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TOUCHING BRAINS

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The first time I held Dum's brain in my hands, I was surprised first by its weight, and then by what I had suppressed—an awareness of the once-living man, a stocky seventy-year-old who had died of heart disease. When the man was alive, I thought, it was all there—internal pictures and words, memories of the dead and the living.

— Siri Hustvedt, *The Sorrows of an American*

The weight of Dum's brain may be surprising, but it's simple to measure. An average human brain weighs about three pounds. In his influential book *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, clinical neurologist and theoretical neuroscientist Antonio Damasio observes, "After considering how consciousness may be produced within the three pounds of flesh we call brain, we may revere life and respect human beings more, rather than less" (28). In other words, studying the brain to determine its role in "the making of consciousness" need not be a reductive enterprise. As a physical object, the brain resonates strangeness, mystery, and unknowability: its folds, crevices, and taut surface; its top-heavy shape, gray and white matter, and apparently identical hemispheres; its interior nuclei, glands, and the cerebrospinal fluid that surrounds its surface; its neurons with their axons and branching dendrites; the glial cells and myelin sheaths that insulate, support, and modulate those neurons; the chemicals secreted and consumed by the cells; the proteins and amino acids that influence the cells' behavior. The weight of a brain is probably the crudest measurement we have, and even that can vary by as much as a pound from one human to

the next (and the weight of a cadaver's brain depends on how it's preserved). Even the simplest questions about the brain compel the asker to think about its estranging anatomy.

In this essay, I focus on the portrayal of physical brains in three novels: Siri Hustvedt's *The Sorrows of an American*, Ian McEwan's *Saturday*, and John Wray's *Lowboy*. These novels are representative of a common literary phenomenon: the dramatization of a fantasy whereby touching brains may reveal the stuff of which self is made. In terms of genre, these novels are revisionist mysteries, wrapped in conventions of detective fiction but revising those conventions in fundamental ways. Their protagonists' affiliations with science and medicine enable their authors to link the mysteries of plot to mysteries about brains. Hustvedt's protagonist, Erik Davidsen, is a psychiatrist reluctantly embroiled in an anonymous extortionist's persecution of his sister, a mystery he can't solve without his eccentric friend Burton, a historian of memory science. McEwan's Henry Perowne is a neurosurgeon hounded by a petty criminal whose Huntington's disease becomes a central plot device. Wray's Will Heller, alias Lowboy, is a schizophrenic teenager recently escaped from a psychiatric hospital and pursued through subway tunnels and city streets by a mystified Detective Lateef with the help of the boy's mother Violet, a failed student of neurochemistry.¹ Representations of physical brains in *Saturday* are pervasive, while they are more scattered in *Lowboy* and *Sorrows of an American*. In all three cases, however, brains provoke questions about the relationship between physiology and the self that become central to narrative closure.

In each novel, plot resolution depends only partly on the solving of crimes. Ultimately, Hustvedt's Erik uncovers the identities of his sister's extortionists; with the help of his son, McEwan's Perowne fights off a violent intruder out for revenge after the smug, wealthy protagonist insults his pride during an argument about a fender bender; and Wray's Detective Lateef discovers that Violet is also schizophrenic, momentarily apprehending Will before the novel closes with its teenage protagonist falling onto subway tracks as a train approaches. These resolutions are necessary but insufficient to the closure of the novels—which dramatize impossible quests for interiority. The process of solving crimes becomes a vehicle for characters to develop new understandings about the relationship between brain, body, self, and world.

All three novels portray physical brains as vehicles for a fantasy that their characters might find elusive, intangible, or ethereal elements of self by dissecting brains, holding them, examining them, or just thinking about them. In these fictions, touching brains provokes a philosophical question their characters cannot answer: How does

the interplay of physiology and the material world produce the felt states whose sum we call self? Plot resolution requires philosophical reflection to become concrete, guiding protagonists' actions and relationships. In short, they must find ways to escape or transcend the insularity of their inner lives. In the process, the novelists question—or revise—conventional understandings of interiority, suggesting that our shorthand term for the representation of what Damasio calls "the feeling of what happens" may obscure fundamental elements of the literary experiments it describes.

When novelists portray fantasies of finding selves in brain matter, they are responding to arguments made by theoretical neuroscientists like Damasio, Gerald Edelman, Jaak Panksepp, and Mark Solms—all of whom take the liberty of stepping outside the laboratory to speculate or perhaps fantasize about relationships between biology, self, and culture. Damasio's theory of consciousness hinges on the dynamic relationship between organisms and objects, a relationship that produces the mental images that comprise subjective experience. One of Edelman's several books on his Theory of Neuronal Group Selection, or "neural Darwinism," is entitled *A Universe of Consciousness: How Matter Becomes Imagination* (a collaboration with Giulio Tononi). The first chapter of Panksepp's book *Affective Neuroscience: The Foundation of Human and Animal Emotions* begins with the sentence, "Our emotional feelings reflect our ability to subjectively experience certain states of the nervous system" (9). In *The Brain and the Inner World: An Introduction to the Neuroscience of Subjective Experience*, Solms and Oliver Turnbull seek to build on "new insights into the natural laws that govern our inner life" in order to resolve longstanding conflicts between neuroscience and psychoanalysis (xiv). The authors of these books are frank about the gap between their dramatic hypotheses and the available evidence. Like the novelists, they are taking the liberty of speculating based on what we do know, in part to spark cultural dialogue and in part to suggest avenues for research that may provide some of the elusive answers.

In the past two decades, a growing number of novelists (and memoirists) have turned their attention to the confounding gap between what we're learning about the physiology of the brain and the various forms of immaterial experience that emerge from it: consciousness, imagination, feeling, emotion, affect, memory, and self.² An astounding number of these novels are revisionist mysteries of one kind or another. In his essay "Rise of the Neuronovel" (in which he coins the term neuronovel), Marco Roth makes it clear how widespread the phenomenon is, including works such as Mark Haddon's *The Curious Incident of the Dog in the Night-Time* (2003), narrated by an autistic child detective; Jonathan Lethem's *Motherless*

Brooklyn (1999), whose protagonist is an unwitting detective with Tourette's Syndrome; Rivka Galchen's *Atmospheric Disturbances* (2008), narrated by a psychiatrist suffering from paranoid delusions; Richard Powers's *The Echo-Maker* (2006), whose protagonist suffers from Capgras Syndrome, leading him to suspect that his friends and loved ones are imposters; and McEwan's earlier novel *Enduring Love* (1997), in which the villain's exotic condition results in a delusion that the novel's protagonist loves him. In addition to the novels Roth examines, we might add Powers's *Galatea 2.2* (1995); Lauren Slater's *Lying* (2000); David B.'s *Epileptic* (1996; 2005), in which the focus on the brain as physical object is fundamental to the blending of fiction and memoir; Teju Cole's *Open City* (2012), narrated by a psychiatric resident whose observations about urban life are filtered through his work with people suffering from mental illness; Haruki Murakami's *IQ84* (2011), in which the heroine perfects an assassination technique involving a needle designed to invade a tiny spot in the brain where conscious life may be extinguished; and, finally, Thomas Harris's *Hannibal* (1999), made notorious through Ridley Scott's film adaptation of the scene in which Hannibal sautéed the living brain of a Justice Department officer and feeds it to FBI agent Clarice Starling.

Roth decries the "rise of the neuronovel" by way of comparison to the genre's predecessors: "What has variously been referred to as the novel of consciousness or the psychological novel or confessional novel—the novel, at any rate, about the workings of a mind—has transformed itself into the neurological novel, wherein the brain becomes the mind." Writers of neuronovels are heirs to a tradition of modernist and postmodernist luminaries whose famous experiments with representing consciousness defined much of the previous century's literature—including Virginia Woolf, E. M. Forster, James Joyce, Gertrude Stein, Marcel Proust, Ralph Ellison, Christopher Isherwood, Vladimir Nabokov, and Toni Morrison.³ As Roth points out, psychological novels—*Clarissa*, *Frankenstein*, *The Strange Case of Dr. Jekyll and Mr. Hyde*, *Mrs. Dalloway*, and *Invisible Man*, for instance—have never been only about the workings of the mind. The same is true of neuronovels.

Roth uses the term neuronovel pejoratively, but it's an apt descriptor for a thriving subgenre of literary fiction. As Stephan Besser argues in "Mixing Repertoires: Brain, Psyche, and Memory in Recent Neurological Fictions," the idea that neuroscience is a monolithic practice dominated by a reductionist and determinist materialism is a misleading generalization: a range of materialisms characterize theory and practice in neuroscience. While neuronovels engage materialist arguments about relations between brain and self, they do not represent a single point of view. A swift taxonomy of neuronovels demonstrates a range of literary techniques for representing the mind

and brain in social and environmental contexts. These techniques are often combined in a single novel, but one or another tends to dominate. While many of these novels focus on protagonists whose neurological difference is at the crux of the narrative, this is not their defining feature. Some neuronovels mine neurological syndromes for techniques of narration, designing sentence and story patterns as mimetic symptoms of the syndrome in question, as in Haddon's *Curious Incident*, Lethem's *Motherless Brooklyn*, or Slater's *Lying*. In others, neurologically different characters catalyze the transformation of neurotypical protagonists, as in McEwan's *Enduring Love* and *Saturday*. Others focus on the experience of caregivers or family members of people suffering from severe neurological disease, as in David B.'s *Epileptic*, Powers's *The Echo Maker*, and Wray's *Lowboy*. Another group involves protagonists whose medical professions or scientific research put them in contact with the minds and brains of others, including Hustvedt's *Sorrows of An American*, McEwan's *Saturday*, Cole's *Open City*, and Powers's *Galatea 2.2*. Still others use the brain as a theatrical plot device, as in Harris's *Hannibal* and Murakami's *IQ84*. Contrary to Roth's argument, the addition of brains need not require the exclusion of minds. If neuronovels share a common element, it's an interest in brain research for the sake of generating new ideas about how consciousness might be narrated and understood. In this sense, neuronovels are cultural responses to neuroscience, expanding the domain of critical debates about the brain. Because of this, it may be the case that neuronovels are more similar in their cultural contributions than their formal attributes.

If modernist experiments with representing consciousness are the most significant literary influence on the neuronovel, the "brain memoir"—or autobiographical account of neurological difference, disease, injury, or experience—is the genre's closest living relative. While neuronovels differ from brain memoirs in many of their aims and forms, they are both responding to contemporary developments in brain research, and they share an impulse to use narrative to probe social and philosophical questions that emerge from this research—questions that are often too ambiguous, overdetermined, or subjective to be pursued through scientific methods.

Of course, neuronovels come in many forms and they are shaped by the philosophical and political dispositions of their authors. Nonetheless, like brain memoirs and modernist fictions, they tend to share common aims, manifested in varying degrees in individual works. Neuronovels revisit the representation of consciousness in response to developments in brain research; provoke debates about determinism and reductionism, asking readers to reconsider simple cause-and-effect relationships between biology and experience; re-

flect and challenge cultural assumptions about neurological difference; experiment with literary conventions to foreground the bewildering complexity of relations between brain, body, and world; and challenge the equation of consciousness and interiority, suggesting that conscious experience is dynamic and relational, emerging through interactions between an organism (or protagonist) and its environment, including other organisms, cultural products, and social relationships. In the process they provoke a reexamination of the modernist fictions whose renown for experimenting with interiority has overshadowed the dynamic and relational portraits of consciousness they depict.

This challenge to assumptions about interiority may be the neuronovel's most easily overlooked cultural contribution, but it is also the element most entangled with the genre's other features. In fact, it may be the key to understanding the challenge many neuronovels pose to widespread cultural assumptions about the brain, assumptions that influence the direction of scientific research and medical practice. The term "interiority" became pervasive in literary studies after interior monologues and stream of consciousness became the primary focus of the big modernist experiments. *Ulysses*, *Mrs. Dalloway*, and *The Sound and the Fury* disrupted literary conventions in order to find formal means of representing what mental experience feels like.⁴ "Interiority" is so standard a term that we've forgotten it's a metaphor, one that conflates the fact that our brains reside inside our skulls with the idea that our mental experience must also live in a container. In its usage, the term both encompasses and obscures the inexorable interplay between body, mind, and environment central to the literary experiments it describes. While I'm not dismissing the term or advocating its disuse, I am taking a cue from the novels I've been discussing to suggest the time is right to defamiliarize it enough to expand its definition and implications. In neuronovels, interiority is recast with a range of narrative techniques for representing felt states produced through the dynamic interaction of an organism (or character) and environment. Interiority, they remind us, is not all about interiors. We can touch physical brains. We know where they are. But where is the self, or the mind, or consciousness? Inside what? Our bodies? Our skulls? Not exactly.

In his book *Embodied: Victorian Literature and the Senses*, William A. Cohen uses the term "material interiority" to describe the "literary depiction of ethereal inner qualities in a language of tangible objects" in nineteenth-century fiction (476). Cohen's concept expands the purview of interiority, emphasizing its dynamic and relational qualities. The impulse is similar to that of neuronovels, which represent the brain as one component in a dynamic and elusive system through which consciousness and selfhood emerge. As Cohen ob-

serves, a range of body parts (and other objects) become entangled with "ethereal inner qualities" in novels by Charles Dickens, Charlotte Brontë, Anthony Trollope, and Thomas Hardy. The novels reflect the wide-ranging objects of inquiry of their era's quickly evolving and increasingly public psychological sciences whose purview was more diffuse than twenty-first century brain research. Phrenology focused on the skull and face, physiognomy on physical traits and demeanor, vivisection on nerves and muscles, evolutionist psychology on the relationship between behavior and genetic inheritance, and sexology on genital behavior.⁵ Of course, twenty-first-century science examines skulls, faces, nerves, muscles, genes, and genitals—but neuroscience, with its acute focus on the brain (and sometimes the nervous system as a whole) currently attracts more cultural attention and social influence than any other branch of psychology or human physiology. As responses to neuroscience, neuronovels tend to focus primarily on the brain—generally in literal terms, rather than through the metaphors of entombment, excrement, penetration, and pollution Cohen examines (*Embodied* 41).

When Roth argues that neuronovels "capitulate" to neuroscience, he's partly right. The brain is central in these novels. According to Roth, the problem with neuronovels is that they mirror reductionist and determinist tendencies of neuroscience. Of course, neuroscience is a range of disciplines, and it would be a mistake to reduce all this science to a singular philosophical point of view or mode of practice. Similarly, it's impossible to generalize about all neuronovels. However, many of them exploit the centrality of the brain to suggest a paradox: when the brain is at the center, its contexts and its ambiguities become resoundingly visible, revealing the impossibility of reducing the self to mechanistic models of cellular interaction. In this sense, many of the novels Roth discusses engage in a more robust dialogue with the sciences than the one he caricatures.

Neuronovels ask us to take biology seriously, to include cells, genes, and organs in our estimation of selfhood, but not necessarily to oversimplify biology's role. When neuronovels ask how biology, self, and culture impinge on each other, they challenge readers to understand neurological difference such as Tourette's Syndrome in Lethem's *Motherless Brooklyn* or autism in Mark Haddon's *The Curious Incident of the Dog in the Night-Time*. The enterprise is not without hazards. Lethem's and Haddon's novels risk dealing in caricatures of neurological difference, reinforcing stereotypes, or making readers feel they are gaining genuine knowledge from fictional portraits. Even when this is the case, those same novels provoke reconsideration of assumptions about the relation between brain and self, often through their emphasis on material interiority, or the portrait of conscious-

ness as dynamic and relational. Similarly, it's possible to argue (as Roth does) that where Woolf emphasizes the subjective experience of consciousness, McEwan reduces consciousness to brain activity or diseases.⁶ But that would be to miss the irony implicit in his dramatization of his protagonist's fantasy of finding the selves of his patients when he cuts open their brains. Like Clarissa Dalloway, Henry Perowne is bourgeois, privileged, and myopic. But also like Woolf's character, Perowne (as his narrator calls him) gives readers plenty of cues to see his failings and to sympathize with his epistemological limitations. In a different vein, Wray's *Lowboy* is a social and political novel, a critique on established medical practices for treating mental illness and an exploration of the ways that race and class shape identity. Hustvedt adopts a more philosophical—almost theoretical—stance, dramatizing the impossible overdetermination of identity, whose contours are shaped by social relations, memory, physiology, sensory experience, emotion, and history. In each case, the writer "assimilates" science so as to "expand the writ of literature" to examine new inflections of the subject Roth argues they eschew: "the personal, the self." Like their modernist predecessors, neuronovels are experiments in narrative representation, experiments that challenge longstanding assumptions about subjectivity and interiority. They exploit twenty-first-century forms of material interiority to give readers an expanded view of "the feeling of what happens."

The Explanatory Gap

It's significant that Erik Davidsen is wrong about Dum's brain. He's confounded by material interiority. "When the man was alive," he reports, "it was all there—internal pictures and words, memories of the dead and the living" (5). That "once-living man" was never found in the brain Erik holds. To use Cohen's terms, his words and memories were "ethereal," his body "tangible." But his body didn't simply house his mind. The resolution of Erik's crisis—a midlife depression exacerbated by self-imposed isolation—requires a philosophical reorientation. Selfhood, he comes to learn, emerges from a dynamic interaction of brain, body, and world. Erik must learn that he, like Dum, is more than the sum of his brain cells. In short, he must return to the messy world of the social by getting involved in the novel's two-pronged mystery plot, which involves questions about a trauma in his father's childhood and the blackmail of his sister by a former lover of her dead husband. The memory, regret, and desire that animate this plot feel ineffable, but they are dependent on the bodies and relationships of those involved. Hence Erik's reluctance.

Erik is stuck in the gap between the material and the immaterial, along with the protagonists of *Lowboy* and *Saturday*. In *Lowboy*, Will hides on a New York City subway platform, reflecting on the bewildering interplay of environmental stimulus, the current of his thoughts, and the physiology of his brain:

Lowboy listened to the sound of the wheels, to the squealing of the housings at the railheads and the bends, to the train's manifold and particulate elements functioning effortlessly in concert. Welcoming, familiar, almost sentimental sounds. His thoughts fell slackly into place. Even his cramped and claustrophobic brain felt a measure of affection for the tunnel. It was his skull that held him captive, after all, not the tunnel or the passengers on the train. I'm a prisoner of my own brainpan, he thought. Hostage of my limbic system. There's no way out for me but through my nose. (5)

Throughout the novel, Will's conviction about the origin of his selfhood vacillates. Sometimes he's sure it's his brain, at other times, the "particulate elements" of his world. But neither answer is sufficient. Wray makes it clear that to find Will, readers should look to the dense and elusive interplay of brain, body, and world. During surgery, McEwan's Perowne does exactly that, probing brains more literally and thoroughly than the characters in the other two novels: "For all the recent advances," he reports during surgery, "it's still not known how this well-protected one kilogram or so of cells actually encodes information, how it holds experiences, memories, dreams and intentions. He doesn't doubt that in years to come, the coding mechanism will be known" (262).

As with Erik and Will, Perowne is wrong about his conviction that neuroscience is all we need to understand selfhood. His certainty is shaken through his encounter with Baxter and is mitigated by his fascination with nonverbal meaning in music and his evolving attitudes about poetry as a means of engaging the ineffable. Like Clarissa Dalloway's, Henry's insights are both genuine and flawed. Throughout the narrative, he clings to the idea that physiology can explain selfhood, but the narrative's central conflict is resolved through a poem and a surgery whose musical accompaniment is central to its success. While Henry shares the fantasy of class privilege that defines Clarissa's subjective limitations, his beliefs are equally shaped by his conviction that the brain is the key to all mythologies. Woolf is more subtle than McEwan, refusing to represent Clarissa's experience as transformative. When her worldview is challenged, she is confused; when Henry's is challenged, he budes. McEwan's portrait of the self, written in the age of neural plasticity, may suggest a too-easy

transformation even while McEwan questions his protagonist's overly rigid ideas about cause and effect relationships between physiology and experience.

Contradiction and inconsistency are inevitable when a novelist explores relations between physiology and self; in fact, they may be the point. In neuronovels, the gap between the material and the immaterial complicates the representation of mental experience. For example, Will's fantasy of extracting his brain—and therefore himself—through his nasal passages neatly summarizes a central problem of these texts. He's looking for his ineffable, suffering self in the contact between two forms of matter: his brain and the subway tunnels. This impossible quest echoes the epistemological impossibilities inherent in an emerging doctrine in theoretical neuroscience and cognitive philosophy: the idea that consciousness and self are products of the dynamic interactivity between brain, body, and world. In Damasio's words, "Consciousness, as we commonly think of it, from its basic levels to its most complex, is the unified mental pattern that brings together the object and the self" (11). Philosopher Alva Noë articulates a similar idea more assertively: "to understand consciousness in human and animals, we must look not inward, into the recesses of our insides; rather, we need to look to the ways in which each of us, as a whole animal, carries on the processes of living in and with and in response to the world around us" (7). While the recent advances in brain research are astounding, we are far from understanding the vicissitudes involved when physical bodies in material worlds produce the ineffable experience of an organism. As responses to recent developments in theoretical, empirical, and clinical neuroscience, the ingenuity of the novels under discussion lies in their experimenting with narrative techniques that can submerge readers in the "explanatory gap" between the material and the immaterial, or the physical and the phenomenological.⁷

Material Interiority

In his discussion of material interiority in Charlotte Brontë's *The Professor*, Cohen asserts that the emphasis on it in Victorian fiction "collapses dualistic notions of mind and body":

By portraying in palpable terms the human body's enclosure of intangible subjectivity, [Brontë] exploits the paradox of an immaterial soul, heart, or mind inhabiting the flesh. Pervaded by metaphors of entombment and boundary violation, the novel's language exaggerates and estranges the conditions of embodiment. In using the term "material

interiority," I mean to designate this literary depiction of ethereal inner qualities in a language of tangible objects, a practice that collapses dualistic conceptions of mind and body (or body and soul) by making subjective inwardness and bodily innards stand for each other. (476)

Cohen's argument that Victorian fiction "exaggerates and estranges the conditions of embodiment" is applicable to contemporary neuronovels, which also make "subjective inwardness and bodily innards stand for each other." Like the Victorian texts Cohen examines, neuronovels remind readers that "the body is the inescapable condition of possibility for human existence" (*Embodied* 131). However, neuronovels are less interested in "collapsing" dualism than they are in estranging relations between body and self in order to emphasize the "possibility" in Cohen's sentence—or, put another way, to highlight the epistemological and experiential uncertainties that emerge from the explanatory gap.

In *Saturday*, for example, Perowne touches brains for a living. In place of Clarissa Dalloway's flights into other characters' psyches, Perowne penetrates other characters' skulls. The novel features numerous surgery scenes, during which Perowne expertly cuts open people's skulls and cuts into their brain matter in the hope of changing or saving their lives. McEwan depicts these surgeries in exquisite detail. When he does so, his narrator assumes a double position, emphasizing Perowne's surgical techniques and speculating on philosophical questions about the capacity of the brain matter to animate his patients. The novel's primary conflict is resolved through a five-page surgery scene. Henry performs this surgery on a character named Baxter, a thug whose portrayal resembles Dickens more than Woolf:

Now, using the same dissector, he lifts the whole free flap away from the skull, a large piece of bone like a segment of coconut, and lays it in the bowl with the other bits. The clot is in full view, red of such darkness it is almost black, and of the consistency of recently set jam. Or, as Perowne sometimes thinks, like a placenta. But round the edges of the clot, blood is flowing freely now that the pressure of the bone flap has been relieved. It pours off the back of Baxter's head, over the surgical drapes and onto the floor. (260)

Perowne's observations are thick with metaphors that estrange the patient's brain, even for a neurosurgeon intimate with the anatomy. The skull is a "coconut," the clot "set jam." His placenta analogy suggests an unrepresented history for Baxter. Before he was a man in

middle age, like Perowne, Baxter was a fetus, then an infant, a child, an adolescent, and a young man. Now his vulnerable body "pours" out of him. Perowne's job is to inflict bodily trauma in order to heal, violating his body's boundaries in order to restore them.

Henry's colleagues don't know it, but Henry caused Baxter's injury by pushing him down a flight of stairs after Baxter broke into his house, terrorized his family, and threatened to rape his daughter. Henry keeps another secret from his colleagues. In addition to the blood clot, Baxter suffers from fairly advanced Huntington's Disease. His life, however compromised, depends on the success of the surgery, depicted in clinical detail:

"Elevate the head of the table. Give me as much as you can," Henry calls to Jay. If the bleed is higher than the heart, the blood will flow less copiously. The table rises, and Henry and Rodney step back in quickly through the blood at their feet and, working together, use a sucker and an Adson elevator to remove the clot. . . . But they can't close up yet. Perowne takes a scalpel and makes a small incision in the dura, parts it a little and peers inside. The surface of Baxter's brain is indeed covered with a clot, much smaller than the first. He extends the incision and Rodney tucks back the dura with stay sutures. (260)

The scene may be contemporary literature's most elaborate (and meticulously researched) display of material interiority. The brain anatomy with which Perowne is so familiar is estranged because of his charged and overdetermined relationship with Baxter, setting the stage for the surgeon to fantasize about the "ethereal" aspects of self he might find as he dissects his antagonist's brain. In the novel's acknowledgments, McEwan thanks a number of neurosurgeons, including Neil Kitchen: "It was a privilege to watch this gifted surgeon at work in the theatre over a period of two years" (292). McEwan's research shows in these passages. Their length and detail feel like they're coming from a writer who can't resist demonstrating what he's learned. However, the language of the passage is literary, not clinical. Metaphors are not uncommon in medical literature, but the emphasis on emotionally charged sensory experience—"[blood] pours off the back of Baxter's head, over the surgical drapes and onto the floor"—is where the craft of the novelist transforms the clinical into the literary. Baxter's body is commingling with the antiseptic environment of the operating room. Readers are asked to indulge the fantasy that an exchange of Baxter's immaterial self is taking place when Perowne cuts him open and lets the contents of his body pour "freely" into the

room. Even Perowne, thoroughly a materialist, imagines that he'll learn something about the mind by touching the brain.

As the scene proceeds, philosophical reflections intrude on the clinical. Like Damasio, Perowne finds all the evidence he needs to revere life in the brain as a physical organ. But his materialism seems to soften as the scene progresses and it becomes clear that Perowne is looking for more than a blood clot under Baxter's skull:

For all the recent advances, it's still not known how this well-protected one kilogram or so of cells actually encodes information, how it holds experiences, memories, dreams and intentions. He doesn't doubt that in years to come, the coding mechanism will be known, though it might not be in his lifetime. . . . But even when it has, the wonder will remain, that mere wet stuff can make this bright inward cinema of thought, of sight and sound and touch bound into a vivid illusion of an instantaneous present, with a self, another brightly wrought illusion, hovering like a ghost at its centre. Could it ever be explained, how matter becomes conscious? (262)

Perowne sounds almost like an Enlightenment naturalist when it comes to predicting epistemological revolutions just beyond reach—a gesture common among neuroscience enthusiasts. You could call these predictions rhetorical sleights of hand, whereby what we might know in the future stands in for what we don't know now, but you might also call them fantasy. It's debatable whether we'll ever understand the complex relationship between matter (our brains, our bodies, and the physical world around us) and the immaterial or ineffable experience of self or consciousness. In the meantime, novelists offer aesthetic experience in place of epistemological certainty.

Whereas science deals in hypothesis, literature deals in the creation of speculative worlds. Both enterprises demonstrate the value of counterfactual thinking—imagining what we cannot yet know. Touching brains to find minds is a fantastical enterprise. In literature, the irony of a quest is explicit. Neuronovelists dramatize epistemological questions that confound science and philosophy, but they make no claim to resolve them. In the process, it becomes clear that moments of material interiority mirror a generalizable formal principle: aesthetic experience involves the inexplicable traffic between the material and the immaterial in ways that feel automatic and often go unnoticed. Words on a page, images on a screen, or sound vibrating from a speaker act on the bodies of readers, spectators, and listeners and in the process trigger a spectrum of immaterial experiences— affective responses, acts of inspiration or imagination,

emotions, desire, and memory—whose physiological correlates, felt and unfelt, trigger still more immaterial experiences, and so on. In this sense, a form of material interiority is fundamental to the capacity for the aesthetic "transmission of affect," to borrow a phrase from the title of feminist philosopher Teresa Brennan's book about the human capacity to share felt states. In the final section of this essay, I will argue that while Hustvedt, McEwan, and Wray begin by probing the origins of ineffable experience, they conclude by focusing on the means for transmitting or sharing it.

Baxter's Blood, Will's Membrane, and Burton's Sweat

In the conclusion to *Embodied*, Cohen revisits "fractured moments that provide glimpses of the body unmaking any abstract idea of the human" in Victorian literature (129). He argues that such moments highlight "the contiguous and reciprocal contact between body and world by focusing on sensory influx and corporeal outflow." In his words,

they draw attention to the conditions of embodiment itself. When the body obtrudes on the self and cannot be regarded merely as its container, we are shocked into recognition of the fullness of bodily existence. Such a recognition registers the primacy of the material that is the human and, at the same time, prevents that material from becoming fixed and left behind by an idea of the ethereal, transcendent, or universal personhood. (131)

Scenes of "sensory influx and corporeal outflow" are central in the neuronovels I've been discussing. Cohen emphasizes obtrusions of the body on the self. These neuronovels extend that idea: as their narratives proceed toward resolution, they emphasize moments when characters' bodies "obtrude" on each other, catalyzing moments of shared subjectivity whereby characters feel like they bridge the gap between one "ethereal" consciousness and another, however momentary or fleeting the experience. Ultimately, plot resolutions depend on these moments of shared subjectivity, similar to the ones Woolf depicts, with the crucial difference that they arise from moments of contact between bodily organs or fluids, sometimes literally and sometimes metaphorically. In the process of solving the crimes that drive their plots, a great deal of bodily obtrusion enables characters to overcome the isolation of "the private, first-person phenomenon" of consciousness, to borrow a phrase from Damasio (12).

In *Lowboy*, for example, Will spends much of the novel on a quest to lose his virginity. His first attempt, in the makeshift subway

tunnel home of a woman named Heather Covington, fails. Nonetheless, Will's reflections on the experience demonstrate his desire for psychological release through bodily obtrusion:

She closed her eyes and opened her legs wider. He looked away for the length of a breath, then leaned forward until he could feel the warmth of her bare skin against his face. The smell forced his mouth and eyes shut. He thought about the inside of his body: how cold and shutaway it was, like a doll forgotten in an empty house. He thought about the end of the world, about the people above the grates, about the tunnel, about MUSEUM OF NATURAL HISTORY. The dinosaurs set like urns into the wall. He pictured his own skeleton there, then Heather Covington's, then Violet's. What he needed to do was as clear as if it had been burned into him with electric wire. He needed to break the membrane that had held him all his life, to slip out into the putrefying world. He had to put himself into another body. He had to bite down on his tongue and push.

Above the grate someone was laughing softly.

"I can't do it," he gasped, gagging on his own breath. "It's gone to sleep, Miss Covington. Take a look." (68)

Toward the end of the novel, Will does lose his virginity with a prostitute who calls herself Secretary. The scene enables him, finally, to feel like he's broken "the membrane that had held him all his life":

The room had gone silent and the light had gone dim and he opened his mouth and the whole world went silent. Somewhere voices were screaming in amazement and victory but the screaming was too far off for him to hear. There was no need to hear. She was moving above him. He could see out of the holes in her eyes and taste with her mouth and feel every single thing that she was feeling. He felt the skin around him breaking and the silence breaking with it. He seeped out of his body like the yolk out of an egg. The world was outside his body now, which meant he was alone. His body was on the outside of the world. (221)

Like Erik and Perowne, Will is an unreliable narrator. His delusions may account for his belief that he can "feel every single thing that she was feeling." But the moment, followed by a beating in which Will's body is obtruded in another more painful and violent way, motivates him to return to the Union Square subway stop, the scene of the

crime that led to his incarceration—a place where Lateef and Violet are likely to find him. Lateef apprehends him momentarily. He bites the detective's cheek, tasting his blood as he falls onto the tracks. Will is relentless in his quest for connection through bodily obtrusion.

Will's feeling of shared subjectivity is grand and generalized. When he dies, the delusional narrator tells us, "the world ended by fire" (258). While his case is extreme, it's contiguous with moments in other neuronovels, including the empathy McEwan's Perowne feels for Baxter. Before giving his assent to close, Perowne directs a nurse to put on Barber's "Adagio for Strings"—to replace the Bach that played during surgery. Music is the only form of art that seems not to leave Perowne cold, and he chooses the soundtracks to his surgeries carefully. Barber becomes the vehicle for Perowne's empathy:

When at last the head bandage is in place and secured, everyone in the theatre, the whole firm, converges on Baxter—this is the stage at which the patient's identity is restored, when a small area of violently revealed brain is returned to the possession of the entire person. This unwrapping of the patient marks a return to life, and if he hadn't seen it many hundred times before, Henry feels he could almost mistake it for tenderness. While Emily and Joan are carefully pulling away the surgical drapes from around Baxter's chest and legs, Rodney makes sure the tubes, leads and drains are not dislodged. Gita is removing the pads taped over the patient's eyes. Jay is detaching the inflatable warming blanket from around Baxter's legs. Henry stands at the edge of the table, cradling the head in his hands. The helpless body is revealed in a hospital gown and looks small on the table. The meditative line of orchestral strings seems to be addressed to Baxter alone. (264)

On completion of the surgery, Perowne reflects on "the dream of absorption" or "benevolent disassociation" that transports him when he cuts people open and repairs their damaged flesh. "He's been delivered to a pure present," he thinks. "It's a little like sex, in that he feels himself in another medium. . . . It's a feeling of clarified emptiness, of deep, muted joy" (266). This particular case is more charged than most. Baxter, the man whose blood poured all over him during surgery, is his partner in this "pure present." He's become intimate with the physiology of his persecutor, the man who nearly raped his daughter. When Perowne expresses the feeling that the music "seems to be addressed to Baxter alone," he adopts Baxter's perspective—or his fantasy of it, momentarily bridging the divide between himself and this man who is so different from him in all worldly particulars. If

Will is unreliable because of his delusions, Perowne, "the professional reductionist" (281), is unreliable because of his rigid materialism, whose persistence is indicated by the scene's final sentence: "There must, he concludes as he stands to leave the theatre, be something wrong with him" (266). After risking his career by insisting on operating on a man whose injuries he causes, Perowne is unable to maintain reflection on his own motives or feelings. While he may dismiss his actions, it's clear to readers that he's been seeking empathy for his persecutor because he needs it to resolve the psychological and epistemological confusion their conflict exposed.

Genital contact is the vehicle for Will's feeling of shared subjectivity; for Perowne, it's Baxter's blood and brain. For Erik, Husvedt's psychiatrist narrator, it's his friend Burton's sweat. In middle age, when readers meet him, Erik is a serious man who's unlikely to give a nickname to a cadaver. When he thinks about holding Dum's brain in his hands, readers become privy to a history that haunts him. Erik was once a younger man, a medical student willing and able to participate in a little gallows humor. As he thinks about the "internal pictures and words" of the "once-living man" represented by that three pounds of flesh (5), readers are prompted to think about Erik in these terms. His "memories of the dead and the living" are internal pictures and words, as Dum's once were. If Erik were right that a life like Dum's could be found in the brain alone, there would be no crisis to resolve—simply a crime to be prosecuted. But life, Hustvedt's novel suggests, happens in the breach between materiality and consciousness. The power of the brain requires a context: a body in a world of other bodies and multitudes of organisms and objects that play roles in the emergence of a human life from systems of proteins, amino acids, chemicals, cells, and organs. Through self-imposed isolation, Erik has been avoiding the contexts that might change his life.

That's where his sweaty friend Burton comes in. Burton is a minor character with a noxious case of material interiority—hyperhidrosis—and a central role in the novel's resolution:

Burton was a fat, waddling, red-faced person who had little luck with girls. His chief trouble, however, wasn't his looks, but his moistness. Even in winter, Burton had a steamy appearance. Bubbles of perspiration protruded from his upper lip. His forehead gleamed, and his dark shirts were notable for the great damp circles under his arms. The poor fellow gave the impression that he was humid to the core, a peripatetic swamp of a man with a single vital accoutrement—his handkerchief. Once in medical school I had suggested that there were some treatments for hyperhidrosis.

Burton had informed me that he had tried everything known to humankind that didn't risk turning him into a vegetable, and his was a hopeless case. "My ur-reality is sweat," he told me. The first year of residency had marked the end of his career as a practicing physician. His melancholy, dripping face, his sticky palms and sodden handkerchief had alienated nearly every conscious patient. . . . (67)

Burton is a messy counterpoint to a protagonist who doesn't realize how much he needs his help. Perhaps unsurprisingly, his sweat has everything to do with his brain and his mind. People with generalized hyperhidrosis like Burton's sweat profusely all over their bodies. While the cause of hyperhidrosis is the subject of some debate, the nervous system plays a role. Of course, many people sweat more when they're anxious, but people like Burton sweat *a lot* more. At the end of the novel, Burton's sweat abates somewhat after the death of his mother. He confesses his concern to Erik that the change—and therefore the sweat itself—might be "symptomatic" (233). A psychoanalyst might see Burton's sweat as a symptom of his feelings about his mother or a childhood trauma. Nonsense, a physician might say. Burton's problem is physical. Hustvedt is careful not to resolve the impasse. In the words of Erik: "I wouldn't overinterpret what appears to be a good thing" (233).

Burton's sweat represents the murkiness of relations between psychological and physical experience, a visible sign of inarticulate and largely unknowable corporeal experience, what Damasio has sometimes called the body's "wordless storytelling" (188). One of Burton's roles is to pull some murk out of the novel's other characters, who speak so deftly that their bodies, unlike Burton's, don't get much chance to communicate. In contrast to Burton, Erik is about as dry as a person gets. He's also the narrator of a novel populated by characters whose ur-realities are ideas and who aren't themselves any closer to resolving the emotional conflicts or family mysteries that hamper them. They are frustrated, unhappy creatures searching for elusive meanings about their pasts, their deceased relatives, their spouses, their crushes, and their work. Ideas insulate them. Burton sweats all over these ideas, dons a wig, solves the novel's central mystery, and delivers some moist comfort to his dry friends.

Burton belongs to a tradition of literary characters who secrete too much, from the pissing giants in Rabelais's *Gargantua and Pantagruel* (1532–64) to the farting Ignatius J. Reilly in John Kennedy O'Toole's *The Confederacy of Dunces* (1980). Their secretions are palpable transmitters of affect. Of course, the root of the word "secretion" is "secret," meaning something set apart or concealed

as private. You might say these characters are leaking for the rest of us, whose secretions are taboo. Even though the experiences are unquestionably universal, we're not supposed to sweat, fart, puke, piss, bleed, or ejaculate in public. Keep your secretions to yourself, the taboo reminds us. That taboo is violated by the characters in *Lowboy*, *Saturday*, and *Sorrows of an American*—and, in another sense, by their authors. Like Rabelais and O'Toole, they printed and published accounts of their characters' leaking bodies. Their novels are public declarations that the taboo against public obtrusions of bodily boundaries may inhibit something integral to life—the material interiority that animates human beings and undergirds social connection. The protagonists of all three novels are seeking emotional and psychological connection through bodily contact.

Hustvedt's earlier novel, *What I Loved*, gives a name to what they seek. In that novel, Hustvedt's character Violet proposes a theory of "mixing" in a book she's writing about anorexia: "They find a way to separate the needs and desires of other people from their own. After a while, they rebel by shutting down. They want to close up all their openings so nothing and nobody can get in. But mixing is the way of the world. The world passes through us—food, books, pictures, other people" (88). Anorexia, Violet theorizes, is an attempt to prevent mixing. In that sense, not mixing is pathological. Plot resolution in *Lowboy*, *Saturday*, and *Sorrows for an American* requires characters to reconceive their relationship to "all their openings." The world, including elements of other people's bodies, passes through us—mostly in undetectable ways. In Cohen's words, "permeable and pervious to the world through our senses, our bodies are . . . dynamic selves" (*Embodied* 132). The characters I've been discussing experience their own failures to mix with other people as a confounding obstruction; it inhibits their "dynamic selves" and their relationships. The narratives in which they star are propelled by their desires to find ways to mix through sex, surgery, physical violence, endurance of another's sweat, or engagement with other people's life stories (as in psychotherapy or detective work).

In many ways, neuronovels focus on material interiority as a way of addressing E. M. Forster's famous dictum from *Howard's End*: "Only connect" (202). Touching another person's brain to find that person's self is a fantasy of connecting: finding empathy, sharing feelings, exchanging affect, and blending each other's stories. Recently, science has developed new methods to explore facets of human connection and exchange. Studies on mirror neurons and empathy are widespread in neuroscience. Studies on neuroaesthetics and the ways literary language affects readers are increasingly common. Research on emotional contagion enjoys a high profile in

social psychology.⁸ Only connect, Forster wrote. This is how we do it, the studies suggest. If only I could, these characters might reply. Understanding the physiology and psychology of connection would not satisfy Forster, and it won't help the suffering protagonists of these novels. Will's psychiatric treatment doesn't help; in fact, his medication inhibits connection. Nor does Perowne's strict materialism or Erik's psychiatric training and practice facilitate interaction. But each of them encounters characters who provoke them to mix. For Eric, it's Burton; for Will, it's Heather Covington and Secretary; and for Perowne, it's Baxter. Their leaking counterparts help them fulfill Forster's dictum or Violet's axiom. These characters are reminders that we're all leaking substances that reveal aspects of self we're hardly aware of. The leakage is essential for the mixing.

At the end of *Embodied*, Cohen quotes *The Picture of Dorian Gray*: "to convey one's temperament into another as though it were a subtle fluid or a strange perfume: there was a real joy in that" (136). "This is a transitivity," Cohen concludes, "beyond the boundaries of the self, soul, or indeed body itself, a material form of existence whose porousness puts it both outside and at the center of what it means to be human" (136). Ultimately, neuronovels explore this porousness, the mechanisms and meanings of which are elusive partly because they occupy the explanatory gap that confounds neuroscience and philosophy. Rather than offering theories or proposals about the relationship between physiology and self, they create narratives that propel characters from the examination of bodies into the feeling of shared experience. By devising aesthetic means of representing the gap, they encourage readers to think about their own porousness.

As Hustvedt's Violet points out, books are one form of material that "passes through us." In her book *Feeling Beauty: The Neuroscience of Aesthetic Experience*, Gabrielle Starr proposes a theory of aesthetics that complements Cohen's argument about porousness, and that may explain how and why twenty-first century novelists are responding in such great numbers to the exciting discoveries and confounding questions of neuroscience. Drawing on a blend of empirical research and literary analysis, Starr concludes, "the arts mediate our knowledge of the world around us by directing our attention, shaping perceptions, and creating dissonance or harmony where none had been before" (14). In other words, art makes new experience possible because "mental images serve to integrate a variety of information" (78). In both cognitive and physiological terms, "imagery is, de facto, not just multidimensional but multisensory" (78). Aesthetic experience marshals the brain's interconnectivity to induce experiences that yield new combinations of sensory, cognitive, and emotional experience. As an aesthetic technique, material interiority

requires readers (and characters) to live with the ambiguity inherent in the idea that our bodies are "both outside and at the center of what it means to be human." To do that, novelists develop narrative strategies that encompass both the harmony and dissonance central to Starr's proposition about art's capacity to exploit the porousness Cohen describes. Erik can't reconstruct the man whose body Dum's brain once occupied, but when he feels its weight, it provokes him to imagine the man's experience. It becomes an aesthetic engagement, like reading a novel. In their responses to the neuroscientific revolution, novelists play a unique role, crafting narratives that may forestall simplistic or reductive understandings of the relationship between brain and self, using the materiality of written words to shape the perception of readers—enabling them to feel the porousness of the explanatory gap.

Notes

1. *Lowboy* is narrated in alternating chapters by Will and Lateef. In an interesting formal parallel, Patrick and Henry Cockburn's collaborative memoir, *Henry's Demons: Living with Schizophrenia, A Father and Son's Story*, is narrated in alternating chapters by Patrick and his schizophrenic son Henry. In both texts, the alternating chapters have the effect of juxtaposing the first-person experience of schizophrenia with the perspective of an observer, preventing the dismissal or stigmatization of schizophrenic subjectivity.
2. For an account of the broader neurocultures context to which such novels belong, see Ortega and Vidal; and Besser, "Beyond Reductionism."
3. Of course, neuronovelists did not invent the depiction of touching or exploring brains (or other body parts) for signs of immaterial elements of self. Scenes like these have a history. Variations on them can be found in a variety of texts, genres, and periods including medieval representations of resurrection, Elizabethan drama rooted in humor theories, and contemporary science fiction depicting human-cyborg relations. See Bynum, *The Resurrection of the Body in Western Christianity, 200–1336*; Harvey, *Sensible Flesh: On Touch in Early Modern Culture*; Sutton, "Spongy Brains and Material Memories" (on early modern medical and literary texts); Stiles, *Popular Fiction and Brain Science in the Late Nineteenth Century*; Dames, *The Physiology of the Novel*; and Cohen, *Embodied: Victorian Literature and the Senses*.
4. The *Oxford English Dictionary* documents the use of the term interiority to mean "inner life" to a text published in 1701, though it doesn't list uses of the term to describe a literary technique until the 1960s.

Google Books's Ngram Viewer, which searches digitized texts dating to 1500, reveals marginal use of the term throughout the nineteenth and twentieth centuries, with a rapid rise in use beginning in the 1960s and continuing through to the present.

5. There is a great deal of scholarship on nineteenth-century medicine and psychology, focusing on the widespread cultural influence of these practices. On phrenology, see Shuttleworth; on physiognomy, see Hartly; on vivisection, see Straley; on evolutionary psychology, see Block, Jr.; on Darwin's literary influence, see Beer; on sexology, see Tougaw, *Strange Cases*, and Bland and Doan.
6. Influential reviews of *Saturday*, notably in *Slate* magazine and the *New York Times*, characterize the novel as an explicit reworking of Woolf's *Mrs. Dalloway* for a neuroscientific era. See Roiphe, Metcalf, Heller, and Kakatuni. In a recent public discussion with psychologist Paul Bloom, McEwan denied any awareness of the connection while he was writing the novel but conceded the possibility of an unconscious influence.
7. Philosopher Joseph Levine introduced "explanatory gap" in 1983 to describe the difficulties of explaining the relationship between physiology and phenomenological experience. Since that time, it has become central to debates in consciousness studies.
8. For a sociological study of mirror neuron research, see Pitts-Taylor, "I Feel Your Pain: Emodied Knowledges and Situated Neurons." For an excellent discussion of neuroaesthetics, see Starr, *Feeling Beauty: The Neuroscience of Aesthetic Experience*. For a brief survey of influential research on emotional contagion, see Hatfield, Cacioppo, and Rapson, *Emotional Contagion*.

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