtonian vibrations cohere into Lockean associations.
Hartley does not acknowledge his debt to the calculus—or the “method of fluxions,” as Newton calls it—as explicitly as he does his other influences. His avowed sources in Newton include the “Hints . . . concerning the Performance of Sensation and Motion . . . given at the End of his Principia, and in the Questions annexed to his Optics” (5). By the end of the Principia, Hartley must mean the very end, the famous final paragraph of the “General Scholium” that concludes volume 2, which speaks directly to Hartley’s interest in anatomy and perception, where Newton describes “vibrations” of “a certain most subtle Spirit” along the nerves that produce sensation. The second source from Newton named by Hartley appears among what are commonly called the Queries in book 3 of the Opticks, included in 1704 and expanded in subsequent editions, which describe vibrations in the “Æthereal Medium” that produce not only vision (“excited in the bottom of the Eye by the Rays of Light, and propagated through solid, pellucid and uniform Capillamenta of the optick Nerves in the place of Sensation”) but also “Hearing” and “so of the other Senses.” Hartley’s elaboration of these Newtonian hints has seemed to intellectual historians like an early attempt at neuropsychology, a science of the minute physiological bases of feeling.

Less explicitly, Hartley turns to Newton’s language of fluxions to emphasize just how radical this minuteness is. Throughout the Observations he refers to “infinitesimal medullary particles” in our brains, where our bodies and souls touch. He never claims that Newton’s method of fluxions inspires him to see our medullary particles as infinitesimal, but some remarks at the end of volume 1 of the Observations imply that it does. For Hartley, nothing but the mysterious, ghostly nature of the infinitely small—as opposed to the merely very small—can provide the subtle, double-sided adhesion of body to soul, soul to body, that his system requires. The most advanced mathematical thinking of his day allows him to conceive of an increment small enough to minimize the difference between feeling and extension, spirit and matter, to nothing. The insensible quality of the infinitesimal, opaque to sense and even comprehension, testifies to the period’s increasing appreciation of feeling’s material subtlety. Unlike the minuteness of particles supposed by natural philosophers after Locke and Robert Boyle to compose all physical reality, the infinitesimal character assigned to medullary particles springs from Hartley’s appreciation of how very distant from ordinary dead matter the liveliness of feeling and consciousness must be. To emphasize feeling’s special status, only a term entirely resistant to feeling will do. The stuff of subjectivity must differ essentially from anything that could be an object of consciousness yet still be material.
Hartley thus connects the terminology of the *Opticks*, in which the infinitely small plays no part, to that of fluxions. He declares, “*External Objects impressed upon the Senses occasion, first in the Nerves on which they are impressed, and then in the Brain, Vibrations of the small, and, as one may say, infinitesimal, medullary Particles*” (11). He continues, “In like manner we are to suppose the Particles which vibrate, to be of the inferior Orders, and not those biggest Particles, on which the Operations in Chemistry, and the Colours of natural Bodies, depend, according to the Opinion of Sir Isaac Newton. Hence, in the Proposition, I term the medullary Particles, which vibrate, infinitesimal” (12). So with the phrase “I term,” Hartley takes ownership of the idea of infinitesimal particles in the white matter, which he contrasts with Newton’s “bigger Particles” of chemistry and colors.

He does not announce that he draws the term *infinitesimal* from the fluxions of Newton who, we will see, invoked the idea of the infinitely small with extreme caution. As some have suggested, Hartley here could seem simply to be groping for some mysterious word to indicate that the medullary particles are smaller than anything we could sense. But some three hundred pages later he reveals what the word means to him by referring again to Newton. There he echoes the earlier invocation of Newton’s account of the “bigger Particles” on which colors and chemistry depend, versus the “inferior Orders.” Thus he explains, late in volume 1, “It seems to me, that the Rays of Light may be considered as a kind of Fluxions in respect of the biggest component Particles of Matter; I mean those upon which Sir Is. Newton supposes the Colours of Natural Bodies, and the Changes effected in Chemical Processes, to depend” (352).

Bringing up fluxions in such close proximity to Newton can leave no doubt that Hartley means to apply a term from the master’s calculus to his *Opticks*, which Hartley’s “it seems to me,” again, indicates is his own idea. He discusses particles of light as “Fluxions” that “bear no finite Ratio to the Quantities of which they are the Increments” (352) and concludes that “Particles of Light, by being infinitely smaller that the biggest component ones of natural Bodies, may become a Kind of Communis Norma, whereby to measure their active Powers”—that is, their velocities and powers of attraction and repulsion (353). Hence the “infinitely smaller” must be both imperceptible in itself in principle and useful in measuring the sensible, as in the infinitesimal calculus. And since Hartley’s notion of infinitely small particles of light is inspired by Newton’s fluxions, it is reasonable to suppose that his notion of infinitesimal medullary particles must be too.

Hartley’s embrace of the “infinitely smaller,” moreover, is bolder than Newton’s had been. A concept more associated with Leibniz, infinitesimals were
treated with increasing caution as Newton’s work on the calculus developed. In his *Method of Fluxions and Infinite Series*, which appeared in translation in 1736 some ten years after his death but was composed in 1671, the work’s editor, John Colson, took care to defend his author against the charge that he thought infinitesimals were real. Colson remarks that Newton “introduces none but infinitely little Quantities that are relatively so.” Since infinitely small quantities are, strictly speaking, unthinkable, Newton cannot unequivocally claim they exist. At most he uses them as a tool for measurement. So if it is right to suggest that Hartley’s “infinitesimal medullary particles” derive from Newton’s fluxions, Hartley goes considerably farther than his master. What are infinitely small are not merely conceptual increments of measurement but infinitesimal objects, light particles or brain particles, things in the world—precisely the status Newton would deny to fluxions.

The mysterious character of infinitesimals was widely noted and often ridiculed. The attack that Newton’s editor Colson answers came from George Berkeley in *The Analyst; or, A Discourse Addressed to an Infidel Mathematician* (1734). Berkeley targets both the concept of the infinitesimal itself and Newton’s hedging characterization of it as merely a heuristic device:

> It must, indeed, be acknowledged, that he used Fluxions, like the Scaffolding of a building, as things to be laid aside or got rid of, as soon as finite Lines were found proportional to them. But then these finite Exponents are found by the help of Fluxions. Whatever therefore is got by such Exponents and Proportions is to be ascribed to Fluxions: which must therefore be previously understood. And what are these Fluxions? The Velocities of evanescent Increments? And what are these same evanescent Increments? They are neither finite Quantities, nor Quantities infinitely small, nor yet nothing. May we not call them the Ghosts of departed Quantities?

This mockery of “Fluxions, Momentums, and Infinitesimals” (57) as ghostly underscores the difficulty of finding a home for them anywhere between matter and spirit, or finitude and infinity. Hartley’s “relative nothings,” again, go farther than the doctrines mockingly attributed to Newton by Berkeley. For Berkeley, fluxions are ghosts because they vanish once they fulfill their heuristic purpose. Hartley’s infinitesimals are *particles* that are at the same time “nothings.”

This helps us understand the force of Hartley’s invocation of the anatomically infinitesimal throughout the *Observations*. He uses it to account for the connection between the material body and “the Soul” in the individual person:
If we suppose an infinitesimal elementary body to be intermediate between the Soul and gross Body, which appears to be no improbable Supposition, then the Changes in our Sensations, Ideas, and Motions, may correspond to the Changes made in the medullary Substance, only as far as these correspond to the Changes made in the elementary Body. And if these last Changes have some other Source besides the Vibrations in the medullary Substance, some peculiar original Properties, for Instance, of the elementary Body, then Vibrations will not be adequate Exponents of Sensations, Ideas, and Motions. (34)

Hartley requires that “infinitesimal” be endowed with its meaning in the calculus to emphasize the crucial yet ultimately mysterious work that medullary particles do. They are particles of matter so small that they approach the condition of spirit: “relative nothings” that, like spirit, exist in no discernible relationship to what materially is. In principle insusceptible to being mentally represented itself, the infinitesimal makes all mental representation—“Sensations, Ideas, and Motions”—possible.

This third category—ghost matter—somewhat surprisingly allows Hartley to maintain his dualism. “I would not therefore be any-way interpreted so as to oppose the Immateriality of the Soul,” he asserts at the end of volume 1 (512). (In this he resembles Locke, who declares in the Essay concerning Human Understanding that “sensation . . . cannot be the action of bare insensible matter, nor ever could be without an immaterial thinking Being,” 306).

In later years, a vitalist such as Joseph Priestley, who re-presented the Observations to the British public in Hartley’s Theory of the Human Mind in 1775, could nonetheless take Hartley as a prophet of his own materialist views. Such an affiliation led Priestley’s antagonist Thomas Reid in Essays on the Intellectual Powers of Man (1785) to dismiss Hartley’s appeal to infinitesimal medullary particles as a mere “castle in the air,” along with what he saw as the “tendency of this system of vibrations” of Hartley’s to “make all the operations of the mind mere mechanism, dependent on the laws of matter and motion.” Attacking Hartley’s “votaries,” Reid must have Priestley in mind. But Hartley’s Newtonian speculations indicate how even dualists attentive to corporeal complexities were driven to enlarge their sense of what the body can do.

And in this Hartley was not alone among physician-philosophers of the early to mid-eighteenth century. A culture of conjecture comprising doctors, theologians, and metaphysicians sought the presence of Newton’s “Æthereal Medium” at the subtlest points of the nervous system. George Cheyne, a colleague and associate of Hartley, is known in literary studies as a friend and physician to Richardson, and scholars often cite his medical works (especially
The English Malady, 1733) as crucial in building “the culture of sensibility.” But early in his career he published a book of Newtonian mathematics, *Fluxionum methodus inversa* (1703)—to a mixed response—and his other works, particularly part 2 of his *Philosophical Principles of Religion* (1715), explore the notion of infinites and the infinitesimal (which he calls a “Relative Nothing”) as a method to describe the continuum between matter and spirit in the universe.

Cheyne carried this interest into his medical and anatomical thinking. Right around the time he met Hartley in Bath in 1742, for instance, he remarks in his *Natural Method of Curing the Diseases of the Body, and the Disorders of the Mind Depending on the Body*, “I imagin, the spiritual Substance uses material Organs, of one kind of Matter or another, in its Operations; and it is highly probable, they are the nervous Glands, the Filaments, the Nerves, but especially the membranous Coats of the infinitesimal Nervuli, and their wonderful Texture and Mechanism, so little known or understood.” As in other contexts that refer to what cannot be felt in the period, Cheyne hunts for terms to describe the point a researcher would most like to see but cannot, the point where perception meets its end at its beginning. With the word *infinitesimal* he can, like Hartley, precisely locate the intersection of spiritual and material substance.

Hartley’s infinitesimal particles not only indicate a limit but also actively mediate between the two great terms of his system, *vibrations* and *associations*—located in the body and the soul, respectively. Locke had introduced the principle of association in the fourth (1700) edition of the *Essay* (book 2, chapter 33) mostly to account for odd psychological variations among people. But in the hands of Hartley and other midcentury philosophers, it becomes the central principle of mental activity. In the *Observations*, repetition in the patterns of vibrations cause ideas to be associated: “For the Alterations which Habit, Custom, frequent Impression, &c. make in the small constituent Particles, can scarce be any thing besides Alterations of the Distances, and mutual Actions, of these Particles; and these last Alterations must alter the natural Tendency to vibrate” (61).

And if we could not associate ideas, vibrations (and sensations, a term which for Hartley means physical stimulation as differentiated from ideas of sensation) themselves would fly apart into their infinitely divisible components: “For since all Sensations and Vibrations are infinitely divisible, in respect of Time and Place, they could not leave any Traces or Images of themselves, *i. e.* any Ideas, or miniature Vibrations, unless their infinitesimal Parts did cohere together through joint Impression; *i. e.* Association. Thus, to mention a gross Instance, we could have no proper Idea of a Horse, unless the particular Ideas of the Head, Neck, Body, Legs, and Tail, peculiar to this Animal, stuck to each
other in the Fancy, from frequent joint Impression” (70–71). To put it more finely, the medullary particles in the brain, by being infinitesimal themselves, can lay hold of “infinitely divisible” physical vibrations and also integrate them into ideas by means of association. In all of these ways, then, infinitesimal medullary particles reconcile opposites: matter and spirit, vibrations and associations, the infinitely divisible and the “joint.” Despite their own inapprehensible character, they thus make ordinary experience and apprehensions possible, much as Locke’s “insensible Parts” that cause our ideas do.

Hartley’s physical account of the infinitesimals in the brain determines his understanding of what psychological mechanisms and consciousness itself are like. Far more explicitly and directly than in Locke, the insensible physical particles at the basis of feeling for Hartley produce our experience of the evolving self through time from the inside. Hartley saw consciousness itself as a discontinuous affair, as Locke did, and the infinitesimal helps structure these discontinuities. Throughout much of volume 1 of the Observations Hartley attends to distinctions between voluntary and automatic actions, making a range of subsidiary distinctions, including “secondarily automatic” motions (105), “semivoluntary” ones (82), and so on. He resorts to the medullary particles’ capacity to vibrate especially subtly to explain these gradations of our conscious lives, noting, “Since the same Motion which occasions Sensation, and intellectual Perception, passes thro’ the Seats of these into the motory Nerves, in order to excite there the automatic and voluntary Motions, thus pervading the whole medullary Substance, in various Ways, according to the Variety of the Circumstances, but in all with the greatest Precision and Exactness, it follows, that this must be a vibratory one, and that of the most subtle Kind” (87). Beyond the autonomic processes of the body such as the contraction of the iris in bright light and “the Motion of the Heart” (108), Hartley is especially interested in the way “vibratory” motions fill our lives with automatic actions that recede from consciousness and voluntary ones that emerge in it. Much like Locke’s consciousness that is “interrupted always,” the texture of our conscious lives for Hartley is woven by such receding and emerging.

These alterations can be explained by the association of ideas that is facilitated, naturally, by the brain’s infinitesimal particles: “After the Actions, which are most perfectly voluntary, have been rendered so by one Set of Associations, they may, by another, be made to depend upon the most diminutive Sensations, Ideas, and Motions, such as the Mind scarce regards, or is conscious of; and which therefore it can scarce recollect the Moment after the Action is over. Hence it follows, that Association not only converts automatic Actions into voluntary, but voluntary ones into automatic” (104). These conversions themselves are not felt, a nonconsciousness adhering to the action of association
itself. Hartley describes a harpsichordist whose learning of a piece consists of an exertion and effort that insensibly fades as it is mastered, noting that “by degrees the Motions cling to one another, and to the Impressions of the Notes, in the Way of Association so often mentioned, the Acts of Volition growing less and less express all the Time, till as last they become evanescent and imperceptible” (109).

For Hartley such transitions model what it is like to be conscious, and the nonconsciousness that accompanies it. In passing from volition to automatic motion, “there is no perceptible Intervention [of the will], none of which we are conscious” (109). Like the infinitesimal particles that hold our ideas together, the motions that “cling to one another” may do so without a conscious exertion. Hartley’s account of discontinuity in consciousness is more positive than Locke’s vision of consciousness “interrupted always.” The unnoticed transitions from automatic to voluntary to secondarily automatic motions and back again constitute mental life. They are less interruptions in consciousness that we perpetually and naturally overcome (upon waking up in the morning and remembering, after a moment or two, who we are) than they are the cement holding mental life together.

Hartley’s description of brain anatomy and the psychological mechanisms arising from it, grounded in the nerves’ “natural tendency to vibrate,” does not, unsurprisingly, anticipate in any precise way the language of electrical signals and synapses of today’s neuroscience. But his speculative vocabulary of body, brain, and mind does resemble the language of affect sometimes used by humanists today, and with good reason. Contemporary affect theory draws its keywords at least as much from the history of philosophy, dating back to the early Enlightenment, as from new neuroscientific developments. “Sensation is vibration,” declares Gilles Deleuze, who finds versions of this notion at least as far back as G. W. Leibniz. Likewise Brian Massumi describes intensities “filled with motion, vibratory motion, resonation,” with a basis in “the unassimilable” of the bodily. Hartley’s account, unlike the most common eighteenth-century theory of the nervous system according to which “animal spirits” flow through nerves like hydraulic tubes, finds the source of his vibrations in an incomprehensible place, the infinitesimal, invisible to anatomy. This, too, resembles the language of affect theory today, but at its most mysterious (and least “neuroscientific”), as when Massumi declares that virtual affect resides in “the incorporeality of the body.” Such a phrase would work well enough as a euphemism for Hartley’s medullary particles. As vividly as Hartley describes the layers of conscious life, he maintains an accompanying sense of the elusive vibrations of the insensible at the root of all feeling.