The Data of Life and the Life of Data
Epistemological and Aesthetic Liminality at the Fin de Siècle

James Dorson (Freie Universität Berlin)

Abstract:
Scientific and literary texts at the fin de siècle are unique cultural documents in that they register at once the culmination of a reductive mechanistic science and its crisis following its expansion into the life sciences. This essay focuses on instances from the late nineteenth century where data takes on a life of its own—instances, that is, where data becomes vital. I suggest that the liminality between a data-driven mechanistic outlook, on the one hand, and tropes of the sublime, on the other, can help us think about the forms of data and narrative in terms of a dialectical interdependence instead of as strictly opposed. By reading the scientific writings of Charles Darwin, Ernst Haeckel, and Claude Bernard alongside literary texts by Émile Zola, H. G. Wells, and Frank Norris, the essay sheds light on how a narrative of the sublime—emphasizing the limits of understanding in the face of the world's irreducible complexity—not only coexists with scientific reductionism, but is actually produced by it, as both William James and Henri Bergson argued when they identified a double movement of rationalization and mystification resulting from the analytical decomposition of what is indivisible. Returning to how this double movement was produced by the encounter of reductive methods with the intractability of the living in the late nineteenth-century life sciences and literature brings recent debates in the humanities, which seek to negotiate the coordinates between "Western aspirations to mastery" and its other, epistemological "humility," into historical relief (Levine, "Enormity" 73). Finally, I turn to Norris's reformulation of literary naturalism as a synthesis of realism and romance in order to show how naturalism inhabits a liminal space that effectively mediates this tension between the mechanical decomposition of life and its mystical recombination.

Does data disenchant? Does breaking the world apart into quantifiable units drive back the unknown? Does computation and control go hand in hand?

Such at least have been the hopes invested in science since the Enlightenment as well as the fears by critics of modernity's distinctive synthesis of knowledge and power. The same logic that aligns science with the disenchantment of the world

has associated art variously with religion, beauty, wonder, pleasure, and the anti-instrumental. This opposition between a positivistic or mechanistic science seeking to dominate nature, on the one hand, and the irreducibility and singularity of works of art, on the other, also remains a formidable structuring force in the humanities today. A recent special issue of *Genre* titled "Narrative against Data" is a case in point. In the introduction to the issue, Jesse Rosenthal notes the disciplinary discomfort that the rise of computational literary studies has produced in a field that long has defined itself against data-driven approaches. But if, as Rosenthal observes, "the role of data in literary criticism presents a threat to business as usual" (4), the aim of the issue is apparently to return to business as usual, as it shores up the opposition between data that disenchants and art that unsettles. Rosenthal writes that the contributors "show how the novel form itself is consistently adept at expressing the discomfort that data can produce: the uncertainty in the face of a central part of modern existence that seems to resist being brought forward into understanding" (2).

This resistance of literature to the incontestable knowledge of data as something given ("datum") is striking in Caroline Levine's contribution to the issue of *Genre*, which examines the Victorian novel's preference for narrative over numerical representations of large-scale phenomena, its "refusal to count" ("Enormity" 61). Levine writes:

> Instead of bemoaning our loss of depth and mastery, I want to suggest that literary critics in the moment of big data might instead take our cue from the sublime and experience a moment of terrifying smallness. That is, the sublimely vertiginous recognition that there is far more to know than we will ever be able to grasp or represent is a better, more chastening and valuable starting point for research than legible and condensed visualizations of data. In response to traditional Western aspirations to mastery, I believe that it is wise, both ethically and epistemologically, to start from a humility in the face of a reality so large that it will always be beyond us. (73)

Victorian novelists refrain from using numbers, Levine argues, because "precise numbers do not produce that unsettling, dissonant crisis of sublime vastness" (71). Yet representations of data are no stranger to "sublime vastness." The most obvious example is what Julian Stallabrass terms "the data sublime," "the impression and spectacle of a chaotically complex and immensely large configuration of data" (82). Tropes of the romantic sublime also infest popular literature on big data, with mandatory references to mountains, oceans, avalanches, and floods of data. And this is only the most recent manifestation of what David Nye (following Leo Marx) calls "the technological sublime," where industrial technologies from the railroad to the atom bomb have been represented in rhetoric borrowed from the natural sublime. That discourse on data routinely invokes the "sublimely vertiginous" can

be shown to be the case both historically, as Maurice Lee does in his account of information overload in the nineteenth century, as well as today, where "[d]ata are everywhere and piling up in dizzying amounts," to quote from the opening of a recent critical book on data (Gitelman and Jackson 1). In short, there is something vertiginous about data that scrambles the coordinates of any debate that takes for granted that data disenchants.

If the aim of producing data is to make the world legible and thereby manageable, why then do representations of data so eagerly embrace romantic tropes? There are doubtless many reasons for this, including the paradoxical mixture of passivity and control built into both the romantic sublime (for Kant the experience of being overpowered is subsequently reclaimed by reason) and scientific reasoning, which submits itself to the natural laws it seeks to discover (as in Francis Bacon's aphorism: "Nature to be commanded must be obeyed" [39]). What I would like to focus on here are instances from the late nineteenth century where data takes on a life of its own—that is, instances where data becomes vital or, to borrow from Don DeLillo's 2003 novel *Cosmopolis*, where "data itself [becomes] soulful and glowing, a dynamic aspect of the life process" (24). I would like to suggest that a consideration of such liminality between a data-driven mechanistic outlook and aesthetic, on the one hand, and tropes of the sublime, on the other, can help us think about the forms of data and narrative in terms of a dialectical interdependence instead of as strictly opposed. My reading in what follows of the scientific writings of Charles Darwin, Ernst Haeckel, and Claude Bernard alongside literary texts by Émile Zola, H. G. Wells, and Frank Norris is meant to shed light on how a narrative of the sublime emphasizing the limits of understanding in the face of the world's irreducible complexity not only coexists with scientific reductionism, but is actually produced by it.

Both William James and Henri Bergson at the turn of the twentieth century identified a double movement of rationalization and mystification resulting from the analytical decomposition of the world. Because they regarded life as indivisible, the application of reductive methods to vital phenomena meant that life could be endlessly decomposed into smaller and smaller units without ever grasping it. The result for Bergson was "an analysis passing away to infinity" (226) leading to a perception of living matter, on the one hand, as "infinitely complex," and, on the other, as ultimately inscrutable, as its fragmented parts could only be recomposed into a whole by assuming an "incomprehensible influence of an external force that has grouped its elements together" (250). When applied to life, physics turns into metaphysics. Or, as James puts it: "[W]e insist on treating things as really separate when they are given as continuously joined, invoking, when union is required, transcendental principles to overcome the separateness we have assumed" ("World" 1164). Returning to how this double movement was produced by the encounter of reductive methods with the intractability of the living in the late nineteenth-cen-

tury life sciences and literature brings recent debates in the humanities, which seek to negotiate the coordinates between "Western aspirations to mastery" and its other, epistemological "humility," into historical relief (Levine, "Enormity" 73). Finally, I turn to Norris's reformulation of literary naturalism as a synthesis of realism and romance in order to show how naturalism inhabits a liminal space that effectively mediates this tension between the mechanical decomposition of life and its mystical recombination.

Darwin's Romantic Materialism

Scientific and literary texts at the fin de siècle are unique cultural documents in that they register at once the culmination of a reductive mechanistic science and its crisis following its expansion into the life sciences. At the beginning of the twentieth century, the Austrian physicist Ludwig Boltzmann called the century that had just ended the "century of the mechanical conception of nature, Darwin's century" (qtd. in Rheinberger 13-14). But if mechanism is the materialist philosophy that regards all matter as reducible to physicochemical elements that can be subjected to experimental manipulation and extrapolation, then Darwin fits uneasily into this rubric. As Gillian Beer writes in her 1983 landmark study *Darwin's Plots*, "[Darwin] could not rely upon a fully experimental method. He was obliged to work in terms of an imaginative history. He moved outside the protecting terms of Baconian induction into a role more like that of a creative artist" (95). In order to understand Darwin's blend of scientific materialism and literary tropes in *On the Origin of Species* (1859), Beer refers to his work as "Romantic materialism" (75). "His text is an unusually extensive fiction," she writes, "one which deliberately extends itself towards the boundaries of the literally *unthinkable*, which displaces the absoluteness of man's power of reason as an instrument for measuring the world" (92; emphasis in the original). If Darwin is a mechanist, his is a mechanism that repeatedly slips into the mode of the sublime as it records the limits of knowledge in face of what he calls "the beauty and infinite complexity of the co-adaptations between all organic being" (84). In *Origin of Species*, the attempt to explain life scientifically leads to aesthetic appreciation of nature rather disenchantment. The scale and intricacy of evolution breaks the frame of mechanistic thinking—not because life for Darwin is not material but because the entangled material relations that determine the life process are 'infinitely complex,' a phrase that recurs repeatedly throughout *Origin of Species*.

Darwin's classic text exemplifies a mechanical materialism that has migrated from the 'hard sciences' of physics and chemistry to the life sciences, uprooting creationist and vitalist explanations along the way, only to reintroduce a level of complexity that exceeds the methods and representational forms available to mech-

anism. Like the data sublime, the "blind algorithmic process" (59) of evolution, to use Daniel Dennett's phrase, is at once mechanistic and unfathomable. Darwin's transgression of neat epistemological and methodological boundaries makes *Origin of Species* a threshold text. Not only is evolution a process of incremental gradation that confounds taxonomic attempts at categorizing living beings into separate species. The form of the text itself is liminal in the sense that the data of life—Darwin's meticulous attention to detail, the slight variations whose accumulated effects resist understanding—continually prompts a narrative that relishes in the wonders of nature. Darwin's conception and representation of evolution requires aesthetic as well as methodological liminality that renders the boundaries between science and art porous. It also suggests an interdependence between the data of life and a narrative that both provokes a reflection on the limits of knowledge and makes life subject to aesthetic appreciation. As the ambitious title of *On the Origin of Species* indicates, Darwin's starting point is anything but humble. And yet his narrative repeatedly turns to humility as the proper response to the "infinite complexity" of the life process.

From Vivisection to Vitalism

Beginning his career at the eclipse of the Victorian era, H. G. Wells did not write Victorian novels but "scientific romances" (Stableford). The humbling feeling of "terrifying smallness" that Levine extols ("Enormity" 73) is nevertheless a stable in his work, where characters are repeatedly confronted with the infinitude of time and space and their inability to grasp it. Moreover, Wells displays not only a refusal to count but a veritable hostility to numbers: "When we teach a child to count, we poison its mind almost irrevocably. […] He is inoculated with the arithmetical virus; he lets a watch and a calendar blind him to the fact that every moment of his life is a miracle and a mystery," Wells writes in his 1891 essay, "The Rediscovery of the Unique." At first glance, the essay appears to ratify the opposition between singularity and disenchanting science. Yet rather than opposed to science, it turns out that singularity is produced by it. "The work of Darwin and Wallace was the clear assertion of the uniqueness of living things; and physicists and chemists are now trying the next step forward in a hesitating way," he writes. "We are on the eve of man's final emancipation from rigid reasonableness, from the last trace of the trim clockwork thought of the seventeenth and eighteenth centuries."

This uniqueness of the living discovered by evolutionary theory, which roots out the mechanical "clockwork thought" of the preceding centuries, is also what thwarts the Frankensteinian efforts of Wells's most memorable antihero, the mad scientist and titular character of *The Island of Doctor Moreau* (1896). Moreau is a "notorious vivisector" (35) who has turned the Pacific island on which the narrator and

protagonist Edward Prendick is shipwrecked into a laboratory for grafting animals into the shape of humans. While Moreau has initial success in creating "humanized animals—triumphs of vivisection" (71) that are capable of speech and religious observance, the humanoid specimens soon revert to their old behavior. In spite of Moreau's best efforts, "somehow the things drift back again," he complains (77). As his scientific quest to take command over life unravels and the island descends into chaos, the ordered universe of Victorian England seems to unravel with it. Facing the violent despair of the "Beast People" torn between their old and their new natures, Prendick has a stark realization: "I must confess I lost faith in the sanity of the world when I saw it suffering the painful disorder of this island. A blind fate, a vast pitiless mechanism, seemed to cut and shape the fabric of existence," where everyone is "torn and crushed, ruthlessly, inevitably, amid the infinite complexity of its incessant wheels" (96). As the novel closes, we find Prendick, who has escaped from the island, withdrawn into solitude, having taken refuge in "experiments in chemistry" and "the study of astronomy," whose "eternal laws of matter" now provide him with the sense of "peace and protection" (131) that he no longer finds among the living.

The novel stages the conflict between two sciences at the end of the century. On the one hand, the life sciences were dominated by the successes of physiology, which used the experimental method taken from chemistry and physics to discover the causal laws of organic matter. On the other hand, the understanding of life in evolutionary terms revealed the limitations of the experimental method's reductionism when confronted with life's "infinite complexity," as Prendick notes with a nod to Darwin (151). The undoing of Moreau's "man-making" (73) project thus reflects the evolutionary challenge to the mechanistic approach to life pioneered by physiology,[1] along with the crisis of humanism based on the idea of scientific progress and control over nature. The solace that Prendick finds in chemistry and astronomy is the solace of order and predictability that celestial mechanics offer but which the study of living matter does not, as Moreau's grotesque failure so vividly demonstrates. It is the encounter of a mechanistic science with the irreducibility of life that drives the novel, where the "science" carefully explained by Moreau gives way to the sublime vision of "a vast pitiless mechanism" (96) beyond the grasp of human understanding and control.

The mechanism out of control in *The Island of Doctor Moreau* is not only a metaphor for evolution, although it surely is that—Darwin too uses machine

1 Niall Shanks and Ray Greek note that "the appearance of evolutionary biology challenged a way of doing biology that had emerged from the rise of science itself during the Renaissance" (130).

metaphors to describe evolution.[2] It also registers a growing tension within the mechanistic science of physiology itself. The expansion of the experimental method to the life sciences initially appeared to validate faith in scientific progress and the control of organic as well as inorganic matter, climaxing with the physiologist Jacques Loeb's "engineering ideal in biology" and the eugenic fantasies it entailed (Pauly). By the turn of the twentieth century, however, it had precipitated an epistemological crisis that saw the revival of various strands of vitalism.

Following the French pioneer of experimental medicine, Claude Bernard, the noted (and notorious for his racial ideology) German zoologist Ernst Haeckel calls vivisection "one of the *indispensable* methods of research into the nature of life" (41; emphasis in the original). Haeckel's monism—the philosophy that subjects all phenomena to the same natural law—involves what he describes as a "cosmic mechanicism" (260) in his popular science book *The Riddle of the Universe* (1895). "The great abstract law of mechanical causality," he writes, "now rules the entire universe, as it does the mind of man" (366). Curiously, however, Haeckel's radical scientific materialism repeatedly shifts into its opposite, a pantheism that he takes from Spinoza and Goethe, and which he refers to as his "natural religion":

> The astonishment with which we gaze upon the starry heavens and the microscopic life in a drop of water, the awe with which we trace the marvellous working of energy in the motion of matter, the reverence with which we grasp the universal dominance of the law of substance throughout the universe—all these are part of our emotional life, falling under the heading of "natural religion." (344)

Reducing all matter to a mechanical "law of substance" leads Haeckel to a romantic vision of a sentient world where even atoms have "souls" (218), as the smallest elements of a mechanical universe are "not without a rudimentary form of sensation and will" (225). Far from disenchantment, a mechanistic approach for Haeckel uncovers a "mighty world-wonder" (380), where "substance becomes more mysterious and enigmatic the deeper we penetrate into the knowledge of its attributes, matter and energy, and the more we study its countless phenomenal forms and their evolution" (380). Science, in short, leads to the "æsthetic enjoyment of nature" (342), as the beautiful illustrations that Haeckel was famous for amply demonstrate. No wonder that William James, in his repeated attacks on monism, referred to it as "the mystical method" ("Pragmatism" 552).[3] More congenially, the physiologist Max

2 Cf. Ruse: "Seeing nature's parts as machines, as mechanisms, as contrivances, is absolutely crucial for Darwin" (63).

3 As James caustically writes: "[T]he authority which absolute monism undoubtably processes, and probably always will possess over some persons, draws its strength far less from intellectual than from mystical grounds. To interpret absolute monism worthily, be a mystic" ("Pragmatism" 552).

Verworn (and not incidentally Haeckel's student) describes the reductive method's paradoxical discovery of complexity as a kind of "mechanical vitalism":

> [T]he view that vital phenomena depend at bottom upon the agency of physical and chemical forces; but that in living organisms these forces are linked together into such a peculiar and thus far unexplored complex that for the present it must be contrasted with all the forces of inorganic nature as a specific vital force, characterising the actions of living organisms only. (44-45)

Such a mechanical vitalism, forced to concede the specificity of the life process, was evident in Bernard's seminal *Introduction to the Study of Experimental Medicine* from 1865, which laid the groundwork for experimental work in physiology as well as provided the inspiration for Wells's Moreau.[4] Bernard does not equivocate about the necessity of a reductive approach in medicine for the discipline to be taken seriously as a science: "[W]e must […] analyze the organism, as we take apart a machine to review and study all its works […] and must make use of the same experimental method which physicists and chemists employ in analyzing the phenomena of inorganic bodies" (65). Nor does he equivocate about the Baconian goal of experimental medicine: "[W]hen an experimenter succeeds in learning the necessary conditions of a phenomenon, he is, in some sense, its master; he can predict its course and its appearance, he can promote or prevent it at will" (66). This approach to life, which relies fundamentally on the practice of vivisection, was resolutely against the idea held by the so-called Montpellier vitalists that life expresses a 'vital force' that cannot be taken apart or be understood analytically.[5] In turn, it was principally in reaction to a mechanistic understanding of life that vitalism saw a revival at the turn of the twentieth century through the work of Hans Driesch and Bergson, whose philosophy of life as "perpetual becoming" (272) rules out experimental control and planning of the life process.

Yet, as a number of critics have pointed out, foremost among them the philosopher of biology Georges Canguilhem (*Knowledge, Vital Rationalist*), Bernard's experimental approach to what he repeatedly calls "living machines" is not as far removed from a vitalist position as it appears. While Bernard insists that life can be understood experimentally in the same way that inorganic matter can be understood, life is nevertheless characterized by unique laws. Bernard's original concept of a 'milieu

4 Bernard defends vivisection in sensationalist terms: "A physiologist is not a man of fashion, he is a man of science, absorbed by the scientific ideas which he pursues: he no longer hears the cry of animals, he no longer sees the blood that flows, he sees only his idea and perceives only organisms concealing problems which he intends to solve" (103). Moreau explains vivisection in almost identical terms: "The thing before you is no longer an animal, a fellow-creature, but a problem" (75). See Vint (87-89) for similarities between Moreau and Bernard.

5 See Wolfe on Bernard's relationship with the vitalists of the Montpellier Medical Faculty.

intérieur' showed that life was a mechanism with its own principles of organization autonomous from the mechanical laws that determine external phenomena. The unique organization of the 'milieu intérieur' is what had misled vitalists to believe in a force exempt from scientific laws. It is also what distinguishes biology from the other natural sciences: "In experimentation on inorganic bodies, we need to take account of only one environment, the external cosmic environment; while in the higher living animals, at least two environments must be considered, the external or extra-organic environment and the internal or intra-organic environment" (Bernard 63). Moreover, the self-organizing 'milieu intérieur' of vital phenomena differs from the 'milieu extérieur' by its greater complexity. Like Darwin, Bernard repeatedly invokes the term "complexity" to describe the life process, referring to its "enormous complexity" (64) and "excessive complexity" (134). And like in Darwin, complexity goes hand in hand with a deference that, even when Bernard is arguing that life is a machine, compels his otherwise coldly analytical prose into romantic appreciation of the wonders of nature: "[A] living organism is nothing but a wonderful machine endowed with the most marvellous properties and set going by means of the most complex and delicate mechanism" (63).

The more that the "living machine" is taken apart, the more wonderful it seems to Bernard. What fundamentally distinguishes life for Bernard is not the particular arrangement of its chemical elements but what he sums up with the dictum that "life is creation" (93). In a passage in which his argument sounds positively vitalist, he writes:

> In every living germ is a creative idea which develops and exhibits itself through organization. As long as a living being persists, it remains under the influence of this same creative vital force, and death comes when it can no longer express itself; [...] physico-chemical means of expression are common to all natural phenomena and remain mingled, pell-mell, like the letters of the alphabet in a box, till a force goes to fetch them, to express the most varied thoughts and mechanisms. (93-94)

Life is likened to a romantic principle of creative self-expression, where even the ruling mechanical metaphors for life used throughout *Experimental Medicine* yield to a linguistic metaphor of creating words out of letters. Rather than starkly opposed to vitalism, Bernard carves out a liminal space between mechanism and vitalism where life is understood as something that can be taken apart like a machine but where there is also something "within life [that] rebels against its mechanization" (Canguilhem, *Knowledge* 73).

The Liminal Aesthetics of Naturalism

If Bernard's experimental medicine served as inspiration for the antihero and plot of *The Island of Doctor Moreau*, it had an even greater impact on the literary movement of naturalism spearheaded in France by Émile Zola. In his famous 1868 preface to *Thérèse Raquin*, his first naturalist novel published serially the year before to widespread scandal, Zola coldly describes his macabre story of passion and murder as "a study of a curious physiological case" (22). "I simply applied to two living bodies the analytical method that surgeons apply to corpses," he explains (23). Later, in his naturalist manifesto "The Experimental Novel" (1880), Zola doubles down on his commitment to the experimental method and the analogy he draws between writing and vivisection: "we should operate on the characters, the passions, on the human and social data, in the same way that the chemist and the physicist operate on inanimate beings, and as the physiologist operates on living beings" (18). Yet, Zola's manifesto is not only exceptional for its loyalty to Bernard's method, which lends naturalist fiction the prestige that Bernard himself had taken from the hard sciences. The essay is also exceptional for its simplification of Bernard's ideas. After quoting Bernard extensively on the 'milieu intérieur,' Zola stops short of following Bernard back down the path of vitalism. "I restrain myself for fear of complicating the argument to too great an extent," he disingenuously concedes, before altogether erasing the difference between the living and nonliving that follows from the 'milieu intérieur': "Living beings, in which the vitalists still admitted a mysterious influence, are in their turn brought under and reduced to the general mechanism of matter" (16).

Zola's aesthetic ideology has been widely condemned by critics who either complain that his fiction does not live up to his theory or who take issue with his mechanistic approach. Commenting on the resemblance of naturalism to the "control-technologies of machine culture" (100), Mark Seltzer writes that naturalist fiction "everywhere notes numbers and intervals of time; calibrates time and motion; measures and decomposes values, distances, and actions into intervals, sequences, and statistics" (14). In contrast to the Victorian novel's "refusal to count," naturalist fiction for Seltzer embodies the "culture of numbers, models, and statistics" of its times (5). If any literary movement could ever be described as 'data fiction' (Dorson and Schober), naturalism would surely be it. Yet, as the discursive liminality between mechanism and vitalism at the end of the century also suggests, a commitment to data and mechanism does not necessarily translate into mastery.

Take the work of Frank Norris, the self-described 'Boy Zola' who helped popularize a naturalist aesthetic in the US after it had run its course in France. While Norris deliberately models his fiction after Zola, he also reads the experimental method that Zola introduced to literature through Bernard as a form of romance characterized by melodramatic excess (Norris, "Zola"). Rather than subjected to disenchant-

ing control, a mechanistic universe for Norris holds a fascination that tallies with the intensity of experience so eagerly pursued by his neurasthenic-wary contemporaries. Jackson Lears notes how Americans at the fin de siècle "yearned to reconnect with some pulsating primal vitality." He writes: "Never before had so many people thought that reality was throbbing with vitality, pulsating with excitement, and always just out of reach" (232). But while Lears ascribes this "vitalist impulse" to "a broad revolt against positivism, a rejection of a barren universe governed by inexorable laws, where everything was measurable and nothing mysterious" (237), in Norris's work it is mechanism itself that is mysteriously vital.

The characteristic movement in Norris's style between minute description and detached explanation resonates with Zola's claim that the goal of the naturalist novel is to produce "human data which may prove very useful" ("Experimental" 53). In his Marxist critique of Zola, Georg Lukács argues that such a capitulation to "bourgeois science" (122), where social relations are naturalized as scientific laws instead of represented as the effect of historical processes, produces a fragmentary effect—"a kaleidoscopic chaos" (133)—in which the plot moves forward mechanically, driven by chance instead of by historical necessity. To compensate for this chaos, Lukács argues that naturalist texts resort to symbols for producing the unity that their lack of historical consciousness deprives them of (131). What Lukács does not observe is how symbolic unity in naturalism is commonly produced by a perspectival scaling up. This scaling effect is used in *The Island of Doctor Moreau* when the narrator describes the "vast pitiless mechanism" by which the islanders are "torn and crushed, ruthlessly, inevitably, amid the infinite complexity of its incessant wheels" (Wells 96). The fragmented syntax along with the climatic buildup of the sentence through repetition ("ruthlessly, inevitably") formally mirrors a movement from chaotic fragmentation to unifying totality too extensive to be grasped. And this aggregation of singular phenomena into overwhelming forces represented metaphorically is the signature style of Norris's naturalism, which he regarded as a fusion of realism's attention to detail and romanticism's larger commitment to "the broad truth of the thing" ("Weekly Letter" 74).

Consider a passage from Norris's posthumously published *Vandover and the Brute*, written between 1894 and 1895, around the same time as *The Island of Doctor Moreau*. In one of many unsettling moments in which Vandover faces the prospect of his own degeneration, he receives, like Prendick, "a glimpse far down into the springs and wheels of life" (181):

> It was Life, the murmur of the great, mysterious force that spun the wheels of Nature and that sent it onward like some enormous engine, resistless, relentless; an engine that sped straight forward, driving before it the infinite herd of humanity, [...] grinding them to dust beneath its myriad iron wheels, [...] driving it blindly on

> and on toward some far-distant goal, some vague unknown end, some mysterious, fearful bourne forever hidden in thick darkness. (188)

This is life as the ghost in the machine, the "mysterious force" that animates nature's "enormous engine." While a glimpse "into the springs and wheels of life" evokes the penetrating gaze of a vivisectionist, taking apart the mechanism of life reveals a vital force that resists mechanical understanding.[6] In typically sublime fashion, the process can only be represented negatively (as something "unknown" and "hidden"). But as the similarity of the style and imagery with the revelation in Wells's novel also suggests, by scaling up to "Life" in the abstract, the passage shifts the understanding of life from physiological to evolutionary terms. If the tension between the two methods of approaching life is generative for the plot of *The Island of Doctor Moreau*, the interplay between the data of life and its sublime narrativization is also a generative aesthetic principle in Norris's naturalism. The fragmentary effects of the naturalist novel, resulting from its aesthetic investment in data, produce the need for a transcendental principle able to unify the text. In other words, realism begets romanticism. But rather than imposed externally, as Lukács argues, the unifying principle in naturalist texts—typically referred to simply as 'force'—results from the mechanistic approach to life itself, where scaling up leads not only to comprehensive totality but also to sublime complexification that exceeds all comprehension.

Conclusion

What light does the scientific and aesthetic liminality at the fin de siècle shed on the current state of the humanities? The recent special issue on "Narrative against Data" is a pushback against the embrace of data in computational literary studies. But Levine's rejection of "traditional Western aspirations to mastery," a tradition to which the reliance on data clearly belongs, in favor of epistemological humility was also evident in her 2015 book on *Forms*. "[W]e may intuit the overwhelmingly complex webs of social interconnections in glimpses and hints," she writes, "but […] the overlapping of social networks approaches a magnitude and a complexity so great that their wholeness defies full knowledge" (129-130). Levine's commitment to complexity that defies analysis vividly recalls the coordinates of the debate that ensued when scientists and writers in the second half of the nineteenth century first contended with the complexity and vitality of the life process.

And Levine is not alone in her call for epistemological humility. The New Materialist embrace of what Jane Bennett calls "methodological naiveté" (17) in the face

6 See also Fleissner's excellent account of physiology and vitalism in *Vandover and the Brute*.

of "vital materiality" (vii) as a way of reclaiming enchantment resonates not only with Spinoza and the vitalists that Bennett reclaims but also with Haeckel's "atoms with souls." The route that arrives at the limits of analytical knowledge may be different—Haeckel takes reductionism to its cosmic limits while Bennett recoils from it—but the result is the same. What such strange resonances suggest to me is that humility is not a radical alternative to mastery but something more like its dialectical counterpart. The concept of liminality at least seems better equipped to illuminate the many dialectical reversals that have taken place since the Enlightenment than moralizing oppositions (for both Levine and Bennett, humility comes with an ethical imperative). The historical interdependence of the data of life and the life of data suggests that mechanism and mysticism are entangled in ways that necessitate a method capable of navigating between the two. Without such a method, we seem to be locked into a false choice between one or the other, and the prospects of scholarship are then, as Canguilhem notes, anything but encouraging:

> We accept far too easily that there exists a fundamental conflict between knowledge and life, such that their reciprocal aversion can lead only to the destruction of life by knowledge or to the derision of knowledge by life. We are then left with no choice except that between a crystalline (i.e., transparent and inert) intellectualism and a foggy (at once active and muddled) mysticism. (*Knowledge* xvii)

Works Cited

Bacon, Francis. *The New Organon and Related Writings*. Edited by Fulton H. Anderson, The Bobbs-Merrill Company, 1960.

Beer, Gillian. *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*. 1983. Cambridge UP, 2009.

Bennett, Jane. *Vibrant Matter: A Political Ecology of Things*. Duke UP, 2010.

Bergson, Henri. *Creative Evolution*. 1907. Translated by Arthur Mitchell, Dover Publications, 1998.

Bernard, Claude. *An Introduction to the Study of Experimental Medicine*. 1865. Translated by Henry Copley Greene, Dover Publications, 1957.

Canguilhem, Georges. *Knowledge of Life*. Translated by Stefanos Geroulanos and Daniela Ginsburg, edited by Paula Marrati and Todd Meyers, Fordham UP, 2008.

—. *A Vital Rationalist: Selected Writings from Georges Canguilhem*. Translated by Arthur Goldhammer, edited by François Delaporte, Zone Books, 2000.

Darwin, Charles. *On the Origin of Species*. 1859. Oxford UP, 2008.

"datum." *Oxford English Dictionary*, Oxford UP, 2019, https://www.oed.com/view/Entry/47434.

DeLillo, Don. *Cosmopolis*. Simon and Schuster, 2003.

Dennett, Daniel C. *Darwin's Dangerous Idea: Evolution and the Meanings of Life*. Simon and Schuster, 1995.

Dorson, James, and Regina Schober, editors. *Data Fiction: Naturalism, Narratives, and Numbers*. Special Issue of *Studies in American Naturalism*, vol. 12, no. 1, 2017.

Fleissner, Jennifer. "The Vital and the Statistical." *Studies in American Naturalism*, vol. 12, no. 1, 2017, pp. 9-27.

Gitelman, Lisa, and Virginia Jackson. Introduction. *"Raw Data" is an Oxymoron*, edited by Gitelman, MIT P, 2013, pp. 1-14.

Haeckel, Ernst. *The Riddle of the Universe at the Close of the Nineteenth Century*. Harper and Brothers, 1900.

James, William. "Pragmatism." 1907. *William James: Writings 1902-1910*, edited by Bruce Kuklick, The Library of America, 1987, pp. 479-624.

—. "A World of Pure Experience." *William James: Writings 1902-1910*, edited by Bruce Kuklick, The Library of America, 1987, pp. 1159-82.

Lears, T. J. Jackson. *Rebirth of a Nation: The Making of Modern America, 1877-1920*. 2009. Harper Perennial, 2010.

Lee, Maurice S. *Overwhelmed: Literature, Aesthetics, and the Nineteenth-Century Information Revolution*. Princeton UP, 2019.

Levine, Caroline. "The Enormity Effect: Realist Fiction, Literary Studies, and the Refusal to Count." *Genre*, vol. 50, no. 1, 2017, pp. 59-75.

—. *Forms: Whole, Rhythm, Hierarchy, Network*. Princeton UP, 2015.

Lukács, Georg. "Narrate or Describe?" 1936. *Writer and Critic and Other Essays*, edited and translated by Arthur Kahn, Grosset and Dunlap, 1970, pp. 110-48.

Norris, Frank. "Frank Norris' Weekly Letter." 1902. *The Literary Criticism of Frank Norris*, edited by Donald Pizer, U of Texas P, 1964, pp. 73-75.

—. *Vandover and the Brute*. 1914. Edited by Russ Castronovo, Broadview Editions, 2015.

—. "Zola as a Romantic Writer." 1896. *The Literary Criticism of Frank Norris*, edited by Donald Pizer, U of Texas P, 1964, pp. 71-72.

Nye, David. *American Technological Sublime*. MIT P, 1994.

Pauly, Philip J. *Controlling Life: Jacques Loeb and the Engineering Ideal in Biology*. Oxford UP, 1987.

Rheinberger, Hans-Jörg. *An Epistemology of the Concrete: Twentieth-Century Histories of Life*. Duke UP, 2010.

Rosenthal, Jesse. "Narrative against Data." Introduction. *Genre*, vol. 50, no. 1, 2017, pp. 1-18.

Ruse, Michael. *Defining Darwin: Essays on the History and Philosophy of Evolutionary Biology*. Prometheus Books, 2009.

Shanks, Niall, and C. Ray Greek. *Animal Models in Light of Evolution*. BrownWalker Press, 2009.

Seltzer, Mark. *Bodies and Machines*. Routledge, 1992.

Stableford, Brian. *Scientific Romance in Britain 1890-1950*. St. Martin's Press, 1985.

Stallabrass, Julian. "What's in a Face? Blankness and Significance in Contemporary Art Photography." *October*, vol. 122, 2007, pp. 71-90.

Verworn, Max. *General Physiology: An Outline of the Science of Life*. Translated by Frederic S. Lee, The Macmillan Co., 1899.

Vint, Sherryl. "Animals and Animality from the Island of Moreau to the Uplift Universe." *The Yearbook of English Studies*, vol. 37, no. 2, 2007, pp. 85-102.

Wells, H. G. *The Island of Doctor Moreau*. 1896. Penguin, 2005.

—. "The Rediscovery of the Unique." *The Fortnightly Review*, vol. 50, July 1891, pp. 106-11. *The Fortnightly Review*, https://fortnightlyreview.co.uk/2017/08/the-rediscovery-of-the-unique/.

Wolfe, Charles T. "Vitalism and the Resistance to Experimentation on Life in the Eighteenth Century." *Journal of the History of Biology*, vol. 46, no. 2, 2013, pp. 255-82.

Zola, Émile. "The Experimental Novel." 1880. *The Experimental Novel and Other Essays*, translated by Belle M. Sherman, The Cassell Publishing Co., 1893, pp. 1-54.

—. *Thérèse Raquin*. 1868. Translated by Leonard Tancock, Penguin, 1962.