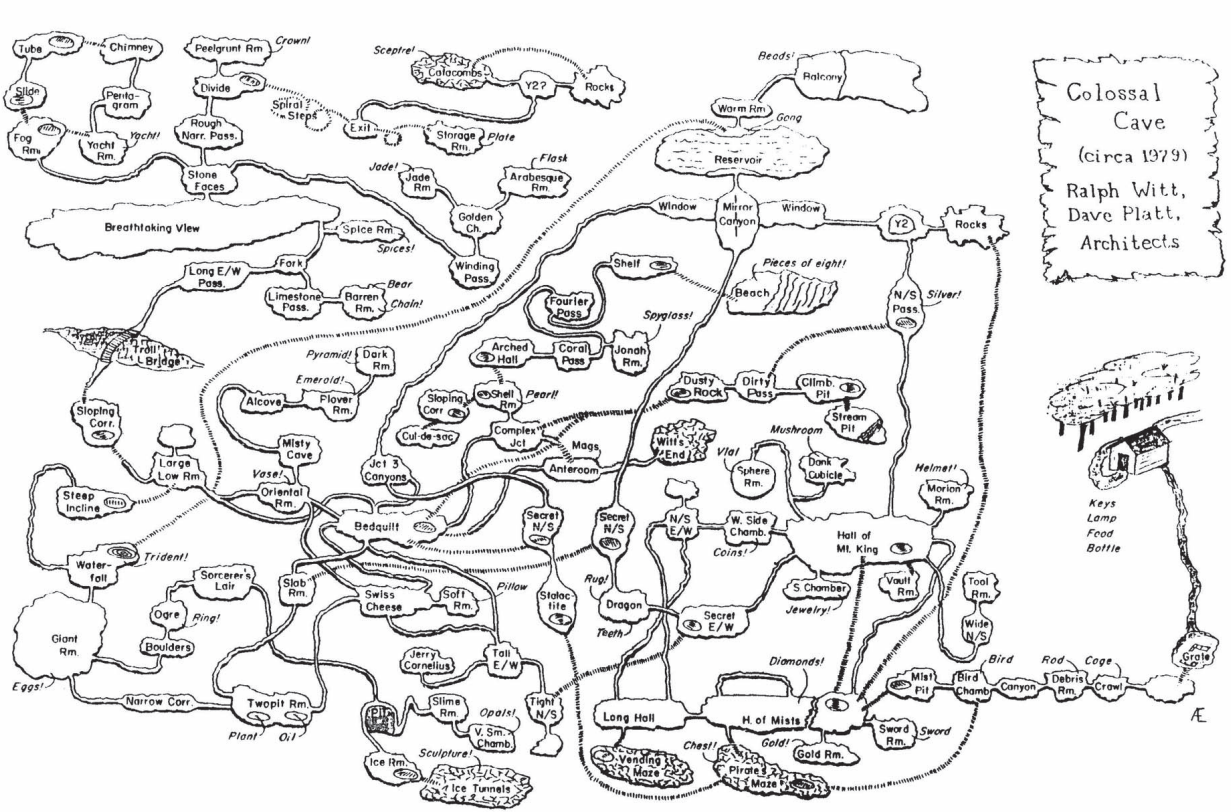

Fig. 1. A map of the convoluted cave system popularized by the early text game *Adventure*, drawn by Bruce Beaumont. Reprinted by permission of David Platt.

Games as Environmental Texts

ALENDA Y. CHANG

> It is utterly different in a cave. Within seconds you lose sight of your starting point. The sinuous passages twist and turn. Always you are confined by walls, floor, and ceiling. The farthest vistas are seldom more than one hundred feet—along a passage, down a pit, up at a ceiling. You are always in a place; you never look out from a point. The route is never in view except as you can imagine it in your mind. Nothing unrolls. There is no progress; there is only a progression of places that change as you go along. And when you reach the end, it is only another place, often a small place, barely large enough to contain your body. It is conceivable that you have missed a tiny hole that goes on. You may not have reached the end at all. The only sign that you have reached the end is that you cannot go on. And there is no view.
>
> *Roger Brucker and Richard Watson,* The Longest Cave

Nature and technology are for most people mutually exclusive realms. Many sympathize with Richard Louv's judgment in *Last Child in the Woods* that generations born since the 1970s are increasingly victims to what he calls "nature-deficit disorder."[1] Predictably, Louv's primary culprits are television and the electronic devices that have come to occupy a disproportionate amount of our time—computers and game consoles in particular. Yet while

we may grant that Louv's work has sparked valuable efforts to reclaim wild land for the education and spiritual growth of children, a crucial problem remains in that Louv, like the nature-technology dichotomy itself, leaves little room for forms of media to be productive agents for social and environmental change.

Many of the benefits of the natural experiences Louv describes could be found in computer and video games: free, unstructured play without adult supervision; a chance to learn about natural processes and life cycles, or how people, animals, plants, and inorganic matter are connected; educated mentorship, or a guiding presence knowledgeable enough to provide more information about what one is experiencing; and hands-on activity with actual consequences. While game environments, no matter how lovingly realized, are not substitutes for direct experience of the natural world, more and more people are turning to virtual worlds not only for entertainment but also for challenge, companionship, and even civic participation—why not embrace and encourage game design in forms that recall our favorite modes of natural play?

Games can offer a compelling way to reconcile a deep connection to nature and the nonhuman world with an equally important connection to technology and the virtual. Even Louv might agree that this is a defining dilemma of our times, or at least of the generations raised with a walking stick in one hand and a joystick in the other.

"SORRY, BUT I AM NOT ALLOWED TO GIVE MORE DETAIL": Ecomimesis and Will Crowther's *Adventure*

Almost by definition, all computer and console games are environments, but surely not all games are environmental. What, then, constitutes an environmental game? Or, if we prefer to steer clear of environmentalist rhetoric, how can a game environment model ecological principles? Most games commit at least one if not all of the following missteps in their realization of in-game environments: relegating environment to background scenery, relying on stereotyped landscapes, and predicating player success on extraction and use of natural resources. In the first and most common scenario, a

game flaunts its environment to the extent that it provides gratifying visuals, but the environment itself remains inert, the functional equivalent of theater flats or bluescreen or greenscreen (chroma key) technology. Action takes place within or in front of such digital set pieces, and it is in this vein that volumes devoted to the artificial intelligence (AI) of games carefully outline the behavior of non-player characters (NPCs) and monsters (mobiles), but leave the articulation of the game environment to artists.[2] Nintendo's old Mario platform games exemplify this spatial hierarchy: although the iconic plumber runs, bounces, and sometimes falls through a series of obstacles set against a simple, side-scrolling backdrop, the backdrop is less interface than canvas, a static representation that shifts only in parallax as the player hurtles forward.[3] Although some might argue that the newer virtual worlds offered by massively multiplayer online games appear to exchange background and foreground distinctions for a more immersive experience of space, the range of possible interaction with the game environment remains disappointingly slight.

Game environments also tend to lean heavily on clichéd landscapes, abandoning any attempts at regional specificity for pre-patterned and ultimately generic scenes. Such environments give players the disorienting and somewhat anaesthetizing sense that *this could be anywhere or nowhere at all*, conveniently overlooking ecological concerns with the finite character of the natural world, entropic limitations on energy and throughput, carrying capacity, and so forth.[4] In an era of widespread anxiety over climate change, increasingly scarce fuel reserves, and overpopulation, it should come as no surprise that an especially popular recourse is the abstract, ever-receding pastoral ideal that Raymond Williams once derisively called "a babble of green fields," which lurks in all the medieval and pre- or alter-industrial lands of games like Blizzard Entertainment's *World of Warcraft* or the *Legend of Zelda* series, and figures heavily in the multitudes of crop-management games like *Harvest Moon* and *FarmVille*.[5] Ecological specificity and accuracy may be neither necessary nor sufficient criteria for successful commercial games, but if we seek to measure games as instruments of public knowledge, it suddenly becomes worthwhile to

make games that are more meaningfully local, games that take the goal of environmental realism seriously—not solely in terms of the visual rendering of environments, but also at the levels of sound design, weather, species density and distribution, and the arrangement of organic and inorganic actors in complex interrelations.[6]

Both of these criticisms—game designers treating game environments as mere scenery, and falling back on caricatures of landscapes rather than attempting to plumb their biogeographical complexity—give rise to the third major issue: game designers have yet to develop more sophisticated rules for interaction between players and game environments. Most game environments are predominantly visual, with the majority of the environments remaining functionally inert; the actionable parts of those environments are most often things a player can use immediately (a power-up, like a health or speed boost), acquire for later use (an item such as a key for a locked door further in the story line), or destroy (panes of glass between you and your target, a creature you didn't like the look of). Some games, such as those belonging to the genre of "God" games, even give players the power to design or modify the landscape, for example, through the terraforming capability in *Spore* or *SimCity*. Games are often celebrated for providing this player-centered paradigm of what Bonnie Nardi calls "performative mastery," while such tributes to player agency and skill simultaneously must distinguish themselves from critiques that games are virtual Skinner boxes producing addiction to learned behaviors or "skills" in return for a randomized reward.[7] While I cannot discount the value of player agency, too often this kind of skill mastery merely equates to mastery of the external environment, and consequently games naively reproduce a whole range of instrumental relations that we must reimagine. Games are opportunities to create entirely new sets of relations outside of those based on dominance or manipulation. More environmentally realistic games could affect our understanding of real-world environmental issues, either by implicitly or explicitly modeling different forms of our individual and collective environmental agency.

Pragmatists might argue that building natural life cycles and both abiotic and biotic factors into game environments would be

cumbersome from a developmental standpoint, as well as frustrating to players accustomed to endless supplies of raw materials. But attention to ecological details can make for not only a more responsible game experience but also a more compelling one. As many have observed, games are so enticing largely because they challenge us to puzzle out the systems of logic underlying gameplay (What works? What doesn't? What happens when I do *this*?). Games that call our attention to environmental states and shifts, and to our implication in those processes, promise a new kind of gameplay challenge, one that would deliver the deathblow to the pernicious myth of a free and ever-abundant Nature while establishing a new level of consciousness in player experience. Why must games replicate the same kind of costly obliviousness we see every day in the nonvirtual world—the refusal to acknowledge or even attempt to understand our role in climate change, environmental degradation, and species loss—when they could instead take such factors into account, with very interesting results?

Some games, however, elegantly avoid these common pitfalls, including one that we find, surprisingly, not far from the origin of modern computer games—a game inspired by the longest known cave system in the world and which uses only text to communicate ambient detail. The game, *Adventure* (sometimes called *Colossal Cave Adventure*, or simply ADVENT, due to an archaic FORTRAN six-character identifier limit), was designed by William Crowther in 1975–76 while he was an employee at Bolt, Beranek and Newman (BBN), best known for developing the ARPANET. Crowther developed *Adventure* using BBN's PDP-10 computer in his off hours, and the game quickly became something of a craze among early computer enthusiasts; it was significantly extended by Don Woods at Stanford in 1977, and throughout the next decade other player-fans would revamp the game for newer platforms like the TRS-80 and the Atari 2600, eventually adding graphics to the text-only interface of the original.

While the original, text-only *Adventure* seems simplistic by contemporary game standards, it successfully foregrounds environment and environmental knowledge not despite, but because of, its textual limitations. *Adventure*'s site-specific subterranean world

exemplifies Timothy Morton's concept of "ecomimesis" from *Ecology without Nature*, which Morton defines as the project of nature writers and ecocritics alike to bring the natural world into their writing through evocative, present-tense descriptions.[8] Although Morton's ruminations on "environmental aesthetics," written in the context of literary ecocriticism, may at first appear to have little to do with game criticism, my overwhelming sense is that both ecocriticism and game studies have much to gain from breaking disciplinary isolation. Having been dominated for some time by amorphous notions of play, narrative, and code, thinking about games is sorely in need of more diverse forms of critical articulation. At the same time, games themselves offer particularly fertile terrain upon which to raise questions of environmental representation, knowledge, and ethics—questions that have dogged ecocritical attempts to reconcile the natural and the ecological with the literary and the artistic.[9]

For Morton, ecomimesis is perhaps counterintuitively non-natural, closer to the self-reflexive, self-conscious aspects of postmodern art than documentary realism. While poets, nature writers, and ecocritics find that ecologically inflected, thick descriptions of natural setting permit an escape from the confines of writing—a return to reality from representation—Morton concludes that "ecomimesis is not necessarily on the side of nature" (*EWN* 34).[10] Dana Phillips, in *The Truth of Ecology*, gives a similar, if more polemical, critique of ecocritic Lawrence Buell as evincing "an inchoate and perhaps not fully conscious desire for a literature of presence," and accuses ecocriticism of going "well beyond the realm of the plausible in its declarations about what literature can and ought to do."[11] Phillips expresses deep skepticism over the referential claims of literary mimesis (access to the full world of sensory experience, fidelity to actual location over fictional topoi, no-fuss invocations of the pastoral, etc.), dismissing them as poorly veiled attempts "to do an end run around contemporary literary theory and culture" (*TE*, 17). However, unlike Phillips, Morton is careful not to throw the proverbial baby out with the bathwater. Even as he admits that "the idea of nature is getting in the way of properly

ecological forms of culture, philosophy, politics, and art" and that ecomimetic projects are clearly artificial constructions, ecomimesis remains for him a valid and important form of poiesis. Moreover, though Morton looks to "art above all else" and Romantic literature in particular for "properly ecological forms," his theory of ambient poetics allows for the analysis of works in a range of media.[12] The concept of ecomimesis can easily extend to encompass photography, film, music, and games—both game texts and games *as* texts. In this age of aggressive graphical display—3D, high definition (HD), and computer-generated imagery (CGI)—we tend to forget that many of the earliest computer games were purely textual constructs, and thus we neglect both the progenitors of the modern, visually saturated computer or video game and continuing experiments in interactive fiction. We might ask ourselves to what degree such text-based games could be said to model the kind of "writing degree zero" Phillips so readily dismisses, or to engage in the less naive Mortonian craft of ecomimesis. A game like *Adventure* demonstrates that game designers are recognizably cousins to ecocritics and nature writers, in that all "want the world to be in the text." But game texts, unlike conventional texts, demand action—games are "richly designed problem spaces" or "possibility spaces" in which we come face to face with our knowledge of and impact on the environment.[13]

Adventure's ecomimetic qualities stem from both the game's signature descriptive brevity and the artful correlation between textual output and player language and movement. When you begin the game, for instance, should you ask for instructions, you receive the following cryptic remarks:

> SOMEWHERE NEARBY IS COLOSSAL CAVE, WHERE OTHERS HAVE FOUND FORTUNES IN TREASURE AND GOLD, THOUGH IT IS RUMORED THAT SOME WHO ENTER ARE NEVER SEEN AGAIN. MAGIC IS SAID TO WORK IN THE CAVE. I WILL BE YOUR EYES AND HANDS. DIRECT ME WITH COMMANDS OF 1 OR 2 WORDS.

Otherwise, you begin with the following description of your location:

> YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK BUILDING. AROUND YOU IS A FOREST. A SMALL STREAM FLOWS OUT OF THE BUILDING AND DOWN A GULLY.

Exploring the surrounding forest yields little, but when you investigate the building you discover a range of objects that might help you in your search: keys, a shiny brass lamp, some food, and a bottle of water. Following the streambed south leads to an area of "bare rock," and "a 20 foot depression" at the bottom of which is "a strong steel grate." Unlocking and opening the grate allows you to lower yourself into the chamber below, and there begins your journey into the expansive underground cave system that forms the majority of the game world.

No progress can be made without issuing recognizable one- or two-word directives to the program's mysterious narrator-actor; thus at first the game can feel like a humorous, ELIZA-like conversation between you (the player) and it (the unknown interlocutor who presents the game) unfolding through the input mechanism of the command-line prompt.[14] Although this interlocutor supposedly serves as your "eyes and hands" and can be ordered about with simple phrases like "north" or "get keys," attempts at complex or creative workarounds are liable to earn only nonplussed responses such as "I don't know how to apply that word here" or this gem, "You can't be serious!" At times, as you wander about lost in chamber after chamber, the computer seems as disoriented as you are, though this disorientation is verbal as much as spatial:

> I AM UNSURE HOW YOU ARE FACING. USE COMPASS POINTS OR NEARBY OBJECTS.
>
> I DON'T KNOW IN FROM OUT HERE. USE COMPASS POINTS OR NAME SOMETHING IN THE GENERAL DIRECTION YOU WANT TO GO.

Compared to current games, in which player identity is most often grafted onto a three-dimensional avatar in a curious blend of first-person belief ("I am the military operative on this mission") and third-person witnessing ("That is my character moving around on

the screen"), *Adventure* is unusual in its interposing of an artificial intelligence between player and environment. In a mode reminiscent of the orthodox Cartesian dualism between mind and body or philosophy's brain in a vat, the player issues commands to his or her physical extremities and waits patiently to see if the commands are understood and acted upon; garbled commands lead to extensive linguistic negotiations, as the player searches for objects and actions that the program can recognize. Thus, "inch forward" becomes "go down," and "hit snake with black rod" resolves simply to "strike snake" (if you err on this account, the program helpfully reminds you that "My word for hitting something with the rod is 'strike'"). Meanwhile, movement into new caverns and crawl spaces is often a leap of faith: until the program outputs the textual description of these new areas, the player is effectively blind.

Crowther's *Adventure* was, in fact, based on a real system of caves—the Bedquilt and Colossal Cave sections of the Mammoth Caves in Kentucky. Crowther, it turns out, was both an avid caver and a player of the early *Dungeons and Dragons*, and indeed *Adventure* effortlessly melds aspects of fantasy (ax-throwing dwarves and "magic words," like the nonsensical teleportation incantation "XYZZY") with the mundane details of spelunking (Crowther and his wife, Patricia, had both spent time mapping Bedquilt). That Crowther imaginatively retooled his physical experiences within a material milieu, transforming them into the stuff of computing lore, supports the game's ecomimetic classification; the text delivers an unexpected intimacy with an alien environment that emerges directly from a caver's ecological awareness and expertise. In a process familiar to cavers, the game therefore proceeds as the compass-guided navigation of a series of interlocking chambers or "rooms," whose descriptions sometimes forgo aesthetic detail for matters of practical judgment:

> YOU ARE ON THE BRINK OF A THIRTY FOOT PIT WITH A MASSIVE ORANGE COLUMN DOWN ONE WALL. YOU COULD CLIMB DOWN HERE BUT YOU COULD NOT GET BACK UP.[15]

Where an untrained eye would see only undifferentiated stone and darkness, the *Adventure* player, with the aid of the knowledges

Crowther has embedded in the game's descriptive texture, spies evidence of previous expeditions, networks of linked passages, climbs of varying difficulty, and even the familiar results of geologic processes:

> YOU ARE IN A ROOM WHOSE WALLS RESEMBLE SWISS CHEESE. OBVIOUS PASSAGES GO WEST, EAST, NE, AND NW. PART OF THE ROOM IS OCCUPIED BY A LARGE BEDROCK BLOCK.

"Obvious" passages notwithstanding, *Adventure* also militates against player hubris, confounding would-be cartographers with the sheer scale and complexity of its natural environment. As one of the game's fan sites notes, *Adventure*'s cavernous expanses eschew the orderly, planar preferences of Euclidean geometry, instead reproducing the curved, choked, and irregular topologies of real cave systems.[16] Some routes are passable only in one direction, and leaving a room by its northern opening does not necessarily mean that you can return to that room by heading south from the next chamber. As veteran spelunkers Roger Brucker and Richard Watson observe in their account of the Cave Research Foundation's involvement in Mammoth Cave National Park, caving expeditions rarely have a discernible end. The challenge is instead to discover connections between cave systems, or to find your way back to where you began (using *Adventure*'s magic word "XYZZY" whisks you back to the starting point), and, unlike most enshrined outdoor activities, caving is less about ascent, panoramic views, and wide open spaces than close confines, restricted vision, and plunging deep below ordinary terrestrial life. "Caving is tactile in a way that no other contact with the inanimate can be," write Brucker and Watson. "There is no other sport where one crawls through mud and slides through sand. One is *in* a cave, but not as a swimmer is in the water. In the cave one is clasped in solid, ever changing walls of stone that provide variegated patterns of visual and tactual delight. Caving can be almost totally sensual."[17] *Adventure* grants its player the caver's quasi-mystical relationship to the nonhuman environment, bringing him or her into meaningful proximity with often over-

looked inorganic actors and the humbling scale of geologic time.

This is not to deny *Adventure* its share of literary excellence. According to Dennis G. Jerz, a recent chronicler of Crowther's work, "*Adventure* succeeds in large part due to the depth and realism of the scenery, which is rendered in concise prose that calls interesting details to the reader's attention, yet leaves much to the imagination" ("SN," section 53). The economy of *Adventure*'s language allows for both the game's ecomimetic properties and its captivating ambiguity. As if to underscore this point, the most cited areas of the game seem to be its two labyrinths, which owe much of their lasting impression to their rendering in words. Nick Montfort, for instance, borrowed the title of his 2005 book on interactive fiction, *Twisty Little Passages*, from this delightfully cryptic line: "You are in a maze of twisty little passages, all alike." In one of the two mazes, this phrase appears but rearranges itself slightly at every turn, enabling attentive readers to determine the way out; in the other, the phrase never changes. Here the game casts the player into a featureless labyrinth of stone and language, in a brilliant play on the double sense of "passages" as both literary and geologic constructs, and it is not at all clear which aspect is the more maddening.

Adventure not only returns us to a time when games were unabashedly textual (sophisticated computer graphics do not necessarily immersive games make) but also offers us a new model for Morton's concept of ecomimesis. Demonstrating at times both the spare elegance of poetry and the resolute matter-of-factness of prose, the text of *Adventure* generates the kind of "poetics of ambience" that Morton describes as "a sense of a circumambient, or surrounding, *world* . . . something material and physical, though somewhat intangible, as if space itself had a material aspect" (*EWN*, 33). *Adventure* is also an example of what Henry Jenkins calls "environmental storytelling," but, as a text game, it is not simply an inferior precursor to the kinds of lush, visual environments offered by modern games.[18] Text games remind us that game worlds are not just substitutive or compensatory simulations, but also evocative spaces in their own right.

Repurposing the Game Walkthrough

Although game design and game studies anthologies have often acknowledged *Adventure*'s importance in the genealogy of both computer games and interactive fiction, most have downplayed the game's unusual relationship to the Mammoth Caves in Kentucky. However, in an unconventional 2005 article in *Digital Humanities Quarterly*, Jerz not only recovers and analyzes the game's original source code, comparing Crowther's version with the one Woods amended, but also embarks on an expedition to Kentucky to assess the accuracy of the game's environmental descriptions. Aided by members of the Cave Research Foundation, Jerz takes pictures as he and his guides descend into the Bedquilt region of Mammoth Cave National Park. As Jerz was aware, the extensive lore around *Adventure* includes numerous testimonials from avid *Adventure* players who, upon visiting the real cave system, were purportedly able to use their detailed knowledge of the game to navigate underground. While Jerz seems to rely less on his familiarity with the game than on his human companions, he does seek out and document a lengthy series of game referents. The result is an annotated "photographic walkthrough": images from the real cave system captioned with the corresponding lines of textual description from *Adventure*. The interest here is not to establish *Adventure*'s physical accuracy; rather, Jerz's journey playfully suggests that established notions of game scholarship can expand to include more ecocritical concerns, while offering a new, more flexible methodology for approaching game environments—the walkthrough.

Walk-throughs, in common parlance, conjure pedestrian images of real estate tours, theater rehearsals, or airy passageways between buildings. In the world of video games, however, the term *walkthrough* has come to mean a kind of "how-to" guide authored by experienced players for the purpose of guiding novice players through difficult game material. These walkthroughs, most often strictly textual, can also include player-generated maps, screenshots, or lines excerpted from the games themselves. In addition, game walkthroughs typically adopt the second person, addressing

the reader with the familiar "you" and thus echoing the present-tense affectation of ecomimetic writing.[19] Jerz's deliberate conflation of multiple *Adventures*—game, text, and environment—implies that sometimes turning a literal face to the worlds of game fantasy can produce significant exchanges. Walkthroughs need not remain confined to any single realm of experience, and game environments cannot consider themselves impervious to correspondence with real-world environments, whether they are based on known places or not.

Again, Morton's *Ecology without Nature* proves a productive starting point for considering game environments as more than artificially isolated, ludic spaces. Although Morton focuses on the need to do away with the idea of nature and to recognize ecomimesis as only natural-seeming, drawing from the realm of art in its attempt to convey environments unadulterated by linguistic mediation, he also reserves some skepticism for what he calls the "supposedly antinatural bliss of sheer textuality" (*EWN* 32). While some might argue that a text game like *Adventure* lies at an even greater remove from the natural world than text penned or printed on paper—that its environments are doubly mediated by both language and code—Morton's hesitations suggest that *Adventure* need not be any less ecomimetic for all its computational permutations. Tellingly, many of the terms Morton turns to in his desire to outline the ecomimetic project are redolent of the discourses surrounding digital media—ecomimesis brings us "into a shared, virtual present time of reading and narrating," and Morton acknowledges "the significance of multimedia in general, and synesthesia in particular, in inspiring the notion of an ambient poetics," two aspects of which are "rendering" and "the medial" (*EWN* 35–36).

Morton seems to recognize a natural affinity between the virtual and the ecological, though in an oddly limited way. His concept of the virtual is tied to the outdated notion of virtual reality, a set of technologies and the concept directing them that have long been set aside as the products of an overzealous technological utopianism and the same historical conditions that gave rise to the furor over hypertext literature and talking robots. So, when

Morton points to the "surprising connections between the imminent ecological catastrophe and the emergence of virtual reality" (*EWN* 26), what he really means is that both experiences are "immersive," threatening to do away with distance or reference, mixing the inside and outside. However, he is at pains to remind us that the disorientation caused by the ecological is of far more import, because it entails real-world consequences. Should life continue on solely in virtual reality, the result would be "psychotic." Thus, virtual reality for Morton seems to be a convenient if stereotyped point for comparison, one that does little to recognize not only the kinds of technologies extant in today's games and digital worlds but also ignores many years of increasingly subtle thinking about these worlds and the kinds of "realities" they present. For Morton, virtual reality cannot help but produce an experience of anxiety. How do we know if this is real? Where does the real end and the virtual begin? These are questions that reveal a surprising naïveté about the actual experiences that can be found in virtual worlds.

A growing cadre of academics interested in games has called the very term "virtual reality" into question by positing the lack of a hard dividing line between its two aspects. One of these scholars, economist and emerging virtual world guru Edward Castronova, relegates the entire "virtual reality" paradigm to an appendix in his first book, *Synthetic Worlds*, casting it as a relatively inconsequential phase of technical development tangential to the kinds of player experiences found in massively multiplayer online games.[20] Castronova uses the metaphor of the permeable membrane to describe the easy passage between the ostensibly discrete fields of the real and the virtual, and his paramount examples are economic—for instance, the sale of virtual items and currency for real-world money. A wide range of research in the social sciences and humanities supports the observation that players do not experience virtual worlds as separate realities. Constance Steinkuehler, James Paul Gee, and Mia Consalvo, among others, point to games as extensive environments for learning and social bonding; anthropologist Bonnie Nardi describes play in a game like *World of War-*

craft as active aesthetic experience in terms originally set forth by philosopher John Dewey and activity theorist Alexei Leontiev; and in the essay "'Complete Freedom of Movement': Video Games as Gendered Play Spaces," Henry Jenkins has argued that "video games constitute virtual play spaces which allow home-bound children . . . to extend their reach, to explore, manipulate, and interact with a more diverse range of imaginary places than constitute the often drab, predictable, and overly familiar spaces of their everyday lives."[21] In a conclusion particularly relevant to ecocritical concerns, Jenkins credits video games as compensating for the loss of what was already in his generation not so much "wild" land as marginal land—areas of overgrowth or undeveloped property within or between suburban enclaves that allowed unsupervised young boys to exercise their bodies as well as their imaginations. Notably, Jenkins takes a position completely counter to that of Richard Louv, whose qualms about an electronic exclusion of the natural began this meditation.

Game environments necessarily exist somewhere between Jenkins's attractive idealization and Morton's worried skepticism. Although games might serve as a palliative for "latchkey" kids whose parents work long hours, or anyone without the means to adopt the "weekend warrior" mentality of the privileged, game environments are ultimately not the environments that players live in. Environmental justice activists remind us of the danger of deflecting our hopes for environmental quality onto the places other than where we live—whether those are national parks, wildlife sanctuaries, or compelling virtual realities. At the same time, games have always been subject to accusations of escapism, and, with Lisa Nakamura's description of online identity tourism in mind, we might advise ourselves of the dangers of virtual environmental tourism: the danger of a pleasant abstraction from actual environmental realities in need of our conscious attention and intervention.[22] Nevertheless, given that game sales generated $10.5 billion in revenue in 2009 and a reported 67 percent of American households play computer or console games, we cannot turn a blind eye to the kinds of game environments that are being produced and played.[23]

Environmental Texts: thatgamecompany's *Flower* and Digital Pollination

> Things don't have purposes, as if the universe were a machine, where every part has a useful function. What's the function of a galaxy? I don't know if our life has a purpose and I don't see that it matters. What does matter is that we're a part. Like a thread in a cloth or a grass-blade in a field. It is and we are. What we do is like wind blowing on the grass.
>
> *George Orr, in Ursula K. Le Guin's* The Lathe of Heaven

Most games oblige players to enter into a player-environment relationship based almost wholly on extraction and utilization of natural resources, which are often effectively infinite.[24] The few that dare to contemplate alternate schemas merit closer inspection, among them thatgamecompany's *Flower* (2009), available as a download on the PlayStation Network.[25] This lyrical, largely meditative game begins with images suggestive of urban ennui—a forlorn, potted flower drooping on an apartment windowsill, a brief cutscene portraying a breathless summer day in the city—but quickly expands into the imaginative realms of vegetal plenitude. Selecting the wilting flower carries you into *Flower*'s first level, a landscape of verdant hills and distant cliffs in which every blade of grass is lovingly rendered and curving lines of unopened flowers beckon you onward. You soon notice, however, that each level of *Flower* begins in an environment that is somehow marred or drained of its full vibrancy, marked, say, by swaths of withered grass, defunct machinery, or collapsed structures. Alighting on or brushing past unopened flowers causes them to bloom and effectively rejuvenates the surrounding landscape, infusing its moribund aspects with a mysterious natural energy.

Already, *Flower* seems well poised to fulfill the criteria for an "environmental text" presented by Lawrence Buell in *The Environmental Imagination*. For Buell, an "environmentally oriented work" is one in which

1. The nonhuman environment is present not merely as a framing device but as a presence that begins to suggest that human history is implicated in natural history.

Fig. 2. A windswept hillside in thatgamecompany's *Flower*. *Flower* is a trademark of Sony Computer Entertainment America Inc. Copyright © 2008 Sony Computer Entertainment America Inc. Developed by thatgamecompany.

2. The human interest is not understood to be the only legitimate interest.
3. Human accountability to the environment is part of the text's ethical orientation.
4. Some sense of the environment as a process rather than as a constant or given is at least implicit in the text.[26]

Above all, the ideal environmental text produces involvement. It brings the nonhuman world into equal prominence with the human, exposes humanity's moral responsibility to and participation in that world, and portrays environments as dynamic processes, not static representations. While not all games can satisfy all of these criteria, games seem especially well suited to fulfill Buell's final requirement—games are, after all, inherently processual, requiring rule-based, procedural interaction between a variable number of players and environments. In theory, games could use their ability to model environmental transformation to bring the first three criteria into play in instructive ways, for instance, by tying environmental change to player action or inaction.

At first glance *Flower* appears inclined to discard the human entirely in favor of the nonhuman. Each level begins with a telling inversion of the cutscenes found in other games, moments that typically showcase a game's most refined animation via cinematic glimpses into the lives of its key characters. In contrast, *Flower*'s cutscenes shift priority to the environment, suggesting human presence and activity only indirectly through abstract and elegiacally disjointed images of city life. As many of the game's reviewers have speculated, *Flower*'s levels also seem to represent the daydreams (and later nightmares) of domesticated plants—a quirky but appealing notion corroborated by the designers' decision to have players essentially act as wind or another such pollinator. Each level is therefore an invitation to inhabit multilayered nonhuman consciousnesses, and by opting not to offer its players human or even humanoid avatars, *Flower* productively destabilizes traditional notions of both player corporeality and player agency and perspective. Taking full advantage of the PlayStation controller's SIXAXIS™ motion-sensing technology, the game encourages you to shed any sense of terrestrial bounding in favor of birdlike swooping and skimming. Moreover, you are essentially invisible except *through* your effects on the environment (for instance, the plants left undulating in the wake of the wind's coursing, or the artful suspension of multicolored flower petals gathered throughout each level, strongly reminiscent of the mobiles of Alexander Calder).[27]

Yet however tempting it might be to read *Flower* as a simple condemnation of urban blight and human encroachment on a pristine natural world, the game explicitly enables players to ameliorate the unfortunate consequences of human oversight. In earlier levels your actions return life to man-made inventions in much the same way that the natural landscapes are themselves restored: conscientious visitation of the game's eponymous flora sets defunct windmills turning and restores power to dead electrical lines as easily as it creates bioluminescent haystacks. In later levels, your aerial gallivanting helps to raise and repair buildings, or you weave your way through masses of twisted, electrified metal, gently opening ghostly white flowers that somehow render the wreckage harmless. Far from condemning human intervention, *Flower* attempts to bridge

the pastoral and the urban through the player's experiential journey from one environment to the other. Equal parts daydream and nightmare, the game, Janus-like, embodies both faces of ecological thinking as described by Morton in *The Ecological Thought*—the sunny optimism characteristic of "green" marketing as well as the dark undercurrents of waste, environmentally motivated despair, and the emptiness of space, all abject aspects of our existence on Earth.[28] In Morton's philosophy, games like *Flower* and *Adventure* can be considered ecologically minded insofar as they permit this essential confrontation with such unlit places beneath the surface of everyday life.

Although *Flower*'s landscapes are admittedly somewhat generic and the game does not strive for biological or ecological accuracy, considering the game in the light of Buell's criteria for environmental texts allows us to credit *Flower* for its foregrounding of natural environments as constitutive of, rather than supplementary to, gameplay. *Flower* also demonstrates that game environments are not solely technical or aesthetic constructs but affective ones as well.[29] Designer Jenova Chen describes his games as efforts to expand the emotional spectrum of games, and in *Flower*, emotional response proves crucial to the player's experience of ethical accountability to the environment.[30] As neuroscientist Antonio Damasio reminds us, emotions are not secondary to the base functionality of an organism, but are instead vital, innate cognitive tools that it uses to navigate and react to its environment: "Emotions provide a natural means for the brain and mind to evaluate the environment within and around the organism, and respond accordingly and adaptively." Moreover, that environment need not be physically present; an "emotionally competent stimulus" can be "a certain object or situation actually present or recalled from memory."[31] Damasio's research confirms my sense that games are not hermetically sealed objects, divorced from our everyday lives and the range of emotions we experience there. Emotion becomes part of a player's apparatus for negotiating virtual environments, and even games that present temporally remote scenarios—for example, narratives of future ecological disaster—can impress themselves forcefully on our psyche.

Why Moore's Law Doesn't Matter

Placing *Adventure* and *Flower* side by side in this discussion of game environments has already implicitly raised the matter of game realism and its relevance, if any, to ecocritical evaluation. While historically most of the game industry has tied itself to the notion that better games demand higher-quality graphics,[32] a few individuals have begun questioning this paradigm, among them designers aware of Japanese roboticist Masahiro Mori's notion of the "uncanny valley" and *New York Times* writer Edward Rothstein, who in 2002 penned the article "Realism May Be Taking the Fun Out of Games."[33] While Rothstein acknowledges that "One of the major goals of video game systems has been to simulate the real, to create images so lifelike, and movements so natural that there is no sense of artifice,"[34] he also notes a curiously anti-technological streak in many of the games developed for recent generations of home gaming consoles. He gives as an example Nintendo's game *Pikmin*, which begins with mechanical failure (the player's spaceship crashes on a distant planet) that can be resolved only with the help of the planet's ambiguously vegetal-animal creatures known as Pikmin. For Rothstein, *Pikmin* and other games like it demonstrate "a tension in the video game universe: technological powers are courted for their possibilities and resisted for their fetishistic demands." Ultimately, this leads him to posit a classificatory scale between games that leverage the increased realism offered by more powerful processors and graphics engines—fighting games, racing games, and shoot-'em-ups—and more "abstract" genres, like puzzle and mystery games, that rely less on visuals than the satisfactions of exploring an at first unknown and complex set of rules. In this taxonomic system, *Adventure* would presumably fall on one end of the spectrum and *Flower* on the other, while the games' essential similarity—their attention to environmental detail—falls out of focus. Rothstein's willingness to cede so much representational ground to the pyrotechnics of visual display risks discounting the many levels on which realism can be grounded.

Castronova agrees with Rothstein on at least one key point, observing that "Great graphics are neither necessary nor sufficient for

a successful synthetic world" (*SW* 88). Noting that the majority of massively multiplayer online role-playing games (MMORPGs) are medieval in theme, Castronova jokes that there can be such a thing as too much realism—as a case in point, would players want the disease and filth once characteristic of medieval cities in their Arthurian RPGs? Castronova resists reading this as evidence of nostalgia for a sanitized, pre-industrial past, concluding instead that game realism is only partially determined by its graphical quality: "All in all, the synthetic environment looks rather like a very nice painting. Even a dull painting would have been sufficient, but nevertheless, the painting is getting better and better every year" (*SW* 89). Castronova suggests that immersion does not spring from verisimilitude but rather from "selective fidelity" to chosen particulars, in a judgment reminiscent of Roland Barthes's description of the "reality effect" in literary discourse. This productive decoupling of "immersion" from graphics reminds us that realism is never purely the domain of the visual and that immersion requires little more than the "magic circle" provided by games or game-like scenarios.[35] Alexander Galloway has usefully approached game realism from the standpoint of "social realism," whereby one evaluates a game's realism in terms of the conformity between the game world and the player's social, political, and other lived contexts.[36] The double-axis game classification model presented by Galloway in *Gaming* presents another way of evaluating the environmental quality of games: games that are meaningfully environmental distribute agency and intelligence more evenly between the machine and operator poles, and necessarily draw a connection between the diegetic world of play and the nondiegetic world of the player. What matters here is the unhitching of realism from crisp visual detail and other forms of postmillennial game design—polygon count (higher numbers mean less jagged edges), texture mapping (the lieutenant's suit looks like real wool), and haptic feedback (the controller shakes when you fire a gun) among them. As Microsoft, Sony, and Nintendo all develop toward game consoles featuring body mapping, voice recognition, and motion-sensitive control, games like *Adventure* and *Flower* expose the quixotic nature of any quest to break down the perceived barriers between artifice and reality.

The varieties of environmental realism encountered in *Adventure* and *Flower* already offer a tempting basis for a defense of video games. So much anti-game rhetoric takes the form of concern over children's time spent sequestered indoors ("Why are you playing games in here when you could be playing outside?"), following the same pattern established by attacks on the ecocritical project ("Why write about the environment when you could just go outside?"). The same flaws characterize both avenues of questioning: not only do such questions posit a falsely limiting either/or, but they also rely on the positivist supposition that the only way to experience nature is to be exposed to the elements. Although in radically different ways, Buell and Morton both remind us why we should bother to create literature and art (and games) that portray people's relationship to their environments. Rather than seeing such works as introducing a barrier to understanding, we can see the particular realization of an environment—whether textual, visual, or procedural—as a filter that helpfully selects certain aspects for consideration while excluding others, not unlike Max Black's description of the function of metaphor in language or Andy Clark's argument in *Natural-Born Cyborgs* that what distinguishes humans is their capacity to complement and extend limited powers of reasoning with tools and other forms of environmental "scaffolding."[37] Like the best literary texts or artworks, games allow for a range of interpretation. Importantly, they provide this through active, exploratory play. Games offer environments that are not stable, but shifting, that react to player input, and, in the case of social worlds, that reflect the actions not of just one person but many, so that the game environment becomes a document of collective yet not necessarily cooperative processes. Ecocritical play, should we attempt it, would recognize that to play is always in some way to inhabit, and in acknowledging the ecomimetic properties of games as environmental texts, we might begin to erode the oft-posited but little-experienced divisions between the real and the virtual, the ecological and the literary, the visual and the textual.

Notes

1. Richard Louv, *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder* (Chapel Hill: Algonquin Books, 2005).
2. See John David Funge, *Artificial Intelligence for Computer Games: An Introduction* (Wellesley: A. K. Peters, 2004). Game AI concerns itself with operations like pathing and collision detection, ensuring that agents in the game world travel by logical routes without bumping into barriers and each other. Game AI is typically considered "weak AI," or what some consider behavioral, as opposed to cognitive, AI—the difference between thinking and acting *like* a human and truly thinking and acting. My proposal to extend game AI to game environments stems from the recognition that game AI derives its strength from the interaction of players and non-players within a richly contextual game world. Games invite us to blur the traditional boundaries between human and nonhuman, organic and inorganic, in ways that invalidate or render secondary the customary linkage of AI with self-contained, artificially isolated intelligent programs.
3. Artist Cory Arcangel effectively parodies this layering with his *Super Mario Clouds* series, in which he hacks Nintendo game cartridges to erase all content but the background of fluffy white clouds.
4. Though "localization" is a common practice in game development, it generally refers to language translation (e.g., English subtitling or voice dubbing for what was originally a Japanese release). A game that has been localized has thus been made linguistically (though not necessarily culturally) intelligible as a requisite for international distribution, but the in-game environment remains the same across all versions. By environment I mean not only topography but also the flora and fauna that should be coextensive with such topography, and their manifestation via images, sound design, and potential for interaction. Thus localization is somewhat of a misnomer, as it is an attempt to universalize the game through the application of customized veneers. Of course, this is not to say that all games must assiduously eco-localize their games—beyond the obvious impracticality of such a mandate, clearly one joy of the fantasy environment is that it need not be tied to real-world equivalents. For more on game localization, see Stephen Mandiberg, "Translation (is) Not Localization: Language in Gaming," UC Irvine: Digital Arts and Culture 2009, http://escholarship.org/uc/item/6jq2f8kw.

5. Raymond Williams, *The Country and the City* (New York: Oxford University Press, 1973), 54.
6. Industry badboy Rockstar Games seems to be moving in this direction: the *Grand Theft Auto* games evolved from taking place in "Anywhere, USA" to site-specific installments like *GTA: San Andreas*, which unfolds in fictional cities modeled closely on San Francisco, Las Vegas, and Los Angeles. The company also released the "open world" game *Red Dead Redemption* in 2010, which plays out in the last days of the frontier in the American West and features over forty species of wildlife (including bison) as both potential predators and prey.
7. Bonnie A. Nardi, *My Life as a Night Elf Priest: An Anthropological Account of WarCraft* (Ann Arbor: University of Michigan Press, 2010); see Nick Yee, "The Virtual Skinner Box," http://www.nickyee.com/eqt/skinner.html.
8. Timothy Morton, *Ecology without Nature: Rethinking Environmental Aesthetics* (Cambridge: Harvard University Press, 2007). Hereafter cited as *EWN*.
9. In its early years, game studies addressed much of its energy to bridging internal rifts, most prominent among them that between ludologists and narratologists. While narratologists insisted on the continuity between games and other media, ludologists sought to disentangle themselves from methodologies traditionally associated with literature and film, stressing the unique mechanics of game design and predicating the computer and console game's medium specificity on the basis of code and microchip, binary streams of data, and algorithmic or procedural operations. In recent years this division has given way to the phenomenal outgrowth surrounding the term *play*, which conveniently seems to bypass the lingering stigmas surrounding games in favor of articulating a broader cultural phenomenon. However, even the fashionably vague concept of play has made it difficult to posit a more explicitly environmental approach to games, one that might dethrone the reigning player- or designer-centered paradigms in order to acknowledge game environments as determining components of player experience, with the potential to edify and spark curiosity about the out-of-game world. When game designers and theorists take game environments for granted, they perpetuate, at worst, indifference to one's lived surroundings, and at best, a shallow specular consumption.
10. Morton uses the following passage from Lawrence Buell as an example of ecomimetic writing: "The grove of second-growth pine trees

that sway at this moment of writing, with their blue-yellow-green five-needle clusters above spiky circles of strophied lower limbs."

11. Dana Phillips, *The Truth of Ecology: Nature, Culture and Literature in America* (New York: Oxford University Press, 2003), 7. Hereafter cited as *TE*.
12. Perhaps because the nature-writing tradition and poetic precursors in the Romantic period are so strong, ecocritical perspectives have thus far been largely confined to the status of text in conventional literary objects.
13. See James Paul Gee, *What Video Games Have to Teach Us about Learning and Literacy* (New York: Palgrave Macmillan, 2007); and Ian Bogost, *Persuasive Games: The Expressive Power of Videogames* (Cambridge: MIT Press, 2007).
14. ELIZA, a natural-language processing program written by Joseph Weizenbaum at MIT in the 1960s, famously simulated a Rogerian psychotherapist in its interaction with users.
15. In "Somewhere Nearby Is Colossal Cave: Examining Will Crowther's Original 'Adventure' in Code and in Kentucky" (*Digital Humanities Quarterly* 1, no. 2 [2007]), Dennis G. Jerz reminds his readers that "Caver terminology often employs architectural metaphors. For instance a 'room' is any discrete space, no matter the shape; a 'hall' is any long space, a 'chimney' is a pit when seen from below, and a 'dome' is the roof of a pit" (section 76). Hereafter cited as "SN."
16. Rick Adams, "Colossal Cave Adventure page," http://www.rickadams.org/adventure/index.html.
17. Roger W. Brucker and Richard A. Watson, *The Longest Cave* (New York: Knopf, 1976), 109.
18. Henry Jenkins, "Game Design as Narrative Architecture," in *The Game Design Reader*, ed. Katie Salen and Eric Zimmerman (Cambridge: MIT Press, 2006), 676.
19. This strongly emphasized second person may seem at first glance to differ distinctly from the usual first person of ecomimetic description. Notice, however, that Morton's first example of ecomimesis in "The Art of Environmental Language" is Denise Levertov's poem "To the Reader," which addresses its reader with the repeated strain "As you read," which for Morton is simply an inversion of the ecomimetic "as I write" (*EWN* 30). According to Morton, in Levertov's poem "the effect is the same, or even stronger, for, as in advertising language, 'you' becomes a niche in the text, specifically designed for the actual reader" (*EWN* 30). Thus the use of the second person does not automatically invalidate the walkthrough's ecomimetic properties.

20. Edward Castronova, *Synthetic Worlds: The Business and Culture of Online Games* (Chicago: University of Chicago Press, 2005). Hereafter cited as *SW*.
21. See Bonnie Nardi, *My Life as a Night Elf Priest: An Anthropological Account of World of Warcraft* (Ann Arbor: University of Michigan Press, 2010); and Henry Jenkins, "'Complete Freedom of Movement': Video Games as Gendered Play Spaces," in *From Barbie to Mortal Kombat: Gender and Computer Games*, ed. Justine Cassell and Henry Jenkins (Cambridge: MIT Press, 1998), 262–97, 263.
22. See Lisa Nakamura, *Cybertypes: Race, Ethnicity, and Identity on the Internet* (New York: Routledge, 2002).
23. "Entertainment Software Association-Industry Facts," http://www.theesa.com/facts/index.asp.
24. Examples abound in the popular genre of "real-time strategy" (RTS) games, in which resource management is a key component of gameplay. Although RTS games tend to enforce resource limitations (mines that can be depleted, timber stands that do not grow back), this valuable ecological lesson gets trampled by pressures to "use it or lose it." Some might argue that games by definition must present limits, since they necessarily entail competition over scarce resources, whether those be time, mineral deposits, food, or screen space (think of the falling blocks in *Tetris*). But without disputing the centrality of constraints to gameplay, I might still point to something like Roger Caillois's taxonomy of games in *Man, Play and Games*, in which games of conflict (agôn) constitute only one, albeit primary, category of games, alongside the categories of alea (games of chance), mimicry (improvisational and theatrical games), and ilinx (games of vertigo).
25. *Flower* is largely the vision of artist and game designer Jenova Chen, whose first game, *flOw*, modeled microbial life and whose forthcoming game *Journey* promises to instill in players a sense of insignificance in relation to their surroundings, allowing them to experience distance, duration, and scale in ways that decenter typical player fantasies of mastery and control.
26. Lawrence Buell, *The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture* (Cambridge: Harvard University Press, 1995), 7–8.
27. Surprisingly, the result is not a lack of embodiment so much as an amorphous embodiment, as the game offers several forms of interaction feedback: the controller responds to the rotation of your hands and wrists and gently shakes at appropriate times (haptic feedback

via DualShock technology), while its elegant sound design allows you to trigger satisfying tonal bursts by rushing over and through unopened flowers.

28. See Timothy Morton, *The Ecological Thought* (Cambridge: Harvard University Press, 2010). Morton set his vision of the ecological against many of the established precepts of modern environmentalism. He urges us to think globally, not locally, big, not small, celestial, not terrestrial, and so on.
29. While some support the concept of a computational sublime or, more generally, aesthetic computing, Lev Manovich has argued the opposite—that "data art" actually represents the "anti-sublime"—while still conceding the power of programming in his essay "The Anti-Sublime Ideal in Data Art" (self-published, 2002, http://www.manovich.net/DOCS/data_art.doc).
30. Jenova Chen (Creative Director, thatgamecompany), in discussion with the author, March 2010. Unfortunately, making game progress contingent on mechanics of visitation and restoration rather than exploitation and strife remains something of an industry anomaly, though even as hard-core gamers decry *Flower*'s lack of firearms and undead legions, others, Sony executives included, prophesy the rise of "Zen" gaming. Zen for most Americans seems to serve as shorthand for a facile kind of meditative experience, but there appear to be genuine resonances between *Flower*'s aesthetics and Zen Buddhist art, with its experiential focus and emphasis on natural subjects.
31. Antonio Damasio, *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain* (Orlando: Harcourt, 2003), 32.
32. Moore's Law is named after Intel co-founder Gordon Moore, who predicted in the 1960s that integrated circuits could double the number of transistors they could contain about every two years (twenty months). The law is often used to predict the exponential growth of computer processing power.
33. Mori hypothesized that humanoid robots designed to look more and more lifelike would trigger positive emotional responses from humans only up to a critical point, just before true verisimilitude, at which human response would actually be less favorable because the robots would appear eerie, or uncanny. This notion of the "uncanny valley" has been applied to numerous objects, often products of digital special effects, from horror films to children's toys to video game art (as in, for example, the *Final Fantasy* series).
34. Edward Rothstein, "Realism May Be Taking the Fun Out of Games," *New York Times*, April 6, 2002.

35. Johan Huizinga popularized the term "magic circle," which has become somewhat of a tired catchphrase in game studies, invoking the boundary crossing that occurs when players enter game worlds, setting aside the rules and habits of the world exterior to the circle and taking on new personas and agendas within the circle.
36. Alexander Galloway, *Gaming: Essays on Algorithmic Culture* (Minneapolis: University of Minnesota Press, 2006).
37. Andy Clark, *Natural-Born Cyborgs: Minds, Technologies, and the Future of Human Intelligence* (Oxford: Oxford University Press, 2003).