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Narrative as Search:

Computational Forms of Knowledge in the Novels of Tom McCarthy

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## I. Introduction

### Narrative as Search

Narrative works, until it doesn't. Leading up to its IPO in 2019, The We Company (formerly WeWork), the real estate company that provides its members access to aesthetically-pleasing shared workspaces in major cities around the globe, created a story about itself so thrilling that it garnered a forty-seven billion dollar valuation from investors, making it one of the most valuable startups in the U.S.. This is a company that supposes its "extensive technology infrastructure" will enable it to "elevate the world's consciousness" (The We 1). Moreover, its "space-as-a-service" business model allows its members to "consume space by the minute" (10). The IPO never happened: serious concerns about the economic viability of the company—paired with rising concerns about its audacious leadership—led the valuation to plummet by as much as ninety percent in mere weeks, and the IPO was cancelled.

Despite its sudden fall, the company had successfully postured as the next gem of the tech startup world for years. As reporter Nitasha Tiku observes in 2015, the company "mastered the kind of storytelling that locks down massive rounds and can earn what is essentially a real estate company the privilege of being discussed—and valued like—a nimble Silicon Valley software startup" ("WeWork Used"). Indeed, the preposterous hopes for the company have little to do with its real estate; rather, they are deeply tied to its ostensible proximity to the tech industry, its language of global network infrastructures, and its efficient slicing of space and time, grafted onto the *keyword-as-a-service* template of the cloud computing industry.<sup>1</sup>

Reflecting on the company's strategy, Matthew Zeitlin writes in *The Guardian* of its attempted "casual transubstantiation of office space subleasing into something more like software." Zeitlin

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<sup>1</sup> Software-as-a-service, Platform-as-a-service, Infrastructure-as-a-service, etc.

is right to invoke this religious language: the company's branding epitomizes a culture (or at least an economy) committed to the fantasy that the world can be recreated by channeling more and more of itself through global networks of computational technologies.

I am interested in the cultures and economies of belief that commit themselves to computation as the medium in and through which humans should increasingly live and think. I wonder how narrative has come to function as kind of currency for tech companies at the forefront of their industry. Further, beyond the role of narrative in financialization, how might the connections between narrative and computational technologies influence our conceptions of knowledge?

The history of computing—from the metaphors early researchers used to conceptualize the modern computer to the contemporary ambitions of Silicon Valley—reveals how narrative desire has strongly shaped the technical development, philosophical significance, and economic functions of the computer. Philosophers, literary critics, and novelists have made this narrative desire visible by focusing on particularly influential tech giants. Barbara Cassin's prescient *Google Me: One-Click Democracy* deconstructs Google's mission statements to illuminate what she asserts is the end of Google's ambitious efforts to organize the world's information: "the fact that quantity is sufficient for quality" (63). Mark McGurl examines Amazon, which from its origins as an online bookseller has come to dominate industries including retail, media, and cloud computing. McGurl emphasizes that the company's stated efforts to maintain immediate and long-term relevance are "exactly the formula for enduring literary value" (459). According to McGurl, critics of Amazon who think the company is "antiliterary, a mere numbers game," miss the fact that "it wants to be the hero of a great literary work in its own right" (469). Tom

McCarthy's line of thinking resonates with McGurl's when he describes the way figurative language functions in contemporary corporate culture:

The point is that the company in its most cutting-edge incarnation, has become the arena in which narratives and fictions, metaphors and metonymies and symbol networks at their most dynamic and incisive are being generated, worked through and transformed. ("The Death")

Implicit in McCarthy's assessment is that corporations deploy narrative to stake their claim on market and garner predictive power over the future.<sup>2</sup>

This goes much deeper than marketing departments: corporations suffuse literary forms such as narrative and figurative language to craft identities and construct teleologies of technological development. If the corporation is annexing literary forms, how does the novel respond? What, after all, distinguishes narrative forms in the novel from those enveloping the history of computation and tech companies? One initial observation is that while the corporation employs narrative forms to affirm itself and assert control over a market, the novel can incorporate narrative forms that question knowledge and demonstrate the tenuousness of control. What insights does the novel lend into the role of narrative and the status of knowledge in the computer age?

To approach these questions, this paper proposes that we attend to the mediated nature of knowledge. Indeed, forms of knowledge are enabled and constrained by varying layers of mediation, from physical properties to social practices. Literary and computational versions of knowledge emerge from different material forms and perspectives on language. Language operates ambiguously in the novel, whereas computation requires determinate code. Literature celebrates and constructs meaning amid the very indeterminacy of language that must be expunged to create programming languages amenable to computation.

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<sup>2</sup> See the discussion on the role of speculation in financial markets in McCarthy's first published novel, *Remainder* (46-47). Also, see Nicholas Huber's interview with McCarthy titled "Zero Degree Everything."

I do not intend to make a strawman of either literature or computation, but simply to observe that the formal incongruity between these two cultural spheres suggests that they engender different forms of knowledge. It is for this reason that they appeal to different forms of justification. In contrast to literature, whose meaning depends in part on phenomenological fidelity to the human, computational forms of knowledge overwhelmingly validate themselves through mathematical logic and analysis.

Pair computation's self-referentiality with its ubiquity in twenty-first century knowledge production to see that we are committing ourselves to a particular epistemological trajectory. But it would be a mistake to ignore the longer history—intellectual and material—informing the present. Critical theorist David Golumbia reminds us that for at least one-hundred years, modern societies have habitually turned to “rationality and more *techné* (and more capital)” (84) as universal solutions to major problems. Along the way, he insists, “computers carry their own linguistic ideologies, often stemming from the conceptual-intellectual base of computer science” (84). Following Golumbia, I think it is crucial to examine how computation becomes cemented, infrastructurally and conceptually, in knowledge production. We must be attentive to the fact that computing is not merely a utility: it promotes its own perspectives, methods, and criteria by which meaning is created and evaluated. This paper is sensitive to anxieties that computation threatens to eclipse non-computational forms of knowledge; nonetheless, it attempts to understand the relationships—at times complementary and antithetical—between computational and literary forms of knowledge. Furthermore, we can refine our question to this: How does literary narrative register the problematics of knowledge in a period committing itself to the epistemological preeminence of computation?

Computational form is registered in the contemporary novel. Criticism that seeks to account for the bi-directional influences between computation and the novel insist that beyond merely representing computational technologies, the novel also restructures itself in relation to them. For instance, in *Network Aesthetics*, Patrick Jagoda asserts that at formal and structural levels, novels are reworking themselves in regard to the concept of the network—what he calls “the principal architecture and most resonant metaphor of the globalizing world” (3). Citing novels such as DeLillo’s *Underworld* and Stephenson’s *Cryptonomicon*, Jagoda suggests that the novel can confront the network formally in figurative language and “*processes of mapping* networks across space and time,” as well as thematically by representing central epistemic problems of networked society (44). Jagoda ultimately insists that network novels “find their fundamental aesthetic raison d’etre in the paradigm shift of the network society that they interrogate and intensify through metaphor and technological imaginaries” (44). In other words, network novels think about networks through a literary form that is itself transformed by the network concept. Nathan K. Hensley’s notion of drone form is another example of criticism’s attempt to track how perspectival figurations germane to computational technologies such as drone usage manifest as a literary form. According to Hensley, drone vision—emerging from the distributed figurations of drones, networks, and human actors through which drones are operated in the context of modern warfare—begets a “way of seeing” (229), and novels like McCarthy’s *Satin Island* generate drone-like perspectival triangulations to reckon with mediated flows of information, hierarchies of power, and human agency. Further, in addition to literary critics like Jagoda and Hensley, scholars working in software studies, for example Wendy Chun, are developing the language and concepts that illuminate the subtle and pervasive influence—



functional and aesthetic—of computation over contemporary life.<sup>3</sup> Chun suggests that software is “a powerful metaphor for everything we believe is invisible yet generates visible effects” (17), thereby invoking software not merely as an everyday or technical term, but as a crucial literary concept for the computer age.

By presenting themselves as glitchy technological interfaces, McCarthy’s novels afford a perspective or logic through which we can see how software and computational systems more generally are literary. In fact, both McCarthy’s fiction and criticism are profoundly attentive to the technological mediation of literature. Firstly, his novels locate themselves amid dynamic media ecologies. At many layers—from characters and plots to narrative form and material production—the novels reflect on the technological mediation that enables and constrains human life. According to Christina Lupton, “Of all recent novelists, McCarthy may be the most widely recognized as working at the juncture of media archeology and fiction . . . spokesperson for the idea that currents of media change are shaping the novel today” (505). I agree: McCarthy’s frame of reference—attentive to the inescapability of mediation—results in novels that reveal and question their own construction. They play with the reader’s suspension of disbelief; they push against the formal or conventional boundaries of the realist novel; they work through anxieties about the role of the author in relation to computational systems that communicate and write for themselves.

If technological mediation is the foundational condition of communication and writing in McCarthy’s texts, then addressing the assertion that writing is ineluctably material is the crucial

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<sup>3</sup> Considering the centrality of mediation in McCarthy’s work, I believe that criticism from new media can lend insight into his novels. For instance, In *Programmed Visions: Software and Memory*, software critic Wendy Hui Kyong Chun casts light on our relationships to technology by highlighting the ontological, temporal, and material heterogeneity that lurks behind seemingly innocuous terms like code and software. Chun defamiliarizes the concept of software, approaching it as a historical invention, fragile technical artifact, and speech act.

first step in reading his novels. Any definition of literature that emphasizes the material channels and formats that enable communication requires a complementary physical theory of information—that is, whatever is being communicated must be reducible into some physical representation that the media accommodates. For example, to communicate over the Internet, a message must be reducible to a string of binary digits (bits).<sup>4</sup> While the influence of the modern computer and the Internet on how knowledge is stored, communicated, and produced is a central concern in much of McCarthy’s work (most evidently in *Satin Island*), his writing engages the long history of the more general question of communicability in the context of physical mediation.

The history of the concept of media is connected to the history of the form, communicability, and limits of knowledge. Although John Guillory connects the origins media as a concept to the emergence of new technical media such as the telegraph and phonograph in the late nineteenth century (321), he emphasizes that many of the questions raised by increased attention to how communication is only made possible by a certain medium have been asked for centuries.<sup>5</sup> One example is the emergence of the printing press, which according to Guillory led to “writing (print) overtak[ing] rhetoric (speech) as the most important form of communication” (326). Another example is the long-running linguistic question of whether language *represents* or *mediates* thought. From John Locke, who considered thought as separate from the imperfections

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<sup>4</sup> The Internet protocol (IP) and the hardware in the underlying physical network work in tandem to enable hosts on different networks to exchange packets of information. Any message communicated via the Internet must break down into a sequence of IP packets, each of which is a sequence of bits formatted according to the specification of the protocol (RFC 791).

<sup>5</sup> Guillory describes three uses of the term “media” that emerge after the late 19<sup>th</sup> century (347); they correspond to the following definitions: 1) “Any of the varieties of painting or drawing as determined by the material or technique used,” 2) “A channel of mass communication, as newspapers, radio, television, etc.,” and 3) “a person believed to be in contact with the spirits of the dead and to communicate between the living and the dead” (OED). However, for the purposes of his essay, Guillory defines mediation more generally as a process (not an object) that “points to a hidden complexity of the representational process, which often goes quite beyond the announced object of representation” (346).

of language (331-334), to the universal language theorist John Wilkins, who sought after a symbolic language free from ambiguity (336-338), to John Stewart Mill, who enjoined the poet to “ignore the injunction to communicate” characteristic of philosophical and scientific writing (340-341), the consequences of mediation are far-reaching. These questions sprawl into the twentieth century in many directions, one of which is the development of the modern computer. The mathematicians, philosophers, and engineers behind the invention of the modern computer wrestled with the problem of how this new hardware could mediate (and thereby augment) human knowledge by representing and operating on it as digital units of information.

In his criticism as well, McCarthy conceptualizes literature in the language of technological mediation. McCarthy develops his theory of literature in *Transmission and the Individual Remix: How Literature Works*. He begins with an image that envisions an airspace crowded with ideas—represented as signals—that have circulated throughout the history of literature: “a set of signals that have been repeating, pulsing, modulating in the airspace of the novel, poem, play—in their lines, between them and around them—since each of these forms began” (*Transmission* I). By transposing the defining or essential characteristics of literature—which in another formulation we might name more specifically as modes of language, narrative archetypes, formal conventions, or something else—McCarthy models literature as fundamentally material, distributed, technological, and dynamic. Moreover, McCarthy fills out this metaphor by drawing us into the literary airspace, desiring that the signals “attune your ear to the very pitch and frequency of its own activity—in other words, that they’ll enable you to listen in on listening itself” (I). Here, McCarthy imagines the readers of literature as listeners—or, more precisely, receivers. And if reading is receiving, then writing is transmitting. Moreover, McCarthy’s model is full of transceivers that both listen and respond to this metaphorical

airspace of literature. Terms from communication technology such as duplication, amplification, attenuation, and modulation are helpful descriptors for the ways in which readings beget writings which are in turn modified by the media that sustains and propagates them to other readers, and into the future. Finally, McCarthy describes the ultimate goal of this tuning—the ostensible purpose of which is to listen in on the signals of literature—in relation to the act of tuning itself. In this way, a core task of good reading is becoming more attentive to the process of mediation at work.

Although the terminology associated with the metaphor of literature as a kind of broadcast technology seems insular to the twentieth and twenty-first centuries, McCarthy insists that the origins of literature lie in the same structural dynamics found in broadcast technologies. Citing the signaling of the fall of Troy via fires on watchtowers from Troy to Argos in the beginning of Aeschylus's *Oresteia* and the dismemberment of the mythological poet Orpheus, McCarthy claims that signals—and particularly the tendency of these technologies to scatter and mutate signals—lie at the heart of literature. Even as technology augments our ability to communicate, the communication it offers us “entails anxiety, bereavement . . . it can't be separated from the topics of dismemberment and death, of loss, dissolution, vanishing” (IV-V). In this formulation, McCarthy connects his signal-based model to the twentieth century critical theory, which promotes intertextual interpretations rather than appeals to the author's intention.<sup>6</sup>

If we view the novel as just another piece of media, it may seem that it is drowning in the sea of computational technologies that increasingly read and write for themselves in the twenty-first century. Furthermore, when we consider how vanguard corporations are wielding literary forms like narrative to inflate their perceived value and exert control over the future, the walls

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<sup>6</sup> Roland Barthes' *The Death of the Author* “binds the act of writing not to integrity and presence, but rather to the opposite, to disintegration and becoming absent” (*Transmission VI*).

seem to close in on the novel even faster: unique, transcendent artform becoming obsolete artifact. This is defeatist hyperbole, but it raises important questions for the contemporary novelist and novel.<sup>7</sup> Perhaps because corporate culture has coopted narrative, McCarthy is convinced that the task of the contemporary novelist lies beyond narrative form.<sup>8</sup>

In McCarthy's most recent work titled *Empty House of the Stare*, which he struggles to define as a "piece of fiction" that responds to a series of conceptual artworks, he writes, "The notion of inventing a 'story' seems quaint and misplaced in this world, now" (28). This world, now, according to McCarthy, is the product of what Michel de Certeau calls the "capitalist scriptural conquest" (137) by which the instruments of capital such as global networks of technology inscribe all surfaces, diminishing the role of the writer as the authoritative, privileged inscriber (*Empty* 29-30). Under these conditions, the task of the writer changes: "The novelist's, the artist's, task is not to write the plot, but rather to 'plot' it in the sense of discerning its nodes and paths, tracing its bifurcations, switchbacks, junctions" (*Empty* 28). I am drawn to McCarthy's model—writer as cartographer in an age overwhelmed by networks and maps of technology that seem inaccessible and often illegible from the vantage point of a single human—as well as his implicit assignment: to cultivate the kind of attention that can identify and navigate these networks, trace their histories, and illuminate their future trajectories.

But I cannot shake the feeling that this vision for the contemporary novelist as cartographic rather than narratological plotter is also somewhat unsatisfying. What's the point of this understanding of contemporary fiction? Resistance to capitalism? Cultivating an attention to

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<sup>7</sup> Lupton claims that we "face choices about how to describe the location and the future of narrative" (516)—the status of the contemporary novel is an open question.

<sup>8</sup> If narrative cannot save the novel, then what can? Is it its material construction, or something about a reader's encounter with the novel—its length, its pagination, its structural composition of its paragraphs and sentences? Is its identity separable from the attitude people bring to the novel as a cultural product in a specific place and time?

our mediated existences? Locating or generating knowledge? Producing reality? These questions are dizzying, and I ultimately believe we can accept that the novel as flexible and dynamic without jeopardizing its identity. In my view, the novel is a sprawling process of knowledge production that is profoundly aware of itself as a medium rooted in language, centered on the phenomenon of human experience.

In the last couple years, I have become fascinated by how different media—from the computational to the literary—promote certain ways of seeing and thinking. Writing this honors thesis has provided me the challenge and opportunity to direct the attention, judgment, and skills I have sharpened in the English department toward questions that span my two undergraduate areas of study, literature and computer science. This project is also part of my effort to educate myself on the historical, ethical, political, and literary dimensions of computation because my undergraduate degree in computer science has been oriented almost exclusively on the technical theory of the discipline and engineering. It has helped me learn to see systems like the modern computer, the Internet, and the Cloud not as inevitable discoveries, but as products of history, as physical infrastructures emerging out of intellectual traditions as well as economic and political circumstances. Finally, this research has led me understand how the production of knowledge—not only in tech and twenty-first century capitalism, but also in a much longer arc of scientific thought—is initiated and sustained by profoundly literary desires.

I have approached my research question on the relationship between novelistic and computational forms of knowledge from multiple perspectives. To understand how the proliferation of information technology influences our relationship to knowledge, I draw from media theorists including Guillory, Golumbia, Hensley, and McCarthy,<sup>9</sup> in addition to theorists

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<sup>9</sup> Addressing McCarthy's role as a critic in addition to a novelist, critic Theodore Martin writes, "If McCarthy's public career reveals the increasingly permeable boundary between writers and critics in the contemporary moment,

who think about the novel in relation to cognitive science such as N. Katherine Hayles and Andrew Gaedtke. My approach also looks to the history of computing for both cultural attitudes and architectural paradigms that prefigure the current state of information technology. For instance, I read pioneering computer scientist Von Neumann's lectures on his early theoretical work on the modern computer to illuminate how he conceptualized computational forms of knowledge in relation to the human brain. Additionally, I consider a model called "cellular automata" popularized by the research program of Stephen Wolfram to illuminate the perspectival limits of computational methods adopted by the narrator of McCarthy's novel *Satin Island*. Finally, to think about the unique status of the novel and narrative in our time, I engage with the narrative theory and recent critical conversations about the status of "the contemporary" in the field of contemporary literature.

McCarthy's novels are effective because they formulate our relationship to knowledge in the twenty-first century as an access control problem. The narrators in McCarthy's novel commit themselves to an impossible task: achieving some privileged perspective or totalizing control amid the enormity and incomprehensibility of global technological systems. McCarthy places his narrators in a mode in which they feel indefinitely on the verge of discovery. They puzzle through contemporary life, searching for what they intuit is an essential knowledge just beyond their vision.

The first chapter of this paper centers on McCarthy's *Remainder*, in which the narrator's ambitious project to re-enact his memories begs the question of what problems can be solved with technical solutions. The novel meditates on the attraction towards a technoscientific attitude

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his novels narrate the consequences of this new professional permeability. In McCarthy's hands, the contemporary novel has become an opportunity to reflect on the academic category of the contemporary itself" ("Contemporary, Inc." 124-125).

toward the world and its cognitive and ethical consequences. Moreover, the chapter considers the dependence of epistemological stability on specific media that enable knowledge production in the first place. It relies on an abstract analogy of search as a way of understanding questions about access to knowledge under the constraints of technological mediation, and it considers the fragility of control and coherence when those media break down. Neither the narrator of *Remainder*'s painstakingly designed re-enactments nor his utilization of computation lends him unflinching control over matter, and the verisimilitude of realist fiction is repeatedly jeopardized by the impossibility of perfect mimesis in the novel. Nonetheless, these searches—these indefatigable negotiations for control and knowledge (we cannot separate these terms after Foucault<sup>10</sup>)—go on: the narrator wills his search for the perfect building needed for his first re-enactment to succeed, and the narrative style clamors over its own ellipses and contradictions towards an illusion of consistency and cohesion. Moreover, in these gritty searches, we witness the power of the novel to explore historically, philosophically, and technologically apposite questions about access to knowledge through narration, understood as a kind of epistemological search in its own unstable media—language and the book.

If the first chapter emphasizes the doomed search for power over a material world that resists totalizing, computational forms of control, then the second chapter centers on a search for perspective amidst the globally networked computational systems that defy the individual's desire for complete access and understanding. Additionally, while the first chapter approaches narration as enacting a search for coherence in the novel, this second chapter thinks about how science invokes literary forms to conceive and explain new concepts.

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<sup>10</sup> In *Discipline and Punish*, Foucault writes, "We should admit rather that power produces knowledge (and not simply by encouraging it because it serves power or by applying it because it is useful); that power and knowledge directly imply one another; that there is no power relation without the correlative constitution of a field of knowledge, nor any knowledge that does not presuppose and constitute at the same time power relations" (27).



Concretely, the second chapter is oriented around *Satin Island* and the twentieth century computer scientist John Von Neumann. In *Satin Island*, the search for an almost objective perspective or revelation runs up against the incomprehensibility of the information age. U approaches the challenge of writing his Great Report—to understand the incoherent, overwhelming, data-dense present—by searching for a vantage point that will enable him to discover (or trigger) the revelatory structures he intuits in society. I consider two perspectives—an elevated, unmediated view as well as a more local, constrained, and mediated view—to relate perspectival limits in the novel to larger considerations about the limits of knowledge in the context of technological mediation. I also draw from the work of John Von Neumann on the early research on the modern computer to reveal the origins of the conceptual entanglements between humans and computers. All of this is my effort to understand the rationales, methods, and consequences of a research ethos committed to the idea that computation should supplant other ways of knowing.

Overall, this thesis traces the roles of narratological and computational forms in generating knowledge in the contemporary novel and society. It investigates the causes and consequences of the inflated sense of power ascribed to computation in relation to other knowledge-producing media. Furthermore, it shows how uncertainty in the twenty-first century translates into trust and reliance on computation for defensible understandings of the world. Formally, McCarthy's novels embody larger anxieties about the novel's ostensibly diminished status amid information technologies. Their narrative styles reflect their own epistemological uncertainties as literary forms self-conscious of their own mediation—their technological limits. My claim is that McCarthy's work opens up an important role for the contemporary novel.

Our culture increasingly turns to computation for knowledge that is ostensibly explicable, verifiable, objective, consistent—impervious to the uncertainties of our world. But knowledge, in all its forms, emerges from historical contingencies and inconstant material conditions.

Knowledge is always mediated and therefore cannot transcend its materiality or be totally complete. By embracing these inescapable vulnerabilities of mediation, the novel can teach readers to qualify forms of knowledge—from the literary to the computational—in accordance with their subtle material conditions. Ultimately, the novel can reveal the limits of computation as well as alternative forms of knowledge, thereby illuminating a more capacious horizon of knowledge available to the twenty-first century.

## II. Chapter 1

### The Desperate Search for Narrative Coherence in *Remainder*

*When a man in a forest thinks he is going forward in a straight line, in reality he is going in a circle. I did my best to go in a circle, hoping in this way to go in a straight line . . . And if I did not go in a rigorously straight line, with my system of going in a circle, at least I did not go in a circle, and that was something. (Molloy 115)*

- Samuel Beckett (1951)

Literary representations of search cast light on our relationships with various strategies for locating and generating knowledge. They also reflect back on the role of search in language itself. Think of Samuel Beckett's novel, *Molloy*, and its representation of Molloy's vague search for his mother. In Molloy's formulation, strategies seem at first to have inverted effects—trying to walk in a straight line results in a circular route, and vice versa—and ultimately are even more subtly counter-intuitive. Molloy is left in some ambiguous, compromised trajectory, and his ability to execute a strategy consistently is as unsure as the relationships between action and effect in the first place. Moreover, Molloy's characterization of search in the epigraph suggests that control and understanding of search is illusory. By divorcing any clear relationship between strategy and consequence—by portraying search as an obscure, contingent, unwieldy process—Beckett confronts anxieties about the absence of comprehensibility. Indeed, Molloy's circuitous description of a strategy that aims to circumvent circuitry brings into relief the fact that the narrative itself is a hermetic recursion of failed attempts to locate a secure root of truth. While Beckett's version of search revolves around existential anxiety about the absence of ontological stability and truth, search in the novels of Tom McCarthy explores the limits of technologically mediated *access* to understanding. Tuning into faint radio transmissions in *C*, re-wiring the brain to execute painstakingly choreographed movements in *Remainder*, and scanning the Internet in *Satin Island*: each of these contribute to a broader concern about the physical bases of human

access to knowledge. Search in McCarthy is constituted by the strategies of attaining understanding from within a frayed mesh of neurological, technological, and, of course, literary media.

Thinking about search in terms of computation raises questions about the status of knowledge in the digital age. In computer science, intelligence is often formulated as the capacity to *search* effectively. To find the best path between two points is to improve upon arbitrary decisions and fruitless wandering: this is the criteria we use to judge mice placed in a maze, automated vacuum cleaners, and map navigation applications. Computer scientists define search more abstractly as “the process of looking for a sequence of actions that reaches the goal” (Russel et. al 66) because this characterization lends itself to a larger domain of problems that do not necessarily involve geographical searches.<sup>11</sup> The field of artificial intelligence has utilized this generalized notion of search since its inception in the mid-twentieth century. At the turn of the millennium—after the search-based decision algorithms of the IBM supercomputer Deep Blue famously defeated Garry Kasparov in a game of chess in 1997—the perennial question of the potential of AI in relation to human intelligence had returned.

However, for all the cultural fervor over the potential of the narrow, domain-specific intelligence afforded by the classical search algorithms from AI, a far more significant formulation of search was in its infancy. In retrospect, the culture’s wonder and concern about the status of knowledge in the coming century was apropos of a much more important event: the founding of Google by Larry Page and Sergey Brin in 1998. In 2000, Page described his goals for Google in an interview:

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<sup>11</sup> In fact, any problem that can be formally represented in the five following components can be devised as a search problem: initial state, goal state(s), set of actions available to the searching agent, transition function that determines the next state based on an action taken at a given state, and, finally, a metric that weights the costs of each available action. See Ch. 2 of Russel et. al’s *Artificial Intelligence: A Modern Approach* for more details.

Artificial Intelligence would be the ultimate version of Google. So we have the ultimate search engine that would understand everything on the Web. It would understand exactly what you wanted, and it would give you the right thing. (Interview)

Page's remark fails to recognize that the ways in which we generate, store, and exchange knowledge transform our conceptualization of knowledge itself. Firstly, when he claims that an ultimate version of Google search that "understand[s]" everything on the Web would also "understand" its human user's desires, he implies that those desires are representable on the Web, or at least capable of being inferred based on information on the Web. In this formulation, the domain of knowledge is reduced to what Google's media—digital information technologies—can accommodate. Secondly, the hypothetical moment at which Google achieves the kind of superintelligence that enables it to "give you the right thing" is paradoxical and impossible to judge. As philosopher Barbara Cassin points out in the recent English translation (a decade after its original publication in French) of *Google Me: One-Click Democracy*, "You are given what you ask for, so you are only given what you are in a position to ask for" (54). Considering the tremendous influence Google exerts over our lives two decades after Page's remark, the notion that our intentions are independent of Google's services (which themselves are customized based on Google's heuristics for our desires) is naive.<sup>12</sup> Nonetheless, Google search, along with the Internet and datacenters it utilizes, has relocated and expanded our primary source of knowledge and altered our means of attaining it.

Differing designs of search procedures enable and constrain the forms of knowledge made possible by those procedures. Versions of search in computer science tend to emphasize properties of search like optimality, completeness, and efficiency. Optimality means making the

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<sup>12</sup> Cassin cuts through Page's simplistic separation of what users of Google want from what Google gives. She explains, "Whichever way you look at it, Google is always helping you to perfect your needs, to be yourself, whether by suggesting the usual spelling ('search instead for . . .'), or your previous searches, or by analyzing your behavior as a customer and deducing what you want" (55).

best possible decision at every stage of the search; a search algorithm is complete if it is guaranteed to find a solution if it exists; and efficient searches minimize the resources of computer memory and time required for the search. Since properties like optimality and completeness are hard to maintain in many real-world settings, search algorithms may introduce heuristics that help it make good—if not the best—decisions faster, and more cheaply. Overall, these formulations of search in computer science appeal to mathematical rigor, prize economic viability, and depend on the power of computation.

The literary representations of search at the beginning of this chapter operate in the much more ambiguous, indeterminate spaces of language. While they are by no means antithetical to computational forms of search, they do suggest the relationship between humans and knowledge is subtle, complex, and phenomenological. By reflecting on the experience of devising and conducting a search, literature—especially the novel’s narratological representation of search—offers a human lens on search that eludes the narrower computational perspectives increasingly predominant in the context of twenty-first century technologies. Narratological representations of search are more capable of exploring the gaps, contradictions, and anxieties about our capacity to design and conduct a search that ultimately produces knowledge.

This chapter focuses on a novel whose narrator overestimates the capability of computational forms of search and understanding to afford him a sense of control after an accident leaves him in neurological disarray. Written mostly by 2001, and published in 2005, Tom McCarthy’s *Remainder* tracks the motives and methods of its narrator to recover a feeling of authenticity after an accident has compromised his memory and motor skills. The narrator has won 8.5 million pounds in a settlement, and he has just one (supposedly) clear memory in which he *does* feel authentic. In the convergence of these factors, the narrator gets the idea that if he

could recreate his one clear memory, down to the finest details, he would feel more real, authentic, and happy. Consequently, he develops a process of purchasing and renovating properties, in which his hired “re-enactors” join him in repeatedly performing actions that correspond to his memories.

*Remainder* confronts the limits of control in the context of the ever-increasing prevalence and power of computation and information technology in the twenty-first century. The life cycle of the narrator’s project—from its hazy inception, the concepts and methods it relies on, and its self-defined evaluative criteria—lends timely insights into premises and strategies of knowledge production for our era. Indeed, the novel exposes the consequences of the attitude that technology is the appropriate and sufficient answer to virtually any problem. By taking these foundational strategies of computation to the extreme at every level of the project—from its economic model,<sup>13</sup> the ethos of the social relations that enable the project, and the forms of cognition the narrator and his second-in-command Naz rely on to conceptualize and advance the project—*Remainder* engages with twenty-first century attitudes toward technology. Reading the novel allegorically brings into focus the parallels between the narrator’s management of his project and predominant cultural attitudes that insist on the limitless potential of technical systems to facilitate human experience and understanding, for example by relying on proximity to computational methods such as search algorithms as the most legitimate means of generating knowledge. Moreover, when the novel demonstrates the shortcomings and breakdown of these methods, it reveals the elusive nature of complete control in an era that often overestimates computation’s ability to overcome this fact. In other words, it reveals the tension between a seemingly unconquerable material reality and faith in technical systems.

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<sup>13</sup> The narrator finances his project with the immense returns from investing his 8.5 million pounds in technology sectors.

The novel embodies these anxieties about the elusory nature of control in its narrative form. The narrator's tenuous hold over his reality, which he so painstakingly manages in his re-enactments, is paralleled by formal elements that reveal and conceal the contradictions, artificiality, and fragility of the plot's construction. Indeed, just as the dynamics of disintegration, incoherence, and entropy jeopardize the narrator's re-enactments, they threaten to rupture the implicit contract between reader and text that predicates the reading of fiction. By disrupting expectations of a realist novel<sup>14</sup> and engendering a narrative voice that uses language as a façade for cohesion, the novel contemplates its particular role as a literary form in the early twenty-first century, in which the site of understanding or coherence is increasingly stripped from the individual and distributed amid proliferating digital storage and communication systems.

It is helpful to read the novel in terms of two related searches. The first is the narrator's efforts to find and construct environments and movements that will give him a sense of control and authenticity over an otherwise incoherent, intractable material reality. The second and related search occurs in the narrative form itself: it is the wrangling of what critic Sydney Miller calls "semantic bits and syntactical parts" (645) into construction of narrative coherence on the brink of entropic breakdown. In each case, *Remainder* reveals the tension between a seemingly intractably complex material reality and systems that attempt to govern it. The narrator's search for coherence responds to the shortcomings of computational procedures to lead him to the kinds of experience and knowledge he desires by disentangling the aesthetics and utility of computation, ultimately relying on computational methods such as search algorithms more as facades for self-justification and self-satisfaction than for their ostensible purposes. In this way,

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<sup>14</sup> In his "Get Real" essay, McCarthy briefly summarizes the history of the realist novel and describes his frustration with the trope of authenticity in self-labelled realist novels of recent years.



the narrator is emboldened by his proximity to computational forms of knowledge production that he feels legitimate his project, even as his decisions are influenced by decidedly non-computational methods such as intuition. Finally, as the metafictional narrative style draws attention to its own strategies for generating a cohesive, consistent form, the novel reflects on itself as a medium with a strained relationship to any reality or world to which it ostensibly represents.

### **The Stakes of Search in the Glitchy Matrix of Literature**

With the understanding that search raises questions about access to knowledge, this section considers the stakes of searches that occur in unstable physical media that may break down at any moment. It draws a connection between the narrator's evolving attitude towards matter and McCarthy's critical reflections on the role of writer in relation to a material world that eludes representation. The importance of this question of the controllability of matter—or at least the novel's capacity to represent material reality—becomes clearer when we consider McCarthy's attention to the ways that physical properties of media such as the novel generate particular forms of knowledge. When *Remainder* ultimately disappoints its narrator's expectation that he could exhaustively choreograph his physical surroundings, the novel not only answers a philosophical problem, but also indicts itself as a medium (and specifically the realist novel as a genre) whose carefully constructed appearances of cohesion and verisimilitude are fragile and prone to collapse. Furthermore, this section explains how *Remainder* demonstrates the failure of computational media to overcome epistemological problems about access to knowledge. Overall, it establishes the stakes of the treacherously contingent searches running through the novel.

As *Remainder* organizes itself around the narrator's efforts to coordinate his unwieldy body in dynamic physical environments, controlling matter becomes a central pragmatic and philosophical problem of the novel. The narrator expresses this problem in terms of a model of cognition.<sup>15</sup> The emphasis of the narrator's model is the temporal gap between experience and understanding. For the narrator, experience must precede understanding for a person to feel authentic, unmediated, and real. While it is not immediately obvious why the narrator associates concepts like authenticity and being real with experience that has not yet been swallowed up by understanding, interpretation, or calculation, the consequences of his accident helps sketch the connections. In the passage below, the narrator describes the version of experience that he has lost, yet still desires, after the accident:

Opening my fridge's door, lighting a cigarette, even lifting a carrot to my mouth: these gestures had been seamless, perfect. I'd merged with them, run through them and let them run through me until there'd been no space between us. They'd been *real*; I'd been real—*been* without first understanding how to try to be: cut out the detour. I remembered this with all the force of an epiphany, a revelation. (*Remainder* 67)

In his recovery, the narrator develops an obsession with fluid geometric, physical circuits. In his slow redevelopment of his motor functions, his doctors and therapists had him visualize actions, like lifting a carrot to his mouth or walking down the hall. This forced the narrator to reverse engineer what are typically instinctual actions, which in the case of eating carrot now requires

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<sup>15</sup> In the novel's exploration of the contingency of human thought to the neurological and physiological—in its reduction of consciousness and mind to cognition and brain, respectively—it engages with themes of the twenty-first century genre of the neuronovel. The effort to reconcile (or at least understand the relationship between) scientific understanding of the human brain and consciousness is not new—philosophers and scientists have asked to what extent human experience is determined by the natural world for millennia—but this literary genre takes up the debate in the context of recent research in brain sciences. Andrew Gaedtke delineates the two poles of this debate on the human brain—phenomenological consciousness and neurological/physiological cognition—in terms of “first-person” and “third-person” perspectives, respectively. Gaedtke claims that the neuronovel integrates these philosophical and scientific problems in its narrative form: the novels “turn toward renewed concerns about the status of narrative as a procedure of knowledge, identity, and self-delusion—concerns that have also been raised by contemporary neuroscience” (187). By understanding narrative as an ongoing negotiation between these two perspectives—which may at times complement or compete against one another—neuronovels like *Remainder* not only take up philosophical problems raised by research in brain science, but also enact in their narrative form fundamental processes of the human brain *that are themselves narratological*.

executing a sequence of “twenty-seven separate manoeuvres” (20). Absent any medical treatment for the psychological dimensions of his trauma after the accident, the narrator’s rehabilitation is reduced to an engineering problem—machine repair. Moreover, when the narrator successfully emulates the “correct” form of these actions, he suddenly feels himself to be real. But, of course, a fundamental contradiction emerges for the narrator: he wants experience to precede calculation or interpretation of that experience in order to feel real, but his physical condition precludes him from achieving the authenticity and naturalness that he so desperately desires. The narrator can only navigate through the world by planning every movement ahead of the time: “No Doing without Understanding” (22). In this way, his experience depends on pre-understanding. For this reason, the narrator feels that he has lost a temporal gap that buffers his sense of authenticity, and he is left feeling that his experiences suffer from a “detour” as his movements are “fake,” “[s]econd-hand,” and “artificial” (24-25). The language of detours and enumerated sequences of actions implicitly appeals to computational formulations of search as a means of reasserting control over his unwieldy body.

The motivation for the project, then, is to get back to the feeling of authenticity that the narrator feels he has lost.<sup>16</sup> The narrator summarizes the purpose of the re-enactments:

They’d all had the same goal, their only goal: to allow me to be fluent, natural, to merge with actions and with objects until there was nothing separating us—and nothing separating me from the experience that I was having; no understanding, no learning first and emulating secondhand, no self-reflection, nothing: no detour.

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<sup>16</sup> Theorist of the novel Nancy Armstrong suggests that the protagonist’s attempts to regain a feeling of authenticity by “organiz[ing] a world of experience around himself as its central intelligence” (8) in true novelistic spirit ultimately leaves us readers feeling more like the contemporary novelist—who recognizes the impossibility of achieving the notion of authentic individuality—than protagonist, who harkens back to an increasingly alien notion of human subjectivity. She claims that what it means to be contemporary is to inhabit a kind of historical break onset by the failure or impossibility of recognizing oneself as a (increasingly anachronistic) modern subject. Concretely, her reading of McCarthy’s novel, *Remainder*, suggests that the narrator “is nothing if not a barely anthropomorphized agent of capital that shows how current economic conditions require him to transform the social practices once presumed to provide the basis of literary realism” (4). This is to say that the novel reflects the strong exertion of capital over an ever-widening swath of human experience, from the economy to social life to the formation of the individual.

(240)

He goes on to describe this “realness [he] was after” not as a single instant, but as “a state, a mode—one that [he] needed to return to again and again and again” (240). Although the narrator’s model of cognition does give language to his frustration with his body after the accident, his attribution of numerous of such broad-ranging and vague concepts—authenticity, motion, experience, understanding—into an almost unreachable mode of being hints at an important paradox rooted into the narrator’s project. The project is spurred on by the narrator’s desire to experience without first understanding—to not have to actively mediate or control his experiences, yet his project is predicated on controlling ever-larger swathes of his material and social surroundings in order to create illusions of unmediated, fluid experiences. In this formulation, increased control presents itself as a fragile solution because it entails ever-more dependencies.<sup>17</sup>

The trajectory of the narrator’s attitudes toward the re-enactments parallels his ongoing negotiation for a more immediate, fluid presence in the material world. The first re-enactment involves finding and renovating an apartment building, in which the narrator places re-enactors to repeatedly perform mundane tasks (e.g. frying liver, playing piano, standing at a concierge desk, repairing a motorcycle). Within this setup, the narrator then progresses through the building based on navigational sequences he remembers, as if to relive his memories. After perfecting this first re-enactment, the narrator begins constructing additional re-enactments, including one at a tire shop, one at the site of a murder on a street, and another in a replica of a

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<sup>17</sup> In his essay, “The Entanglements of Humans and Things: A Long-Term View,” Ian Hodder observes that starting when humans settled down in the agricultural revolution, a new paradigm of human relationality to human-made artifacts emerges: “more stuff requires more investment by humans in more stuff” (30). Furthermore, he explains the dynamic by which complexity begets more complicated solutions, which in turn begets greater complexity. In his words, “The stickiness of human-thing entrapments has another implication: entanglements gradually increase in complexity and scale, and it becomes more and more difficult to get back” (31).

bank. The final re-enactment is a real bank heist—premised on the idea that by learning from actual bank robbers and anticipating the behavior of employees and patrons at the bank, the re-enactors' practice in a replication of the bank in a warehouse can be slotted into an actual bank. In this climactic final re-enactment, the careful orchestration of the scene devolves when a re-enactor attempts to trip on a kink in the carpet that was in the fake bank where he had practiced: the failure of the planned trip results in an unexpected trip. As the re-enactor-turned-robber tumbles, he shoots another robber. As the man bleeds out on the floor, the robber exclaims in horror, “‘*It’s real!*’” (*Remainder* 293). This newfound embrace of the uncontrollable matter that his re-enactments up until this point have tried to control marks the narrator’s acceptance of the fragile contingency of control symbolized (and foreshadowed by) the inciting incident of the novel, the “Technology. Parts, bits” (1) of the accident, and the series of smudges and spills that represent “[his] undoing: matter” (7).

But what do we make of the robber’s exclamation that “It’s real”—that reality has sprung up on him unawares? In his critical writings, McCarthy suggests that the role of the writer is to set up encounters with “the real,” which is something like a sudden moment of recognition of fiction’s strained relationship to an unrepresentable material world. In his essay, “Get Real, or What Jellyfish Have to Tell Us About Literature,” McCarthy highlights the fact that rather writers generate, rather than merely describe, reality: “Reality’s not there yet;” he writes, “it is something to be brought forth or produced; and this producing is the charge, duty and stake of writing” (58). To explore this daunting task of the writer to create and deal with reality in some way, McCarthy organizes his essay around three terms: realism, the real, and reality. Realism has the most straightforward definition: it is a literary convention. Most pertinent to my paper, as well as critical tasks of the writer, according to McCarthy, are the real and reality.

To explain his definition of the real, McCarthy likens the writer's relationship to the real to the toreador's relationship to a bull.<sup>18</sup> In the case of the bullfighter, style and showmanship flirt with the ever-present reality that things could go terrible wrong: the horns of a charging bull could kill the toreador, immediately transforming the scene into chaos. In McCarthy's analogy, the writer is like the toreador, skillfully crafting language into literature. Moreover, the real is like the bull's horn, a danger to the literary project which at any moment may violently tear through the page and lay bare the artifice and constructedness of the text. For McCarthy, this involves "an *event* that would involve the violent rupture of the very form and procedure of the work itself" (68). He describes the jeopardy of the real further:

a real of the type that I suggest we should embrace and celebrate punctures the screen or strip of film, destroying it: a real that *happens*, or forever threatens to do so, not as a result of the artist "getting it right" or overcoming inauthenticity, but rather as a traumatic real; a real that's linked to repetition; a real whose framework of comprehension is ultimately neither literary or philosophical but psychoanalytic: the real that Lacan defines as "that which always returns to the same place" *and* as "that which is unassimilable by any system of representation." (69)

Following this analogy, the writer depends on the ever-present threat of the real as an essential aspect of the dynamic acts of reading and writing literature. "[P]lunging craft into chaos" becomes the risk and reward of writing (68). In describing the devolution of craft into chaos, this analogy resonates with the structural dynamics found in McCarthy's communication technology-based model of literature. Just as broadcasting into the literary airspace is to invite fragmentation, attenuation, and disintegration, bullfighting enamors only as it accepts the risk of disaster, and even death.

For McCarthy, disintegration is not merely a feature of how literature's conceptual scaffolding and conventions are transmitted across readers and time. McCarthy subscribes to

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<sup>18</sup> McCarthy builds on Michel Leiris and Ann Smock's analogy of the writer to the toreador in the essay, "The Bullfight as Mirror."

twentieth century literary theorist Maurice Blanchot's perspective on literature when he suggests that the fundamental purpose of a text is "*désœuvrement*: 'un-working,' an unraveling-from-within through which the very content that the work purports to convey or recover becomes lost, the avenues and relays through which it promised to deliver this to the reader become degraded" (*Transmission* VI). The structural dynamic of disintegration is interwoven into the project of literature itself, an inescapable fact that looms over the relationship between a reader's or writer's relationship to a literary text. The text eludes predictability and control. In one sense, the tendency Blanchot and McCarthy describe is a kind of wandering from or losing its purported purpose. Perhaps the most striking aspect of this passage is that McCarthy seems to characterize this 'unraveling-from-within' as something that is not necessarily planned for or even anticipated, either from the author or some reader. Rather than challenging or upsetting the reader's expectation within the world of the literary text (character, plot), the source and stake of this disintegration is at a more formal and phenomenological level—a consequence of our encounter with the text as a literary text. In this encounter, there is always the threat that our relationship to a literary text will rupture, and the unspoken contract that enables us to encounter texts as literature breaks, the suspension of disbelief collapses.<sup>19</sup>

The bullfighting analogy gives a sense of how McCarthy envisions the writer's relationship to the real, but it does not explain what constitutes the real. McCarthy's use of terms like trauma and repetition, and his appeal to Lacanian psychoanalysis in contrast to a framework of comprehension that is either literary or philosophical suggest that the real operates in the unconscious or perhaps beyond the limits of representation. Moreover, in the final phase of his argument in the essay, McCarthy integrates his ideas about the writer's struggle with the limits of

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<sup>19</sup> "The very mechanisms and technology of writing continually threaten to unravel the writing project itself" (McCarthy, "Vanity's" 173).

representability in media with a definition of the real rooted in materiality. Matter, he argues, is the reality that is not fully representable: it cannot be reduced, captured, or embalmed in language. “Viewed from this position,” he writes, “a thing’s real would be touched in its own materiality: a sticky, messy, and above all *base* materiality that overflows all boundaries damming the thing’s—and everything’s—identity, and thus threatens ontology itself” (“Get Real” 71). Observe that the encounter with the real requires a “[touch]”—a physical meeting beyond the conceptual boundaries of the thing, beyond identity and ontology. Implicit to the claim that the real eludes identity is the claim that the real eludes representation in language.

Necessarily, then, McCarthy’s version of the real has a tense relationship to literature as operating in the domain of language. Yet the writer’s/toreador’s showmanship is made meaningful by the presence of the dangerous real, which at any moment may burst through the façade of the art’s construction. Call it failure, the wiliness of language and narrative to uncontrollably veer off track, or the fragility of the conceptual scaffolding that enables readers to encounter texts as literature. Nonetheless, it is the enabling condition of literature; and, according to McCarthy, the paradoxical dynamic that invigorates the acts of writing and reading literature.

I would argue that a peculiar simile in the beginning of *Remainder* comes close to what McCarthy might call a rupture of the real. When the narrator learns that he was won 8.5 million pounds in a phone call with his attorney, he accidentally pulls his phone set off the wall in his apartment. He recalls, “I stood there for some time, I don’t know how long, holding the dead receiver in my hand and looking down at what the wall had spilt. It looked kind of disgusting, like something that’s come out of something” (8). The simile functions not to transfer attributes of a vehicle to a tenor, but simply to be a simile that closes out a paragraph. The abstract and vague image of “something that’s come out of something” as a vehicle for demonstrating some



non-obvious attributes of the receiver that has just come out of the wall is odd, as if to call attention to itself. I suggest that the primary purpose of this simile has nothing to do with the phone receiver; rather, it exists for the sake of the narrative, as a way of recognizing an experience that eludes understanding in the tropes of language that signal understanding. Moreover, the blatant literalism of the simile jeopardizes the verisimilitude of the scene. This comic absurdity calls attention to the narrative as stunted or not-fully-rendered—an incomplete draft that has not expunged the marks that might reveal the artificiality of the plot.

In *Remainder*'s meditations on the unmanageable entropy of matter in relation to literature, it asks whether computational methods shift the balance, affording a greater degree of insight and control over the material world. In fact, the novel very consciously associates both the narrator and his assistant, Naz, with computational forms of cognition, and this informs the evolution of their mutual project to create increasingly ambitious re-enactments. Moreover, in demonstrating the reflexive relationships between human cognition and computation as the re-enactments ultimately devolve into chaos, *Remainder* reveals the inability for computational media to afford stable control over the material world.

N. Katherine Hayles' broad definition of cognition in *Unthought: The Power of the Cognitive Nonconscious* lends insight into the relationship between human thought and the form of computation found in the modern computer.<sup>20</sup> Her exact definition of cognition is “a process

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<sup>20</sup> N. Katherine Hayles constructs a model of cognition that emphasizes the automatic cognitive processes that precede and underlie human consciousness. According to Hayles, nonconscious cognition filters massive amounts of information into more manageable representations that consciousness relies on. Given that the human sensorium produces far more information than the conscious mind can handle, nonconscious cognitive processes act as intermediaries that prevent information overload in the conscious mind. This initial or pre-processing stage of nonconscious cognition prevents the conscious mind from being deluged with information to the point of debilitation. Hayles goes on to argue that in consciousness' compulsive drive to wrangle experience into understanding—to convert immense amounts of information that is often complex, seemingly uncorrelated, or even inscrutable into useful models or representations—it favors coherence over precision.

Hayles' model of cognition informs her reading of *Remainder*. Pointing to the description of the narrator's physical condition after the accident, as well as the trance-like states he enters during the re-enactments in the latter

that interprets information within contexts that connect it with meaning” (22), and the key to this seemingly abstract definition of cognition is that it opens itself as a way of describing parallels between functional and structural aspects of human cognition and technical systems, like the modern computer. In fact, Hayles characterizes the computer as a quintessentially cognitive technology.<sup>21</sup>

These resonances between human cognition and computation help illuminate the consequences of figurative language in *Remainder* that envisions human thought in terms of the modern computer. For example, the narrator feels that his brain “short-circuited” his sexual fantasies about Catherine because they never lived up to his impossible standard of perfect fluidity of movement. The most striking and recurring example is the narrative voice’s description of Naz’s cognition in terms of “whirring”:

He [Naz] didn’t answer at first. His eyes had glazed over while the thing behind them processed. I’d seen them do that before, several times; only now the processing seemed to have stepped up a gear—several gears, gone into overdrive,

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half of the novel, Hayles claims that the narrator has lost critical nonconscious cognitive processes after his accident. The narrator’s attempt to regain a sense of fluidity and naturalness in his movements fits into Hayles reading as an effort for consciousness to take on the responsibilities of nonconscious cognition. However, in Hayles formulation this is impossible because of the temporal (nonconscious cognition precedes consciousness), directional (nonconscious cognition is a one-way transfer of information to consciousness), and functional (nonconscious cognition reduces and smooths information into more representations more intelligible to consciousness) differences between the higher modes of awareness and nonconscious cognition. Hayles describes the consequences of the narrator’s consciousness:

Consciousness here seemingly achieves its dream not only of narrating the world but acting as the dictator determining what goes into that narrative in the first place. In this sense, *Remainder* presents an exaggerated vision of what we may call the *imperialism* of higher consciousness, magnifying to nightmarish proportion its tendency to insist that it alone is in control and is the sole originator of human agency. (90-91)

Hayles envisions the narrator’s consciousness as a desperate for control not merely over the whole of the narrator’s cognition, but also over his employees and his material surroundings. If the narrator’s higher consciousness is characterized as imperialistic, then Hayles implies that the narrator’s consciousness responds to the loss of the nonconscious cognitive processes with a campaign for more range, power, and control. Moreover, higher consciousness’ power depends on the consumption of external resources, and its control entails the decreased liberty of its subjects. Indeed, the narrator projects his desires onto the motivations of others and onto his own notion of reality.

<sup>21</sup> Hayles writes, “Computational media are distinct, however, because they have a *stronger evolutionary potential* than any other technology, and they have this potential because of their cognitive capabilities, which among other functionalities, enable them to simulate any other system” (Hayles 33). This claim is based on properties relating to the generality of Turing Machines, the abstract model of computation implemented in the modern computer.

become almost unbearably intense. It amazed me that his head didn't explode from the sheer fury of it all. I could almost *hear* the whirring . . . giant systems hungry to execute ever larger commands. Eventually the whirring slowed down, the eyes became alive again . . . (235)

The sequencing of Naz's behavior in this interaction aligns with the sequence of events utilized by modern computers to process user input. One immediate observation is that Naz's thought is characterized mechanically—specifically, in terms of “processing”—inviting the comparison to a microprocessor. I claim, however, that the entire sequence of Naz's behavior—not just the interval of “whirring”—in this passage registers as a metaphorical computer. Operating systems, which manage how the resources of a microprocessor are shared amongst many running processes on a computer, make the relationship between input/output devices and a microprocessor more complex to better utilize the processor. Approaches that successfully share a single microprocessor core among multiple (often thousands) of independent processes account for the fact that a processor core can only work on behalf of a single process at a time. Thus, processes are effectively put to sleep and awoken on a carefully tuned schedule to ensure that each process gets some processor time without completely starving other processes. The important consequence of this approach is that the microprocessor has to ignore input and output devices for periods of time in order to get any actual computation done. Only by closing its eyes to the outer world does a microprocessor have any hope of allotting the processor time to perform the requisite computations for its many running processes.

Naz demonstrates the attentional dynamic of the computer. As if he withdraws into himself when his eyes glaze over, shutting down his relationship to the exterior world, Naz begins process the narrator's statement. Only after the period of furious computational maneuvers inside his head does he resurface to the exterior world, becoming “alive again.” If the novel so directly associates Naz with computers, then his final reaction to the bloodshed of the

bank heist brings into relief the blindness and ethical problems of conjoining human thought with the computer. Indeed, in the final pages of the novel, the whirring, which has become “manic whirring” (255), ultimately leads to a mental breakdown akin to a computer crash. When Naz learns what happened at the bank, the narrator describes a change coming over him “like a computer crashing,” then “his body stiffened and his eyes went into suspension while the thing behind them tried to whirl,” but “it couldn’t whirl anymore: it had frozen” (298).

Parallel to the development of the modern computer in the twentieth century was the emergence of the modern concept of information. Historian of technology and media theorist Geoghegan tracks the term from its first (and sparse) uses in the medieval era to its ultimate dramatic redefinition by the father of information theory, Claude E. Shannon, in 1948. Derived from the Latin *informare*, which refers to the impartation of form to matter, the word information was first associated with divine influence. According to Geoghegan, for medieval audiences, “Information and transmission had more to do with *inspiration*, or the imparting of intelligible qualities” (174). By the early twentieth century, when the definition of information was developing in relation to pattern recognition in electrical and radio networks, engineers “initially referred to the data of transmissions as *intelligence*, swapping out that term only as it became clear that intelligibility to humans was not necessarily a factor in discerning these patterns” (176). It seems that if the religious affects of information wane by the twentieth century, the privileged epistemological status of information carries on. The most important event in the constitution of the modern definition of information is Claude Shannon’s paper, *A Mathematical Theory of Communication*, in which he creates a strictly quantitative formulation of information, ensuring that “semantic aspects of communication are irrelevant to the engineering problem” (379). The modern conception of information, so integral to the industrialization of computer

systems,<sup>22</sup> holds true to its Latin roots—the giving of form to matter—and this fundamental dynamic lends insight into a tension between these basic building blocks of knowledge and their volatile physical basis.

The common denominator of this section is attention to the inherent limitations of the media systems through which we construct understanding. The narrator's failed attempts to micromanage his physical environment via re-enactments; McCarthy's critical reflections on the always-imminent rupture of the real into the literary project; the 20th century re-invention of information a fundamental unit of knowledge—each constitutes a search for control or understanding jeopardized by the contingencies of physical mediation.

### **The Role of Ornamental Search Algorithms in Generating Self-Assuredness**

The metaphorical language that associates the narrator as a kind of computer belies his more subtle relationship to computational technologies and methods. This section begins with the observation that the narrator meditates on technical systems, which ostensibly are comprehensible and dependable, to assuage his frequent anxieties that he is not in control or fully cognizant of his surroundings. It then focuses on the narrator's chapter-long search process for an apartment building for his first re-enactment. I claim that when the narrator's methodology is guided by intuitions and influenced by shifting memories, the narrator surrounds the search with adjacent, ornamental algorithmic search procedures, whose presence confers the narrator an aesthetic of computational rigor and air of legitimacy that he feels is otherwise lacking. Further, as the narrator experiences the enticements and shortcomings of the forms of search akin to the search procedures developed by computer scientists, the chapter of *Remainder* illuminates a

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<sup>22</sup> Shannon suggests that the most efficient way to transmit information was according to a binary system, which of course is amenable to the modern digital computer (Geoghegan 179).

fundamental gap between desire and justification to which the researchers must reconcile themselves. In other words, for the researcher, the desire for understanding, discovery, and progress is in tension with the strategies, techniques, or methods that purport to justify conclusions garnered from their use.

The narrator feels in control when he orients his attention to the technical infrastructures around him. Recalling his feeling of nausea in the ambulance after his accident caused by his inability see outside the window to “get a grip on the space [he was] traversing” (15), the narrator feels a similar sickness when riding the London tube. But thinking about the networked transportation system stabilizes him:

I experienced echoes of the same uneasiness, the same nausea. I kept them at bay by thinking that the rails were linked to wires that linked to boxes and to other wires above the ground that ran along the streets, connecting us to them and my flat to the airport and the phone box to Daubenay’s office. (15)

The sentence structure here enacts the kind of thinking that the narrator suggests will help the narrator distract himself from his physical queasiness by mapping out his geography. By sequencing prepositional phrases, the sentence represents his mental mapping of the network in terms of its nodes and connecting wires. The repetitive structures—things connected “to” things “that” connect to other things—builds a sense of rhythm and flow, rare signals of control in a narrative style that is frequently staccato and disjointed. As if to will his phone call with Daubenay to go well later in the novel, the narrator focuses on the same wires again: ‘I gripped my phone’s receiver harder and frowned in concentration as I thought about the wires connecting me to him, Brixton to Angel. It seemed to work’ (81). Each of these instances contributes to the narrator’s growing notion that directing his psychic energy at the technologies distributed around

him, they will respond in his favor and enable him to exert more control over his circumstances.<sup>23 24</sup>

Turning to the narrator's search for the "right" building for his first re-enactment, the first stage of the search process for the building is to remember (or envision) the building with some precision. When he ponders how he might remember the location of the building in London, however, hard concentration doesn't cut it: the narrator describes the memory of the location as startled pigeon that has fluttered away from an accessible region of memory (91-92). Whereas hard concentration seems to give narrator control over his memory, the simile of the pigeon-like memories implies that the narrator cannot conjure up memories at will—like a passerby on the street, any sudden move toward a pigeon will only scare it away.

Furthermore, the narrator resolves to coax the bird-memory to him. Recalling an art teacher from his childhood who encouraged him to think of sculpture as removing "surplus matter" from the block to unveil the finished sculpture already within, the narrator imagines that his building is already nestled within London and that it can be revealed by a kind of process-by-elimination search of the city (91-92). Thus, the narrator and Naz devise a search algorithm for removing the surplus matter of London until only the narrator's building remains. The narrator

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<sup>23</sup> Zara Dinnen attends to the affective relationships we develop towards digital technologies in her book, *The Digital Banal*. She observes the cultural phenomena of the twenty-first century by which frequent and radical changes to the technological landscape mediating our daily lives—think smartphones, Facebook, Twitter, etc—are almost immediately treated as familiar, part of the status-quo. She suggests this phenomena the digital banal, "the condition by which we don't notice the affective novelty of becoming with digital media" (1). In other words, we fail to realize our ongoing transformation with the plethora of digital technologies mediating our daily lives. When literature consciously calls attention to those processes of mediation— even or perhaps especially at their most banal—it creates a rupture in the ostensibly smooth mediational surfaces of digital technology—both as technical systems and historical conditions. By making visible the invisibility of the mode of the digital banal, we can become more attentive to the role of these technologies in our lives. Dinnen's argument meshes well with McCarthy's novels, in which are rich with moments of greater awareness of a relationship of becoming-with technology.

<sup>24</sup> See Mark Goble for an understanding of modernism's attitude toward technological mediation, and how the influence of these attitudes and desires on perspectives of new media. "Modernism encouraged a unique structure of feeling toward the technologies of art and literature—in all the specificity of their material aesthetics—and which survives and flourishes as a feeling for technology in general" (25).

insists that they “hire a room” that will be the central control office of the search. The phrase personifies the office space as an employee, which betrays the narrator’s desire that his financial resources are sufficient to bend space towards his will. Anyway, the divide-and-conquer algorithm he and Naz develop partitions the city into numerous segments, “scanning in” portions of the city from a wall-mounted map onto a laptop, using software to cut away adjacent streets, and “zapping out” the rendered images to the employees’ mobiles (94). The crisp language of scanning, cutting, and zapping London into representations amenable to the search algorithm indicates the narrator’s initial attraction to this systematic approach. Finally, as this information is centralized at the narrator’s office, he or Naz will periodically travel to the candidate buildings themselves to make a final judgment. Moreover, I argue the most important properties of this search algorithm are that it is complete—provably guaranteed to find the building, if the building exists—and that it is a relatively efficient algorithm. The first property arises from the fact that the search process is designed to cover the entire city over time (London is segmented, and as the search progresses over time, the search advances into unsearched portions of the segments). The second property is a feature of divide-and-conquer algorithms, which break one large, difficult problem into several small, easy problems that can be solved more quickly.

When the narrator is unsatisfied with the progress of the team’s systematic search process, he betrays that this kind of search process was doomed from the start because the building cannot be specified exactly. The narrator reflects on the situation: “No matter how well I described it to them or how thoroughly they looked, they wouldn’t find my building for a simple reason: it wouldn’t be my building unless I found it myself” (95-96). This revelation disqualifies any interpretation that reads the narrator’s memory of the building as empirically



reliable.<sup>25</sup> The narrator asserts that even if he described the building in perfect detail and his staff scoured every inch of the city, they would still fail to find his building.

In this formulation, the building (the goal state of this search) does not exist independently of the narrator (the searching agent). This is to say that the narrator's search is not reducible into the procedural thoughtlessness of the search algorithm: the kind of discovery the narrator is pursuing is beyond the reach of the most mathematically robust algorithms. Rather, the building or goal state only exists in relationship to the searcher who wills, negotiates, coaxes, imagines it into existence. Finally, it seems that the building only exists in relation to the narrator's ongoing reconciliation of the inconsistencies or gaps between his memory and the actual material reality of London.

Moreover, the narrator's relationship to algorithmic approach changes such that he is less concerned with its ostensible benefits (the facts that it is complete and relatively efficient) and—strangely—more enamored by the aesthetic qualities he ascribes to it. Instead of cancelling the team's search, he allows it to continue as a backdrop to the one search capable of succeeding, his own. He explains, "Why hadn't I called the search off, then? You might ask. Because I liked the process, liked the sense of pattern . . . Process: it was necessary" (96-97). Analogizing the search to sculpting an artform and pigeons once again, he suggests that "their burrowing [his staff's systematic search] would get inside the city's block and loosen it, start chiseling away at surplus matter: it would scare my building out, like beaters scaring pheasants out of bushes for a Lord to

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<sup>25</sup> The integration of Catherine's memory into the narrator's own supports my claim that the narrator's memory of the building is inconsistent. Long before the narrator begins the search, he asks Catherine to describe her clearest memory. She recalls, "There were swings, these swings, on concrete, with a lawn around them. And there was a raised podium, a wooden deck . . ." (*Remainder* 76). Later, after the narrator decided on a building, we learn that his renovation plans include adding the elements of Catherine's memory: the narrator remarks, "Swings were being installed that day. I hadn't seen swings in my original vision of the courtyard—but they'd grown there later, as I thought about it further a concrete patch with swings on and a wooden podium a few feet to its right" (122).

shoot” (96). It seems that despite recognizing that the algorithmic search is doomed to failure, the narrator holds onto the idea that he is bolstered by the algorithm—the scientific methods have a power merely in their presence, even as they are wrongly applied and practically useless. Alongside the narrator’s increasing disregard for the pragmatic utility and appreciation of the aesthetic properties of the divide-and-conquer search algorithm is a shift toward a more violent image of his relationship to bird-like memories. In his second formulation, the remembered building is like a pheasant that the narrator will shoot for sport—starkly different from the first avian image of pigeons that flutter back into accessible regions of his memory on their own schedule. In another visualization, the narrator takes pleasure in imagining a kind of out-of-body experience in which he looks down on himself and his employees like a GPS satellite as they conduct the divide-and-conquer search: “I imagined looking down and seeing them all—plus me, the seventh moving dot, my turning and redoubling etching out the master pattern that the other six were emulating” (96). This image signifies his shift towards aesthetic valuations of the algorithm with the imagistic and gestural language of etching, patterns, and emulation in contrast to the functional utility of the algorithm.

The narrator’s dream supports my claim that despite the narrator’s attachment to deterministic algorithmic procedures, they are the merely an aesthetic backdrop to a project much more dependent on intuition, chance, and compromise.<sup>26</sup> He recounts the dream:

After a while I closed my eyes, my dream-eyes, and tried to *sense* when it was coming up. I sensed the rhythm things were moving at, the patterns they were following, and let my imagination slip inside. I could sense when my building was about to come by. I waited for it to go by twice, and just before it reappeared a third time shouted: “Stop!” (98)

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<sup>26</sup> The role of dreaming in this research methodology invites the suggestion that the narrator is guided by opaque unconscious desires that cannot be neatly accounted for by computational search algorithms. See the chapter on *Satin Island* for another instance of a narrator looking for meaning in a dreamscape that has otherwise been unavailable in waking life.

This passage demonstrates the narrator's tendency to ornament intuitive decisions with a façade of systematic or algorithmic basis. Although the narrator describes the sequence of images as following patterns—which might suggest that when he “sense[s]” an upcoming fleeting image of his building, he is inferring the location of his building in the set of buildings based on arithmetic and logical properties of the sequence of buildings in his dream—but I argue that the word sense is more closely associated with intuition than calculation. After all, to take a step back to consider the purpose of the dream, it seems to function more as a way for the narrator to manifest his desire to find the building than a means for him to refine an algorithmic approach to locating the building. Nevertheless, there is some room for ambiguity in regard to whether or not the narrator's choice to wait until the third pass of the building to yell “Stop!” is a sign of a more 1) calculation-based approach that uses the additional passes to better estimate frequency at which the building's image passes in order to make a better guess, or 2) intuition-based approach that waits until the third pass rather than the first for a façade of mathematical justification to the narrator's decision. In any case, I maintain that the narrator depends on computational methods to ease his anxieties about the unreliability of his memory. The narrator uses these computational methods, regardless of their relevance to the problem at hand, to justify his ultimate discovery of his building—to bolster his conviction that he really has located the building and not merely allowed his unreliable memory to manufacture a false sense of control. They envelop the narrator's decisions within an atmosphere of precision, rigor, and logic that is often lacking.

When the narrator awakes, he is sure that the team-based algorithm has misled him, and he further obfuscates his search process by taking an “irrational” approach (99). He considers all sorts of complex and seemingly arbitrary search algorithms, wrongly associating concepts like inefficiency and randomness with irrationality. The heuristics for making decisions in these

alternative approaches range from using randomization, following a certain color throughout the city streets, jerking back-and-forth erratically to reduce predictability, and introducing numeric and symbolic systems into extremely complex algorithms full of “fractions” and “differentials” (100). Creative as his heuristics are, the narrator has a moment of self-awareness and resigns to the fact that planned irrationality is not truly irrational:

By early afternoon I'd realized that none of them would work in any case, for the good reason that implementing any one of them methodically would cancel its irrational value. I started to feel both dizzy and frustrated, and decided that the only thing to do was walk out of my flat with no plan at all in mind—just walk around and see what happened. (102)

We may be surprised at the narrator's sudden rejection of the algorithmic methods he has appreciated and held on to even when they were not practically useful to his search process. This shift suggests that the frame of reference for understanding how the narrator responds to the gap between his desire to discover the building in unsullied conditions than his research methods seem to enable is much broader than a question that balances the interplay between calculation and intuition.

The truth of the matter is that no method is perfect, and there is no way to discover the building without a method. Ultimately, the narrator tries to leave his apartment without a plan, but he cannot extricate himself from searching according to perhaps unconscious heuristics: he follows the same route away from his apartment building that he took at the beginning of the novel; he then goes toward Plato road, the part of town where he first had the idea for the re-enactment; and he makes left and right turns an equal number of times “to balance things up” (102). When leaving his apartment, he decides to just “see what happen[s],” and eventually he turns around and sees the building—“It was my building alright. I knew that instantly” (103). The narrator's instant confidence reveals that the criteria of the search is clearly not verification, but the narrator's will. To know it instantly—to be absolutely sure—is to bring faith or intuition

into the fold, for how can he know until he has seen the inside of the building? What do we make of this abrupt conclusion to the search process? Knowing, it seems, is willing, generating, or accepting a perhaps compromised or incomplete conclusion for a research process for the sake of meaningful progress. It is just the messy self-criticism and self-delusion along the way that is a precondition for accepting a conclusion that is neither arbitrary nor perfect. The compromises, negotiations, and revisions of a research method reveal the tense relationship between the means of knowledge production and knowledge itself.

If the narrator's search for his building reveals the compromised nature of a conclusion that does not necessarily follow directly from the research methods, then *Remainder* is committed to the question of how methodology partly bridges and partly occludes the gap between researcher and conclusion. Perhaps the most notable remark on the methodologies of the search process is how the narrator's morphing relationship to algorithms: at first they guarantee success, second they lose their utility but their mere presence seems to distract from more intuitive and less computationally rigorous approaches, and third they are inimical to serendipity and must be rejected nominally even though they are not totally escapable. Nonetheless, the narrator's troubled negotiation of the role of algorithms in his project helps him arrive at a point where he can put an end to the search and finally see a building that is at least similar to the one in his dreams, and immediately accept it as a perfect discovery, glossing over the inconsistencies and questions about the veracity of his claim. The search reveals a strained negotiation for epistemological confidence from a contradictory set of computational and intuitive methods.

### **The Stumbling Procession of Narrative**

The metafictional narrative style of *Remainder* reflects an ongoing search for cohesion and control over language in the narrative form of the novel. This section approaches questions about narrative style in *Remainder* by illuminating how the thematic of search functions in the novel's narrative form. Furthermore, I survey the epistemological landscape that emerges from the narrative form of *Remainder* in connection with more general reflections on the relationship between narrative search and control.

In a similar fashion to the narrator's use of algorithm not for its ostensible purpose but for its much more nebulous and aesthetic role in his own self-justification and motivation, the narrator's diction—couched in ellipses indicating his struggle to find the right phrasing—exhibits his attempt to divorce semantics from syntax. This first example is one of the narrator's initial conversations with Naz, in which tries to express his vision for the re-enactments in words:

“No,” I said. “All the . . . performers—no, not performers: that's not the right word . . . the participants, the . . . staff . . . must be . . . I mean, we'll need complete . . . jurisdiction over all the space.” “But go on,” Naz said. “Sorry I interrupted you.” “You did?” I asked him. I was slightly flustered now; I felt my tone was slipping. I thought of the last formal word I'd used and then repeated it, to bring my tone back up. “Well, yes: jurisdiction.” (88)

As the narrator fumbles over his words he becomes frazzled: he feels that he is disrupting the flow of the conversation. Indicated by his frustration with his vocabulary, the ellipses, and the stop-and-start rhythm, the narrator's “tone was slipping.” Critically, the narrator elevates his tone and regains his confidence not by achieving semantic clarity (for example by finding a new phrase that helps convey his idea), but rather by repeating a formal word. In this way, the narrator circumvents a loss of control over language by reasserting the rhythm of his speech—not by expressing himself more clearly.

In fact, the compulsion to maintain the rhythm of speech is a motif throughout the novel. Recalling his coming out of his coma after the accident, the narrator recounts dreams in which he took on the role of commentator at a sports stadium. “There’d been a commentary,” he remembers, “and I’d had to join in with it, commentate as well. I’d had to speak my commentary to the rhythm of these beeps and rasps or else I’d fade out of the scene” (54). Considering that the narrator associates fading out of the scene with falling deeper back into his coma (signaled by his reference to the “beeps and rasps” in his hospital room), his ability to compulsively commentate is connected to his ability to take and control and surface into consciousness once again. Further, speech is a means of maintaining or even gaining control when the narrator feels most vulnerable to the disintegrating effects of his accident. Critic Sydney Miller has written on the resonances between the narrator’s anxiety about his loss of fluidity of movement after his accident and the narrative form. She argues that “in line with the narrator’s movements having become machinic as a result of his accident, the narrative itself reads like a labored computation of semantic bits and syntactical parts” (Miller 645). In other words, the narrator’s struggle to weave together smooth experiences in an unwieldy material world manifests itself in sentence structures that tend to unravel into clauses and disjointed fragments. Despite the fact that the circuitous style signals a lack of clarity, it has its own unique rhythm that supports itself even when its semantics are weak.

The narratological strategies developed in twentieth-century U.S. academic and military institutions demonstrate the broad and powerful role of literary desire beyond the novel. In his essay, “RAND Narratology,” Kent Puckett makes the argument that the major research programs at RAND (Research ANd Development), a think tank started in 1948 that strongly influenced U.S. military strategy, deployed the epistemological functions of narrative to satisfy a desire for

control during the Cold War. Puckett explains the development and popularization of game theory in the RAND researcher's structuralist approach toward international politics and war strategy, and he observes the gravitation of research at RAND to enumerate and account for a tremendous number of hypothetical scenarios between the U.S. and the Soviet Union. Take, for examples, Herman Kahn's thirty-two rung "escalation ladder," an ordered list of hypothetical nuclear crises, and RAND's long-running hypothetical debate about whether conservative tit-for-tat escalation scenario might circumvent the total annihilation promised by aggressive nuclear strategies (47-51).<sup>27</sup> In each case the exhaustive playing out of scenarios that—according to much of the game-theoretical and related logics underlying the RAND research—inevitably escalate towards aggressive nuclear war begs the question of whether this research was in part "motivated by something other than RAND's vaunted rationality" (49). The crux of Puckett's assessment is that the effort to enumerate the (effectively arbitrary and useless) small escalatory steps that lead to the model's ultimate prediction of total catastrophe is motivated by a basic narrative desire for control over the story. He writes,

At a moment when the enormity, immediacy, and speed of thermonuclear war threatened the very idea of significantly different but related beginnings, middles, and ends, RAND advocated styles and strategies that betray not necessarily a commitment to military victory (an increasingly hollow concept in the age of the bomb), or even to meaning at a moment when meaning seemed under threat, but rather to an unmotivated desire for what we might call *bare narrativity*. (35-36)

Here, Puckett summarizes his understanding of the role of temporally distended narratives in extending the apparently diminishing timeline of human action in twentieth century. So long as there was work to be done, hypothetical scenarios left unconsidered, the experts at RAND still mattered—human agency was not yet undermined by the enormity of nuclear war. The institutional irony (if not tragedy) of this history are that these anxieties are baked into the geo-

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<sup>27</sup> For more details, see Puckett's analysis of the debate between the MAD (Mutually Assured Destruction) and NUTS (Nuclear Utilization Targeting Selection) (47-51).



political status quo, at least in part as a consequence of a much more vulnerable narrative desire to retain human agency in a world with nuclear weapons.

The intricate (and perhaps psychologically indulgent) narrative plotting at RAND prioritizes models over the apparent state-of-things, hoping they might invert the ideally causal relationship between model and phenomena by letting the model exert influence over phenomena rather than merely letting the model describe or follow from the phenomena. Puckett finds a unifying thread among the various researchers at RAND:

shared faith in the autonomous power of their models, in their shared sense that a realist sought not to describe the world as it really was but rather to imagine a model that might anticipate the world as it should be: this is realism as desire rather than description, realism as discourse rather than event. (56)

The narratological concepts put forward by the Russian formalists, *fabula* and *syuzhet*, help clarify Puckett's delineation of discourse from event. According to classicist Genevieve Liveley in her book, *Narratology*, these terms emerge as the Russian formalists emphasize form over content: "the how rather than the what, the device rather than the material, the manner rather than the matter . . . discourse rather than story, narration rather than narrated, and—in the terms they themselves introduced to narratology—*syuzhet* (plot) rather than *fabula* (story)" (111-112). Understanding the efforts at RAND to seize control through complex military-strategic plotting over the latent threats of nuclear devastation during the Cold War casts the research program as a remarkably literary project.

I see a connection between the narrative style of *Remainder*, which struggles to maintain a sense of cohesion and control, and Puckett's notion of a kind of over-active *syuzhet* in the RAND research program. The most prominent instance of this dynamic is in the trick played on the reader when the narrator reveals that the interactions with a homeless man he has been describing for a number of pages were simulated, fake—they never happened. Because these few

pages of narrative ultimately expose themselves as false or unreal, we can more confidently understand the narrative form as both a product of the narrator's cognition and a translation of his attempt to control the London of the novel into a similar effort to control or construct a coherent narrative in the novel.

The fake scene shows how the narrator's desire for control manifests in language that diminishes the identities of other characters in the scene—a dynamic at the core of the labor practices in his re-enactments. When the narrator takes the (still unnamed) homeless person to a restaurant, he struggles to write the waitress into the scene. At first, she is “an old woman with big glasses” (57), but she morphs into an eighteen or nineteen-year-old one page later (58). As the scene begins to collapse, the description of the waitress is completely indeterminate: “The waiter came back over. He was . . . She was young, with large dark glasses, an Italian woman. Large breasts. Small” (59). Nevertheless, if the narrator's failure to prioritize character relative to other narrative elements is innocuous enough, his use of synecdoche and possessive pronouns makes clear the power dynamic of the scene. When the narrator successfully bribes the waitress to let the homeless man's dog sit inside the restaurant, he feels in control, and the waitress is “all smiles now” when she returns. Letting a smile stand in for the waitress signals that the narrator treats characters as means to ends, potential accelerators or inhibitors of his own goals. Furthermore, once the narrator has set up the scene for more dialogue with the homeless man, he begins to refer to the man as “My homeless person” (58), using the possessive pronoun to signal the narrator's brazen sense of ownership of the man.

In the constructed scene, the narrator models his own behavior in part by imitating the behavior of other characters in earlier portions of the novel. In the first instance, he imitates Daubenay: the narrator recounts/imagines “‘Well!’ I said. I leant back in my chair and drew my

arms out wide. ‘Well!’” (58), imitating the earlier scene in Daubenay’s office: “‘Well!’ he said. ‘Well!’ He leant back in his chair and drew his arms out wide” (42). Daubenay exudes a confidence that the narrator wants to project in his dialogue with the homeless man. The imitation reflects the narrator’s desire to present himself as an authoritative figure even as it lays bare the act of writing with its repetitions and the strange timeliness of the narrator-as-narrative-voice describing himself in a past tense in the present tense, which the reader only comes to understand retroactively when the scene is revealed as fake. These fascinatingly complex dynamics spring from the page when the narrator’s meta-textual bluntness invites us to understand the narrative as theatrically staged and improvisational. The second instance is less explicit, but it occurs when the narrator says “Cheers!” before beginning a vague dialogue muddled with ellipses and then knocking over his glass such that “wine sloshed out across the tablecloth” (59). This sequence recalls a scene involving the narrator’s friend, Greg, when he hears that the money from the Settlement came through: “‘Cheers!’ he said, ‘To . . . well, to money!’” (31). In addition to the “Cheers” and ellipses in both cases, Greg also “sloshed” beer on the pub floor at this moment. These examples utilize the narrator’s behavioral strategies to cope with his feeling of inauthenticity by imitating others to show writing of fiction *live* in the development of recurring images (spilling liquids) and their symbolization (a lack of control). Further, they translate the narrator’s search for control in the plot into a search for coherence in the narrative itself, formulating the writing of fiction as a kind of search problem with its own entropic trends toward disintegration.

Thus far, I have pointed to how *Remainder* explores the capacity of different aspects of language such as how semantic nonsense can be partially concealed or mitigated by a veneer of consistent rhythm, or how syntax can register uncertainty and loss of control. From another

perspective, the novel considers the power of language in relation to knowledge, and specifically the novel's position in this dynamic. In service of a larger claim about *Remainder*'s self-awareness as a novel among other media forms, Christina Lupton points to the secondary role language takes to matter in the novel. Referring to the part of the first re-enactment in which the narrator has instructed the lady who fries liver on the floor beneath him to utter an unplanned phrase when he walks by, Lupton observes that language is often secondary to physical arrangement in the novel:

... language is sound excreted, unthought, owned by no one . . . This scene [*Remainder* 143] is a pivotal one in *Remainder*, a triumphant distillation of cognition to technology, language to mediation. But the outburst of pleasure that comes from language produced in this way also raises the question of what, if any, role transcendence is to play in a world for which pervasively material explanations can be offered. (507)

Lupton's claim that the secondary role of language in the re-enactments signals that cognition is reduced to matter of technology, and language a matter of mediation. When Lupton refers to technology and mediation, she emphasizes material contexts—specifically, the physical arrangements of the re-enactments. Moreover, her claim that cognition and language are somehow lessened or more narrowly defined in terms of physical configurations shows that she interprets the role of language in these re-enactments as not merely enabled and supported by technological mediation (as represented by the choreography of the re-enactments), but instead, only possible and completely determined by them. This leads to the second important aspect of the passage: Lupton's notion that reducing cognition and language to technological mediation means losing any transcendental qualities we may attach to cognition and language. In other words, thought and language are material phenomena explained by their material basis, their technological mediation.

Lupton zooms out to consider how *Remainder*'s attention to mediation of thought and language raises questions about the nature of literary texts. Namely, she points to the fact that if language is understood strictly in terms of the material circumstances by which it is produced, then literature loses any transcendental qualities our intellectual history or culture may wish to ascribe to it. She writes, "We can draw back from this larger argument to the sense that the novel, even once it is ontologically conceived, must perform its own little leap, between the world pages, letters, paper, in which it is crafted, and the form in which it is read" (508). In delineating two forms of the novel—one that is constituted by the processes and materials of its production, and another form characterized by how a novel is experienced when it is read—Lupton gestures toward the necessity of a reader to confront the novel with a willing suspension of disbelief or ignorance about its material circumstances to encounter it as a piece of literature, an elevated if not transcendental artform, rather than merely as printed words on a page.

*Remainder* brings attention to the act of narration in the novel, revealing the gaps between the book as artifact, or novel as haphazard collection of formal components, and the reader's (perhaps partial or inconstant) suspension of disbelief. The novel, it seems, has an entropy problem. But it is not alone: computational methods, despite their mathematical and procedural crispness, have their limits. When these forms of knowledge break down—or, more accurately, when we finally recognize that they are not separate from the material contingency from which they arise—we can appreciate knowledge for what it is: a fragile, non-miraculous miracle.

### III. Chapter 2

#### The Perspectival Limits of Computation:

##### Researching the Present in *Satin Island*

*“It is true, however, that nature seems to be willing to go much further in the direction of complication than we are, or rather than we can afford to go.”*

*- John von Neumann (1948)*

The complexity of nature frustrates scientific progress. Twentieth century polymath and pioneering computer scientist John von Neumann confronts this fact in his lecture, “The General and Logical Theory of Automata,” in 1948. His perspective in the lecture seems to follow discovery but precede application: early to mid-twentieth century research in mathematics and computer science has been laying the conceptual groundwork for the initial versions of the modern computer. Von Neumann’s lecture demonstrates a desire to bring the promising future of the computer into the present, to realize the power of computation augured by the U.S. academy and military for decades.

The context of Von Neumann’s remark is his comparison of the human brain to automata, abstract computers with which researchers reasoned about the principles of computation. Indeed, a theme of Von Neumann’s work was the evaluation of computers against the human brain, and vice versa. In this lecture, Von Neumann describes a problem in making the comparison: his automata rely on certain simplifying assumptions related to knowledge representation not found in the human nervous system.<sup>28</sup> These simplifications simultaneously enable and constrain the computer: standardizing knowledge representation in computers promotes further research and development, but it also undermines the long-held desire that the

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<sup>28</sup> While computers store and operate on digital representations of numbers, knowledge representation in humans is more complex. I return to the importance of knowledge representation in comparing computation to human cognition later in this chapter.

computer fashion itself after human cognition. What strikes me in Von Neumann's statement is his characterization of nature as stubbornly resistant to the uncompromising, steady progress of his research program. What momentum behind the research on the early computer cannot afford to slow down or pause in the face of nature's complexity?

I claim that Von Neumann's statement casts light on an ethos that has surrounded the computer from its origin to the present. This ethos is marked by an enthusiasm for computation (its speed, its consistency, its applications) that overrides complexity and subtlety for the sake of technological progress. Although the destination toward which the ethos advances is unclear, it is evident that computation and its supporting institutions become ever more powerful and dominant, to the point that they present themselves as the logical recourse for all problems—even the ones they generated. In other words, this ethos increasingly makes sense of the world through the eyes of the computer, and this type of vision reconfigures the world into one more amenable to computation.

In Von Neumann's desire to move the present into a computation-centric future, he wrestles with the problem of situating the present relative to the past and future. He considers recent discoveries as leading up to the momentous present that can finally propel itself into a glorious future. In an important sense, the short history of the modern computer is colored by prediction, anticipation, and wonder about just how transformative the computer will turn out to be. Perhaps because of the brevity of its history and the rapidity and unpredictability of its development, the role that the computer—or computation, the more general and powerful idea implemented by the modern computer—plays in society is hard to discern in the present. Yet seventy years after the date of Von Neumann's lecture, the ethos I have described continually invites computation to shape the future.

In *Contemporary Drift: Genre Historicism, and the Problem of the Present*, Theodore Martin suggests that the challenge of making sense of the present has become an increasingly prevalent problematic since the mid-twentieth century. Neither my claim nor Martin's is that the modern computer is solely responsible for a preoccupation with interpreting the present;<sup>29</sup> nonetheless, I believe that the ethos enveloping the emergence of the computer is an excellent case study for examining the processes (as well as their stakes) that work to situate the present in relation to the past and future. Moreover, Martin suggests that this urge is characteristic of much contemporary literature. He joins other theorists in using the term "contemporary" not merely as an adjective, but as a critical concept in its own right. He elaborates,

Given its fuzziness as a period, its drift through time, its diminishment of critical distance, and its commensurability with everyday life, how does the idea of the contemporary come to have any meaning for us? One way to begin to answer this question is to consider the contemporary not so much as an index of immediacy as a *strategy of mediation*: a means of negotiating between experience, immersion and explanation, closeness and distance. (5)

Martin is careful to not define the contemporary based on a strict periodization or merely as a synonym for the present which contains "everything that surrounds us" (5).<sup>30</sup> In this passage, he associates the contemporary with increased attentiveness to a present moment and the subtle affective heuristics that ultimately enable one to map the instant in terms of more coarse binary oppositions (e.g. close versus far). Martin emphasizes that the contemporary is useful in large part before it calls attention to itself and the critical methods we use to understand—or at least think about—the present.

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<sup>29</sup> Martin maintains that the rise of the contemporary as a concept (as well as a literary field) cannot be understood without considering it as "a response to the fate of the present under the accelerated conditions of late capitalism" (*Contemporary Drift* 19).

<sup>30</sup> Martin relies on four negative theses to respond to potential misconceptions about his definition of the contemporary: "The contemporary is not a period;" "The contemporary is not contemporary;" "The contemporary is not historical;" and "The contemporary is not mere presentness" (*Contemporary Drift* 2-5).



We find another delineation of the contemporary as a singular and worthwhile concept in anthropologist Paul Rabinow's book, *Marking Time: On the Anthropology of the Contemporary*.

His formulation distinguishes the contemporary from modernism:

If modernism was characterized by an insistent search for the shock of the new, the contemporary ethos seeks neither to shock for its own sake nor doctrinally to eradicate historical reference . . . a practitioner taking up a contemporary stance is perplexed about how to treat representation, affect and reference. (71-72)

According to Rabinow, modernism's obsession with newness leads it to charge onward into the future, swallowing it up into itself, but a contemporary approach treads more lightly, hyper-aware of the present and the web of relationships in which suspend it between past and future. As a consequence, the challenge of the contemporary to make sense of the present without the benefit of hindsight is very much a problem of integrating seemingly disparate, local ideas into more comprehensive global claims.

Two important threads of this introduction—the historical ethos enveloping computation as well as the contemporary and its challenge of interpreting the present—come together in Tom McCarthy's third novel, *Satin Island*, published in 2015. In fact, understanding the present is the narrator's job in *Satin Island*. The narrator, U, is an anthropologist plucked from the academy into the corporation. While on the surface, U is supposed to inspire clients with stories about the cultural importance of their products so that they can create new marketing strategies, the CEO, Peyman, has given U the preeminent task of writing the Great Report, the "First and Last Word on our age" (61). When U initially asks for clarification, Peyman invokes a vague model of the anthropologist who ventures out into the field, gathers data, returns to identify and interpret the patterns hidden in his observations, and, finally, writes his book. The key difference for Peyman

is that he does not want any old book—he wants “the Book” (61) that names nothing less than “what’s taking place right now” (63).<sup>31</sup>

*Satin Island* follows U’s efforts to tackle this vague and seemingly impossible challenge. Despite his often ironical attitude toward his role at the company—evident in his presentations that invoke flashy critical theory to elevate the cultural significance of his clients’ banal consumer products—U reveres the power of his company (and especially its leader Peyman) to tell stories, to conjure meaning that simultaneously makes sense of the present while propelling it into a ostensibly transformative future. U also has the sense that he is on the cusp of finally drawing all-important connections between his various research projects and day-to-day fascinations, collected in dossiers (or occasionally in unclosed tabs in his web browser). Despite his ambition, U’s research is constantly undermined by the limits of his perspective and the shortcomings of the computational methods he supposes will allow him to discern, or even initiate, a fundamental social logic and lay bare the significance of the present moment. Blitized by endless streams of new data, U struggles to wrangle his ideas into a master theory. His desire for an unmediated view of the present is continually foiled by the proliferation of opaque data.

In this chapter, I examine the beliefs and methods U develops as he searches for a perspective that will enable him to write the Great Report. First of all, I want to illuminate the presumptions underlying a project such as the Great Report: What beliefs about technology and computation in general could justify such a project, even if only superficially? A second and related goal is to reveal the reflexivity of our relationships with information technology, the ways in which they enable and constrain—make and remake—our ways of knowing. I claim that the

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<sup>31</sup> Notably, *Satin Island* engages Paul Rabinow’s writing on contemporary anthropology, most directly through U’s notion of “Present-Tense Anthropology™” and imagined cohort of “new-ethnographic agents” (79-80). McCarthy acknowledges Rabinow in the Knopf edition of the novel (191).

research process in *Satin Island* illuminates the conceptual entanglements between human and machine that arise as a consequence of the persistent belief that computational methods can lead to an objective perspective and totalizing knowledge.

### **Anticipating Revelation**

Undergirding U's project are a set of implicit presumptions that motivate U's research on the present. U's fascination with the connections between knowledge, technology, and time helps explain U's sense that he, in the momentous present, is on the verge of discovery.

Furthermore, the supernatural tones of U's language code him not as a detached researcher, but as a religious devotee. As U associates his form of secularized religiosity with technology—and specifically the limits of knowability at the mediational interfaces of technology—we glimpse why U might trust in (and even mystify) information technology to help him attain revelatory knowledge.

In the first pages of the novel, U presents his beliefs about the tenuous relationship between humans and knowledge or understanding:

People need foundation myths, some imprint of year zero, a bolt that secures the scaffolding that in turn holds fast the entire architecture of reality, of time: memory-chambers and oblivion-cellars, walls between eras, hallways that sweep us on towards the end-days and the coming whatever-it-is. We see things shroudedly, as through a veil, an over-pixelated screen. When the shapeless plasma takes on form and resolution, like a fish approaching us through murky waters or an image looming into view from noxious liquid in a darkroom, when it begins to coalesce into a figure that's discernible, if ciphered, we can say: *That is it, stirring, looming*, even if it isn't really, if it's all just ink-blots. (3-4)

Despite the rich imagery in this passage, it is not clear what exactly U is gesturing toward. He calls it a “coming whatever-it-is,” “things,” “shapeless plasma,” or “it,” and it approaches us from the “end-days.” The eschatological connotations of a mysterious entity approaching the present from the future evokes W. B. Yeats's beast who “Slouches towards Bethlehem” in the

poem, “The Second Coming.” U’s formulation shares with Yeats’ the sense that a certain unknown presence will soon intervene in human affairs, but U’s version differs in the fact that the “People” are eager to meet it. In fact, U’s people rush through “hallways that sweep us on” in its direction, attempting to trace its outline in the pursuit, even as their vision is mediated through veils or pixelated screens. Crucially, the people are pursuers: they have engineered these hallways and they are in the darkroom developing film to finally encounter what they sense, but cannot clearly see.

U’s passage emphasizes the technological methods people rely on to enable or perhaps even preempt an encounter with the unknown. Although U does not explicitly characterize the mysterious “it” as a supernatural entity, it seems to have this allure. Two of the objects U imagines as mediating the humans and preventing them from identifying the obscure form are a veil and a pixelated screen. The veil immediately alludes to a “famous shroud . . . showing Christ’s body supine after crucifixion” that U has just realized was discovered near his current location, in the airport of Turin, Italy. Apparently, in the case of this real shroud, the faded image of Christ on the fabric was discovered by the negative of a photograph of the shroud. By implying these vague analogies—between the veil occluding the “whatever-it-is” and the shroud bearing Christ’s likeness; and between the film that revealed Christ’s image and the rendering digital image of yet another kind of revelation—U draws a connection between technology and mysticism. Somehow technology enables or supersedes a kind of knowledge traditionally located in the domain of religion.

Placing *Satin Island* in conversation with the genre of the detective novel lends insight into the temporal problematics—namely, anticipation—of the novel.<sup>32</sup> In *Contemporary Drift*,

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<sup>32</sup> U compares his anticipation of a discovery with those of “hard-boiled novels” (37).

Martin suggests that “from its inception, detective fiction has concerned itself with the question of what we can know about the world” (*Contemporary* 95). In an earlier essay, Martin emphasizes suggests that

Although it is often described as a genre concerned with the retrospective narration of the past, detection fiction is built fundamentally on future expectation, a constant looking forward to a well-nigh utopian moment of absolute knowledge. (“The Long Wait” 168)

The long-awaited moment of understanding of the detective novel manifests in *Satin Island* as U’s anticipation of a revelation that will allow his Great Report to fall into place. Furthermore, McCarthy’s novel shares many narrative features with the genre: sifting for evidence, a desire to crack the case, the difficulty of making sense of data without the temporal distance that often affords perspective, etc. Martin is interested less in the moment of revelation (which may or may not be fulfilled) and more the anticipation of that instant. He formulates this “long wait” as “the uncertain distance between expectation and fulfillment,” “the persistent gap,” and “the specter of interminable delay” (*Contemporary* 168). As a literary critic of the concept of the contemporary, Martin’s purpose is to highlight how the lengthy process of detection and the frustratingly persistent gaps of knowledge that envelop the detective repeatedly bring attention to the “the temporal form of our inchoate, unfolding present” (180). Martin’s characterization of detective fiction in terms of the tension between the desire for understanding and the limits of knowability in the present helps us identify the essential problematics of U’s research project.

U’s introduction prefigures two of his guiding beliefs that function as foundational premises for the Great Report. The first is his vague notion that a transformative kind of knowledge is looming, seemingly just beyond reach. The second is an intuition that even though this knowledge seems unreachable, it is in fact accessible, if the technological conditions are just right.

## **The Fantasy of an Unmediated Perspective in the Information Age**

This section examines the methods U adopts in hope that from a critical distance, he will have a broad perspective from which he might discern subtle patterns in the social matrix. Indeed, U finds the idea that there are fundamental structures and logics of society extremely alluring; it is unsurprising then that U pursues an elevated perspective from which these structures may become visible. Equally important to U's search for a vantage point by which he might see the present clearly are the explanatory models he develops to make sense of his observations. Therefore, I aim to show how U's search for knowledge involves to both a misguided—if not naive—search for an unmediated perspective and reductive models that interpret human behavior in terms of algorithms and computational mechanisms.

U craves an unmediated perspective. He recognizes that this desire is rooted within major strands of the discipline of anthropology: “The ‘purity’ [anthropologists] crave is no more than a state in which all frames of comprehension, of interpretation and analysis, are lacking” (20). Although U recounts that his single major academic publication explored the inescapability of the frames of comprehension, mediation, or subjectivity that stands between the observer and the observed, he does not immediately apply this understanding to his research on the Great Report.

Describing the specific methods of a corporate anthropologist, U asserts that

It's about identifying and probing granular, mechanical behaviours, extrapolating from a sample batch of these a set of blueprints, tailored according to each brief—blueprints which, taken as a whole and cross-mapped onto the findings of more “objective” or empirical studies (quantitative analysis, econometric modeling and the like), lay bare some kind of inner social logic, which can be harnessed, put to use. (23)

U characterizes human behavior as reducible to “granular, mechanical behaviours” by the anthropologist's discerning eye. According to U, these observations fit neatly into batches of

blueprints that can eventually reveal the logical system underlying human social life. In this model, human behavior has to be subdivided and abstracted into algorithmic components before it may reveal a yet more fundamental logic of society. The two presumptions of this claim are that a fundamental logic of society exists in the first place and that it can only be known by reducing or abstracting human behavior into an algorithm. Furthermore, this kind of data collection about human behavior already anticipates the desired conclusion because the unproven belief in this logic pattern asserts itself on the scientific process that is designed to reveal the pattern. If the model presupposes this kind of algorithmic human behavior in order to search for a totalizing social logic, then then the model is already biased toward that conclusion. In other words, the scientific process in pursuit of objectivity is subjective from the very start.

In *Objectivity*, Lorraine Daston and Peter Galison trace the history of the eponymous term.<sup>33</sup> Moreover, by examining scientific atlases, they illuminate the broad range of “epistemic virtues” to which scientific communities have subscribed to throughout the last few centuries.<sup>34</sup> Daston and Galison emphasize that the habits of scientists, such as keeping a lab notebook, grid-guided drawing, or passive observation, cultivate a “scientific self” in the same way that other selves emerge out of other practices like meditation, prayer, or physical exercise (38-39). Daston and Galison bring attention to the fact that because knowledge requires a knower, it is important to understand how the attitudes and methods of a knower constrain and enable their ability to acquire various forms of knowledge (40). They explain:

Epistemic virtues are virtues properly so-called: they are norms that are internalized and enforced by appeal to ethical values, as well as pragmatic efficacy in securing knowledge . . . Epistemic virtues earn their right to be called virtues by molding the self, and the ways they do so parallel and overlap with the

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<sup>33</sup> According to Daston and Galison, the terms and concepts of “objectivity” and “subjectivity” find their first usages that relate to their modern definitions in the work of Immanuel Kant around 1850 (30).

<sup>34</sup> For centuries, scientific atlases “set the standards of a science in word, image, and deed—how to describe, how to depict, how to see” (Daston and Galison 26).

ways epistemology is translated into science. (40-41)

According to Daston and Galison, as different strategies or habits become well-regarded in scientific research communities, individual scientists aspire to these standards at both professional and deeply personal levels. In this way, the practices are about much more than their pragmatic utility—they are the highest standards of the community. Furthermore, a scientific community's relationship to the knowledge it pursues is dependent on an unending negotiation about which methods and habits are best.

According to Daston and Galison, there have been three dominant codes of epistemic virtue since the eighteenth century: truth-to-nature, mechanical objectivity, and trained judgment. The ethos of the truth-to-nature approach is evident in eighteenth-century drawings by naturalists, which aimed to depict “the idea in the observation, not the raw observation itself” (73). These scientist-artists sought to attune themselves to the essential aspects of the phenomena—to elicit the universal spirit of nature from the particular, imperfect specimens they observed. The belief that human imagination was key to drawing out essential aspects of nature concealed in part by the immediate face of nature explains why these naturalists were not merely observers: “The eyes of both body and mind converged to discover a reality otherwise hidden to each alone” (58).

Mechanical objectivity rebuffs the subjectivity of the truth-to-nature approach. Indeed, the new concept of objectivity corresponds to a desire to expel the human hand from the science through mechanical processes.<sup>35</sup> “Objectivity,” Daston and Galison assert, “was a desire, a passionate commitment to suppress the will, a drive to let the visible world emerge on the page without intervention” (143). Appearing in scientific atlases first in the 1840s and

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<sup>35</sup> These mechanical processes could also be described as algorithms, provided that the algorithms minimize human intervention.



overwhelmingly by the 1880s and 1890s, objectivity is inseparable from the invention of photography, which at the time supposedly freed the observer from “the inner temptation to theorize, anthropomorphize, beautify, or interpret nature” (139). However, the scientist’s ascetic rejection of any roles such as editor, selector, or curator of the mechanically produced image(s) introduces a gap between the scientific process and knowledge. Daston and Galison highlight this consequence of mechanical objectivity in the common decisions of atlas makers—dogged in their commitment to let unedited images speak for themselves—to distance their atlases from interpretation. That was left to the reader. Daston and Galison’s final major scientific code, trained judgment, responds to mechanical objectivity in the twentieth century. Trained judgment relies on the expert to highlight the salient information that may not be emphasized in an approach committed to mechanical objectivity (311).

Although it is not included as a major code of epistemic virtues in the history of modern scientific methodology, Daston and Galison devote a chapter to the concept of structural objectivity as an important set of epistemic virtues especially popular around the early to mid-twentieth century. Structural objectivity was committed to form, not image. This scientific movement retreated to what it sensed to lie behind the surface of things captured in the image (257). The proponents of structural objectivity, many of whom were the mathematicians and early computer scientists like Von Neumann preparing the way for the modern computer, had a growing suspicion that because the appearance of things was always contingent on some subjective observer, objectivity must lie elsewhere, in some deeper fold of reality. Daston and Galison provide a summary of this ethos:

The objective was not what could be sensed or intuited, for sensations and intuitions could be shown to differ, and in ways that were incorrigibly private for each person. Nor was it the bare face of facts, scrubbed free of any theoretical interpretation, for today’s facts might be cast in a wholly different light by

tomorrow's findings. Objectivity, according to the structuralists, was not about sensation or even about things: it had nothing to do with images, made or mental. It is about enduring structural relationships that survived mathematical transformations, scientific revolutions, shifts of linguistic perspective, cultural diversity, psychological evolution, the vagaries of history, and the quirks of individual physiology. (259)

This fascination with structural relationships persisting amid the flux of appearances finds resonances in U's research project. This ethos manifests in U's belief in an "inner social logic" and in later formulations such as "world-shape" and "era-mold" (76). But other aspects of U's research methodology—his willingness to let his intuitions guide him and his tendency to reduce phenomena to mechanistic descriptions to name just two examples—suggest that U does not neatly fall into one of Daston and Galison's categories. The fact that the ethos of U's project spans this history does not contradict Daston and Galison because they emphasize that these different codes of epistemic virtues are not mutually exclusive. Rather, such codes contribute to a "repertoire of possible forms of knowing" (113). U haphazard methodology does not come as a surprise: he does not have a traditional, definitive scientific atlas to turn to study his topic, the present. U's atlas is the Internet, in all its enormity and incoherency as a text.

U's research methods are a mixture of principles that have emerged and declined in popularity throughout the history of objectivity. Despite U's tendency to view humans as mechanical parts in some social machine, his research does not subscribe to self-effacement in pursuit of objectivity that Daston and Galison associate with the history of mechanical objectivity. On the other hand, a premise of the Great Report is that if it succeeds, it will be to U's credit, for only a singular genius could be capable of curating the data of the present into the univocal "First and Last Word on our age." Furthermore, U's personal investment and expertise in the project has at least some resonances with the epistemic virtues of truth-to-nature and trained judgment, respectively. Finally, U's preoccupation with transcending mediation echoes

the desire of the structuralists to make claims to knowledge that are free from the arbitrariness of mediated experience. He shares with the structuralists the sense that the ostensible incoherence of the present is a screen that obscures more coherent formal structures. U's alignment with the epistemic virtues of the structuralists suggests that his attraction to computation-centric forms of knowledge production is part of a long-running dialogue about the potential of computation, as well as the objectivity of knowledge garnered from it.

In *The Cultural Logic of Computation*, David Golumbia critically examines the belief that a formal logic underlies human thought and behavior. His book considers the ways that the language and concepts of computers and computation in general influence our ideas about how much of the human mind and social life is fully knowable. He begins with a historical and philosophical review of computationalism, which in its original formulation in philosophy “is the view that not just human minds are computers but that *mind itself* must be a computer—that our notion of intellect is, at bottom, identical with abstract computation” (7). For Golumbia, computational processes describe more than the forms of computation associated with modern computers; they are the perfect expression of rationalism—“the old belief system—that *rational calculation* might account for every part of the material world” (1). Golumbia broadens the classical definition of computationalism for his purposes: he defines it as a particular ethos, “a commitment to the view that a great deal, perhaps all, of human and social experience can be explained via computational processes” (8). By using the word “commitment,” Golumbia implies that computationalism is sure of itself, that the presumption about the essential role of computation in human thought is the lens through which it sees the world—not the result it has to prove.

Columbia's broadly construed version of computationalism resonates with U's research methodology, which first presumes an "inner social logic" and then abstracts human behavior into "granular, mechanical behaviours" that fits more neatly into a totalizing logical system. Columbia would call this a computational bias, "a gut feeling or intuition that computation as a process must be at the bottom of human and sometimes cultural affairs, *prior to the study of compelling evidence that such a thesis might be correct*" (106). In Columbia's view, the ways of knowing the world are severely limited and predetermined by ethos of computationalism, which tends to interpret the world within its self-perpetuating framework, or self-fulfilling prophecy, about the centrality of computation to the world.

As U attempt to gain perspective on the contemporary moment—to see the "whatever-it-is" just beyond his reach—he increasingly models humans as simple mechanistic components in a complex structure that U sees from above. U dreams about the Company's Koob-Sassen Project, the vaguely defined project in which Peyman hopes U's Great Report will play a decisive role:

Below them, hordes of people—thousands, tens of thousands—labored, moving around like ants, their circuits forming patterns on the sand; patterns that, in their amalgam, coalesced into one larger, more coherent pattern, just as the meandering, bowing, divagating stretches of a river delta do when seen from high enough above. What were they doing, all these ant-like labourers? Why, they were bringing in materials, or carrying out excavated soil, or delivering instructions they themselves, perhaps, did not quite understand, nor even, fully, did the person to whom they were relaying them, so complex was the logic governing the Project as a whole—instructions, though, whose serial execution, even if full comprehension was beyond the scope of any single point in the command-chain, had the effect of moving the whole intricate scheme towards its glorious realization, at which point all would become clear, to everyone, and ants would see as gods. (68-69)

U is fascinated by the "circuits," "patterns," or "logic" of the choreography of the "ant-like labourers." Even though the significance of their actions is opaque to themselves, they are part of an "intricate scheme" that rings with the promise of revelation. Although U has a sense that all of

the ants would soon have the perspective of gods, they remain ants with a flattened view and endless labor as they wait for their transcendence. In U's dream, however, he has an aerial, ostensibly objective view of the ants beneath him. Golumbia considers this kind of perspective, along with its fraught ethical problems, characteristic of computationalism. "The true power relation to the computer," he writes, "involves the raw distillation of information to a point, the ability to get a birds-eye-view (or a God's-eye-view), especially if one is in the bird's seat" (198). U's dream demonstrates how his focus on mechanism, protocols, and algorithms in human behavior produces hierarchy that favors the observer, the one who stands above as a sovereign.

Nathan K. Hensley suggests that drone vision is useful for understanding the panoramic point of view that U desires. Beyond recognizing drones as a key technology of modern warfare, Hensley suggests that the existence of drones, and their model of perception, reveal the desperation and inherent violence in contemporary empires' strategies of surveillance and control. Hensley writes that drones are "at once a symptom and a realization of the empire's end. But they are also a regime of figuration, a way of seeing and, therefore, a modality of thought" (229). Moreover, in his essay on drone vision in McCarthy's novels, Nathan K. Hensley argues that U's Great Report "seeks the total knowledge or perfect social anthropology that drone surveillance too holds out as its aspirational conclusion or *telos*" (244). U's goal of achieving a definitive view on the contemporary moment shares with the function of military drones the incorrect belief that the kind of knowledge that is made possible in these top-down (aerial), reductive perspectival arrangements are at all sufficient, complete, or objective.

Indeed, despite his elevated view in the dream, U struggles to interpret the scene beneath him. He cannot detect the revelatory patterns that he believes are latent in the collective ant-like behavior of the humans. His desire to understand, or at least achieve a broad enough view of the

complexity of the present, is constantly frustrated by his entanglement within its systems; he is unable to separate himself to gain the critical distance to see things more clearly. I would argue that this aerial view is in itself a fantasy of escaping mediation and finding a clearer vantage point. In a later formulation, U shifts his perspective on society from above—the detached God’s eye view—to within the social matrix. Specifically, he envisions the special role anthropologists and ethnographers will perform to somehow trigger an epistemic revelation—to unleash the coming “whatever-it-is”:

I tried to picture cells, “chapters” of new-ethnographic agents, like you get with biker-gangs and spies, each of them primed, initiated, privy to a set of protocols and gestures, that a tacit call to order might activate, and re-activate time and again . . . And then the rituals and ceremonies that ensued—might *that* be the Report . . . ? Would this new Order then, like a cult gestating in the catacombs of some great city it will one day come to dominate, pulsate and grow with each one of these covert iterations—until eventually, it might, yet, *fulgurate*: erupt, break cover, soar upwards and, in the light of full, unhindered proclamation, found its Church? (80)

The important perspectival shift between U’s dream and his notion of the new-ethnographic agents is from the unmediated God’s eye view outside the system to a mediated algorithmic protocols and gestures within the system. In contrast to the aerial, drone-like view his dream afforded him in the previous passage, U enters into the fray alongside his cohort of “new-ethnographic agents” here. Moreover, as he refines his algorithmic models of society, they increasingly rely on formalizable relations between abstract human actors. His new idea is that by strategically performing a certain algorithmic sequence of movements (which unsurprisingly U cannot describe), he and his fellow ethnographers will activate the latent revelation in society. This secular rite will elicit its own version of the second-coming, which, rather than being withheld in the realm of the divine, is already on earth, like a thunderbolt about to strike or bird about to take flight. U’s imaginary protocol is the key—the activation energy for a new earth, or at least a new religion.

I claim that in pondering the capacity for programmatic behavior within a system to transcend itself—to create a more global transformation from the actions of smaller, local components—U is unwittingly confronting the limits of computational methods. To make my case, I want to draw connections between U’s passage and a model in computer science that has historically been used to investigate the capacity for extremely simple computer programs to reveal fundamental principles and structures of computation itself. I have two aims in making this analogy: firstly, to explain the irreconcilability of U’s desire for totalizing knowledge with the fact that his perspective is inescapably mediated; secondly, to illuminate in another way a set of beliefs that understand computation not only as powerful and pervasive, but as an essential structural dynamic of nature.

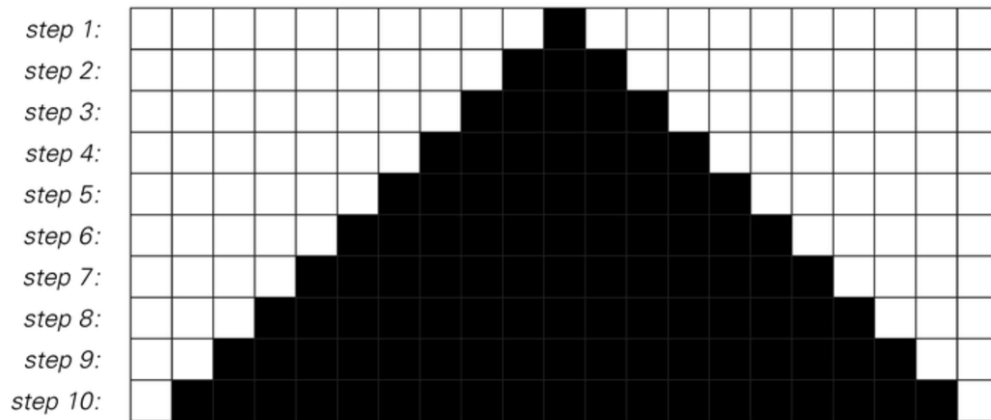
Computer science, among other engineering disciplines, share with U an appreciation for how, given the right relationships between them, simple components can give rise to impressive complexity. In fact, this is a fundamental tenet of designing computer systems. In the 1980s, the results of an experiment led computer scientist Stephen Wolfram to adopt a decades-long research program to understand how simple rules can lead to surprising complexity.<sup>36</sup> Wolfram was working with a model called cellular automata, which are “simple mathematical idealizations of natural systems” (“Cellular” 4). Wolfram was fascinated by cellular automata because he thought they had the potential to “capture the essence” of the “generation of complexity” (3)—to illuminate computation’s role as an essential organizing process that explains the emergence of complexity in nature. For Wolfram, the patterns he began to see in his

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<sup>36</sup> Born in 1959, Wolfram was tremendously successful in his early academic work. He earned a PhD in theoretical physics from the California Institute of Technology at the age of twenty and became the youngest recipient of the MacArthur Fellowship in 1981 (“About”). Although Wolfram’s long-running work on Mathematica, a system for technical computing, is highly regarded, *A New Kind of Science* is a very controversial book. Some critics take issue with its lack of citations and bold claims.

models of cellular automata were all related, and his intuition that computation was the lens through which one might understand complexity in nature motivated a decades long research program resulting in an ambitious and controversial book called *A New Kind of Science*, published in 2002.

A cellular automaton is made up of a set of cells that hold a value, such as the binary digits zero or one. Experiments on cellular automata specify a transition function that takes as input the value of a given cell as well as the values of its neighboring cells and returns as output a new value for that cell. With a set of cells (each of which has an initial value) and the transition function, researchers can apply the transition function to each cell to observe how the cells' values change. If the transition function is successively applied to each cell, one can observe how the system evolves over time.

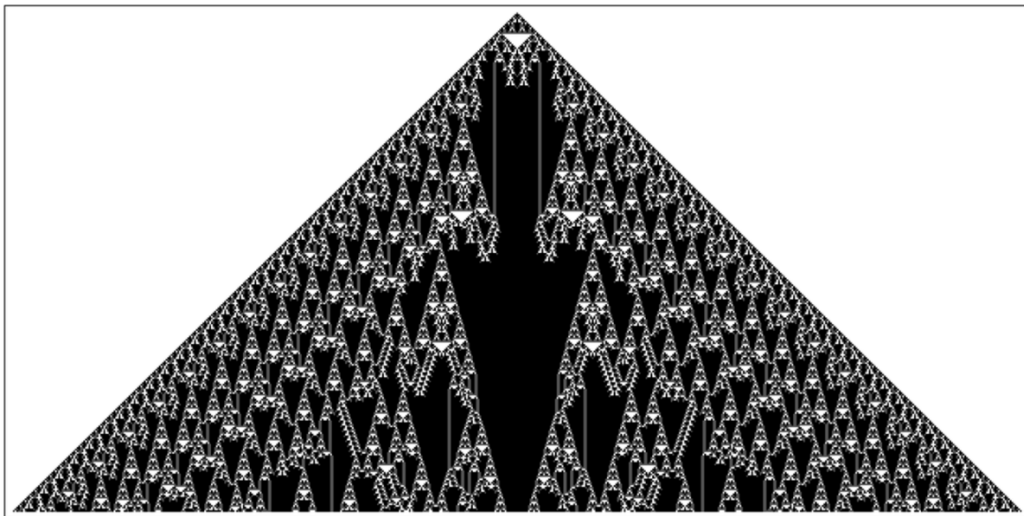


**Fig. 2.1** A basic cellular automaton (*A New 24*).

Fig. 2.1 shows a simple cellular automaton. The top row of cells (labeled “step 1”) is the initial state of the system: there are twenty-one cells, twenty of which have one value represented by a white square (i.e. 0) and the center square in the row has a value represented by a black square (i.e. 1). The rows of cells labeled by steps 2-10 are the same cells from step 1, but they show the state of the system after the transition function has been applied to all the cells in the row, two to



ten times, respectively. For example, once the transition function (which is not shown here because the specifics are unimportant to this discussion) has been applied to each cell in step 1, the results are appended beneath to show the state of the updated state of the system. By treating each successive step as a period of time, we can visualize how the transition function—merely a set of rules that describe how the value of a cell should change based on its current value and the values of the adjacent cells to the left and right—influences the system. Transition functions can implement rules that lead to more interesting patterns, as in Fig 2.2, and there are many other variations to the experimental setup such as starting with a two-dimensional grid of cells rather than a one-dimensional row or redefining a cell’s set of neighbors. Cellular automata have been used to model predator-prey dynamics, the spread of wildfires, self-segregation in housing preferences, and even the foraging patterns of ants.<sup>37</sup>



**Fig. 2.2** A cellular automaton that generates a more complex pattern (*A New* 66).

Two perspectival relationships—one local and one global—in cellular automata lend insight into U’s search for perspective in *Satin Island*. The local relationship is between a cell and its neighbors. We can think of U’s new-ethnographic agents as the cells in a cellular

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<sup>37</sup> See Watmough and Edelstein-Keshet’s visualizations of ant foraging with cellular automata. The visualizations of their models resonate with the God’s eye view U has over his “ant-like” humans.

automaton, and their “protocols” as implementing the transition function. In this case, the cells or agents are acting from within the system, and therefore their perspective has severe limitations. The second perspective—what I call the global perspective—is the privileged view outside the cellular automaton itself. It is the view the researcher has after the fact, once the experiment has finished and all of the steps are laid out on the page as in Figs. 2.1 and 2.2. This delineation helps draw out the incommensurability of U’s mediation—the fact that he and his agents can only ever be a cell within the dynamic system—and his desire for a God’s eye view from which he might recognize patterns that explain how the system works. If we analogize U’s agents to cells in the model, then the latent structures and patterns U intuitively corresponds to the structures that emerge in successive steps of a cellular automaton experiment. However, according to the formal constraints of a cellular automata, there is no outside viewer—the researcher has a critical distance from the closed system across space and time, from their aerial view that retrospectively stitches together an image of the system as it evolved over time. No component within the system can hope for such a global perspective—they are like the “ant-like” humans from U’s dream, blind to the overall choreography of the system.

Furthermore, the aerial, God’s eye view U enjoys in his dream is a fantasy: he is just another ant. The impossible dream gives U an unmediated view, much like our observations of cellular automata experiments. U’s passage about the new-ethnographic agents seems to recognize the impossibility, and instead resolves to act on the system from within. If even from the elevated perspective in his dream U cannot interpret the scene beneath him, then he and the new-ethnographic agents—in their more limited view—seem doomed to failure. How could they understand—let alone see—the pattern generated by their protocols?

U is not alone in perhaps overestimating the power of computational methods to lead to totalizing knowledge: Stephen Wolfram's *A New Kind of Science* advocates for the idea that computation is the underlying principle that begets complex natural phenomena. When Wolfram announces that he intends to "initiate another such [scientific] transformation," (*A New* 1), we may hear echoes some of the attitudes we have seen earlier in the epigraph of this chapter, Columbia's computationalism, and the proponents of structural objectivity described by Daston and Galison. For instance, his attraction to universal structures and his disinterest in particularity is evident in the opening pages of the book:

But in the world of simple programs I have discovered that the same basic forms of behavior occur over and over again almost independent of underlying details. And what this suggests is that there are quite universal principles that determine overall behavior and that can be expected to apply not only to simple programs but also to systems throughout the natural world and elsewhere. (5)

We can suspend judgment about much of Wolfram's work and still understand that his commitment to interpret nature in terms of universal principles of computation fit into a larger ethos that favors computation as the cornerstone and methodological means of knowledge production. When Wolfram writes that "all processes, whether they are produced by human effort or occur spontaneously in nature, can be viewed as computations" (715), he limits his vision and strongly influences the conclusions, or range of possibility, of his research.

### **The Consequences of Analogizing Computers to Humans**

Throughout the history of computing, researchers have conceptualized computation in terms of human thought, and, conversely, human thought in terms of computation. This section considers how the hazy beginnings of a scientific research program—in this case, work on the digital computer—expresses itself in language. I am interested in the ongoing negotiation between scientific precision and perhaps less precise concepts that promote scientific progress

and communication. My claim is that analogies between human cognition and computation were an imprecise but enabling fiction for researchers working on the computer.

Returning to my epigraph, the history of cellular automata begins in 1948, when John von Neumann gave a lecture titled “The General and Logical Theory of Automata.” The lecture is concerned with abstract machines called automata. In an article about the importance of Alan Turing’s theoretical work on automata later called Turing machines, Liesbeth De Mol emphasizes that Von Neumann, alongside contemporary pioneers in computer science like Alan Turing, was invested in determining the power of computation. Von Neumann summarizes the importance of Turing’s work on the Turing machine: “the important result of Turing’s is that in this way the first machine can be caused to imitate the behavior of *any* other machine” (*Computer* 73). Indeed, the significance of Turing’s result is deeply related to probing the limits of computation. Turing proved that a certain kind a universal Turing machine can in theory emulate any other kind of Turing machine,<sup>38</sup> and this property of computation (as it is defined by a Turing machine) shows just how powerful computers (implementations of Turing machines) could be.

In his lecture, Von Neumann sketches a way in which a Turing machine could be designed to have properties characteristic of biological organisms such as analogous forms of self-reproduction. I want to look more closely at how Von Neumann’s characterizes the emerging relationship between the automata and other academic disciplines and humans more generally.

Automata have been playing a continuously increasing, and by now have attained a very considerable role in the natural sciences. This is a process that has been

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<sup>38</sup> A *universal* Turing machine describes a Turing machine that can provably emulate any other Turing machine. For our purposes, the importance of this distinction is that by proving that a universal Turing machine could exist, Alan Turing demonstrated how powerful and general his model of computation (which is implemented in modern computers) is.

going on for several decades. During the last part of this period automata have begun to invade certain parts of mathematics too . . . Natural organisms are, as a rule, much more complicated and subtle and therefore much less understood, than are artificial automata. Nevertheless, some regularities which we observe in the former may be quite instructive in our thinking and planning of the latter; and conversely, a good deal of our experiences and difficulties with our artificial automata can be to some extent projected on our interpretations of natural organisms. (“The General” 288-289)

The agency Von Neumann ascribes to the automata is striking. It is not the researchers who are positioning automata in the natural science or mathematics: the automata themselves are “playing” and “attain[ing]” roles and “invad[ing]” these disciplines. By ascribing agency to the automata and concealing the roles of the researchers and developers of the automata, Von Neumann exhibits an early example of the “belief in the power of computation” (Golumbia 2) familiar to us in the twenty-first century. Von Neumann recognizes the potential power of automata, and he seems sure that they will have a significant influence on the academy. However, the suggestion that the principles of automata will influence how academics approach their research in other domains raises the question of whether or not the academy will be remade in the image of the automata as a consequence of its development. Von Neumann indicates a desire to let research on natural organisms influence the development of automata, but he also suggests that the research experience with the admittedly simpler automata can be “projected on our interpretations of natural organisms.” If the simpler artificial systems have something to offer, then implicit to Von Neumann is a belief that certain properties of computation discovered through automata must lie within natural systems that by all other accounts do not operate according to this model of computation. Such an attitude prefigures U’s beliefs about structural patterns in human society, Golumbia’s notion of the bias of computationalism, and Wolfram’s hunches about the centrality of computation in natural systems.

Von Neumann's analogies between natural organisms and automata demonstrates the conceptual entanglements between the human and machine baked into the history of computers. He begins with the assertion that to compare artificial automata with humans, which at the surface present such great complexity, the first step is to subdivide the human into more manageable, comprehensible components. Only after understanding these components should one attempt to piece them back together in the proper relations, to develop a holistic understanding (289). I think it important to read Von Neumann generously here: the language that today might read as the hubris of Frankenstein is not far removed from revered engineering principles. In a sense, Von Neumann's bluntness about the open research question of how alike humans and computers are, and his ambition to answer it is perfectly reasonable science at his specific stage in the research program. On the other hand, it is possible that Neumann's fervor for automata has clouded his view of how embodied humans are not merely frames that host the same universal computation being built into computers.

Von Neumann's lecture struggles through a tension we have seen in U's methodology: the impossibility of starting research intended to be objective without undermining its validity with subjective presumptions about what the results of the research will turn out to be. In U's case, he presumes that there is a looming revelation, and this exerts significant influence over how he collects, interprets, and evaluates data. Von Neumann is painfully aware of his simplifying assumptions, but his hesitation to misrepresent the problem does not overpower his commitment to discovering the power of computation. He appeals to his audience

The living organisms are very complex—part digital and part analogy [analog] mechanisms. The computing machines, at least in their recent forms to which I am referring in this discussion, are purely digital. Thus I must ask you to accept this oversimplification of the system. Although I am well aware of the analogy component in living organisms, and it would be absurd to deny their importance, I shall nevertheless, for the sake of the simpler discussion, disregard that part. I

shall consider the living organisms as if they were purely digital automata. (297) In a panel discussion after the lecture, Warren McCulloch, who created a computational model of neural networks with Walter Pitts in 1943,<sup>39</sup> shares a similar sentiment: “As I see it what we need is first and foremost not a correct theory, but some theory to start from” (319). In both of these statements, the presumed necessity of advancing the research and its bias for action overwhelms any concerns that important considerations are being lost in the enabling simplifications and abstractions of the research. Von Neumann explains the definitions of digital and analog number representation,<sup>40</sup> as well as how he maps these concepts onto human cognition,<sup>41</sup> elsewhere. In the lecture on automata, Von Neumann considers it absurd to deny the importance of the non-digital aspects of living organisms, but he “nevertheless” can only approach the problem if the analog features of organisms are neglected, at least for the time being.

Having recognized (and promptly set aside) the concern that humans are not digital creatures, Von Neumann analogizes the humans to the machine and the machine to the human. He writes, “The basic switching organs of the living organisms, at least to the extent to which we are considering them here, are the neurons. The basic switching organs of the recent types of computing are vacuum tubes” (299). Although Von Neumann has carefully identified the abstraction unifying the neuron and the vacuum tube to be the concept of an all-or-nothing, binary mechanism, his analogy attempts to entangle the human and computer parts directly. If

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<sup>39</sup> See McCulloch and Pitt’s “A Logical Calculus of the Ideas Immanent in Nervous Activity.”

<sup>40</sup> In the *Computer and the Brain* manuscript for lecture to be given later in the year of his death, Von Neumann explains his definitions for two classes of number representation: digital and analog. “In an analog machine,” he writes, “each number is represented by a suitable physical quantity, whose values, measured in some pre-assigned unit, is equal to the number in question” (3). Furthermore, “In a decimal digital machine each number is represented in the same way as in conventional writing or printing, i.e. as a sequence of decimal digits. Each decimal digit, in turn, is represented by a system of ‘markers’” (6).

<sup>41</sup> To apply his terms to the human nervous system, he suggests that “the nervous pulses can clearly be viewed as (two-valued) markers, in the sense discussed previously: the absence of a pulse then represents one value (say, the binary digit 0), and the presence of one represents the other (say, the binary digit 1)” (*Computer* 43).

Von Neumann was committed to making this comparison without entangling humans and computers more than necessary, then he could have referred to the binary mechanism of the human and the binary mechanism of the computer separately. The important point here is that instead of associating the neuron and switch with the abstraction of a binary mechanism, he associates them with each other. Consciously or unconsciously, Von Neumann's lecture begins to intertwine the fate of the computer and the human. If Von Neumann's lecture is an omen of both the dramatic increase of the presence of computers in our lives as well as the merging of human and computers in language, then Golumbia sees it from the future when he writes that "Mass computerization is part of a complex world-historical politics in which reciprocal desires to see the world as computable and to see computer technology as an ultimate achievement of modernity walk hand-in-hand" (155).

As his health declined in the final year of his life, 1957, Von Neumann had been preparing a series of lectures to be given at Yale University. Von Neumann died before he could present the lectures, titled *Computer and the Brain*, but we are left with a draft of his accompanying manuscript. *Computer and the Brain* is remarkable for the measured tone that accompanies the radical ambitions that Von Neumann had pursued throughout his life. The lectures are committed to comparing the human brain to computers in a similar fashion to that of 1948 lecture on automata, but his conclusion distinguishes human cognition from computation more dramatically. Von Neumann explains the greater cognitive range of humans in comparison to computers. He concludes

When we talk mathematics, we may be discussing a *secondary* language, built on the *primary* language truly used by the central nervous system. Thus the outward forms of our mathematics are not absolutely relevant from the point of view of evaluating what the mathematical or logical language *truly* used by the central nervous system is. (82)



In this passage, “mathematics” refers broadly to the forms of knowledge representation that computers—and computation more generally—operate on. Here, Von Neumann suggests that in the same way a universal Turing machine can emulate any specific Turing machine, the human brain can emulate computation. Von Neumann’s claim stems from his empirical understanding that knowledge representation in the brain is more complex and subtle than the digital forms of knowledge representation in computers. Crucially, Von Neumann concludes that human cognition is more capacious than computation—or, in other words, that computation is only part of a larger whole that describes how humans think. While this careful distinction does not undermine or contradict Von Neumann’s research program, it marks an important conclusion that Von Neumann arrives at the end of a decades long linguistic blurring of border between man and machine. I would argue that the ontological fog that gathers between the time of the question (Can computers think like humans?) and the answer (no) lingers.

### **Faith in Data**

In *Satin Island*, the indefinite search for a revelation that never quite arrives engenders its own transformations. We saw in an earlier section how U’s obsession with hidden structures and patterns at the deepest layer of society influenced his research methods. In this final section I argue that the same presumptions influence U in other ways that recall the novel’s technomystical beginnings.

Excepting the analogy to Yeats’s beast in “The Second Coming,” I have neglected the religious language that U invokes when describing the cusp of breakthrough and discovery. After all, the end goal of the cadre of new-ethnographic agents, whom he hopes will transform the societal order and found “its Church.” In moments when, sitting in front of his computer at the

office, the video pauses and the buffering symbol spins, he contemplates the source and transmission of data through the network. For U, data is divine:

The buffering didn't bother me, though; I'd spend long stretches staring at the little spinning circle on my screen, losing myself in it. Behind it, I pictured hordes of bits and bytes and megabytes, all beavering away to get the requisite data to me; behind them, I pictured a giant *über*-server, housed somewhere in Finland or Nevada or Uzbekistan: stacks of memory banks, satellite dishes sprouting all around them, pumping out information non-stop, more of it than any single person would need in their lifetime, pumping it all my way in an endless, unconditional and grace-conferring act of generosity. *Datum est*: it is given. It was this gift, I told myself, this bottomless and inexhaustible torrent of giving, that made the circle spin: the data itself, its pure, unfiltered content as it rushed into my system, which, in turn, whirred into streamlined action as it started to reorganize it into legible form. The thought was almost sublimely reassuring. (73)

This is a dramatic depiction of the transmission of Internet data packets from their origin in massive datacenters, through the network, to their destination, U's computer. The buffering signifies the congestion in the network that prevents the buffer—the memory—in U's computer from filling with sufficient data to stream whatever video he is trying to watch. Although buffering is a sign of the limitations or constraints of these technologies, U sees the buffering symbol as the opposite—the infinite abundance of data. U registers his receipt of data from the network as a divine gift of grace. Although the buffering brings attention to the technological infrastructures and protocols mediating U's experience, U does not characterize this mediation as obscuring or inhibiting his search for objectivity, but rather as welcome influence of the divine, the server, the source. U follows this worshipful meditation with a lingering anxiety that the buffering symbol is “just a circle”—that the data source has run dry or that his attachment to it has been severed. Furthermore, U perceives his Internet access as a tether to a paradoxically secular, data-giving deity.

While the domain of the divine is traditionally marked as qualitatively distinct from the domain of humankind, U's well-spring of data is metaphorically divine merely because of its

immense quantity of data. In other words, U transmutes the problem of human knowledge of the divine from a difference of kind to a difference of degree. As a consequence, U's concept of the unknowable is reduced to the realm of computation, and faith becomes trust in complex systems.

U considers the leap of faith of a skydiver whose parachute failed:

That final spur, the one that carried skydivers across the threshold, out into the abyss, was faith: faith that it all—the system, in its boundless and unquantifiable entirety—*worked*, that they'd be gathered up and saved. For this man, though, the victim, that system, its whole fabric, had unraveled. That, and not his death, was the catastrophe that had befallen him. (85)

Despite U's earlier formulation of the divine as quantifiable but practically inaccessible, he seems to counter this interpretation in his reference to the "unquantifiable" system on which the skydiver depends. One reading of this ostensible contradiction is that somewhere in the "entirety" of the system, there is a rupture that transposes the intractability of the theoretically solvable problem (proving that the parachute will work) into something not merely practically impossible, but theoretically impossible. I argue that this conflation of intractability with theoretical impossibility demonstrates the tendency of computationalism to perceive the world through its own eyes, to equate the knowable with computable. Nothing eludes computation, and the concept of unquantifiability is lost.

U considers the temporal dynamic of video streaming as a fitting analogy for human thought. He writes

We require experience to stay ahead, if only by a nose, of our consciousness of experience—if for no other reason that that the latter needs to make sense of the former, to (as Peyman would say) narrate it both to others and ourselves, and, for this purpose, has to be fed with a constant, unsorted supply of fresh sensations and events. But when the narrating cursor catches right up with the rendering one, when occurrences and situations don't replenish themselves quickly enough for the awareness they sustain, when, no matter how fast they regenerate, they're instantly devoured by a mouth too voracious to let anything gather or accrue unconsumed before it, then we find ourselves jammed, stuck in limbo: we can enjoy *neither* experience *nor* consciousness of it. (74-75)

U suggests that people are constantly narrating their own lives, generating stories and structure for themselves and others. This impulse to transform information into meaning is so “voracious” that it constantly catches up with the present in the same way the icon on a video stream advances into the region of buffered data as the video plays. This is a reformulation of the characteristic problem of the contemporary described by Martin and Rabinow: making sense of the present without the critical or temporal distance that affords perspective. Furthermore, U associates buffering—the period in which the video pauses until enough data is buffered to resume the video—with a kind of “limbo” of consciousness. U claims that when our self-narrations converge upon the present, any notion of unfiltered experience is lost, and we run out of the raw materials of experience we need to satisfy our hunger for coherence in the form of stories about ourselves.

The religiosity U associates with data and his formulation of human thought in terms of computer network protocols demonstrates the tendency for information technology to reconstruct domains of human experience in its own image. In *Satin Island*, the proliferation and spread of computational technologies occurs not only in the infrastructural scaffolding of the modern world—its datacenters, networks, oil rigs, transit systems, etc—but also into the very conception of what distinguishes divine and human thought.

This chapter has illuminated an ethos supporting the rise of computation in the short history of the computer, as well as the problem of making sense of the present without the benefit of historical perspective. *Satin Island* confronts the difficulty of understanding the present and the centrality of computation in contemporary conceptions of knowledge. The novel entertains and ultimately undermines the alluring fantasy that computational methods can afford

an unmediated perspective. In so doing, it certainly problematizes the status of knowledge in our computational world—but not without luxuriating in it.

## IV. Conclusion

### Qualifying the Literary Enterprise of Computation

McCarthy's work compels us to examine the structures we trust to secure knowledge. My claim has been that McCarthy's novels draw attention to their own searches for knowledge mediated by language and the book. Their narrative styles self-consciously exhibit their creation of meaning. In so doing, they invite us to wrestle with the tensions between forms of knowledge and their mediation not merely in the novel, but in other contexts as well, namely computational culture.

This is crucial work for our time. Our era is marked by its reliance on computer applications, databases, and networks. Our relationships with knowledge are mediated by computational forms of search, from navigation applications to Google Search to AI algorithms. Indeed, computation has accrued tremendous epistemological capital since the mid-twentieth century. At the same time, computation is inseparable from a history that has repeatedly overestimated its generalizability and ubiquity in nature.

Computational culture has narratological commitments to the centrality of computation in the world. According to McCarthy, code *is* narratological: "We are embedded amidst codes, which re-embed themselves in us, refreshing every day and every second. They imply drives and propulsions; they anticipate and produce certain outcomes" (*Empty* 28). In this formulation, the desires and events engendered by scripts of computer code can be illuminated by literary (and specifically, narrative) forms originating in Greek tragedy. However, key for McCarthy is that while the Greeks presumed the gods authored their fates, we implicitly understand that code determines many of our lives' outcomes: "We don't have gods anymore; just algorithms, reading and re-writing one another, hiding from, or maybe in, the light-source, plotting" (28). On the

surface, this notion of algorithmic “plotting” refers to the formal mechanisms of narrative that shape and reveal story, but it also elicits anxieties that some of these algorithmic plots may be diabolical machinations. Two decades into the twenty-first century, we have created a new community of inscription: computational systems whose databases, networks, and applications are reading and writing for themselves. As their relative power and autonomy increases, we should ask ourselves what stories are made possible in these media, and, crucially, which stories may be left untold, unimagined. This is why I think it is crucial to understand computational technologies in literary terms. In a period that turns to the datacenter, network, and computation to archive, transmit, and generate knowledge, respectively, computer systems have become the opaque site of an immense literary enterprise.

Furthermore, it is crucial to delineate novelistic conceptions of narrative from alternative conceptions, such as those that supported the rise of the computer and those utilized by corporations to gain control over the market. Certainly, McCarthy’s novels and Von Neumann’s research on the modern computer demonstrate how fictions create and lend access to knowledge. These narratives do more than provide a perspective on the state of the world: they exert tremendous control on its future and the avenues through which we might understand it. In keeping with this thesis, searches for knowledge in the novel and computational technologies never arrive at some unitary site or discovery of knowledge; rather, knowledge is generated in the process—the methodology—of the search itself.

Moreover, the act of searching influences the medium in which the search takes place. McCarthy’s novels change the landscape of the contemporary novel, and Google Search changes the representation, storage, and accessibility of knowledge globally. In other words, search is more than navigation: it overlays, projects, constructs. Our world undergoes constant

reconfiguration on account of searches (rooted in desire to comprehend and control) for knowledge. McCarthy writes, “Knowledge is not a thing; it is an infrastructure of holding and delivering, of guarding and making available; the stacks” (*Empty* 25-26). McCarthy draws our attention to the fact that knowledge is always governed by systems that curate and distribute information. I might add to McCarthy’s characterization of knowledge that the library stack has arguably been overcome by another kind of stack: computer science’s name for the fundamental data structure of computer memory. Perhaps it is a truism to say that this stack—the type of queue used for memory allocation in the computer—mediates our culture’s searches for knowledge. Nonetheless, if, as this thesis has shown, the means toward knowledge is never separate from its end, then we must continually examine how our reliance on computation transforms our conceptions of knowledge. For all the benefits of computation, we sell ourselves short if we automatically turn to computation as the supreme avenue toward and guarantor of knowledge.

I believe the novel can sharpen our attentiveness to the subtlety of knowledge even as economic conditions in the twenty-first century favor computational forms of knowledge. Only by contemplating our technological mediation will we foster attention to how knowledge is changing in the world of the computer. McCarthy’s novels embrace this contingency of knowledge in narrative procedures that continually place their tenuous relationships with knowledge in flux. Narrative in these novels illuminates the human condition by reflecting on the impossibility of narrative cohesion and direct access to knowledge. In contrast, computational forms of narrative tend to function as tools for determinacy and total control. This distinction highlights the importance of McCarthy’s novels. They offer a fundamentally different



understanding of what is going on when we narrate, opening a crucial role for the novel today: to show how knowledge *is itself* literary.

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