Traumas of Code

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Language isn't what it used to be. In computer-mediated communication, including cell phone conversations, email, chat room dialogues, blogs, and all documents written on a computer, the language we learned at mother's knee is generated by computer code. Though computer-mediated language may appear to flow as effortlessly as speaking face-to-face or scribbling words on paper, complicated processes of encoding and decoding race up and down the computer's tower of languages as letters are coupled with programming commands, commands are compiled or interpreted, and source code is correlated with the object code of binary symbols, transformed in turn into voltage differences. Most of this code is inaccessible to most people. At the level of binary code, few are equipped to understand it with fluency, and even fewer can reverse engineer object code to arrive at the higher-level languages with which it correlates.[1] As a result, contemporary computer-mediated communication consists of two categories of dynamically interacting languages: so-called natural language, which is addressed to humans (and which I will accordingly call human-only language); and computer codes, which (although readable by some humans) can be executed only by intelligent machines.

The vast majority of the literate public who are not computer programmers becomes aware of this dynamic interaction through ordinary

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1. The immense difficulty of reverse engineering object code was the key factor in the Y2K crisis. Although the feared catastrophic failure did not materialize, attempts to correct the problem vividly demonstrated code's opacity.

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experiences. The easy flow of writing and reading human-only languages on computers, increasingly routine for the millions who populate cyberspace, is regularly interrupted by indications that unseen forces are interacting with the language flow, shaping, disrupting, redirecting it. I mistype a word, and my word processing program rearranges the letters. I think I am making the keystroke that will start a new paragraph and instead the previous paragraph disappears. I type a URL into the browser and am taken to a destination I do not expect. These familiar experiences make us aware that our conscious intentions do not entirely control how our language operates. Just as the unconscious surfaces through significant puns, slips, and metonymic splices, so the underlying code surfaces at those moments when the program makes decisions we have not consciously initiated. This phenomenon suggests the following analogy: as the unconscious is to the conscious, so computer code is to language. I will risk pushing the analogy even further; in our computationally intensive culture, code is the unconscious of language.

How literally should we take this aphorism, hovering somewhere between an analogy and a proposition? If we take it seriously as a proposition, a skeptic may object that code is easily read and understood, whereas the unconscious is inherently unknowable. Such an objection depends on a naïve notion of programming that supposes code is transparently obvious to anyone who knows the coding language. On the contrary, people who have spent serious time programming will testify that nothing is more difficult than to decipher code someone else has written and insufficiently documented; for that matter, code one writes oneself can also become mysterious when enough time has passed. Since large programs—say, Microsoft Word—are written by many programmers and portions of the code are recycled from one version to the next, no living person understands the programs in their totality. Indeed, the number of person-hours necessary to comprehend a large program suite such as Microsoft Office exceeds a working lifetime.[2] In

2. Robert Bach, vice president of Microsoft's Marketing Desktop Application division, reports that the company employed 750 people, working full-time for two years, to bring Office 97 to market; see "Office 97 Q and A with Robbie Bach," *Go Inside*, http://goinside.com/97/1/097qa.html. Assuming forty-hour weeks and fifty weeks per year, that amounts to 1.5 million

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the case of evolutionary algorithms where the code is not directly written by a human but evolves through variation and selection procedures carried out by a machine, the difficulty of understanding the code is so notorious as to be legendary. These examples demonstrate that in practice both code and the unconscious are opaque, although with code it is a matter of degree, whereas the opacity of the unconscious is assumed. Psychoanalysts position themselves as informed theorists and practitioners who can understand, at least partially, the workings of the unconscious; programmers constitute the group who can understand, at least partially, the workings of code.

A more cogent objection is articulated by Adrian Mackenzie in his groundbreaking study *Cutting Code*, where he considers code as the site of social negotiations that structure and organize human agency, behavior, and intention.[3] His book illustrates the advantages of *not* black-boxing code. This stance is a valuable option, and the rich insights in his work testify to the need for more studies of this kind. Nevertheless, the argument Mackenzie makes for the agency of code—one of his major points—can be appropriated for the case I am making here for code as the unconscious of language. With admirable clarity, he shows that code is not merely a neutral tool but an ordered system of cognitions making things happen in the world, both among humans who can (sometimes) understand the code and those who cannot. The agency of code underscores its similarity to the unconscious in producing effects even when it remains hidden under a linguistic surface.

A framework extending code's effects into the nonlinguistic realm is provided by Nigel Thrift's *technological unconscious*.[4] Thrift uses the term to reference the everyday habits initiated, regulated, and disciplined by multiple strata of technological devices and inventions, ranging from an artifact as ordinary as a wristwatch to the extensive and pervasive effects of the World Wide Web. Implicit in his argument is the idea that both the conscious and unconscious are influenced and shaped by the technological environments with which humans have surrounded themselves as far back as the domestication of fire. The argument suggests that the unconscious has a historical dimension, changing in relation to the artifactual environment

person-hours. To put this number in context, the average person puts in 80,000 person-hours at work during a lifetime. Of course, my argument is concerned with the amount of time necessary to understand the code, whereas the above figures indicate the time required to create and test the Microsoft product. Nevertheless, the comparison gives an idea of why no one person can comprehend a complex large program in its totality.

3. See Adrian Mackenzie, *Cutting Code: Software and Sociality* (New York, 2006).

4. See Nigel Thrift, "Remembering the Technological Unconscious by Foregrounding Knowledges of Position," *Environment and Planning D: Society and Space* 22, no. 1 (2004): 175–90.

with which it interacts. Thrift's vision resonates with recent arguments for thinking of cognition as something that, far from being limited to the neocortex, occurs throughout the body and stretches beyond body boundaries into the environment. Andy Clark and Edwin Hutchins, among others, see human thought as taking place within extended cognitive systems in which artifacts carry part of the cognitive load, operating in flexible configurations in which are embedded human thoughts, actions, and memories. For Hutchins, an anthropologist, an extended cognitive system can be as simple as a geometric compass, pencil, and paper.[5] It is not only a metaphor, he asserts, that drawing a line on a navigation chart constitutes remembering, and erasing it is forgetting. Clark carries the argument further to envision humans as natural-born cyborgs who have, since the dawn of the species, excelled in enrolling objects into their extended cognitive systems, from prehistoric cave paintings to the laptops, PDAs, and cell phones pervasive today.[6]

The shift from "thinking" to "cognizing" in this model is significant, for it blurs the boundary between conscious self-awareness and nonconscious processes. These include dreams (associated with the Freudian unconscious) as well as cognitions that occur in the limbic system, the central nervous system, and the viscera, which, as Antonio Damasio has argued, are integrally involved in feedback loops with the cortex and thus should legitimately be considered part of the human cognitive system.[7] The idea that the unconscious may be historically specific now appears considerably less contentious. If the dreaming part of cognition is seen in the context of an integrated system that includes, for example, the limbic system and its associated motor functions, it stands to reason that, as motor functions change in relation to a technologically enhanced environment, these changes would resonate through the entire cognitive system. Indeed, from this perspective the Freudian unconscious may appear as a fetishization that privileges the dreaming part of cognition as consciousness's shadowy other, while relegating to mere biological functions the rest of the extended cognitive system.

In view of the long association of the unconscious with dreams, I propose modifying Thrift's terminology to the *technological nonconscious*. The modification highlights a principal difference between humans and intelligent machines: humans have conscious self-awareness, and intelligent machines do not. Along with the capacity to feel emotions, self-awareness remains a distinctively biological characteristic. Nevertheless, contemporary computers

5. See Edwin Hutchins, *Cognition in the Wild* (Cambridge, Mass., 1996).

6. See Andy Clark, *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence* (Oxford, 2003).

7. See Antonio Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York, 2005).

perform cognitions of immense power, complexity, and sophistication. The technological nonconscious, impacting human cognition for millennia before the advent of the digital computer, now has a stronger cognitive component than ever before. Human cognition increasingly takes place within environments where human behavior is entrained by intelligent machines through such everyday activities as cursor movement and scrolling, interacting with computerized voice trees, talking and text messaging on cell phones, and searching the web to find whatever information is needed at the moment. As computation moves out of the desktop into the environment with embedded sensors, smart coatings on walls, fabrics, and appliances, and RFID (radio frequency ID) tags, the cognitive systems entraining human behavior become even more pervasive, flexible, and powerful in their effects on human conscious and nonconscious cognition. Thomas Whalen references this entrainment when he calls the World Wide Web the *cognisphere*, a term that can be expanded to include many different kinds of human-machine cognitions, including wired, wireless, and electromagnetic communications.[8]

Enmeshed within this flow of data, human behavior is increasingly integrated with the technological nonconscious through somatic responses, haptic feedback, gestural interactions, and a wide variety of other cognitive activities that are habitual and repetitive and that therefore fall below the threshold of conscious awareness. Mediating between these habits and the intelligent machines that entrain them are layers of code. Code, then, affects both linguistic and nonlinguistic human behavior. Just as code is at once a language system and an agent commanding the computer's performances, so it interacts with and influences human agency expressed somatically, implemented for example through habits and postures. Because of its cognitive power, code is uniquely suited to perform this mediating role across the entire spectrum of the extended human cognitive system. Through this multilayered addressing, code becomes a powerful resource through which new communication channels can be opened between conscious, unconscious, and nonconscious human cognitions.

Code and Trauma

A promising site for the possibility of new communication channels is trauma. In clinical accounts of trauma, such as those presented by Bessel van der Kolk and Onno van der Hart, trauma overwhelms the ability of a human to process it.[9] In this view, traumatic events are experienced and

8. See Thomas Whalen, "Data Navigation, Architectures of Knowledge," www.banffcentre.ca/bnmi/transcripts/living_architectures_thomas_whalen.pdf

9. See Bessel van der Kolk and Onno van der Hart, "The Intrusive Past: The Flexibility of Memory and the Engraving of Trauma," in *Trauma: Explorations in Memory*, ed. Cathy Caruth (Baltimore, 1995), pp. 158–82.

remembered in a qualitatively different way from ordinary experience. The characteristic symptoms of trauma—dissociation, flashbacks, reenactments, frighteningly vivid nightmares—suggest that traumatic memories are stored as sensorimotor experiences and strong emotions rather than as linguistic memory. Dissociated from language, trauma resists narrative. When traumatic events are brought into the linguistic realm, they are frequently divorced from appropriate affect. As Dominick LaCapra puts it, "Trauma brings about a dissociation of affect and representation: one disconcertingly feels what one cannot represent; one numbingly represents what one cannot feel."[10] Moreover, van der Kolk and van der Hart's research indicates that when people experience traumatic reenactments while sleeping, their brain waves differ significantly from those characteristic of REM dreams. In light of these results, he suggests that traumatic nightmares should not be considered dreams but a different kind of phenomenon; to recognize the distinction, I will call traumatic reenactments and related experiences that occur outside and apart from conscious awareness the traumatic aconscious.

Experienced consciously but remembered nonlinguistically, trauma has structural affinities with code. Like code, it is linked with narrative without itself being narrative. Like code, it is somewhere other than on the linguistic surface, while having power to influence that surface. Like code, it is intimately related to somatic states below the level of consciousness. These similarities suggest that code can become a conduit through which to understand, represent, and intervene in trauma. Code in this view acts as the conduit through which traumatic experience can pass from its repressed position in the traumatic aconscious to conscious expression, without being trapped within the involuntary reenactments and obsessive repetitions that typically constitute the acting out of traumatic experience.

This possibility was explored in the early days of virtual reality, through simulations designed to help people overcome such phobias as fear of heights, agoraphobia, and arachnophobia. The idea was to present a simulated experience through which the affected person could encounter the phobia at a distance, as it were, where fear remained at a tolerable level. As the person grew habituated and less fearful, the simulated experience was gradually intensified, with habituation occurring at each step. When the stimulus reached real-life levels and the person could tolerate it, the therapy was considered successful.[11]

10. Dominic LaCapra, *Writing History, Writing Trauma* (Baltimore, 2000), p. 57.

11. See, for example, the study conducted at the Human Interface Technology Laboratory at the University of Washington, Seattle, "VR Therapy for Spider Phobia," http://www.hitl.washington.edu/projects/exposure/. For a comprehensive list of publications on the subject, see the Delft University of Technology and the University of Amsterdam website on collaborative research at a number of universities, especially Charles van der Mast, "Virtual Reality and Phobias," http://graphics.tudelft.nl/~vrphobia/

Useful as these therapies may have been for particular phobias, they focused on a narrow range of traumatic experiences and used code in a purely practical way without deeper theoretical resonances. More interesting from a theoretical perspective are recent cultural productions that explore through fictional narratives the ways in which code can be appropriated as a resource to deal with trauma. Precisely because these are works of the imagination, they can shape their narratives to probe the deeper implications of what it means for code to entrain human behavior. They consequently have much to say about the ways in which the technological nonconscious operates with unprecedented cognitive power in conjunction with the performances of intelligent machines; they explore the implications of these enactments for the computational present and the even more computationally intensive future; and they meditate upon the ethical significance of enmeshing human agency within the optic fibers, data flows, and smart environments of the cognisphere.

To explore these interrogations of the role of code in the cultural Imaginary, I will focus on three works, each setting up a different relationship between trauma and code and each produced within a different medium. First, William Gibson's print novel *Pattern Recognition* represents a complex transmission pathway for trauma in which code plays a central role, by breaking the cycle of obsessive repetition and allowing the trauma to reach powerful artistic expression that can touch others and even initiate a process of healing.[12] *Pattern Recognition* makes extensive use of ekphrasis, the verbal representation of a visual representation, creating through its verbal art the representation of video segments released on the internet (and therefore mediated through code).[13] The footage, as the 135 segments are called by those who avidly seek them out, becomes a topic of intense interest and speculation for the online discussion site F:F:F (Fetish:Footage:Forum), leading to a confrontation with trauma staged on multiple levels. Second, Mamoru Oshii's film *Avalon* explores a different problematic, how code controls and delimits the space of representation.[14] Compared to the sensory richness and infinite diversity of reality, computer simulations are necessarily much more limited, typically evolving only within the parameters specified by the code. The film sets up a structural dichotomy between real life and the eponymous virtual reality war game Avalon. Death is the ultimate signifier separating the real world from the simulacrum, for in the game "reset" can be called and the game replayed. Code lacks the serious-

12. See William Gibson, *Pattern Recognition* (New York, 2003); hereafter abbreviated *PR*.

13. This definition and insight is offered in W. J. T. Mitchell, "Ekphrasis and the Other," *Picture Theory: Essays on Verbal and Visual Representation* (Chicago, 1994), p. 152.

14. See *Avalon*, DVD, dir. Mamoru Oshii (Miramax, 2001).

ness of real life because it provides only a simulacrum of death, not the thing itself. Paradoxically, the inability to experience the ultimate trauma becomes itself the presenting trauma of *Avalon*, a condition generated by and mediated through code. Finally, Jason Nelson's online fiction *Dreamaphage* takes this implication to its logical conclusion, presenting code as an infectious agent that inevitably leads to death.[15] The three works thus present a spectrum of possibilities, from code opening the way to overcoming trauma, to code becoming so ubiquitous it threatens the very idea of real life, and finally to code as a virus eating away at life from the inside. Their differences notwithstanding, all three works entwine code with trauma and explore code's ability to influence and entrain human conscious, unconscious, and nonconscious cognition.

The different thematic significations of code in these works correlate with how deeply code entered into the work's production, storage, and transmission. As a print novel, *Pattern Recognition* was produced by manipulating electronic files. Indeed, digital encoding has now become so essential to the commercial printing process that print should properly be considered as a specific output form of digital text. Code thus generated the text but was not necessarily involved in its transmission or storage. Code was also used in the production of *Avalon*, created through a combination of filming live actors, generating special effects through computer graphics, and using nondigital effects such as hand mattes. In contrast to the print novel, code was also involved in transmission and storage processes, especially in marketing the film as a DVD. For the online work *Dreamaphage*, code is obviously crucial in all phases of creation, storage, and transmission. As code enters more deeply into the production and dissemination of these works, they become more concerned about the adverse effects of code on the fabric of reality. Thematic anxiety about code within the text thus appears to be reflexively entwined with how deeply code was involved in the production of the work as an artistic object. The more the work depends on code, the more it tends to represent code as not merely involved with traumatic pathways but itself the cause of trauma.

At crucial points in the narratives, each work highlights a doubled articulation, as if acknowledging the double address of code to humans and intelligent machines. The specific configuration of the doubling serves as a metaphor for the work's exploration of the ethical significance of coupling code with trauma. In *Pattern Recognition*, the doubled articulation connects a physical wound with the representational space of the footage, suggesting that the transmission pathways opened by code can overcome dissociation

15. See Jason Nelson, *Dreamaphage*, http://www.heliozoa.com/dreamaphage/opening.html

by forging new associations between life and fiction. In *Avalon,* doubling blurs the boundary between life and simulation; rather than promoting healing, the interpenetration of life and code troubles the quotidian assumption that there can be life apart from code. In *Dreamaphage*, doubling takes the form of imagining a physical virus that is indistinguishable from viral computer code. Here the transmission pathway opened by code is figured as an epidemiological vector along which disease travels, with fatal results for human agency, consciousness, and life. The implication is that code is a virulent agent violently transforming the context for human life in a metamorphosis that is both dangerous and artistically liberating. Notwithstanding the different ways in which the encounter with code is imagined, the works concur in seeing code as a central component of a complex system in which intelligent machines interact with and influence conscious, unconscious, and nonconscious human behavior.

Pattern Recognition: Interpolating Code

"Only the wound, speaking wordlessly in the dark" (*PR*, p. 305). This is Cayce Pollard's thought when she finally succeeds in tracking down the maker, the artist responsible for the compelling segments of the footage. Cayce's search for the maker leads her to Nora and Stella Volkova, whose parents were killed by a bomb planted by the political enemies of their powerful and very wealthy uncle, Andrei Volkova. Nora was severely injured in the explosion when the triggering device of the Claymore mine was driven deep into her brain. As a result, Nora is unable to speak or focus on anything around her, but Stella notices that Nora seems to attend to a nearby screen. She has a computer and monitor installed by Nora's bedside, and Nora, a student filmmaker before her injury, begins creating the images that become the footage. The only times she is intellectually and spiritually present is when she works on the footage; otherwise she lapses into an unresponsive state that Stella describes by saying Nora is simply not "there." The footage, then, is both antidote and witness to the trauma Nora has suffered.

The breakthrough in Cayce's search comes when a group of Japanese footageheads discover that the images are watermarked. (Watermarking is a computational version of steganography, defined as hiding a message within another message.)[16] When decrypted, the hidden message depicts a T-shaped city map, presumably the city where the footage's action takes place. A pattern-matching program discovers, however, that the shape corresponds to no known urban geography; instead it is a perfect match with

16. For more information on steganography techniques and countermeasures, see Neil F. Johnson, Zoran Durig, and Sushi Jajodia, *Information Hiding: Steganography and Watermarking: Attacks and Countermeasures* (New York, 2000).

the Claymore mine trigger. In this complex entanglement of signifiers, the hidden message points in two directions at once: inward to the physical object that is the immediate cause of Nora's injury and outward to a representation that promises to link the footage with the world. This doubleness is mirrored by the footage's effects on trauma. It helps to give Nora's life focus if not meaning. It also has a profound effect on others, particularly Cayce, for whom it initiates a chain of events that helps her partially overcome her own traumatic symptoms.[17] The transmission pathways associated with the footage depend for their construction and dissemination on computer code. Without the mediating code, Nora could not create, others could not be affected by her creation, and the footage could not become the glue binding together the globally dispersed community participating in the F:F:F discussion site. Like the doubleness of the T-shaped map, this insistence on the mediating role of code is articulated twice over: once in the computer code that, when executed, creates the footage by making visual images and again in the steganographic message hidden within the executable code.

Although the footage segments are not numbered, many who follow their release believe they should be assembled to create a narrative, although in what order remains a matter of intense debate, as does whether they should constitute a narrative at all. The *articulated* narrative, of course, is the plot built around the ekphrasis that creates the footage through verbal representation. On this level too code plays a crucial mediating role. Cayce is able to make contact with Stella Volkova after she obtains her email address through a backdoor connection to the National Security Agency, the branch of the U.S. government charged with overseeing the encryption and decryption of code. Sitting in a London park at the foot of a statue of Peter Pan, Cayce enters a trancelike state in which she writes an email to an unknown addressee, whom she presumes to be the footage's maker: "We don't know what you're doing, or why. Parkaboy thinks you're dreaming. Dreaming for us. Sometimes he sounds as though he thinks you're dreaming us. . . . We become part of it. Hack into the system. Merge with it, deep enough that it, not you, begins to talk with us. . . . We may all seem to just be sitting there, staring at the screen, but really . . . [we are] out there, seeking, taking risks" (*PR*, p. 255). The passage hints at an unconscious connection between Cayce, her fellow footageheads, the wound-marked Nora, and the code that

17. See Caruth, *Unclaimed Experience: Trauma, Narrative, and History* (Baltimore, 1996), in which she comments on the infectious power of trauma. Even more eloquent is Shoshana Felman's account of the devastating effects that reading about trauma and listening to interviews with Holocaust survivors had on the members of her graduate class; see Felman, "Education and Crisis, or the Vicissitudes of Teaching," in *Trauma*, pp. 13–60.

mediates their connection to "the system" with which they merge on conscious, unconscious, and nonconscious levels. The connection remains latent until Cayce, still in a trancelike state, hits the send button. The gesture, taking place as a somatic action below awareness, initiates the events that create a transmission pathway between Cayce's individual traumatic symptoms, those of the community whose presence she evokes, and the healing possibilities of the footage.

Although we never learn the precise nature of the originating trauma, Cayce's symptoms bear witness to its existence. The triggering stimuli are commercial logos, especially Bibendum, known in the U.S. as the Michelin Man. The symptoms, including panic attacks, flashbacks, nausea, inappropriate affect, and uncontrollable repetitions of the talismanic phrase "He took a duck in the face," exist before the death of Cayce's father, Win, in the 9/11 Twin Towers disaster, but become worse afterwards. The symptoms seem to be connected with Cayce's inability to follow her father's advice to "secure the perimeter"—a phrase that summed up his strategy as a security expert, the profession he adopted after retiring as a CIA operative. After his death, the phrase connotes for Cayce a haunting sense of vulnerability. One of its manifestations is pervasive paranoia; another is a deep sense of a rift between body and spirit that makes Cayce feel her soul is trailing after her as she jets around the world, tethered to her body by an invisible thread she feels she must reel in to achieve a wholeness that nevertheless eludes her.

These intuitions are embedded in a narrative in which, for nearly three hundred pages, nothing much happens. The effect of delaying all the decisive action until the end is to envelop the reader in an atmosphere of murky apprehension, searching for the pattern amidst a welter of precisely drawn details that do not quite cohere into plot.[18] The murkiness finds explicit articulation in the belief of Cayce's mother, Cynthia, that her dead husband is trying to communicate with Cayce through EVP, Electronic Voice Phenomena. Cayce has been named, we learn, for Edgar Cayce, the "sleeping prophet" famous for falling into a self-induced trance in which his mind could seemingly transcend the limitations of time and space.[19] Cayce follows her father in refusing to believe in EVP and other paranormal phenomena, debunking the mindset that Win called "apophenia . . . the spontaneous perception of connections and meaningfulness in unrelated

18. The contrast between the precise details that are everywhere in Gibson's novel and the lack of historical and geographical markers in the footage is remarked upon by Fredric Jameson, "Fear and Loathing in Globalization," *New Left Review*, no. 23 (Sept.–Oct. 2003): 113–14.

19. For more information on Cayce, see Thomas Sugrue, *There Is a River: The Story of Edgar Cayce* (New York, 1945), and Sidney Kirkpatrick, *Edgar Cayce: An American Prophet* (New York, 2000); the range of publication dates indicates enduring interest in this phenomenon.

things" (*PR*, p. 115). Yet the narrative seems finally to validate EVP, for, as the action accelerates, Cayce perceives (receives?) messages from her dead father that intervene by rescuing her from harm. In all but one instance, the messages come to her amidst electronic noise, mediated through electronic circuitry. Indeed, they can be seen as a special kind of steganography, for they are messages hidden within the noise of other texts.

The connections thus created between Nora's wound and her creation of the footage, on the one hand, and Cayce's traumatic symptoms and her EVP experiences, on the other, extend the scope of code's mediating function to transnational proportions. As the action jumps from New York City to London, Tokyo to Moscow, computer-mediated communication is pervasive, from the F:F:F website to email and electronic music to the creation and rendering of the footage. Representing the cognisphere in which, as a mass-market print novel, it is also enmeshed, *Pattern Recognition* brings to conscious articulation the pattern we are thereby enabled to recognize: the crucial role of code in allowing trauma to be released from the grip of obsessive repetition, emotional disconnection, and aconscious reenactment so that it can achieve narrative expression. In this sense *Pattern Recognition* is a self-referential fiction, for its ability to create a narrative about creating a narrative through code reflexively points back to the role of code in its own production as a material artifact. At the same time, the possibility that the footage, compelling as it is, may not finally be a narrative at all hints at the vulnerability of narrative at a time when Lev Manovich, among others, asserts that the database has displaced narrative as the dominant cultural form.[20] The apprehension that permeates the novel thus operates on two levels at once: as the visible trace of trauma that bodies experience in the text and as the text's latent fear that the penetration by code of its own textual body could turn out to be traumatic for the print novel as a cultural form.[21]

Avalon: Traumatizing Code

In *Pattern Recognition,* there is never any doubt that the world of flesh and blood exists in its own right as something other than code. This is precisely the premise that Mamoru Oshii's *Avalon* draws into question. Filmed in Poland by a Japanese director and crew, featuring Polish dialogue and

20. Manovich comments that "the database becomes the center of the creative process in the computer age" (Lev Manovich, *The Language of New Media* [Cambridge, Mass., 2001], p. 227).

21. Kathleen Fitzpatrick discusses at length the fears of print writers—especially young white male writers—that the novel is about to become obsolete. She interprets their fear symptomatically, seeing it as a move to claim the cachet of being an at-risk minority while still occupying a hegemonic position; see Kathleen Fitzpatrick, *The Anxiety of Obsolescence: The American Novel in the Age of Television* (Nashville, 2006), chap. 1. Nevertheless, the evidence that a number of writers do fear the obsolescence of the print novel is overwhelming.

actors, and Japanese and English subtitles, the film was released in Japan, the U.S., and Europe. It thus shares with *Pattern Recognition* an international milieu and the computer technology necessary to coordinate a transnational enterprise. Even before the titles play, the film presents action in which code does not merely mediate but actually creates the world of the illegal virtual reality game Avalon. The opening scenes depict the terrifying events of a war zone—bombs dropping, tanks rumbling down city streets, civilians screaming and running. The signs of potential trauma are everywhere. But when the film's protagonist Ash (Malgorzata Foremniak) turns and shoots a young soldier drawing a bead on her, his body explodes into pixilated fragments as she calmly remarks, "You are not ready for Class A yet. You might want to spend a little bit more time in Class B." In the Avalon war game, death is evacuated of the finality that makes it the ultimate signifier, for it means merely that a player is ejected from one level of the game and must start again at a lower level. Moreover, even that simulated death becomes a matter of choice, for when the pressure becomes too intense and threatens to overwhelm a player, he can always call "reset," whereupon the game is aborted.

No sooner are these ontological boundaries established, however, than the film renders them ambiguous. The game's dangers are not exclusively simulated; players who push too far too fast can experience brain death and become Unreturned, condemned to live as institutionalized vegetables. When Ash meets Stunner (Bartek Swiderski), one of her former teammates from Wizard Party (as one of the VR teams is called), she learns that their leader Murphy (Jerzy Gudejko) suffered this fate. Stunner suggests that Murphy was searching for the gate that would lead to Special A, a secret, ultrahigh level where one cannot call "reset" and must play the game to the end. The sign that signals proximity to the gate is the Ghost, a mysterious apparition manifested as a luminous, floating young girl. "Killing" her opens the gate, but her appearance is also accompanied by grave danger. Murphy's mistake, Stunner suggests, was to go after the Ghost, and as a result he became Unreturned.

Although Wizard Party was so good that its exploits were legendary, it broke up when one of its members disobeyed orders, panicked, and called "reset," thereby bringing ignominy upon the team. Unaccustomed to defeat, the members thereafter loathed one another, and the team was dissolved. The guilty player, so rumor goes, was none other than Ash. Ironically, the "reset" call, designed to abort the game when it threatens to become traumatic, itself becomes for Ash the source of her traumatic symptoms, associated with a potent brew of intense fear, shame, and repulsion at her inability to control her emotions. She exhibits classic indications of

trauma, including dissociation, flashbacks, and isolation. Her sole companion is her dog, a lugubrious basset hound. The film's representation of her condition is heightened by the landscape of urban blight she inhabits, the dreary communal kitchens where she watches Stunner wolf down disgusting gruel, and the sepia-colored cinematography. Given this grim world, it is no wonder that disillusioned young people prefer the excitement of the virtual reality game or that the authorities have declared it illegal. Entering the game world is a relief not least because it offers an objective correlative for trauma in a context where one has at least a theoretical possibility of winning the game. The game's addictive appeal is clearly evident in Ash's lifestyle. Surrounded by code, immersed in code, she experiences simulation as if it were life, investing in it all her emotional energy, and lives life as if it were a pale imitation of the virtual reality war game. The ironic motto of the U.S. Army's Program for Simulation Training and Instrumentation, All but War Is Simulation, has come true for her.[22]

After Ash's encounter with Stunner, she experiences in her next game a wrenching flashback, involuntarily returning to the traumatic experience in which Wizard Party fights its last battle together. The violent experience is so upsetting that she rips off the VR helmet and vomits, in a symmetrical inversion of the scene where the camera gives us a long close-up of Stunner's repulsive gorging on the food she bought for him as a bribe for information about Murphy. The entanglement of food with trauma continues as she compensates for her involuntary reenactment by splurging on real meat, real vegetables, and real rice so she can lovingly prepare a magnificent feast—for her dog. But when she turns around to find him in her small one-room apartment, the animal has inexplicably disappeared. Since he was her only friend and companion, his disappearance precipitates her realization that she can no longer put off confronting the source of her symptoms. She accordingly decides to go in search of Murphy, which in a sense means going in search of death.

This decision prepares for her entry into the game's next level, a transition signified by the image of her body surrounded by concentric rings of flashing code, emphasizing the massive computations necessary to propel her into this realm. When she emerges, she finds herself not in the war-torn game world but, significantly, back in her own apartment. Previous shots had shown her reclining with her head encased in a VR helmet when she was in the game world, establishing a clear boundary between simulated action and the real world. Moreover, to access the VR equipment she went

22. For a discussion of this motto, see Timothy Lenoir, "All but War Is Simulation: The Military Entertainment Complex," *Configurations* 8 (Fall 2000): 289–335.

to a cavernous game hall, the locale's specificity emphasized with long shots of her walking down the hallway, riding a grungy trolley home, and trudging up a flight of steps to her apartment. Now that geography collapses, along with the distinction it created between the game world and her drab everyday existence.

Glancing at the computer screen, she is informed she is now in "Class Real." A screen interlocutor tells her that a rogue player has illicitly entered this level, and her task is to find and kill him, which corresponds, her interlocutor says, to acting as a debugger and eliminating a virus from the system. She and the intruder will be the only players; everyone else is a "neutral." If she kills or injures one of them, she loses the game. If she succeeds in terminating the intruder, she will be allowed to join the privileged group whose members are successors to the game's original programmers. Warned that "Class Real" is a much more complex game level than any she has previously seen, she finds beside her computer an evening dress and a gun.

Now comes another rupture in the fabric of reality, for when she goes out, she discovers not the dark and somber world where she has lived but a bright, bustling, European metropolis, filled with light, color, and people. All this suggests that her supposedly "real" world was merely another level of the game, and she has now graduated from being a creature within the game world and been allowed to enter the real world, the one we ourselves inhabit. In this "Class Real" world, she sees a poster advertising a musical concert of Avalon; decorating it is a picture of her beloved basset hound, underscoring his function as a signifier of the real.[23] Following the breadcrumb trail of posters, she is led to the concert hall, where she discovers, mingling among the concertgoers, her old teammate Murphy.

This discovery reinforces the suspicion that she is now in the real world, in which case the instruction telling her that killing Murphy amounts to eliminating a virus appears as a lie designed to overcome any scruples she might have about murdering her comrade. The discrepancy between what she has been told and the audience's understanding of her task hinges on the meaning of the death Murphy would suffer. Is he a person or a bit of troublesome code? Would his death represent an irrevocable finality or merely another move in a simulated world where the game can always be played again? The ambiguity is heightened by the Avalon concert, sung by

23. Brian Ruh, whose interpretation of the ending is almost orthogonal to my own, cites Oshii's comments on the significance of the dog: "For the main character, the dog can be considered as the symbol of 'reality' itself. The meaning of the disappearance of the dog is important in the film, but whether or not the dog existed in the first place is an even more important question" (quoted in Brian Ruh, *Stray Dog of Anime: The Films of Mamoru Oshii* [New York, 2004], p. 181). While Ruh interprets this comment to mean that Ash may be fantasizing the dog's existence, it seems to me to allude to the possibility that her entire world is a simulation.

a magnificent soprano backed by a full chorus and orchestra. In the Arthurian myth, Avalon is of course the island where, as the words of the song remind us, "departed heroes go"—departed from one world but somehow still living in another.

Ash confronts Murphy as he perches on a World War I cannon, a reminder of the war game in which they were comrades. As the camera pans around her and Murphy, the music rises toward a climax, with jump cuts between their confrontation on the lawn and the ongoing concert in the hall. She charges Murphy with deliberately arranging the disaster that tore apart Wizard so he could continue on alone and reach this level of the game, deserting his teammates after they had ceased to be useful and becoming, as she says, a hollow shell. "Do I look like a hollow shell?" he asks incredulously. He ripostes with what the audience has already surmised, that he has escaped from the game and now chooses to inhabit this world. "Reality is only what we tell ourselves it is," he asserts.

As the tension mounts and the action moves toward the inevitable moment in which one will kill the other, Murphy tells Ash that when the body actually bleeds instead of disintegrating into pixels she will know they are no longer in the game. Anticipating that moment, he asks her to "imagine what it's like to actually be shot . . . to experience that pain." When Murphy draws his weapon, Ash shoots him repeatedly in the chest, whereupon he opens his hand and drops the bullets that, unknown to Ash, he has refused to use. As he predicted, his body bleeds and he writhes in pain. Trauma returns, it appears, as the signifier of the real. At the next moment, however, this normalizing interpretation is subverted, for at his death his body does not simply become inert but rather dissolves into the concentric rings used to signify the game death of advanced players. The double signifiers of his bleeding body and its disintegration into code create an unresolvable ambiguity about whether this world is a simulation or reality. Somehow it is both at once, and death functions simultaneously as the ultimate trauma and as a disjunction separating one round of game play from another.

With Murphy dead and erased from the scene, the antagonist that Ash must face shifts to those who control the game. The shift has been anticipated in Murphy's final words. He tells Ash, "Don't listen to what they tell you. Never go back. This world right here is where you belong." That the game is continuing into another round (perhaps at another level) is further indicated by what Ash does when Murphy's body disintegrates. As a result of his sacrifice, she has something the programmers of the game could not have predicted—the unused bullets he left behind, which she loads into her gun. The implication is that she intends to make those who control the game pay for their deception. But what does a loaded gun mean when the status

of death is ambiguous? How can Ash kill the makers of the game when she may still be inside the game, as Murphy's pixilated body suggested? These questions are not so much answered as intensified by the action that follows. She slowly walks into the now-deserted concert hall, at the front of which appears the Ghost. As the girl lifts her head and smiles with an expression that is somehow menacing, the camera cuts to a game screen with the message, "Welcome to Avalon."

What are we to make of these mysterious final moments? Does Ash make it to Avalon because she has a loaded gun and the will to use it or because she refrains from shooting? How can the Ghost, an unearthly apparition possible only within the simulation, appear in the concert hall previously understood as located in the real world? In an interview, Oshii commented that "Hollywood films about virtual reality always end with a return to the real world. However, because those real worlds exist within film they themselves are lies. Reality is a questionable thing. I didn't want to do a movie where the characters return to reality."[24] As his remarks suggest, the conundrums of the final moments are unresolvable as long as we cling to the belief that the world of simulation, the world generated and maintained by code, is separate from the real world in which we live. The appearance of the Ghost indicates that "Class Real" is yet another level of the game. Since this new world is indistinguishable from our own, we are left with the conclusion that there is no escape from the simulation; we too are creatures of code. If the realm of code has expanded so that all death is simulated, this does not mean that trauma is absent. Although death has (perhaps) been divested of its preeminent position as the ultimate trauma, it is revealed as covering over the actual traumatic experience, which is nothing other than the discovery that reality itself is generated by code. Hence the double signifiers of Murphy's bleeding body and its pixilated disintegration, respectively identified with reality and code; their juxtaposition indicates that reality and simulation no longer constitute mutually exclusive realms but now interpenetrate one another. Derrida's famous aphorism, "Il n'y a pas de hors-texte" has been replaced by its computational equivalent *Il n'y a pas de hors-code* (there is no outside to code).[25]

Dreamaphage: Infecting Code

In Jason Nelson's online digital fiction *Dreamaphage*, code penetrates reality by first colonizing the unconscious. The backstory is narrated by Dr. Bomar Felt, investigating doctor for the Dreamaphage virus. People infected with the virus start dreaming the same dream every night; the

24. Mamoru Oshii, quoted in *Akadot*, http://www.akadot.com/article.php?a = 109
25. Jacques Derrida, *Of Grammatology*, trans. Gayatri Spivak (Baltimore, 1976), p. 158.

dream differs from person to person, but for any one person it remains the same. Becoming increasingly obsessed with the dream, the infected person finds that it starts looping, a term significantly associated with the programming commands of machine cognition rather than the putative free will of humans. Soon the dream occupies waking thoughts as well as sleeping visions. Within three to four months after initial onset, the infected person slips into a coma and dies. Dr. Felt has encouraged patients to keep dream journals, and he suggests that they may hold the key to understanding the virus.

The next screen, an interactive animation programmed in Flash, shows rectangles whirling within a frame, suggesting that the work proceeds as an exploration of this digital space rather than as a linear account. Represented in diminishing perspective, the space seems to recede from the screen, intimating that it is larger than the screen can accommodate, perhaps larger than anyone can imagine. The navigation requires the user to catch one of the rectangles and, with considerable effort, drag it into the foreground so it can be read. The task is difficult enough so that the user may feel relieved when she finally succeeds and finds the rectangle imaged as a small handmade book. If so, the relief is short-lived, for she discovers that the book's contents can be accessed only by laboriously catching onto the lower page corner and carefully dragging it to the other side, as if the work was punishing her for her desire to return to the simplicity and robustness of a print interface.

The dream journal narratives are wildly incongruous, telling of chairs impossible to move, grocery coupons exploding under the shopper's hat, and skin cells inhabited by couch potatoes. They are accompanied by clever interactive animations that do not so much act as illustrations as performances accentuating the surrealistic mood. The following illustrates the logical disjunctions that the verbal narratives enact:

> And by sunlight I mean those sparkling particles the super-intelligent viruses manipulating the fiery burst we call the sun use [sic] to control our, deceivingly harmless, aquarium fish. But then that's another story now isn't it. Moving on, this substance holds our world and all other worlds together. It makes us sad and happy and hungry for humping. [next page] Sometimes this goo collects between two people . . . [next page] but love has nothing to do with goo. Instead love is governed by a complex system of ropes and wires haphazardly connected to cattle in the Texas panhandle. [next page] Lucky for us it seem the cattle haven't yet discovered their power over love.[26]

26. Nelson, "Book 4," *Dreamaphage.*

Although the text presents itself as narrating a linear causal chain, the connections it posits are preposterous, from sunbursts to aquarium fish to love controlled by wires and ropes running through Texas cattle. Recall the interactive animation from which this text was pulled; with its swirl of many different shapes receding into the distance, it suggests a large matrix of reading trajectories, which I have elsewhere called a possibility space.[27] The narratives make no sense qua narratives because they function as if they were constructed by making random cuts through the possibility space and jamming together the diverse elements, resulting in texts that present themselves as sequential stories but are socially illegible as such. This does not mean that the narratives (or, better, pseudonarratives) fail to signify. They do so, powerfully, testifying to a cognisphere too dense, too multiply interconnected, too packed with data flows to be adequately represented in narrative form.

This intricately coded work, with its interactive animations, accompanying sound files, and complex screen designs, testifies through its very existence to the extent to which code has become indispensable for linguistic expression. If, as noted earlier in the discussion of *Pattern Recognition*, database is displacing narrative as the dominant cultural form of our computationally intensive culture, here we see that process represented as an *infection* of narrative by data. Generating the linguistic surface, the code infects that surface with its own viral aesthetics. The symptomatic monologic dreams indicate that the unconscious has been colonized by the Dreamaphage virus, a screenic word generated by the underlying code (as are all the screen images). Readers of Neal Stephenson's *Snow Crash* will recognize in the Dreamaphage virus a remediation of the idea that computer viruses can be transmitted to humans and make them behave as if they were computers, here specifically by making them execute an endless programming loop consisting of the dream.[28] Since it is not clear in Nelson's text how the virus is transmitted, we may suspect that viewing the screens of computers infected with the virus is a disease vector for human transmission (as in *Snow Crash*). In this case, the word that appears on the screen, *Dreamaphage*, at once names the phenomenon and spreads the infection, an implosion of signifier into signified that is possible because code is the underlying causative agent for both the screenic word and the disease it signifies. In a certain sense, then, the disease consists of nothing other (or less) than collapsing the distinction between artificial and human

27. See Hayles, "Narrating Bits," *Vectors* 1 (Winter 2005), http://vectors.iml.annenberg.edu
28. See Neal Stephenson, *Snow Crash* (New York, 1992).

cognitions and a consequent conflation of computer code and human-infectious virus. The code-virus preempts the normal processes that produce dreams and installs itself in their place, creating visions of the cognisphere, its native habitat, that appear nonsensical when forced into the linear sequences of human-only language. It is not the virus that is diseased, however, but the human agents who cannot grasp the workings of the cognisphere except through stories no longer adequate to articulate its immense complexity. The individual patients may die, but the cognisphere continues to expand, occupying more and more of the terrain that the unconscious used to claim. That at least is the story *Dreamaphage* enacts, a bittersweet narrative that exults in the power of code to create digital art even as it also wonders if that power has exceeded the capacity of humans to understand—and by implication, control—the parasitical ability of machine cognition not merely to penetrate but to usurp human cognition.

Code/Coda

Although previous arguments have established that code is available as a resource to connect with trauma, they do not fully explain why, as our culture races over the millennium mark, this resource should be taken up by contemporary cultural productions. To explore that question, I want to reference a moment in Joseph Weizenbaum's *Computer Power and Human Reason: From Judgment to Calculation*, when his secretary becomes so engaged with the ELIZA computer program mimicking a psychoanalyst's routine that she asks him to leave the room so she can converse with the machine in private.[29] The moment is all the more extraordinary because, as he notes, she's fully aware how the program works and so is not deceived by the illusion that the machine in any way understands her problem.[30] Shocked by the intensity of her engagement, Weizenbaum feels compelled to issue a stern warning about the limits of computer intelligence. Humans must not, he argues, think that computers can make ethical, moral, or political judgments—or indeed engage in any judgment at all. Judgment, in his view, requires understanding, and that is a faculty only humans possess.

29. See Joseph Weizenbaum, *Computer Power and Human Reason: From Judgment to Calculation* (New York, 1976).

30. The ELIZA program was designed to prompt its human interlocutor by picking up and repeating key phrases and words as questions or comments. For example, if the human mentioned, "I saw my father yesterday," the computer would respond, "Tell me about your father." See Weizenbaum, "ELIZA—A Computer Program for the Study of Natural Language Communication between Man and Machine," *Communications of the Association for Computing Machinery* 9 (Jan. 1966): 35–36.

I propose to revisit the scene with the secretary and ask again why she was so intensely engaged with what she knew was a dumb program. Let us suppose she was suffering from a traumatic experience and was using the computer to explore the significance of that experience for her life. What qualities does the computer have that would make it the ideal interlocutor in this situation? It does not feel emotion and so cannot be shocked or repulsed by anything she might reveal; it does not betray anyone (unless programmed to do so) and so can be assumed to function in a perfectly logical and trustworthy manner; and—precisely the point that so bothered Weizenbaum—it does not judge because it lacks the rich context of the human lifeworld that would make it capable of judgment. In brief, it possesses the kind of cognitive state that psychoanalysts train for years to achieve.

After four decades of research, development, and innovation in information technology, computers are becoming more humanlike in their behaviors. Research programs are underway to give computers "emotions" (although as software programs they remain very different from human emotions mediated by the endocrine system and complex cortical feedback loops). Object-oriented languages such as C++ are designed to mimic in their structure and syntax human-only languages, making possible more intuitive communication between humans and computers. Neural nets, within the parameters of their feedback information, can learn to make a wide variety of distinctions. Genetic programs use diversity and selection to create new emergent properties, demonstrating that computers can achieve *human-competitive results* in such creative endeavors as electronic circuit design.[31] In addition, more and more code is written by software programs rather than humans, from commercial software like Dreamweaver that does html coding to more sophisticated programs designed to bootstrap computer-written software through successive generations of code, with each program more complex than its predecessor.

The present moment is characterized, then, by a deep ambivalence in the roles that computers are perceived to play. In certain ways they remain like the relatively primitive machine on which Weizenbaum created the ELIZA program—unendingly patient, emotionless, and nonjudgmental. In this guise they are seen as interacting positively with humans to provide transmission pathways for the articulation of trauma. In other ways, however, they are taking over from humans more of the cognitive load, a maneuver widely perceived as an implicit threat to human autonomy and agency. The double speaking that characterizes my three tutor texts—in *Pattern*

31. See John Koza et al., *Genetic Programming III: Darwinian Invention and Problem Solving* (San Francisco, 1999).

Recognition the map/trigger, in *Avalon* the bleeding/pixilated body, and in *Dreamaphage* the code-virus—signifies more than the double addressing of code to humans and intelligent machines. Rather, it interrogates the ambivalence inherent in the double role that the computer plays, as the perfect interlocutor and as the powerful machine that can not only penetrate but actually generate our reality.

Increasingly computers are seen as evolutionary successors to humans that are competing for the same ecological niche humans have occupied so successfully for the past three million or so years. The evolutionary progression that gave humans the decisive advantage over other species—the development of language, the coordination of larger social groups and networks that language made possible, and the rapid development of technologies to make the environment more friendly to the species—is now happening with intelligent machines, as computers have ever more memory storage and processing speed, as they are networked across the globe, and as they move out of the box and into the environment through interfaces with embedded sensors and actuators dispersed across the world.

The issues at stake, then, go well beyond linguistic address (although this is, I would argue, the fundamental characteristic from which other behaviors evolve, just as language was the fundamental development that initiated the rapid development of the human species). As the technological nonconscious expands, the sedimented routines and habits joining human behavior to the technological infrastructure continue to operate mostly outside the realm of human awareness, coming into focus as objects of conscious attention only at moments of rupture, breakdown, and modifications and extensions of the system. Trauma, the site in these fictions through which the ambivalent relations of humans to intelligent machines are explored with special intensity, serves as the archetypal moment of breakdown that brings into view the extent to which our present and future are entwined with intelligent machines. No longer natural, human-only language increasingly finds itself in a position analogous to the conscious mind that, faced with disturbing dreams, is forced to acknowledge it is not the whole of mind. Code, performing as the interface between humans and programmable media, functions in the contemporary cultural Imaginary as the shadowy double of the human-only language inflected and infected by its hidden presence.