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The Perspectival Limits of Computation: Researching the Present in *Satin Island*

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This paper examines a search for perspective amid globally networked computational systems that defy the individual's desire for complete access and understanding. It also illuminates how science invokes literary forms to conceive and explain new concepts. Concretely, the paper is oriented around Tom McCarthy's novel *Satin Island* and twentieth century computer scientist John Von Neumann's early research on the modern computer. In *Satin Island*, the narrator's search for an almost objective perspective or revelation runs up against the incomprehensibility of the information age. I consider two perspectives sought after by the narrator—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. 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 explain 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. 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.

> "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.[1] These simplifications simultaneously enable and constrain the computer: standardizing knowledge representation in computers accelerates research and development, but it also undermines the long-held desire that the 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

[1] While modern 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, 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 (2017) suggests that the challenge of making sense of the present has become an increasingly prevalent problematic since the mid-twentieth century. Neither Martin's nor my claim is that the modern computer is solely responsible for a preoccupation with interpreting the present;[2] 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. (p. 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" (p. 5).[3] In this passage, he

[2] 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*, 2017, p. 19).
[3] Martin relies on four negative theses to respond to potential misconceptions about his definition of the contemporary: "The contemporary is not a period;"

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 because it calls attention to itself and the critical methods we use to understand—or at least think about—the present.

We find another delineation of the contemporary as a singular and worthwhile concept in anthropologist Paul Rabinow's (2007) 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. (p. 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 what he calls the Great Report, the "First and Last Word on our age" (p. 61). When U initially asks for clarification on the Great Report, Peyman invokes a vague model of an 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

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"The contemporary is not contemporary;" "The contemporary is not historical;" and "The contemporary is not mere presentness" (*Contemporary Drift*, 2017, p. 2-5).

Book" (p. 61) that names nothing less that "what's taking place right now" (p. 63).[4]

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 (and unclosed tabs in his web browser).

Seventy years after Von Neumann's lecture, the computer is a familiar object to U, but the ubiquity of large-scale, globally distributed computing systems is new. U is frequently awed by the immense quantity of data shuffling between emergent "cloud" computing systems of the 2010s. However, in trying to understand this incoherent, overwhelming, data-dense present, U is constantly undermined by the limits of his perspective and the shortcomings of the computational methods he supposes will lead him to revelation. As much as he takes pleasure in the new information ecosystem of the twenty-first century, he struggles to synthesize its seemingly inexhaustible streams of new data into a coherent, complete theory of the present for his Great Report. His desire for an unmediated view of the present is continually foiled by the proliferation of opaque data.

Furthermore, through U's narrative, McCarthy raises questions about the epistemological limits of computation. I consider two perspectives sought after by the narrator—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. By compelling us to examine the computational processes and structures we trust to secure knowledge, *Satin Island* invites us to pay attention the tensions between forms of knowledge and their mediation—not merely in the novel, but also in computational cultures that turn to computation as the supreme avenue toward and guarantor of knowledge.

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[4] 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 (p. 191).

In this paper, 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 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

Underlying U's project is a set of implicit presumptions that motivates U's research on the present. U's fascination with the connections between knowledge, technology, and time helps explain U's sense that the 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 technological interfaces—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-pixellated 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. (p. 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's 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—in the novel.[5] In *Contemporary Drift*, Martin suggests that "from its inception, detective fiction has concerned itself with the question of what we can know about the world" (p. 95). In an earlier essay, Martin (2012) emphasizes 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. (p. 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

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[5] U compares his anticipation of a discovery with those of "hard-boiled novels" (McCarthy, 2015, p. 37).

affords perspective, etc. Martin (2017) 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" (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" (p. 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 both a misguided (if not naïve) 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" (p. 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. (p. 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, for 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 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 (2007) trace the history of the eponymous term.[6] 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.[7] 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 (p. 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 (p. 40). They explain:

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[6] 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 (p. 30).

[7] 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, L. & Galison, P., 2007, p. 26).

> 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 ways epistemology is translated into science. (p. 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" (p. 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" (p. 58).

Mechanical objectivity rebuffs the subjectivity of the truth-to-nature approach. Indeed, the new concept of objectivity corresponds to a desire to minimize human influence in scientific knowledge production through mechanical processes.[8] "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" (p. 143). Appearing in scientific atlases first in the 1840s and 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" (p. 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

[8] These mechanical processes could also be described as algorithms, provided that the algorithms minimize human intervention.

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. Furthermore, 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 (p. 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 (p. 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. (p. 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" (McCarthy, 2015, p. 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" (p. 113). U's haphazard methodology does not come as a surprise: he does not have a traditional, definitive scientific atlas to rely on for his research area, 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 hints that his attraction to computation-centric forms of knowledge production is part of a long-running discourse on the potential of computation, as well as the objectivity of knowledge garnered from it.

In *The Cultural Logic of Computation*, David Golumbia (2009) 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" (p. 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" (p. 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" (p. 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.

Golumbia'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. Golumbia 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*" (p. 106). In Golumbia'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. (McCarthy, 2015, p. 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" (p. 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 (2018) 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" (p. 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*" (p. 244). U's goal of achieving a definitive view on the contemporary moment shares with the function of military drones the epistemological limits of aerial, top-down reductive perspectival arrangements: they are not 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? (McCarthy, 2015, p. 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 very 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.[9] Wolfram (1983) was working with a model called cellular automata, which are "simple mathematical

[9] 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, his book *A New Kind of Science* is famously controversial. Some critics take issue with its lack of citations and bold claims.

idealizations of natural systems" (p. 4). Wolfram was fascinated by cellular automata because he thought they had the potential to "capture the essence" of the "generation of complexity" (p. 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 models of cellular automata were all related, and his intuition that computation was the lens through which one might understand complexity in nature motivated his 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.

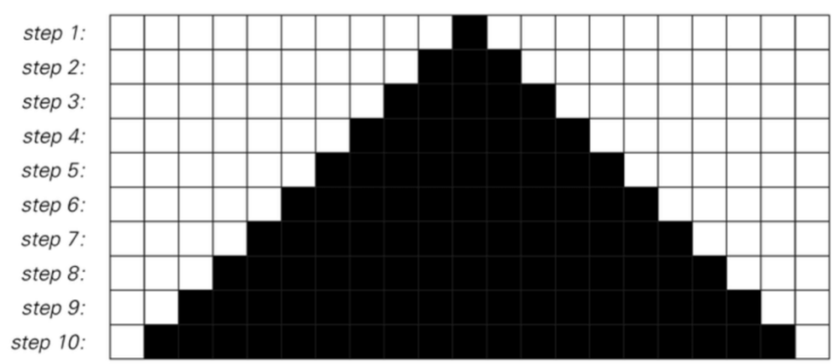

FIGURE 2.1. A basic cellular automaton (*A New* 24).

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 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.[10]

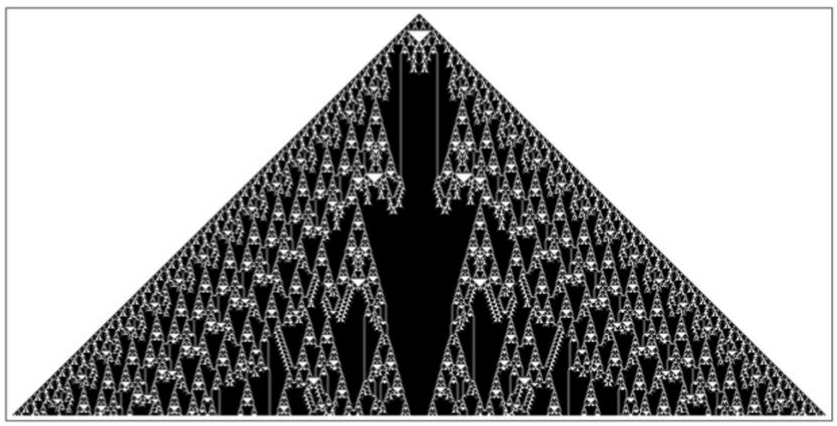

FIGURE 2.2. A cellular automaton that generates a more complex pattern (*A New* 66).

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 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 perspectives are locally constrained. 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

[10] See Watmough and Edelstein-Keshet's (1995) 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.

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 intuits correspond 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 (2002) announces that he intends to "initiate another such [scientific] transformation," (p. 1), we may hear echoes some of the attitudes we have seen earlier in the epigraph of this chapter, Golumbia'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. (p. 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" (p. 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 imprecise 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 (2018) 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*, 1958, p. 73). Indeed, the significance of Turing's result is deeply related to probing the limits of computation. Turing discovered that a certain kind of universal Turing machine 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 the how powerful and general his model of computation (which is implemented in modern computers) is—and, by extension, how powerful the modern computer could become.

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 (1948) lecture 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 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. (p. 288-289)

The agency Von Neumann ascribes to the automata is striking. It 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, 2009, p. 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 is whether or not the academy will be remade in the image of the automata as a consequence to 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 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 (2002) 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 (p. 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 (1948) 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. (p. 297)

In a panel discussion after the lecture, Warren McCulloch (1943), who created a computational model of neural networks with Walter Pitts in 1943,[11] 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" (p. 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,[12] as well as how he maps these concepts

[11] See McCulloch and Pitt's "A Logical Calculus of the Ideas Immanent in Nervous Activity."
[12] 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" (p. 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'" (p. 6).

onto human cognition,[13] 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” (p. 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 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” (p. 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

[13] 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*, 1958, p. 43).

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. (p. 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 similar way that a universal Turing machine can emulate any particular 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 decade-long linguistic blurring of the border between human 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, revelation is 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. (McCarthy, 2015, p. 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. (p. 85)

Despite U's earlier formulation of the divine as quantifiable but practically inaccessible, he seems to counter that interpretation in the above passage, 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 computational intractability of the problem (proving that the parachute will work) into the realm of undecidability. There is a subtle but crucial distinction between computational intractability and undecidability. An intractable problem is one that can provably be solved by a computer, but the resources (such as time and memory) needed to solve the problem are pragmatically unattainable. An undecidable problem is provably unsolvable by a computer with an arbitrary amount of resources. In a sense, the difference between intractability and undecidability is not a matter of degree, but of kind. I argue that this conflation of intractability and unquantifiability 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. (p. 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.

McCarthy's novel and Von Neumann's research on the modern computer demonstrate how literary forms enable and constrain 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. *Satin Island* 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.

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