

Enduring Words

*Literary Narrative in a
Changing Media Ecology*

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The Waterworks Knowledge and Cognition in the Early Age of Data Storage

When it comes to molecules and cranial pathways, we automatically think of a process similar to that of Edison's phonograph.

—Georg Hirth

Man was created by Nature in order to explore it. As he approaches Truth, he is fated to Knowledge. All the rest is bullshit.

—Dr. Sartorius, astrobiologist, in Stanislaw Lem, *Solaris*

The literary broth of *The Waterworks* is simple enough: Sarah, a beautiful young widow left penniless by her aged robber baron husband, Augustus; Martin, a caustic young ingenue in search of his deceased father's mysterious whereabouts; innocent children at the mercy of the Faustian Dr. Sartorius in obsessive pursuit of an elixir of life; exhumed bodies and brutal murders in the foggy back alleys of Gotham; and the list goes on. We have all the classic ingredients of a detective and science-fiction thriller with their requisite echoes of Dickens, Doyle, and Hawthorne, among others. The madly brilliant scientist is German, of course, and might well hearken back to any number of brainy villains that have stalked the (alternately, urban or lunar) back lots of Hollywood. Welcome to the *Night of the Living Dead*, or, as the case may be, to *Frankenstein*, *Dracula*, or *Invasion of the Body Snatchers*.¹

The point here is as simple and obvious as the formula above: in a series of self-conscious maneuvers, Doctorow dips into the reservoir of literary and cinematic narratives that make up *The Waterworks*. Similar to Dr. Sartorius's constructive sewing of old bodies into new ones through forced organ transplants and fluid exchanges, Doctorow doctors with the narrative spare parts of his predecessors to stitch together a new novel that understands itself as a high-and-low and cut-and-paste composite of leftovers. The spirit of thievish recycling is so evident that one reviewer described the

book as “a terrific piece of literary larceny” (Jones)—but it is larceny with a twist, of course. For Doctorow, literary and cinematic reappropriations are not self-serving props but time-tested building blocks flexible enough to be updated with a contemporary flush.² Thus, the standard chase through the streets of New York, when the police keep bludgeoning a perpetrator already incapacitated, reads like a déjà vu of the Rodney King incident, a historical reflection of police brutality evident in 1992 no less than in 1871, the year the novel is set.³ The strangling grip of Boss Tweed and his Ring over the municipality of New York City, including the press and the police, “like a vampire’s arterial suck,” evokes the modern specter of repressive regimes throughout the world. And the medical experiments of Dr. Sartorius himself, of course—involving blood transfusions and the injection of “cellular matter” with hypodermic needles—anticipate not only the inhumanly human cruelties of Auschwitz but, in contemporary terms, also the ethical dilemmas of medical advances and the dubious cultural authority of science.⁴ In more senses than one, as the novel’s narrator McIlvaine puts it, *The Waterworks* depicts “a panoramic negative print” of our contemporary condition (59), and as such it mirrors one of Doctorow’s central concerns: the illusory progress of history, the Nietzschean notion of “eternal recurrence” as the apparently ineluctable course of human and institutional degeneration.⁵

Paralleling such large historical resonances, *The Waterworks* also stages retrospectively the building crisis in information processing and knowledge production following a booming postbellum economy. While Doctorow’s late nineteenth-century predecessors were acutely sensitive to the emerging media ecology, especially the growing fissure between the ethos of journalism and fiction writing and the emergence of new data streams, only a writer looking back on such a medial juncture from the late twentieth century can offer sustained reflections (in, significantly, fictional form) on the continued epistemological role of narrative. Through the quixotic figures of a maverick detective and a fictionalizing newspaper editor, not only does Doctorow open a space that interrogates the slippery distinction between knowledge and information in a predominantly empirical culture; he also retraces the cognitive recalibrations of the human mind as effects of an urban data surplus, evident above all in the various forms of personal information processing and the novel’s sustained discourse of the brain.

Stars at War, or Data in Gotham

In his study of the technological and economic origins of the information society, James R. Beniger has pointed to the synergy of energy consumption, transportation technologies, and the desire for the fast distribution of

industrial output. Their collective effect on the American economy, particularly from the 1850s through the 1880s, was “to speed up society’s entire material processing system, thereby precipitating a crisis of control, a period in which innovations in information-processing and communication technologies lagged behind those of energy and its application to manufacturing and transportation” (427). While the pre- and postbellum American industry developed forms of high-speed production and efficient distribution networks to reach consumers, its communicational infrastructure was playing catch-up with a burgeoning economy, having fallen behind by “perhaps ten to twenty years” (432). As a snapshot of New York’s exploding economy following the Civil War, *The Waterworks* registers such a crisis of control on a number of levels, just as it registers the cultural pressures of the new economy on the development of communication and information-processing systems. In a Whitmanesque panegyric to Manhattan (similar to Norris’s on Chicago), McIlvaine celebrates “the telegraphy singing through the wires. Toward the end of the trading day on the Exchange the sound of the ticker tapes filled the air like crickets at twilight” (6). Later he rhapsodizes that “our city is lit in gaslight, we have transcontinental railroads, I can send a message by cable under the ocean” (105). Telegraphs, tracks, and ticker tapes are the enabling conditions to accelerate the new economic dynamo, just as they facilitate the corrupt business ventures of Pemberton & Tweed, Inc., such as their ongoing slave-running operation and the delivery of shoddy supplies to the Union Army.⁶

What is more, *The Waterworks* also retraces the feedback loop between improved information-processing technologies, historical junctures, and their secondary and tertiary effects, particularly in the area of McIlvaine’s profession: journalism. Beniger has shown that “except for the linotype, . . . the technological revolution in power mass printing had been essentially completed in 1883, when Joseph Pulitzer took over the New York *World* and transformed it into what most newspaper historians consider America’s first modern newspaper” (359). Correspondingly, McIlvaine’s paper, the *Telegram*, along with other New York dailies, is in the vanguard of printing technology and data storage: “Our high-speed rotaries had come along around 1845, and from that moment the amount of news a paper could print, and the numbers of papers competing, suggested the need for a self-history of sorts” (28). To have within easy reach “a library of our past inventions,” and hence to avoid having to “spin our words out of nothing,” the *Telegram* began to archive the stories it had published in previous issues—what McIlvaine calls a “a memory file of our work” (28), or what Roland Barthes a century later would call *le déjà lu*. A simple operation at first, when an old man in

the basement “lay one day’s edition on top of another, flat, in wide oak cabinet drawer,” story processing intensified significantly during the Civil War, as it “became apparent . . . that salable books could be made of collections of war pieces from the paper.” At that point, mere collecting ballooned into an entire archival apparatus that occupied several young men equipped with “scissors and paste pots.” Their job was to cut up and sort by topics the “fifteen New York dailies a day [that] were dropped on their tables,” thus creating a citywide information network or system of “cross-reference filing,” an indexed form of data management containing all the published narratives of New York (28).

Even more important, perhaps, *The Waterworks* also records the beginning of new disciplinary practices and their attendant data streams which, in turn, require new modes of processing. While phrenology, as McIlvaine notes, was a pseudo-scientific rage in the 1870s, it can be understood as a “system for organizing perceptions” that mapped the fledgling theories of human behavior onto the topology of the brain and displaced the Renaissance theory of humors (46).⁷ In a position worthy of a *Bartleby*, officer Donne is originally in charge of the “Bureau for the Recovery of Lost Persons” before being promoted to another dead-end assignment tracking urban mortality rates: “the office that certified deaths in the city by age, sex, race, nativity, and cause . . . and recorded them in an annual table for the city atlas that nobody ever read” (86). Donne is also, in McIlvaine’s view, responsible for developing the first system of “description-based portraiture for police purposes,” whereby a tentative pencil sketch, “composed from the combined words” of eyewitnesses, yields an image of the perpetrator, thus establishing a visual archive for future crime detection (121).⁸ Conversely, complementing these forms of administrative logistics, Donne’s opponent on the dark side develops innovative medical technologies to allow for data gathering on the human body, such as “apparatus for the transfusion of blood. . . . Apparatus to measure brain activity. Diagnostic uses of fluid drawn from the spine,” among others (232). Submitting himself to analysis, Martin in fact recalls the cerebral wave recorder as “a remarkable picturing device” that yields “a graphic representation of the electric impulsings of my brain” (196). Collectively, Sartorius’s instruments are part of what Joel Reiser has called “the translation of physiological actions into the languages of machines,” when the subjective character of an examination is transcribed into “an objective, graphic representation that was a permanent record of a transient event, amenable to study and criticism alone or by a group of physicians” (104).⁹ Contemporary physicians reverently referred to their ostensibly infallible data-gathering registers as “the graphic age” (Reiser 109), and Sartorius,

as if to confirm future medical practice, indeed compares Martin's electroencephalic record with that of a man suffering from "a defect of brain tissue" (196).

The presentation of characters as operators in an information-driven culture is hence commensurate with the novel's attention to emerging disciplines and their data-processing systems. Bad guy Knucks, a one-time career criminal with an outstanding record of murder and mayhem, "makes his living no longer with his muscles but by his faculties of observation and deceit" (91), supplying Donne with crucial information from the city's dark side. He is an agent worthy of Tom Clancy, an informer swapping not classified codes about nuclear warheads or submarines but the dealings of Sartorius in subterranean New York. Similarly, as Martin recounts his observations about the doctor, McIlvaine sees him as "a carrier of essential information," "the messenger" returning from reconnaissance to deliver critical intelligence about Sartorius's whereabouts (142). More important, it is Donne and Sartorius themselves—the detective and his nemesis—whom the novel juxtaposes as two Lords of Information, gifted data processors whose capabilities reflect their location within the urban data grid. For that reason, *The Waterworks* reads like an up-to-date retro version of Sherlock Holmes or *Dracula*, a rematch of the cerebral parrying of a Holmes with Moriarty or the Count with van Helsing, whose stories are told by the figures in their shadow: Watson, Harker, McIlvaine. In each case, the masterminds operate as "perfect living encyclopedia[s]" and engage in a kind of data duel where access to information (both arcane and public) is trump.¹⁰ The difference between these true late nineteenth-century arch-villains and their contemporary reembodyment is that, unlike Moriarty and *Dracula*, Dr. Sartorius is not an unequivocal allegory of the dark side (a critical point to be raised below) consciously working against his detective twin, even as he is networked into a mesh of crime.

Consider, for example, Sartorius's encyclopedic reach for knowledge. Martin notes that the doctor was "fluent in several languages" and "knows everything going on in the sciences," but "reads impatiently, looking always for something he doesn't know." Propelled by a search for instrumental knowledge, he studied "the philosophers, the historians, the natural scientists, and even the novelists, without differentiating their disciplines in his mind. Looking, always looking, for what he would recognize as true and useful to him" (186). Also, as one of the expert witnesses during the Sartorius hearings notes, while the doctor's brilliant procedures would have revolutionized the field of medical technology, he deigns to join the New York Medical Association and demonstrate his expertise: "We have conferences, symposia, we share our knowledge," Dr. Mott observes, "but Sartorius had

no regard for any of that" (125). Instead, the doctor exhibits "a terrible intolerance for opposing points of view" and relishes his role as a medical recluse hoarding knowledge for himself (126). Even his meticulous records— withheld from public view by the commission because of their visionary content—were written in Latin, an Old World practice with a quasi-cryptic flush, to bar their immediate, wider circulation (231).¹¹

In that sense, Sartorius is very much like the syndicate he is working for, preferring to work in secretive isolation rather than cooperative sharing. August Pemberton, whose capital helps fund the doctor's doctorings, "did not carry on his ledgers a large complement of employees." Instead, "It's all up here anyhow," was his famous line, delivered as he pointed his index finger at his head. "My own mind is my office, my warehouse, and my account book" (32). Even when required to involve others, his wife recalls, "my husband was a very secretive man. For different matters he hired different attorneys. In that way no one would know more than a part of his business" (80). Pemberton's executor, similarly, managed the Home for Little Wanderers in a way that separated lines of communication to disperse control save for the mastermind: "[T]he division of responsibility among the staff, the teachers and dormitory monitors, was such that only Simmons would have known that anything was out of the ordinary" (174). And Sartorius himself unwittingly describes his own practice and complicity when characterizing his experimental subjects: "each one of my gentlemen was given by nature to secrecy . . . they not only wanted what I offered, they wanted it only for themselves" (229). Each in their own way is preoccupied with the exclusive control of data, their synchronized flow within restricted channels, and their use for specific and secretive operations.

Paralleling Sartorius, Donne was a "lonely eminence," a rare breed of a detective living in monkish seclusion "like someone who has taken holy orders" (85). Like the doctor, he is ensconced amid "stacks of loose pages" and "glass-covered book cases [that] were bowed with the weight of law books, manuals of municipal regulations, and volumes of papers in their folders," much like "a scholar working in the silence of a library" (88). For that very reason, Donne, like Sartorius, is a multitasking operator with an awesome capacity for filtering and synchronizing various channels of information. McIlvaine describes him repeatedly as "a walking newspaper who could carry the stories simultaneously in their parallel descents" (116). But while the doctor is trying to master (godlike) virtually all fields of knowledge indiscriminately, Donne only sorts and selects the data necessary to do his job. While Sartorius seems to aspire to become a medical-scientific polymath, perhaps in the Old World tradition of the French *encyclopédistes*, Donne is a more focused

knowledge worker. Systematically, beginning with “the hardly likely” (111), Donne sifts through various public and private documents, such as Pember-ton’s dubious “medical history” and the contracts in “the Hall of Records” suggesting the gradual liquidation of his assets (189); as he combs through a duplicate of the Ring’s ledgers, “what he found meaningful was not the usu-ally inflated sums” but “the occasional entries that seemed legitimate in their accounting,” eventually identifying a fictitious bond issue for the improve-ment of the Croton Aqueduct in the accounts of the city’s Water Depart-ment (152). Assembling these various bits of information, in turn, allows Donne to have “his brilliant and culminating insight” about the site of Sar-torius’s factory of immortality and, more important, to exhibit a combinatory power uncanny in its precision (208). Donne’s instinctual advance knowl-edge of the coach driver’s identity heading out of the orphanage, for example, prompts McIlvaine to rhapsodize about “the conjunctions of which Edmund Donne was capable. What information did he depend on? I can never know. But at this moment the shock to my system was stunning” (159).

Such deductive brilliance is worthy of a Holmes, and the two are indeed blood brothers: both are socially awkward; both operate on the fringes of official crime detection; and both operate with the knowledge that indi-vidual brain capacity is indirectly proportional to the exploding data flow of nineteenth-century urban life. As Holmes put it (in his very first appear-ance): “I consider that a man’s brain originally is like a little empty attic, and you have to stock it with such furniture as you choose. A fool takes in all the lumber of every sort that he comes across, so that the knowledge which might be useful to him gets crowded out, or at best is jumbled up with lots of other things, so that he has difficulties in laying his hands upon it. . . . It is a mistake to think that that little room has elastic walls and can distend to any extent” (Doyle 25).¹² Rather than cramming their gray matter with irritating surplus matter, Holmes and Donne accrue cognitive power precisely to the degree that they are able to filter that which is insignificant or peripheral to their case. To become an efficient information processor in the new economy, the brain must pre-process data prior to, as it were, putting it in storage: only that which is absolutely essential must be committed to memory; the rest, as with Donne’s arcane resources, need only be retrievable from other data banks and not block the human data bank, a.k.a. the brain. Postbellum soft-ware efficiency is a question of cerebral sorting, storing, and discarding.¹³

Significantly, while one Lord of Information is fully networked into the fellowship of the Ring, and circulates his research exclusively through its closed circuit, the other is out of the loop even while in the employ of the Municipal Police, not only not having paid for his commission but “remain-

ing always outside the order of connived loyalties that passes for brotherhood among policemen" (86). He makes his critical breakthroughs once he is twice removed from the Ring—that is, when his enforced suspension makes him a doubly independent operator—and he does so by both analyzing arcane data ("which nobody ever read") and by repeatedly circumventing the law, as when he enters the orphanage without a warrant (173). The man who is seen as the poster child for the integrity of a corrupt police force thus in reality operates as a self-incriminating maverick pursuing the criminal superstructure of postbellum New York, ironically upholding the law by breaking it himself. Most important, he lets himself be guided as much by rational analysis as by intuitive guesswork, achieving his greatest moments when his dazzling deductions are tempered by daring hunches, when head and gut combine to filter esoteric bits. His unorthodox methods of inquiry make him into a subversive knowledge producer within the system of lawlessness by bringing into play that very system's practices and by inserting himself into its own channels of information.

As such, Donne can be seen as an ideal, particularly urban "nomad" in the sense of Deleuze and Guattari, a viral defector or informational guerilla fighter operating on the margins of official power. Even more appropriately, perhaps, he evolves into the "intellectual operator" Michel Serres has designated as *le parasite*, a term combining the fields of biology, anthropology, and communications theory and suggesting, in William Paulson's gloss, that "the parasite always *interrupts*, be it the circulation of nutritive elements, the service of food, or the transmission of signals" (*Noise* 37). By uncovering Sartorius's lab inside the waterworks, Donne indeed pulls the plug on various types of both life-sustaining and life-withdrawing circulation. What is more, the parasite has "a parallel relation to order and disorder": it places itself in relation to order it has not produced, and its presence brings disorder to the system in which it appears (*Noise* 37). Donne of course is such a disorderly (and disheveled) agent. By intercepting and decoding the signals running through the networks of the Ring, he becomes in effect a circuit breaker in that he destabilizes the data flow and creates a kind of counterorder, a systemic disorder emerging from the corrupt, exclusionary, and monopolistic order of secretive information.

Thus, what may appear to be Donne's initially anachronistic mode of processing is, in fact, highly futuristic in the sense that he implements a politics of informational hygiene (not unlike today's hackers) that questions the exclusionary and dubious machinations of the Tweed Ring. It is forward looking in that he complements his analytical skill with instinctive reaction to allow for a synergy of mind and body; cerebral efficiency and embodied re-

sponse surmount the rigid “project of Cartesian rationalism, of a knowledge committed to maximal clarity and maximal efficacy,” which is a “project of violent domination” akin to the dictatorial rule of Tweed (*Noise* 36). Most important, even as Donne relies on a union of head and gut, his processing is highly selective and relies on both internal and external storage technologies so as to free the brain for higher-function processing operations. Beniger indeed noted that brains had to be synchronized with the increased flow of goods, people, and data in an industrial economy: the use of human beings “for the more objective capacity of their brains to store and process information, would become over the next century a dominant feature of employment in the Information Society” (225). Donne is such a cerebral sorter, a pre-processor fully adapted to the data streams of postbellum urban America, or what the late Peter Drucker, writing about the twentieth century, has called an “emerging knowledge society” (64). Highly refined powers of selection and combination and a memory storing only crucial data make up the essential software protocols of his brain. Everything else, as it were, is at his fingertips in the archival hardware surrounding him.

When Donne is done, of course, the novelist has only received his Jamesian *donnée*, the raw materials of his narrative, but not the story itself. When Ed Doctorow lends Ed Donne his initials (and furthermore suggests their joint heritage in America’s literary mastermind, Edgar Allen Poe), he may well point to the occupational hazards of both: detectives, no less than novelists, are professional mosaicists composing their stories from events and evidence.¹⁴ But it is significantly from McIlvaine’s perspective, not from Donne’s, that the story is eventually reconstructed two generations later. Living in an apartment close to Doctorow’s former Manhattan office, “three stories up in Bleecker Street,” the man of letters attempts to transmute Donne’s evidence into epistemology (178). His narrative perambulations probe the slippery boundaries that Donne’s hunt for data is unable to engage: what is the difference between data and knowledge, information and wisdom, sanity and insanity, and, finally, what is the place of narrative in a time of exploding data streams?

Brains, Waves, and Recording Machines

In the tradition of thrillers and films like *Frankenstein* and *The Cabinet of Dr. Caligari*, whose gothic conventions the novel reworks, and in the tradition of epistemological science fiction like *Solaris*, *The Waterworks* interrogates the ethical consequences of human being and creation. If humankind is, by some accounts, considered the brainchild of evolution, what are

we to make of the ultimate fruit of this brainchild: the achievements of human intellect? While Tweed's dealings are indisputably illegal and corrupt on a large scale, the "Commissio de Lunatico Inquirendo" evaluating Sartorius's mind is less sure about a judgment. It ultimately decides to put the doctor into the state's Institution for the Criminally Insane, but when McIlvaine interviews the commission's chair, his responses are one long exercise in waffling and sidestepping, alternately acknowledging the doctor's visionary brilliance and genius yet unable to certify any mental instability. Dr. Hamilton suggests that Sartorius "kept going . . . through, beyond . . . sanity, whatever that is. Or morality, whatever that is. But in perfect line with everything he'd done before," especially his cutting-edge work as a surgeon during the Civil War that earned him the gratitude of hundreds of soldiers. Most symptomatically, in response to McIlvaine's query that Dr. Sartorius wasn't "truly insane," he simply responds, "No. Yes"—giving expression not only to the commission's ambiguous verdict but also to the gray zones produced by the gray matter that lie outside neat binaries: the imponderables of truth, justice, and the human mind itself (231).¹⁵

Doctorow's narrative symbology tells a similar story: all the bad guys die from a sustained injury to the head or brain. Informer Knucks, a "brainlessly amoral charmer," has his neck wrung by Sartorius's willing executioner, Wrangel (115), who, in turn, not only gets his noggin smashed by overzealous troopers (prompting McIlvaine to ponder "the effects of the blow on the encased brain" [158]) but dies from "bruises on the . . . skull" followed by a hanging (206). Pemberton's right-hand man, Simmons, falls off a cliff and has "his head almost entirely pounded into the sandbank," with "a great mess of blood matter around the head" and thus prefigures the death of his boss (226). An institutionalized inmate, Sartorius is one day found—in a replay of his henchman's feats—with his head "smashed against the asylum stone floor with such force . . . that the skull caved in like an eggshell and the brain . . . there is no other word for it . . . ran" (246). Together with Boss Tweed, who, on the lam, stumbles like a delirious "madman" through the Cuban jungle (244), these more than literal deaths suggest not only ambiguous poetic justice but also a possibly catastrophic disconnect between body and brain, matter and mind. Ubiquitous corruption and unrestrained scientific practice are seen as diseased outgrowths of the human brain, fantasies of godlike power born of an organ that has gone postal.

Such a rhetoric of skulls and brains is of course part of the cultural imaginary of nineteenth-century America. In 1871, the year of the novel's events, McIlvaine's paper reports that scientists discovered "the skull of a Neanderthal," with the "cranium severed from the jaw and brow" to serve as "a drink-

ing bowl" (46). During the same decade, a faddish phrenology assumed that "configurations of the skull" allowed for a mental typology of human beings, as with Martin's "high brainy brow," and raised the issue of whether female heads require their own "special skull reading" (46). Such news fillers suggest not only a kind of evolutionary self-distancing of the brain from its primordial functions—thought and survival—but also its versatility for projections of various sorts, dependent only on the imaginative (that is, cerebral) reach of the mind. This is also true of the evolutionary (that is, imaginative) discourse that entered mainstream America. When Sartorius, once incarcerated with the criminally insane, sees in the motley crew surrounding him evidence of a nature "always willing to transform, to experiment, to propose itself into a new shape, a new way of being, a new mind," he also comments on the questionable achievements of his own brain, as well as the mutations of cerebral effort and endeavor more generally (240).

Most important, perhaps, the novel foregrounds the discourse of the mind, and its (in)ability to process and remember, in the context of Dr. Sartorius's pioneering work on brain research.¹⁶ In their entirety, his contributions read like samples, both actual and visionary, of the work of some of the pioneering (experimental) psychologists of the day. Similar to Paul Broca's groundbreaking autopsy in 1861, which located the speech center in the brain (appropriately called Broca's area since), Sartorius dissects the corpse of one of his patients whose epileptic seizures he had earlier attributed to degenerative brain disease: syphilis. Opening the skull, Sartorius gives Martin a walking tour of the brain, pointing to cranial depressions that correspond to "three hard and irregular coral-like growths on the surface of the brain—as if the brain itself had absorbed the bony material." Noting that "these adhesions about the fissure of Silvius" bind "the anterior and middle into one mass" and that "the dura mater in this area adheres to the brain tissue," he extracts and weighs the diseased portion of the brain—"a suppurating, yellowish cheesy deposit, shaped like a pyramid"—only to confirm the findings of Philippe Ricord's 1838 groundbreaking study, *Treatise on the Venereal*, about degenerative brain disease (194).¹⁷

Similarly, Sartorius uses the electroencephalic record of a certain Monsieur (a "tic-ridden, stuttering spastic") to diagnose his cognitive disorder: the "compulsive imitation" to return "every fleeting expression on your face." He observes that such behavior had to arise from "a defect of the brain tissue" because the cerebral graph—a "wild disarray of peaks and valleys, irregular, jagged, profuse"—indicates "merely an acceleration and intensification of normal human activity" (196).¹⁸ Such medical practice not only looks forward to contemporary clinical methods, in which EEG is used to determine

brain wave activity in obsessive-compulsive patients, but may also suggest the external origin of such disorder: overstimulation. Michael Gazzaniga notes that current cognitive research “points to one overall picture of the essential nature of obsessives. They are overaroused by events that nonobsessive people find easily manageable” and “do not adapt or become habituated to repeated occurrences of an event that has excited them” (132–35). Monsieur may well be such a casualty of overload, an urban data victim unable to process the information streams washing over him. Unlike more fully conditioned modern subjects, who have learned to raise their cognitive shields so as to avoid shock, Monsieur responds to the “*intensification of nervous stimulation*” with a short circuit in his brain (Simmel 175). In a city unmatched in its “acceleration of energies” (13), it was certainly not difficult to develop the disorder New York physician George Miller Beard had unleashed on America in the 1860s and which matched Monsieur’s diagnostic profile: neurasthenia, a disease designating “all the forms and types of nervous exhaustion coming from the brain and from the spinal cord” and originating in a civilization-induced “overpressure of the higher nerve centers” (qtd. in Rabinbach 153).¹⁹

Thus, when Martin sees the doctor “inject cellular matter in deadened brains,” his therapy is one of bio-rejuvenation (198). The aim is not just to offset syphilitic degeneracy or cerebral overload but more generally to kick-start dormant minds back into being. His club of immortals, in fact, does recover enough to allow for a kind of vegetative ambling in their subterranean hydrocloche, an Atlantis-like pseudo-Eden without genuine life. Brain cells taken from children allow them to exist as a gang of zombies eating, breathing, and occasionally (with the help of suggestive statues) blinking an eye. More advanced, more properly human functions such as thinking or self-reflection, however, are beyond their cerebral reach and highlight not just quality-of-life issues in the current debate about health care reform but, more important, the ethical and epistemological limits of medical intervention and what it means to live humanely. The very fact that the doctor’s “marvelous brain” is thoroughly “lacking in self-consciousness” suggests, in micro-cosmic form, a cerebral disconnect that the comatose octogenarians play out on a larger scale (198).

Exceeding these cognitive pathologies and therapies, which allegorize once more the mutations of Sartorius’s own brain, the doctor also explains the current theory of nervous electricity as a precondition for his work on brains. Alluding to early work in physiology, experimental psychology, and electromagnetic field theory, Sartorius notes that “our bodies have tides, and flow with measurable impulses of electric magnetism.” To visualize biologi-

cal information transmission, he suggests, in a common trope, that we may “live strung like our telegraph wires in fields of waves of all kinds and lengths, waves we can see and hear and waves we cannot, and the life we feel . . . is what is shaken through us by these waves” (216).²⁰ Much like the water flowing through the waterworks (in whose catacombs his lab is housed), from where it is routed to replenish the vital fluids circulating through individual bodies, the body generates an electrical field even as it is embedded in larger ambient fields. That electric premise, in turn, allows the doctor to construct a diagnostic apparatus to measure cranial currents. Martin recalls how the doctor attached “two anodes of a small magneto to my head, one at each temple,” which were “connected by wires to a pair of needles with their points resting against a revolving wax cylinder.” That cylinder, in turn, was propelled by a “gearshaft attached to a small brass steam engine” and traced “the electric impulsings of [Martin’s] brain,” or what we now call electroencephalic currents: the first data of a domain yet to be called cognitive science (196).

Similar machines of inscription had, in fact, been invented by enterprising doctors at about the same time. The kymographion (1847) developed by the German physiologist Karl Ludwig, for example, visualized direct arterial pulsations through a U-shaped mercury-filled tube that—with a pen mounted on a float—“traced the motions communicated to it . . . via a strip of paper stretched around a revolving drum” (Reiser 100). Upgraded by his countryman Karl Vierodt into a sphygmograph (1854), “which connected Ludwig’s pen and revolving drum to an artery indirectly, by means of a spring pressed on the artery,” it was simplified and made clinically workable by Etienne-Jules Marey’s machine of the same name.²¹ His invention (1860) “had a lever, one end resting on a pulsating artery and the other connected to a pen. A clockwork mechanism moved a strip of smoked paper under the pen at uniform speed, converting the pulsations into a pictorial form” (Reiser 101).²² As the pioneer of modern medical notation, Marey, in particular, developed numerous inscriptive devices such as a myograph (improving on Hermann von Helmholtz’s muscle-meter), a cardiograph, a pneumograph, and a thermograph, among others.

The point here is not simply that Sartorius’s brain-wave meter is part of an emergent data recording regime (and echoes the encephalograph of his futuristic doppelgänger in *Solaris*), a form of automatic writing translating physical signs into technological inscription. Nor is it that such machines signaled the shift from empirical forms of scientific inquiry toward a more clinical, Sartorian form of laboratory research, reinforcing a “conception of the body as a field of forces to be investigated and measured by

medical technologies designed for that purpose" (Rabinbach 66). Sartorius's steam-driven apparatus measuring cerebral electricity, in fact, ingeniously unites the two predominant paradigms of late nineteenth-century science—thermodynamics and electromagnetic field theory—and symbolically inscribes the dangerous background noise otherwise rendered inaudible by the waterworks' churning masses of water: the transfer and circulation of energy from young to old bodies, and hence a kind of entropic reversal of the natural order of things.²³ Most important for the argument at hand is that the machine Sartorius's machine resembles most closely is Edison's phonograph of 1877 (developed for serial production by about 1888). While Edison's voice recorder had a crankshaft, not a steam engine hookup, to propel its drum, the encoding of electroencephalic waves is identical to Edison's engraving of sound waves onto (first tin foil, then waxen) grooves. Both operate as drum-based, analogical inscription systems for the storage of vital signs or embodied data streams.

Following the discovery of the X-ray in 1896, Edison announced his attempt to photograph a living human brain, one of his many publicity stunts. Challenged by a man who might easily have been one of Sartorius's well-heeled patients—William Randolph Hearst—to produce a cerebral "cathodograph" (Baldwin 253), Edison claimed, in a rare moment of modesty, that "[Roentgen] needs men like myself, whose chief aim is to turn the great discoveries of science to practical use and adapt them" (qtd. in Reiser 60). Once word got out, the leading neurological publication in America, the *Journal of Nervous and Mental Disease*, requested that "a repro of Brain Photography" appear in its pages, but the experiment in what would have been an early form of tomography proved unsuccessful because the human skull was, as it were, too thick for present-day cathode rays to penetrate (Edison Papers, D-96-310).²⁴ Edison also received thousands of "idea letters" from an enthused public urging him to think of machines the inventor was too busy to invent. One such letter noted that "the convolutions of the human brain are largely though not entirely a Phonograph," observing further that the "grey matter acts . . . after a manner of the wax-cylinder." Suggesting further research, the letter writer outlined the benefit of postmortem cranial readings in the case of murder victims or Egyptian mummies that would reveal intriguing data (qtd. in Gitelman 88).²⁵

But while Edison never appears to have contemplated engineering a brain-wave recorder, it was precisely his phonograph that provided an imaginative model for human memory and cognition. Not just an eager public but literary and philosophical figures as well saw in the sound recorder a technological equivalent of human processing. Rainer Maria Rilke recog-

nized in “the coronal suture of the skull” sitting on his desk “a similarity to the close wavy line which the needle of a phonograph engraves on the receiving, rotating cylinder of the apparatus.” He frequently wondered what kind of “primal sound” would be audible “if one changed the needle and directed it on its return journey along a tracing which was not derived from the graphic translation of sound but existed of itself naturally . . . along the coronal suture” (*Selected Works* 1:54). Similarly, like Edison’s correspondent, the philosopher Jean-Marie Guyau suggested in 1880 that “the most refined instrument . . . with which the human brain may be compared is perhaps Edison’s recently invented phonograph.” Analogous to the engraving of sound waves onto a rotating cylinder, and their subsequent replay, “invisible lines are incessantly carved into the brain cells, which provide a channel for nerve streams. If, after some time, the stream encounters a channel it has already passed through, it will once again proceed along the same path,” causing the cells to vibrate “in the same way they vibrated the first time; psychologically, these similar vibrations correspond to an emotion or a thought analogous to the forgotten emotion or thought” (qtd. in Kittler, *Gramophone* 30).

Such a structural analogy of course presupposes not only the actual existence of the phonograph but also its physiological a priori, such as the conception of the nervous system—following the neurophysiologist Sigmund Exner—as an aggregate of conduits (*Bahnen*) and engrams channeling what Sartorius calls “impulses of electric magnetism.” What is more, such an analogy also presupposes a virtual equality between the body and the machines invented for its physiological and electrical mapping, which is precisely how psychotechnology in the late nineteenth century came to see the body. For researchers intent on measuring sensory and cognitive deficiencies—often brought on through strokes, gunshot wounds, or industrial accidents—the body that once housed a metaphysical and transcendent Hegelian spirit was reduced to a series of electric (and increasingly disembodied) signals susceptible to mathematical measurement; and such signals, in turn, in effect, constitute an electronic form of the soul or cognition. If humans had, in the well-known Renaissance dictum, been the measure of all things, now they were measured by machines that suggested that the cascade of neurological impulses jumping from relay to relay made humans into information-processing machines themselves.²⁶ Freud, for one, in both his case studies and lectures repeatedly refers to his “phonographic memory,” and hence suggests the evacuation of the traditional notion of the soul from the humanities (22:5). Thanks to the combined work of Edison and psychotechnology, the phonograph can thus be seen to both operate as and *be* a model of a materi-

alized consciousness. As Kittler puts it in the general technospeak of media theory, "All questions concerning thought as thought have been abandoned, for it is now a question of implementation of hardware" (*Gramophone* 33).

It is precisely such a mechanistic model of cognition—a precursor to today's cybernetic (and tomorrow's positronic) brain models—that Doctorow is interrogating. While Sartorius's medical achievements per se are not in doubt, Doctorow questions what is at the very heart of his creation: a single-minded belief in physiological processes blind to the ethical and epistemological ramifications of such processes. It is for that very reason, I would suggest, that Doctorow's doctor (unlike Lem's) invents a machine in the 1870s that was not to see its technological reality until fifty years later, when the German physiologist Hans Berger developed an encephalograph that "measured the electrical activity of the brain graphically" (Reiser 218). Sartorius's visionary brain-wave recorder is not only unable to store a precise analogical record of an individual's memory and cognitive processes (which is what the technological model underlying it, Edison's phonograph, is assumed to be able to do), generating instead only a general graphic representation of microelectric cerebral impulses; it is also unable to record such more traditional yet crucial brain output as cognition, reflection, and knowledge: cerebral activities that may well be unwritable in mathematical (that is, analogical and digital) terms and hence defy belonging to any more technically prescribed notion of *data* altogether. With a head start of two generations, Sartorius's futuristic machine thus charts through its very existence its own limitations as a recorder of vital signs whose humanistic, as opposed to biological, heartbeat goes unrecorded. It inscribes a reductive, physiological conception of cognition and memory, but is unable to document and capture brain work not amenable to technical forms of quantification or measurement.²⁷

Equally important, Doctorow takes issue with a relay model of cognition that reduces (a Heideggerian form of) human being to binary signal sets and that defines agency in terms of electric impulse switches. Much like the disjointed necks and brains in *The Waterworks*, whose unlinking from the body suggests interrupted circuits, cognitive processing in mechanistic forms severs instantaneous high-speed decision-making from more long-term and wide-ranging ethical considerations, in effect positing "an identity between signal and act and an identity between communication and execution" (Seltzer 11). Instead of inviting reflection on emergent, and hence unpredictable, consequences, such a processing model encourages a slippery autonomy that, again much like the severed heads and brains, can lead to a kind of cruise control or practice unchecked by more nuanced and sustained,

fluid and open-ended cogitation. If the doctor's surgical hands (perhaps in a gesture toward *Las Manos de Orlac* and similar genre films) quite literally embody a body gone autopilot—at moments appearing as if it were not the doctor but “the hands that were speaking” (195)—Dr. Sumner's digital answer (“No. Yes”) may well circumscribe the reductivism of any binary mode of cognition. Sartorius's work on undead bodies, indeed, is just one step away from delirious fantasies of weightless being that ignore the complexities of a body-in-the-mind “too unruly to fit into disembodied ones and zeros” (Hayles, *Posthuman* 13).

As a traditionally more human and embodied storage technology, literary (and oral) narrative, by contrast, can negotiate such divides and binaries. Fiction, in Doctorow and McIlvaine's view, has the quality of a ruminating and reconstructive retrospectivity to tell its tale. Unlike film and sound storage, which record physiological effects of the real, narrative can enact a form of more conventionally mimetic memorization by sorting through, and distilling, real history into a verbal account cognizant of its symbolic artifice; unlike a futuristic electroencephalograph, which registers cerebral tremors in generalized graphic form, the novel is a more effective brain-wave recorder, the “printed circuit” whose alphabetic software is best equipped to record the vicissitudes of thought (*Essays* 151).²⁸ McIlvaine offers such an account and suggests a definition of narrative as a form of collective information processing or cultural substrate taking stock of events in hindsight and sorting meaningful from meaningless noise. In the process, he raises critical questions about the (nonphysiological) memory function of literature and, very much in sync with Holmes, Donne, and Edison, about the cognitive distance necessary to pre-process and condense history into the limited storage container of a book.

Meanwhile, the wizened Wizard of Menlo Park sensed it all. While, in the spirit of the media theorists co-opting him, conceiving of his own brain in material terms as a “plate on a record or a receiving apparatus,” a more spiritual notion of cerebration crept into his thinking (Baldwin 376). Mystic extraordinaire Madame Blavatsky had instilled in the inventor extraordinary ideas about cosmic matter and energy, and Edison, in a synthesis of technology and mysticism all his own, set out to record the most elusive of all: the human personality. Positing that the Broca fold in the brain housed memory cells capable of storing a person's assimilated lifetime experiences, perhaps even, as he put it, “the subconscious mind so-called,” he concluded that such cells would float freely through space once a person had died.²⁹ To access such knowledge banks, he set to work on a “sensitive apparatus” with which to detect and unlock lifetimes of unmoored information cells “prowl-

ing through the ether of space" (qtd. in Baldwin 377). If this sounds like the Houdini of *Ragtime* trying to make contact with his deceased mother, and uncannily prefigures cyberpunk fiction and current fantasies of downloading human consciousness into a computer, it also suggests the project of McIlvaine's novel: the retrospective storage of a historical moment in the medium of alphabetic print as seen through an individual human consciousness, after having accrued a lifetime of knowledge and experience.³⁰

Modularity, Information, Narrative Knowledge

It is no coincidence that the emergent cognitive rhetoric of the later nineteenth century spills over into the brain work of *The Waterworks*' major actors and tellers. Following their body-snatching heist, artist Harry Wheelright is haunted by the "image of that dead boy [sitting] in my brain," unable to paint and, hence, release it into artistic form (109).³¹ Mesmerized by the ingenuity of the doctor, Martin is similarly aghast at his seeming complicity, "as if I had performed on myself some excision of a portion of the brain" (203). While his stepmother counsels Martin against retelling his experiences, for fear of "leaving them to swell the brain," Donne urges a total recall, aware that mental buildup might require psychological release. McIlvaine too suggests that the best therapy for diseased minds is "getting the story told, turning it into an object made of language" (201). Years after the events, in the throes of composition, he notes that the events have "grown into the physical dimensions of my brain," so "however the minds works . . . that is the way the story gets told" (219). How that mind works is of course part of the very story: a story about the act of re-cognition and re-memorization. *The Waterworks* indeed proposes itself as an extended discourse on literary narrative in relation to print and journalism, memory and morality, and the very idea of cognitive modularity itself.

As part of its cognitive mapping of postbellum America, *The Waterworks* draws attention to the nineteenth-century precursor of the modular mind: phrenology. McIlvaine is quick to dismiss it as another newspaper filler, a science on the cusp of discreditation postulating a veritable bumpology along gendered lines, but the three basic Temperaments he describes—Mental, Motives, and Vitals—already look forward to contemporary descriptions of cerebral domains as "mental organs," as in Steven Pinker's evolutionary models (46).³² Such a tripartite cranial economy was even then crude and fantastic in the extreme, but the understanding of the brain's subdivision into localized departments, each with a specified range of tasks, was in effect a simplified model of the cerebral modules of the late twentieth century.³³ Sar-

torius's work on the brain, in that sense, is a pioneering effort to chart the claims of phrenology in experimental and physiological terms. When McIlvaine describes knowledge of noggins as "a system for organizing perceptions," he may have in mind what Orson and Lorenzo Fowler—the cranial connoisseurs with a U.S. corner on all things phrenological—saw as central to their beliefs (46). The publishers of Walt Whitman's first volume of poetry (a fellow Fowlerian who is suitably quoted in *The Waterworks*), the brothers claimed that "the mind is a plurality of innate and independent faculties—a congregate of distinct and separate powers," which fully corresponds to the premise of distributed cognition in present-day modularity (qtd. in Cooter 291). Similarly, their handbills claimed that phrenology can be an aid in cognitive muscle flexing and lead to "a retentive memory," so that "a lawyer or *literati*" could be "enabled to recall all he ever knew"—issues at the center of modern-day cognitive science no less than at the center of McIlvaine's recollective project (qtd. in Cooter 118).

As a novel that self-consciously engages the work of brains, *The Waterworks* indeed displays numerous correspondences between theories of modularity and its narrative mode. Recognizing print narrative's minority report within the contemporary field of representation, Doctorow has always favored a "multiplicity of witness" or "democracy of perception"—a novelist's version of distributed cognition within media culture (*Conversations* 113). Literalizing such representational diversity in *The Waterworks*, Doctorow empowers a de facto decentered narrator to assemble a retrospective narrative from a series of eyewitness reports, surmises, and speculations, to which that narrator adds his own interpretive overlays from a distance of roughly two generations. All the major players lend their perceptions to the story in the making that, in its entirety, makes up a series of micro-narratives orchestrated into a putative master-narrative by "the intrusive factor of an organized consciousness," namely, McIlvaine himself (*Essays* 160). Observations such as, "all of this is filtered through the brain of Dr. Grimshaw and after many years in my own mind," indicate *in nuce* the layered cognitive refractions operative in the novel (40). And while his distanced and seemingly impartial story, from the voice of an octogenarian, has the aura of authority, McIlvaine, no less than the reader, is cognizant that his final version of events is by definition unstable and inconclusive, much as distributed networks "don't quite so much compute a solution as they settle into it" (Pagels, qtd. in Spolsky 33). In McIlvaine's own words, even the tales told by best-intentioned people "must go spiraling off in the resolution of things" (250).

Similarly, in the same way McIlvaine's role as a Jamesian "central intelligence" is complicated through the accounts of others, his position as a nar-

rative processing conduit exemplifies breakthrough innovations in modular theory. For once, his decentered role as switch point or node for the convergence of parallel narrative strands not only gives him greater responsiveness than a traditional, however sophisticated, consciousness. More important, as Ellen Spolsky has noted, distributed cognition allows for the modeling of a “processor that is highly tolerant of error,” much like McIlvaine’s own thinking is, at virtually every step, recalibrated, refined, and thickened as other narratives are traveling through his neuropathways (34). Donne’s criminal insights, in particular, as well as Martin’s more philosophical recollections, add narrative loops to an already complicated meshwork of story lines. What is more, the scatterbrained mode of McIlvaine’s re-memorization—with competing stories morphing and adjusting in interplay with one another—suggests the cognitive model of Gerald Edelman, in which neurons form clusters and connections based on competing fields of stimuli, eventually producing consciousness and thought, much like the mechanisms of Darwinian selection at work in biological populations. Just as McIlvaine evolves a forever preliminarily final version of the Pemberton story that builds on the cumulative gathering of directive evidence, but shuts out numerous others *in potentiae*, so neuron podding in the brain depends on epigenesis, the often accidental, and hence un(pre)determined, adaptation to environmental pressures. Indeed, as Spolsky notes, in view of Edelman’s close attention to the actual physiology of brains, his model contains within itself “a theory of a fragmented, contingent, necessarily opportunistic or pragmatic postmodern consciousness” (37).

Such a consciousness is McIlvaine’s indeed, and its refractive quality is signaled not only in his self-acknowledged memory gaps—his repeated recognition that “what you remember as having happened and what truly did happen are no less and no more than . . . visions” (59)—but also in his literally elliptical story: the narrative’s virtually ubiquitous perforation with the three dots of ellipsis. Indicative, perhaps, of a mentally challenged old man whose speech and thinking patterns are stalling—alternating between bursts of recall and re-memorative dry spells—such gaps also mark the signifying rupture to be closed by the reader’s hermeneutic collaboration.³⁴ As well, such lacunae suggest points of cognitive blindness opening up when communication between (and within) the representation of various modules is suspended, faults that point toward a temporary processing impasse of information in need of neurological rerouting. As Daniel Dennett has noted, while consciousness appears to be fluid and continuous, it is in fact “gappy and sparse, and doesn’t contain half of what people think is there” (366). Replacing a materialist biology of the brain with a phenomenologist’s penchant for

metaphor, he observes that at “any point in time, there are multiple drafts of narrative fragments at various stages of editing in various places in the brain” (135). If this reads like a literal version of what amounts to McIlvaine’s progressive chapter drafts in *The Waterworks*, it also describes McIlvaine’s own philosophical distancing, through the act of writing, from the cognitive materialism of Dr. Sartorius. The seeming fullness of consciousness is belied by the short-lived and always-about-to-be-bridged breaches in neural connections, outwardly manifest in McIlvaine’s disjointed narrative fractals. In the words of Spolsky, “the gaps in the interpretive system, far from being accidental, are necessary and innate aspects of our generally inherited epistemological equipment” (192).³⁵

Significantly, as if to rehearse the gappy and multiply spatial nature of cognition, McIlvaine offers a model of meaning-making that is akin to the spatial model of modularity. With an eye toward his own discombobulated narrative and as a warning to his readers that “linear thinking” is anathema to sense and thinking—that “knowing in advance the whole conclusive order [of things] makes narration suspect” (123)—he describes the material layout of nineteenth-century “vertical” newspapers as a network of seven descending lines of text (115). In their parallel synchronicity, these text lines require sustained cognitive oscillation to yield meaning: “Now we ran off eight pages of seven columns, and only if you stretched out your arms wide could you hold the paper taut to its full width. And we had readers of the city accustomed to this . . . who scanned our columns the instant they got them . . . as if our stories were projections of the multiple souls of man . . . and no meaning was possible from any one column without the sense of all of them in . . . simultaneous descent” (115). Only the capacity of thoroughly alphabetized readers for parallel processing makes it possible to synthesize disparate narrative elements into the big picture; only the sustained filling of gaps and interstitial voids (of, almost literally, reading between the lines) allows for the coordination of semes into a coherent semantic whole. Similar to the data juggling of Donne, and similar to the composite criminal sketches of Wheelwright—whereby eyewitness accounts yield a kind of pictorial group memory or cognitive abstraction (121)—sense is the result of unparalleled intellectual work: the ramified combination of clues, criminal, hermeneutic, or otherwise.

By advancing such a parallel model of computational processing, McIlvaine of course anticipates in informational terms something akin to the spatial novel of literary modernism, novels whose rearranged chronology is meant to create the illusion of simultaneity within the reader.³⁶ In contrast to spatial narratives, however, which silently assume that readers synthesize dis-

jointed fragments into a phenomenological gestalt, McIlvaine's model suggests the parallel brain work underlying such apprehension. The synchronous descent of news columns, in that sense, could be seen to look forward to hypertext as not only the mode of industrialized informational retrieval but also the narrative form closest to the vicissitudes of the processes of reading and thinking. George Landow has noted that "in contrast to the rigidity and difficulty of access produced by present means of managing information based on print and other physical records, one needs an information medium that better accommodates to the way the mind works" (14). For Doctorow, by contrast, narrative spatialization appears to be nothing new. While columned news distribution may indeed be a response to modern-day information growth, cognitive synchronicity has evolved as a hardwired feature in the human brain. Parallel processing, he seems to suggest, has long been part and parcel of cognitive, and hence narrative, conventions, and readers of serious fiction have long felt drawn to the nonlinear and multidirectional vectors of literary narrative. When McIlvaine describes his model of parallel descent as "cuneiform carved across the stele" (146), he indeed suggests the ancient, evolutionary character of modular thinking (just as he points to the always already cryptic form of any act of coding).

Thus, while the brain solving the crime is that of a brilliant detective, the brain telling the story is that of ruminating journalist increasingly at odds with the data-based, and hence quickly dated, discourse of his former profession. The prism of McIlvaine not only both refracts and bundles the narrative strands of *The Waterworks* but also illustrates the inadequacy of the informational discourse of journalism. Consider McIlvaine's shift in allegiance from news to novel. A full-blooded journalist since his teens, he believes that newspapers function as *the* stabilizing epistemology of a chaotic world: "If journalism were a philosophy rather than a trade, it would say there is no order in the universe, no discernible meaning, without . . . the daily paper" (14). Such oft-repeated reportorial absoluteness, however, reaches its limits when trying to offer sustained reflections on past events. While McIlvaine's credo anchors journalism in "the social and political urgencies" of the day, his "newspaperman's metaphysics" is under siege once confronted with Martin's "philosophical meditation" on his near fatal experiences (166). Martin's morose brooding gives McIlvaine "considerable misgiving in [his] newspaperman's soul" about, fundamentally, not going "out to the edges of . . . whatever was possible" (166), culminating in his insight that, even once ostensibly completed, historical events are not "reportorially possible": "there are limits to the use of words in a newspaper" (207-8).

What is behind this schism is the generic oscillation between the late

nineteenth-century discourses of journalism and literary narrative, the former gravitating toward an information-based economy of immediately newsworthy information, the latter insisting on reflective discursivity exceeding the regime of data and instantaneous reportability. While McIlvaine is, initially, fully vested in the presumption of reportorial fullness, his probes into the doctor's ethical responsibility make him realize the myth of the narrative totality of any experience. Instead, through a kind of professional crossover, he reorients himself toward the retrospective form of fiction and thus signals his acceptance of the forever elliptical representation of any event. "Whoever tells our moral history . . . must run behind, not ahead of it" (207), he notes, and he thus reprises not only Doctorow's claim about fiction as "a kind of speculative history" filling the gaps left by other discourses and Benjamin's observation about the quick dissipation of newsworthiness (*Essays* 162)³⁷; he also instantiates—in narrative terms—areas that have defined much of the field of cognitive science: how to distinguish between short- and long-term reflection (formerly known as *cogitation*) and between information and knowledge.

One way to understand these distinctions is to import Freud's notion of *condensation* into this discussion. Freud noted that while human memories are notoriously erratic, they rarely forget experiences altogether. Rather, memories tend to leave traces in a subject's psychic apparatus, configuring and tilting that apparatus to frame future experiences in a similar way. (In evolutionary terms, the human brain can thus be seen as the result of such collective forms of condensation.) Building on Freud, Hartmut Winkler has observed that language, too, in its entirety can "be seen as a product of 'condensation.'" Just as psychological sedimentation always leaves trace deposits in the individual human mind, or, in evolutionary terms, in the human cognitive apparatus, so language is an act of compaction so extraordinary as "to fit into puny human skulls" ("Discourses" 104). While memories and speech acts are often fleeting and forgotten, both lead, over time, to a gradual buildup and increasing concentration on both an ontogenetic and a phylogenetic level. Memories, no less than linguistic symbol systems, are compressed and infinitely coded in cerebral folds.

Analogously, one might say, journalism and literary narrative can be seen in terms of their cognitive longevity and compression. Just as memories and language diachronically commute experiences and speech acts into highly condensed "semantic-mental structures," so literature can be seen as a process of cultural concentration, transforming—through retrospection, that is, time—ephemeral data and short-lived fact into insight with the presumption of (more) enduring value (Winkler, "Discourses" 104). By looking back-

ward, or running behind the times, rather than ahead of them, as McIlvaine says, the novel can submit data to a winnowing or filtering process separating the wheat from the chaff, or the flotsam from the jetsam. Journalism, by contrast, bound to report on the world of verifiable fact and to the protocols of quick information delivery, engages with the immediate present, without the privilege of retrospection and ripening reflection. Instead of substantive reconsideration, the work of reporting virtually coincides with the daily unfolding of history, without temporal space or distance for a sustained critical and imaginative review—documentary, profound, and resistant to prevailing power structures as it often is. If journalism informs in a mode that is almost coterminous with emergent events, literature adds a more distanced and speculative version to these events once they have crystallized into stacked interpretive overlays.

Thus, what goes by the old-fashioned terms of counsel, wisdom, or knowledge—those musty words long mothballed by the postmodern border patrol—can be understood as literature's cultural offering: the cognitive substrate of a historical moment, the dust that has settled into a deposit. If "the true name of the press is oblivion" indeed, as Emile de Girardin, the inventor of the penny press, once famously put it, the true name of the novel might be remembrance or memory working through unresolvable imponderables one more time (qtd. in de la Motte and Przyblyski 4). Significantly, Freud's psychological notion of condensation derives from the poetic notion of (*Ver*) *dichtung*, suggesting verbal and narrative processes of concentration or, better, densification. Significantly as well, Doctorow in *The Waterworks* repeatedly draws attention to this cognitive (both synchronic and diachronic) compression of language. The reader learns that Sartorius's name evolved during the German Middle Ages, when tradespeople in the process of social elevation "took the Latin form of their names. The miller became Molitor, the pastor became Pastorius, and the tailor became Sartorius" (128).³⁸ To Sartorius's demand for an abolition of "poetic . . . conceits" (242), Doctorow responds that discourse is conceptual, and hence a mostly verbal substrate—the result of semantic compression. And, perhaps most dramatically, when McIlvaine interviews Sartorius in the insane asylum, his learned answers rise amid a "symphony of shrieks, cries, caterwaulings, trills, shouts, and pealing laughter," sounds that are echoed in the delirious "tweet, tweet" of Tweed, the skilled verbal manipulator now "impoverished of language" (242–44). Nonsense and full sense, non-language and highly evolved discourse are here immediately juxtaposed to illustrate the gamut of cognitive yield, a self-organizing system extending from noise and verbal chaos to coherent speech and sophisticated communicative order.

Mapping the signifying range of language within the space of just a couple of lines is of course part of the power of literary narrative. It draws from the very *Verdichtung* of discourse as a veritable archaeology of semantic strata and, precisely because of its density, always produces noise as a constitutive byproduct; its very concentration forbids transparency even as it invites reflection. “The literary experience extends impression into discourse. It flowers to thought with nouns, verbs, objects,” as Doctorow puts it in his next novel, foreshadowing his increasing interest in the imbrication of language and cognition (*God* 214). As long as readers meet the cognitive densities of literary narratives halfway with their own cognitive resources—sharing as they do language as the medium circulating through both cerebral currents and the “printed circuit” of a book—the novel will remain a constructive player in the formation of a culture’s intellectual landscape. As long as a culture has enough appreciation for language as its major vehicle of expression and intellectual exchange, it can counteract the danger of cognitive flatlining brought about by a shrinkage in communicative nuance and breadth, be it through tabloid journalism or the visual and electronic media of today. Otherwise, as Doctorow once put it, “If there was a way of taking a national EEG, you’d find that the brain waves have gone flat” (*Conversations* 71).