Comment on sources: To preserve the flavor of contemporary discourse, quoted sources are presented verbatim, including any grammatical peculiarities or typographical errors, and without editorial intervention unless needed for clarity. For the sake of accuracy, citations of online materials are historically specific whenever possible, referring to original hosting websites, full URLs, and dates of first publication or appearance unless otherwise indicated. Although some websites may have disappeared or changed over time, for the most part, the specific materials cited here can still be accessed through the Internet Archive’s Wayback Machine or other web-archiving initiatives. However, other materials—such as those hosted on sites that block web crawlers—have not been publicly archived. Copies of all cited documents and media materials are on file with the author.

Introduction
1. Developed by Toaplan in 1989, Zero Wing was originally an arcade game before it was ported to the Mega Drive in Japan in 1991. For the console version, Toaplan added the introductory scene to expand the narrative context. Sega published the English-language version for the European market in 1992.

2. Many gamers have noted that cats bears an uncanny resemblance to the Borg from Star Trek, not only visually but also rhetorically, insofar as the cats leader echoes the Borg’s characteristic threats of total assimilation. As one Zero Wing fan explains, “The introduction shows the bridge of a starship in chaos as a Borg-like figure named cats materializes and says, ‘How are you gentlemen!! All your base are belong to us.’ . . . Has many of the connotations of ‘Resistance is futile; you will be assimilated.’” See Biohertz, “All Your Base Are Belong to Us,” Urban Dictionary, January 30,

3. See Poster, Information Please; Jenkins, Convergence Culture; Krapp, Noise Channels; and Nunes, Error.

4. Around 1999, a GIF made from the English-language opening scene of Zero Wing began to replicate on the internet, hosted on the Rage Games forum, the Zany Video Game Quotes website (http://zanyvg.overclocked.org), and elsewhere. By 2000, remixes and dubs started to appear, such as the Zero Wing Dub Project on OverClocked, along with an explosion of image macros developed on Something Awful and the TribalWar forums. In 2001, Bad_crc of the TribalWar forums created a music video for “Invasion of the Gabber Robots” by The Laziest Men on Mars—a hardcore techno song that samples liberally from the Zero Wing soundtrack—showcasing a variety of the joke macros and media pranks inspired by Zero Wing. As this video went viral, it triggered other remix experiments. Since then, the Zero Wing meme has continued to evolve and diversify—even if some of the ineffable humor of its early years has diminished over time. On the development of the meme, see Jeffrey Benner, “When Gamer Humor Attacks,” Wired, February 23, 2001, http://www.wired.com/2001/02/when-gamer-humor-attacks/; Chris Taylor, “All Your Base Are Belong to Us,” Time, February 25, 2001, http://content.time.com/time/magazine/article/0,9171,100525,00.html; and Triple Zed, Jamie Dubs et al., “All Your Base Are Belong to Us,” Know Your Meme, May 1, 2016, http://knowyourmeme.com/memes/all-your-base-are-belong-to-us. On the propagation and cultural effects of such internet memes, see Shifman, Memes in Digital Culture; W. Phillips, This Is Why We Can't Have Nice Things; and Milner, World Made Meme.

5. For key accounts of technogenesis, the emergence of technical beings and collectivities in relation to the technical production of the human itself, see Simondon, On the Mode of Existence of Technical Objects; Stiegler, Technics and Time, 1; Waldby, Visible Human Project; Hansen, Bodies in Code; Loeve, “About a Definition of Nano”; Denson, Postnaturalism; and Hayles, How We Think.

6. S. Mitchell, Technogenesis, 28, 94.

7. McCarthy, Bloom, 6, 100.

8. The philosophers Jacques Derrida and Bernard Stiegler have theorized this condition as originary technicity or originary prostheticity. See Derrida, Of Grammatology; Derrida, Archive Fever; Derrida and Stiegler, Echographies of Television; and Stiegler, Technics and Time, 2. For context, see Beardsworth, Derrida and the Political; Bennington, Interrupting Derrida; and Mackenzie, Transductions.

9. See Genosko, When Technocultures Collide; Beyer, Expect Us; Burkart, Pirate Politics; Dunbar-Hester, Low Power to the People; Hurley, Geek Feminist Revolution; Postigo, Digital Rights Movement; Sarkar, “Media Piracy and the Terrorist Boogeyman”; W. Phillips, This Is Why We Can't Have Nice Things; and Coleman, Hacker, Hoaxer, Whistleblower, Spy. Riffing on James Scott’s concept of “weapons of the weak” and forms of peasant resistance, Coleman describes such technopolitical practices as “weapons of the geek.” She writes that “weapons of the geek is a modality of politics

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exercised by a class of privileged and visible actors who often lie at the center of economic life. . . . What they all have in common is that their political tools, and to a lesser degree their political sensibilities, emerge from the concrete experiences of their craft, like administering a server or editing videos. Often these skills are channeled into activities in order to bolster civil liberties, such as privacy. Unlike peasants who seek to remain inconspicuous and anonymous even as a group, geeks and hackers—even the anonymous Anonymous—explicitly call attention to themselves via their volatile, usually controversial, political acts (107). See also Coleman, “From Internet Farming to Weapons of the Geek.” On technopolitics as the enactment of political processes through technological use and development, as well as the political qualities of technologies themselves, see Hecht, *Radiance of France*; T. Mitchell, *Rule of Experts*; Conway, *High-Speed Dreams*; and Edwards, *Vast Machine*.


13. *Doom* instruction manual (Mesquite, Tex.: id Software, 1993), 7. The “*respawn*” parameter is described in the *Doom* “readme.txt” file as follows: “*respawn* tells *doom* that, yes, you are a badass, and yes, you want all the monsters to respawn around 8 seconds after you kill them.” See “Welcome to v1.8 of *doom!*” readme.txt, *Doom* version 1.8 (id Software, 1995).


15. See Thacker, *Global Genome*; Sunder Rajan, *Biocapital*; Cooper, *Life as Surplus*; and Stevens, *Life out of Sequence*. As Stevens writes, “Biological databases are not like archives and museums—they are oriented toward the future more than the past” (138–39).


17. See Weis, “Bio-Gaming”; Weis; “*Assassin’s Creed* and the Fantasy of Repetition”; and Parkin, *Death by Video Game*.


20. See Jenkins, *Fans, Bloggers, and Gamers*; Taylor, *Play between Worlds*; Taylor; “Pushing the Borders”; Jones, *Meaning of Video Games*; and Consalvo, “There Is No Magic Circle.” On wandedashing and other specialized practices that enable new emergent forms of play in and around existing game objects, see Boluk and LeMieux, *Metagaming*. As Boluk and LeMieux argue, the expansion of a game beyond itself into other games and gamelike practices (*metagaming*) always redefines the game, recursively producing and re-producing its conditions of playability, such that the game becomes less the origin than the effect of the metagame: “Before a videogame can ever be played—before software can be considered a game in the first place—there must be a metagame” (9).


22. Anonymous Network, “Message to nsa—Anonymous #Opnsa,” YouTube, August 1, 2013, http://www.youtube.com/watch?v=TinLuKuSnaU. This video was originally released in early June 2013. It was uploaded many times to YouTube and other websites over the following two years, along with several related Anonymous videos about Opnsa. For additional details about Opnsa activities, see the AnonOps website, *Operation nsa: Make Privacy Matter*, 2013, https://anonops.com/opnsa/. See also the @AnonymousOpnsa Twitter stream, https://twitter.com/AnonymousOpnsa, which helped to propagate the #Opnsa hashtag. Some members of Anonymous had previously tried to launch #Opnsa in January 2012, responding to emerging details about surveillance activities of the U.S. cyber-military-industrial complex that were already becoming known prior to the Snowden revelations. For example, NSA’s secret Turbulence program (designed to monitor hackers around the world and launch preemptive cyberattacks) as well as some other electronic eavesdropping practices had been reported as early as 2007. See Bamford, *Shadow Factory*. Further indications of mass surveillance had come to light thanks to the Anonymous-affiliated Operation Metal Gear team coordinated by Barrett Brown, later rebooted as Project PM. (Notably, the focus of Operation Metal Gear on exposing mysterious cybersecurity projects took a cue from the *Metal Gear* and *Metal Gear Solid* video game series.) These efforts had found evidence of various spying programs by analyzing email data from the Anonymous hack of the HBGary security firm in February 2011, as well as additional data gathered from other security contractors in the same year. The first Anonymous video to declare Opnsa explained:

Greetings Citizens of the World. We are Anonymous. For years, the NSA has been tasked with protecting the United States by gathering foreign intelligence of threats against its citizens and military. But this agency has unlawfully been monitoring civilian Internet and communications. The media and U.S. government has been frowning on our Operations when they themselves have done their fair share of what they call “hacking.” The Nixon, George W. Bush, and Obama administration have been involved in wiretapping of the public.
Operation Turbulence is the current reincarnation of the NSA’s programs that include data mining and malware injection into computers. Congress and politicians know of these programs and support them, even when they break our privacy. This is a formal message to the NSA, Congress, and the current administration . . . STOP! You have been warned. . . . We are Anonymous. We are Legion. We do not forgive. We do not forget. Expect us. (runmonkey75, #OpNSA.wmv, YouTube, January 26, 2012, https://www.youtube.com/watch?v=U7LOWGmGXIE)

Despite such early provocations, OpNSA was left simmering until the Snowden leaks happened. At that point, Anonymous turned it up to a full boil, organizing diverse protest actions.

25. Greenwald, No Place to Hide, 46. On the various ways that games can intervene in politics, including via content, narrative form, procedural rhetoric, and other means, see Bogost, Persuasive Games; Losh, Virtualpolitik; Dyer-Witheford and de Peuter, Games of Empire; Burak and Parker, Power Play; and Jagoda, “Videogame Criticism and Games in the Twenty-First Century.”
29. See Lenoir and Caldwell, Military-Entertainment Complex; Der Derian, Virtuous War; Kline, Dyer-Witheford, and de Peuter, Digital Play; Crogan, Gameplay Mode; Halter, From Sun Tzu to Xbox; Huntemann and Payne, Joystick Soldiers; Mead, War Play; Payne, Playing War; and Allen, America’s Digital Army.


33. On the ways in which new forms of life arise in technoculture as contests over structures of meaning and the rules of play, see Fischer, Emergent Forms of Life and the Anthropological Voice; Fischer, Anthropological Futures; Epstein, Impure Science; Juris, Networking Futures; and Choy, Ecologies of Comparison. On gaming as a zone of sociopolitical conflict, see Dyer-Witheford and de Peuter, Games of Empire, and J. Wright, Embrick, and Lukács, Utopic Dreams and Apocalyptic Fantasies.


36. On the rhetoric of futurity that often adheres to gaming hardware, see Maher, Future Was Here; Milburn, Mondo Nano; and Altice, I Am Error. As Michael Newman shows, the early personal computer industry also pushed the idea of computers as toys while emphasizing their futuristic orientation, advertising them as serious high-tech devices that would transform both labor and leisure in the society of tomorrow. Ads for personal computers such as the Radio Shack TRS-80 and the Commodore VIC-20 featured Isaac Asimov, William Shatner, and other figures from the world of science fiction playing video games on home computers while indicating that these devices were capable of far more than mere entertainment. See M. Newman, Atari Age, 115–52.
By the time Apple launched the Macintosh in 1984 with its famous Orwellian Super Bowl ad, presenting the Macintosh as a sporty hacker weapon against technological authoritarianism, the science-fictional sheen of personal computing and video games had been well established. See Friedman, *Electric Dreams*, and Bukatman, *Terminal Identity*.


ONE. *May the Lulz Be with You*

1. On *Spacewar!* and its role in the evolution of hacking, see Brand, “Spacewar”; Levy, *Hackers*; Barton and Loguidice, “History of *Spacewar!*”; and Turkle, *The Second Self*. The *Spacewar!* project and other hacker experiments indicate how computer programming is itself a form of play; see Wells, “Programmer as Player.” On ways that *Spacewar!* and university labs influenced the development of the games industry, see Lowood, “Videogames in Computer Space.” While *Spacewar!* has often functioned as an origin myth for hackers, the history of hacking actually reveals multiple genealogies and microcultures, especially in global context; see Coleman and Golub, “Hacker Practice,” and Kelty, *Two Bits*.


12. The hacker and security researcher Raphael Mudge originally released Armitage in November 2010. Armitage is a graphical interface for the Metasploit framework, named after the character Armitage in *Neuromancer*, a former military cyberoperative who is controlled by the AI Wintermute. Mudge developed Cortana in 2013 as a scripting engine to extend the capacities of Armitage and to create automated bots for penetration testing. The Cortana scripting engine is named after the friendly AI in the *Halo* games, a companion to the Master Chief and an efficient instrument of netwar. (As a hacker tool, Mudge’s Cortana seems well aligned with the character of Cortana in the *Halo* series, unlike Microsoft’s own virtual personal assistant for Windows 10 and Xbox One, which is also named Cortana but proves to be rather less hack-friendly.) Mudge has often pointed to a range of speculative ideas and concerns raised by hacking tools such as Armitage and Cortana, even beyond their allusive names. For instance, in a tutorial document for Cortana, he quips, “To prevent self-aware bots from taking over the world, Cortana has blanket safety features to provide positive control when enabled.” See Raphael Mudge, *Cortana Tutorial*, May 21, 2013, available at http://www.fastandeasyhacking.com/download/cortana/cortana_tutorial.pdf. On Berlin’s c-base and its wonderful mythology, see the website c-base >>> Raumstation unter Berlin, www.c-base.org. See also the book *c-book: 20 Years of the c-base* (Berlin: c-base e.v., 2015).

13. On Emmanuel Goldstein, Hagbard, the Legion of Doom, and their relations to science fiction, see Goldstein, *Best of 2600*; Sterling, *Hacker Crackdown*; Hafner and Markoff, *Cyberpunk*, 160–61, 234–35; and Slatalla and Quittner, *Masters of Deception*. Count Zero of the Cult of the Dead Cow (cdc) is one of several hackers who have sported the same handle. He has often narrated his own backstory using elaborate science fiction tropes: “Count Zero is a man of science. Abandoning a promising career as a neurologist and cabaret dancer, he joined the cdc as their official Surgeon General where he performs surgical bio-enhancements on all members to keep them...
operating at peak performance during space battles and onstage performances. He is a hacker of the human brain and a connoisseur of fine Bordeaux and crunchy breakfast cereals. Ultimately scorned by the medical establishment for his radical ideas and flashy jewelry, he operates out of a hidden medical laboratory beneath the ice cap in Antarctica. When fighting crime, he outfits himself in a black jumpsuit augmented with bio-mechanical weapons and surgically attached robotic homunculi. Turn-ons include long walks in the park and sunsets. Zero fights the good fight, preparing for the future showdown against the evil robots for the fate of mankind.” See Count Zero, “About—Team Bio,” Cult of the Dead Cow, 2008, http://w3.cultdeadcow.com/cms/team_bio.html.

On Team GhostShell’s global hacking activities and its manifestos about Dark Hacktivism (“Information Is Everything”), see Team GhostShell’s Pastebin, https://pastebin.com/u/TeamGhostShell. On Sandworm Team, see Ward, “isIGHT Discovers Zero-Day Vulnerability,” isIGHT Partners, October 14, 2014, http://www.isightpartners.com/2014/10/cve-2014-4114; and Zetter, “Russian ‘Sandworm’ Hack Has Been Spying on Foreign Governments for Years,” Wired, October 14, 2014, https://www.wired.com/2014/10/russian-sandworm-hack-isight/. While studying the hackers’ attacks on foreign governments and infrastructures, researchers at the isIGHT security firm came up with the name after noticing a surprising number of Dune connections, for example, in the hackers’ use of base64-encoded urls for command-and-control servers that would translate as “arrakis02,” “houseatreides94,” and so forth. On the Shadow Brokers and the geopolitical implications of the NSA exploit leak, the ways in which citizens and businesses become collateral damage in the games of cyberwarfare played by government actors, see van Der Walt, “Impact of Nation-State Hacking on Commercial Cyber-Security.” On the Decepticons, the Shadow Brokers, and the concept of a “public interest hack” where private information is dumped on the internet for the sake of public, sometimes even civic interest, see Coleman, “Public Interest Hack.”

16. See Canaday, Nuclear Muse; Brake and Hook, Different Engines; Milburn, “Modifiable Futures”; Milburn, “Ahead of Time”; Shoch and Hupp, “‘Worm’ Programs.”
18. Fleischmann and Templeton, “Past Futures and Technoscientific Innovation,” 1. Other sociological studies have offered similar assessments. In 1954, for example, the sociologist Arthur S. Barron noted that the most avid consumers of science fiction at the time tended to be scientists, engineers, and others working in technical fields, suggesting the genre’s capacity to affirm and cultivate a scientific disposition. See Barron, “Why Do Scientists Read Science Fiction?”
20. See Jameson, Archaeologies of the Future, and Wegner, Shockwaves of Possibility. On the ways in which different communities of practice shape the cognitive and social affordances of speculative fiction, including its political horizons, see Hassler-Forest, Science Fiction, Fantasy and Politics, and Rieder, Science Fiction and the Mass Cultural Genre System.

22. See Cusack, “Science Fiction as Scripture.”


26. Coleman interviewed in *We Are Legion* (2012, dir. Brian Knappenberger). There is actually a long history of conflict between hacker geeks and the Church of Scientology. In 1995, for example, one of the church’s lawyers tried to shut down the alt.religion.scientology Usenet group for distributing proprietary Scientology documents and facilitating abusive discussions of the church. In response, the Cult of the Dead Cow declared war on the church, leading to sustained hacker interest and scrutiny of Scientology as a symbol of information suppression.

27. On the development of LOIC and the practices of DDOS, see Sauter, *Coming Swarm*.


34. Topiary, “You Cannot Arrest an Idea,” Twitter, July 21, 2011, 7:02 p.m. (PT), https://twitter.com/atopiary/status/942257738960155872. Topiary was responding to a wave of Anonymous arrests in North America and Europe. His pointed allusion to V for Vendetta has become legendary, inspiring further adaptations. The Lizard Squad, for example, has reinvented Topiary’s aphorism with a reptilian wink. Following their attacks against various online game servers on November 23, 2014, and promising bigger stunts to come (“Cooking up something nice for later”)—perhaps looking ahead to their big Christmas 2014 takedown of the PlayStation Network and Xbox Live—the Lizard Squad tweeted, “You cannot arrest a lizard.” See Lizard Squad @LizardPatrol, “You Cannot Arrest a Lizard,” Twitter, November 24, 2014, https://twitter.com/LizardPatrol/status/53663331336141760. It has since become one of Lizard Squad’s mottos.


36. On the logics of conspiracy theory that inform the practices of hacktivism, see Krapp, Noise Channels.

37. OpLastResort, “United States Sentencing Commission Owned by #Anonymous,” Twitter, January 25, 2013, 8:41 p.m. (PT), https://twitter.com/OpLastResort/status/295028645993517056. The website defacement took place over the span of several hours that night. Although some of the initial changes to the site seemed haphazard, the attack plan had been set up long beforehand.


40. Anonymous, “Operation Last Resort.” OpLastResort was only one—albeit the most spectacular—of several attacks by Anonymous factions around the world against U.S. agencies in retaliation for the death of Aaron Swartz. For an overview of Swartz’s life and death, see the documentary The Internet’s Own Boy (2014, dir. Brian Knappenberger).


42. On the development of Asteroids and its genealogical debts to Spacewar!, Atari’s 1971 Computer Space (itself a commercialized reinvention of Spacewar!), Larry Rosenthal and Cinematronics’s 1977 Space Wars (the pioneering vector-graphics arcade...
game, likewise an adaptation of *Spacewar!*, and other ancestors, see Drury, “Making of *Asteroids*,” and Burnham, *Supercade*, 62, 184, 194–97. Ed Logg, the developer of *Asteroids*, has often emphasized the *Spacewar!* connection: “For example, when *Asteroids* was in development I used the ideas from *Spacewar!* to provide the game with hyperspace as well as the shape of the player’s ship”; Logg, quoted in Lorge and Antonucci, “Game Changers,” 49 (foldout sidebar). On the history and design constraints of *Asteroids* and other Atari games of that era, see Montfort and Bogost, *Racing the Beam*.


45. John Leyden, “FBI Sends Memo to US.gov Sysadmins: You’ve Been Hacked . . . for the Past Year,” Register, November 18, 2013, http://www.theregister.co.uk/2013/11/18/anon_us_gov_hack_warning/. Aside from bank-executive and witness-protection information, whatever data the hackers may have captured during Operation Last Resort has never been publicly released, allowing the criminal justice system to frame the legal and political stakes in an interpretive vacuum; see Follis and Fish, “Half-Lives of Hackers and the Shelf Life of Hacks.”

**TWO. Obstinate Systems**


3. See McDonough et al., “Twisty Little Passages Almost All Alike.”
6. Crowther, quoted in Peterson, *Genesis II*, 188.
8. Woods, quoted in Cordella, “Interactive Fiction?”
11. A. Clarke, *Profiles of the Future*, 21. The third law appears in the 1973 revised edition of *Profiles of the Future*, and, with slightly different language, in A. Clarke, *Report on Planet Three and Other Speculations*, 139. The other two laws are (1) “When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is probably wrong”; and (2) “The only way of discovering the limits of the possible is to venture a little way past them into the impossible.” Clarke revised the wording of these laws several times, even in later editions of *Profiles of the Future* (see especially his foreword to the Phoenix “Millennium Edition”). On the dispositions of wizard hackers and their relation to fictive archetypes, such as Gandalf and Jedi knights, see Brunton, *Spam*, 17–48.
12. Boluk and LeMieux, “Annotating *Adventure*.”


23. On Robinett’s virtuosic approach to the platform limitations of the Atari 2600 as opportunities for innovation, likewise constrained by the ungenial working conditions at Atari, see Montfort and Bogost, *Racing the Beam*.


27. Dyer-Witheford and de Peuter, *Games of Empire*.


33. In this regard, *System Shock* echoes Michel de Certeau: “In the arena of scientific research (which defines the current order of knowledge), working with its machines and making use of its scraps, we can divert the time owed to the institution; we can make textual objects that signify an art and solidarities; we can play the game of free exchange, even if it is penalized by bosses and colleagues when they are not willing to ‘turn a blind eye’ on it; we can create networks of connivances and sleights of hand; we can exchange gifts; and in these ways we can subvert the law that, in the scientific factory, puts work at the service of the machine.” See de Certeau, *Practice of Everyday Life*, 27–28. On the ways in which video games both replicate and sometimes resist the corporate logics of the neoliberal era, see Dyer-Witheford and de Peuter, *Games of Empire*.

34. Billy Idol, “Shock to the System,” *Cyberpunk* (Chrysalis Records, 1993). On Idol’s *Cyberpunk* album in the context of science fiction discourse, as well as the cultural and racial politics of the “shock to the system” motif, see Foster, *Souls of Cyberfolk*. 

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36. See Kilgore, Astrofuturism; Markley, Dying Planet; and Stuhlinger and Ordway, Wernher von Braun.
37. On games as educational and skill-building tools, see Gee, What Video Games Have to Teach Us; S. Johnson, Everything Bad Is Good for You; Ching and Foley, Constructing the Self in a Digital World; Davidson, Now You See It; Ito, Engineering Play; and Nguyen, “Minecraft and the Building Blocks of Creative Individuality.”
38. Kay et al., System Shock 2: Prima’s Official Strategy Guide, 128–33. On cheat codes, walkthroughs, strategy guides, and other forms of licit illicitness in gamer culture, see Consalvo, Cheating, and Consalvo, “Zelda 64 and Video Game Fans.” On paratextual materials as shaping the meaning of gameplay and game narratives, see Jones, Meaning of Video Games. On out-of-game practices as reconstituting and renewing the game as such, see Boluk and LeMieux, Metagaming.

THREE. Still Inside

1. See Burden and Gouglas, “Algorithmic Experience.” These same themes extend through Portal 2 and its pointed satire of corporate agricultural biotechnology; see Wills, “Corporate Agriculture and the Exploitation of Life in Portal 2.” The GLaDOS-controlled Aperture facility, like the SHODAN-controlled Citadel and Von Braun, represents an archetypal space of the military-industrial imagination, what Paul Edwards has called the closed world: “enclosed and insulated, containing a world represented abstractly on a screen, rendered manageable, coherent, and rational through digital calculation and control.” See Edwards, Closed World, 104.
2. Raley, Tactical Media, 6, 12. For further analysis of tactical media practices as modes of resistance and critique, see Lovink, Dark Fiber; Galloway, Protocol; Thacker, Global Genome; and da Costa and Philip, Tactical Biopolitics.
3. On ways that consumers transformatively appropriate media technologies and media narratives, see Jenkins, Textual Poachers; Penley, NASA/Trek; Eglash et al., Appropriating Technology; and Hilderbrand, Inherent Vice.
4. The 2011 graphic novel Portal 2: Lab Rat, published by Valve to create retroactive continuity between the first game and its sequel, establishes that the other survivor in the facility is Doug Rattman, a former lab technician at Aperture.
5. GLaDOS’s mind games here resemble the infamous Milgram experiment on obedience to authority figures; see Burden and Gouglas, “Algorithmic Experience.”
8. On glitching as subversive play that nevertheless affirms the exploratory spirit of gaming, see Consalvo, Cheating; Boluk and LeMieux, Metagaming; and Schleiner, Player’s Power to Change the Game. On glitches and glitch gaming as both intrinsic and resistant to the dominant logics of efficiency and control, see Krapp, Noise Channels.


12. wearelegionanon2, “GLaDOS Guide to February 10th,” YouTube, January 29, 2008, https://www.youtube.com/watch?v=PkJhR79ujw. The GLaDOS guide drew mainstream media attention to Anonymous, which was until then largely unknown outside of internet culture. As *Cinema Blend* reported the following day, “Not much is known about the group [Anonymous] as they have refused to identify themselves on all counts and were instructed to obscure their identities by a familiar voice, GLaDOS. . . . ‘Anonymous’ has been building support, as was evident yesterday when hundreds of protestors showed up outside of Scientology centers worldwide. Evidence of this, as GLaDOS instructed, has appeared on YouTube in the past twenty-four hours.” See Tim Beringer, “GLaDOS Protests Scientology with Anonymous,” *Cinema Blend*, February 11, 2008, http://www.cinemablend.com/games/GLaDOS-Protests-Scientology-With-Anonymous-8832.html.


18. twolf1, “Portal Pepper Spray Cop,” Dorkly, November 28, 2011, http://www.dorkly.com/post/27991/portal-pepper-spray-cop. On the media dynamics of the Pepper Spray Cop meme, see Milner, *World Made Meme*. On the extent to which the remixed images of the Pepper Spray Cop meme were acts of affirmative speculation akin to science fiction, parodying the present to potentialize a different future, see uncertain commons, *Speculate This!*


**FOUR. Long Live Play**


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5. ted2112, “Remembering the Great PSN Outage of 2011.”

6. On the human and nonhuman aspects of networks, see Galloway and Thacker, Exploit. On networks as dominant social models whose pervasiveness becomes most evident in moments of network disruption, see Mejias, Off the Network. On the ways in which system-crashing bugs, hacks, spam, viruses, and other network pathologies expose technical functions while also highlighting the conditions for online community, see Parikka, Digital Contagions, and Brunton, Spam. In Updating to Remain the Same, Wendy Chun argues that networks become imaginable and inhabitable through familiarity and repetition. As habitual experiences, they enkindle anxieties of loss—“Habit is becoming addiction: to have is to lose” (8)—refined by crisis, resolved by updating (or, alternatively, respawning in a new direction). As Patrick Jagoda suggests, “Networks, a limit concept of the historical present, are accessible only at the edge of our sensibilities.” See Jagoda, Network Aesthetics, 3. However, Jagoda shows how networks are rendered perceptible through aesthetic forms and cultural productions (including video games, films, and novels), as well as user discourses and experiences (including ordinary encounters with lag, broken links, crashes, fatal errors, dissapearances) that constitute the network imaginary and articulate its sociopolical affordances. Science fiction, in particular, often serves an important function in situating networked subjects relative to the network imaginary. See Shaviro, Connected. Certainly, many PlayStation gamers grappled with the network outage and its implications by resorting to the resources of science fiction.

7. Serres, Parasite, 225. Serres’s privileged example of a quasi-object is the ball in a ballgame, the focal element in a system of play that binds the players together.

8. Latour, We Have Never Been Modern, 89.


11. For example, see Standage, *Future of Technology*, 198–200 (“The Cell of a New Machine”). The Cell processor was developed through a collaboration among Sony, IBM, and Toshiba.


13. The notion of “PlayStation DNA” had become part of Sony’s marketing repertoire as early as May 9, 2006, when Kazuo Hirai introduced it during Sony’s press conference at the 2006 Electronic Entertainment Expo (E3). Hirai had replaced Ken Kutaragi as the president of Sony Computer Entertainment shortly after the launch of the PS3. Celebrating the power of the Cell processor and announcing some new Sony initiatives, Hirai also claimed, notoriously, that the “essence of the PlayStation DNA is real change and the consumers are ready,” even as he showcased some rather familiar game concepts. But the notion of “PlayStation DNA” stuck, with a range of associated meanings. In an interview at E3 2010, for example, Hirai suggested a different interpretation: “I think that PlayStation DNA has always been about stability and not making changes midcourse” (quoted in Nick Cowen, “E3 2010: Kazuo Hirai Interview,” *Telegraph*, July 7, 2010, http://www.telegraph.co.uk/technology/video-games/7877149/E3-2010-Kazuo-Hirai-interview.html). The flexible notion of “PlayStation DNA” would therefore encompass both “real change” and “stability,” revolutionary upgrades as well as “not making changes.” In this regard, it might seem rather analogous to the actual hereditary material on which this metaphor is based, affording the transmission of stable genetic traits across generations even in the context of mutation, recombination, and long-term evolutionary forces. Featured in publicity announcements for several PlayStation products, the concept also appeared in a promotional video released for the fifteenth anniversary of the PlayStation brand, *The PlayStation DNA: 15 Years of PlayStation*, available at the Sony Computer Entertainment America “sceablog” channel, YouTube, October 26, 2010, https://www.youtube.com/watch?v=YKpwrC8kk-8.

14. Sony Computer Entertainment, “PlayStation Vita, PlayStation®3, PSP® (PlayStation®Portable) and PlayStation®2 Retail Sales Exceed 6.5 Million Units Worldwide during the Holiday Sales Season,” press release, January 10, 2012. Original document
archived at the Investor Relations News section of Sony's main website, https://www.sony.net/SonyInfo/IR/news/20120110E.pdf. A similar assertion about PlayStation DNA and technosocial connectivity had appeared in the first public announcement for the PS Vita in January 2011, when the device was still codenamed “NGP” (“Next Generation Portable Entertainment System”): “Deep and immersive gaming is at the core of PlayStation’s DNA, and NGP is the latest embodiment of this vision. By having both Wi-Fi and 3G network connectivity, together with various applications, NGP will enable infinite possibilities for users to ‘encounter,’ ‘connect,’ ‘discover,’ ‘share’ and ‘play’ with friends wherever they are. Within the device are a range of features that provide a genuinely cutting-edge, next generation ultimate portable entertainment experience”; Sony Computer Entertainment, “Sony Computer Entertainment Announces Its Next Generation Portable Entertainment System,” January 27, 2011, archived at PlayStation.com, http://us.playstation.com/corporate/about/press-release/next-generation-portable-entertainment-system.html.

15. Sony, “PlayStation Family: The Best Place to Play—Welcome to the Future of Play,” PlayStation.com, January 1, 2017, https://www.playstation.com/en-us/explore/playstation-family/. Rob Gallagher offers an incisive analysis of Sony’s rhetoric of the “PlayStation family” and the game industry’s obsession with hardware generations (“next-gen consoles”) as indicative of heteronormative ways of thinking, a reproductive futurism that gets baked into gamer discourse at large—though the implicit narrative of progress is sometimes queered by certain video games themselves. See Gallagher, “Intergenerational Tensions.”


22. For example, see Lutmman et al., “Accelerating Molecular Dynamic Simulation on the Cell Processor and PlayStation 3.”


26. crashmashoi, “A ‘Regular’ Story about Me and My Life with PlayStation,” PlayStation Community, April 7, 2012, http://community.us.playstation.com/t5/PSN-Community -Meets-the-PS-Blog/A-Regular-Story-about-me-and-my-life-with-playstation/td-p /37259218. Interestingly, the Crash Bandicoot games featured in crashmashoi’s autobiography were developed by Naughty Dog, a game company that Vijay Pande (the director of Folding@home) helped to launch while he was still a high school student.


31. sephron9, comment #55, April 24, 2011, response to Dobra, “PlayStation Network Still Down.”


35. erick_34, response to Seybold, “Latest Update on PSN Outage.”


45. geohot, “Jailbroken PS3 3.55 with Homebrew,” YouTube, January 7, 2011, http://www.youtube.com/watch?v=UkLSXsCKDkg. In addition to the “sup dawg” program featured in the video (geohot_1st.self), GeoHot also released a small PS3 application that would create a blank text file called “geohot.txt” (Lv2diag.self).
47. Ask PlayStation, “PSN Currently Undergoing Sporadic Maintenance,” Twitter, April 4, 2011, 9:35 a.m. (PT), https://twitter.com/AskPlayStation/status/54945167689515008.


57. The Lulz Boat, “#Sownage (Sony + Ownage),” Twitter, May 29, 2011, 1:16 p.m. (PT), http://twitter.com/LulzSec/status/74932233550569472.


59. The Lulz Boat, “You Sony Morons,” Twitter, May 31, 2011, 10:12 a.m. (PT), https://twitter.com/LulzSec/status/75610558178668544. Perhaps in response to the growing backlash from the gamer community, however, LulzSec then began to target other online games directly—hacking the servers of EVE Online, Minecraft, and others—which further enraged many gamers, even some who were otherwise sympathetic to the hacker perspective.

60. Donne, response to Robinson, “Why Is the PSN Network Down?”


69. PacManPolarBear, “Folding@Home with Skynet,” *Sarcastic Gamer*, February 15, 2008, http://forums.sarcasticgamer.com/showthread.php?t=3822. Other versions of this facetious scenario have often flared up in times of network trouble. For instance, on March 1, 2010, some PS3s were unable to connect to the network due to a clock bug. The YouTube video blogger sWooZie (Adande Thorne) responded to this incident with an animated cartoon called “How Skynet Caused the PS3 Apocalypse,” YouTube, March 5, 2010, http://www.youtube.com/watch?v=KRRpzZYFDRc. The cartoon focuses on a handful of Sony executives trying to manage the crisis. Apparently, a new virus is responsible: “It’s like nothing we’ve seen before. It keeps growing and changing and evolving, like it has a mind of its own.” Hoping to reverse the situation before it is too late, the chairman gives the order to uplink the new Skynet defense technology: “If we plug Skynet into all our systems, it’ll squash this thing like a bug and give me back control of Sony.” But the decision proves fatal. Seconds later, the executives hear sirens and gunfire as Skynet becomes self-aware and launches a war on humanity. When will they ever learn?

70. quaappybla, response to Blazerdt47, “Five Reasons Why the PlayStation Network Is Down,” *GameSpot*, April 25, 2011, http://www.gamespot.com/forums/system-wars-314159282/five-reasons-why-the-playstation-network-is-down-28584028/. Similarly, for jho, who reposted the image in figure 4.12, the coincidence of Skynet Day 2011 served as both a convenient metaphor of technocratic control as well as actual evidence of a conspiracy: “Allow me to reiterate my suspicions . . . are we witnessing an internet false-flag designed to introduce the White House’s proposed internetID [cybersecurity program]? A case of problem, reaction, solution? Could this be an attempt to piss off the gamers whom are suffering gaming withdraw and concerned

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about this happening again? Will they ultimately sacrifice their anonymity online due to the fear of not being able participate in their preferred method of escapism?"


73. Reitinger, “Enabling Distributed Security in Cyberspace.”


75. Wraith07, “Zombies of the Apocalypse,” PlayStation Forum, April 30, 2011, http://www.community.eu.playstation.com/15/General-Discussion/Zombies-of-the-Apocalypse/td-p/12795108. For some PlayStation users, however, things would never be quite the same. Years later, without admitting any wrongdoing, Sony settled a $15 million class action lawsuit on behalf of those users whose personal information may have been compromised during the network breach—though Sony representatives also pointed out that no cases of identity theft had ever been credibly linked to the incident, and, of course, the PSN user agreement and privacy policy does clearly state that “there is no such thing as perfect security.” See Judge Antony J. Battaglia, “Order
Granting in Part and Denying in Part Defendant’s Motion to Dismiss Plaintiffs’ First Amended Consolidated Class Action Complaint” (Doc. No. 135), In Re Sony Gaming Networks and Customer Data Security Breach Litigation, U.S. District Court for the Southern District of California, MDL No. 11md2258 AJB (MDD), January 21, 2014. Sony distributed more free games and subscriptions to PlayStation Plus as part of the settlement. Afterward, Sony also settled a class action lawsuit on behalf of all the U.S. owners of the original “fat” PS3 who had “suffered injury” from the removal of OtherOS and the erasure of whatever DIY future it represented. See William N. Hebert, Rosemary M. Rivas, and James Pizzirusso, “Second Amended Consolidated Class Action Complaint,” In Re Sony PS3 “OtherOS” Litigation, U.S. District Court for the Northern District of California, Case No. C-10-1811 (YGR), May 29, 2014. The lawsuit was settled in 2016, but then renegotiated in 2017 after Judge Yvonne Gonzalez Rogers found the claims process to be burdensome for some PS3 owners. Under terms of the second settlement agreement, each injured PS3 owner was eligible to receive up to sixty-five dollars for any pain or damage they experienced due to the loss of technical functionality. For the zombies of the Apocalypse PSN, however, it was surely cold comfort.

**Five. We Are Heroes**


5. Belford, “Farewell, from All of Us at Paragon Studios.”

6. The economist Edward Castronova has described player investments in MMO characters in terms of “avatar capital,” accounting for the accrual of both economic and social value; see Castronova, Synthetic Worlds.


8. On the crystallization of superhero narratives in relation to patriotic imagery, see B. Wright, Comic Book Nation, and Goodnow and Kimble, 10 Cent War.


10. Travis Smith, response to Russell, “Keep ncsoft from Shutting Down City of Heroes!”


12. Mark Moore, response to Russell, “Keep ncsoft from Shutting Down City of Heroes!” As Katherine Isbister argues, “The combination of these features contributed to [City of Heroes] players’ emotional and social engagement—deep avatar customizability linked integrally to gameplay and framed with a rich and evolving backstory, and a variety of ways to play together and stay connected.” See Isbister, *How Games Move Us*, 62. On the processes of community formation in MMOs and the ways in which playing together allows for insights into the technical affordances and constraints of online communities, see Taylor, *Play between Worlds*; Boellstorff, *Coming of Age in Second Life*; Nardi, *My Life as a Night Elf Priest*; Cornelissen and Rettenberg, *Digital Culture, Play, and Identity*; and Mark Chen, *Leet Noobs*. In many instances, as we have seen, the end of an online gameworld and the subsequent gamer diaspora into other online spaces is an occasion for rediscovering the meanings and values that were essential to the original social network, fully recognized only in its loss; see Pearce and Artemesia, *Communities of Play*.

13. Courtney Panos, response to Russell, “Keep ncsoft from Shutting Down City of Heroes!”


21. On the (often conflicted) cosmopolitan and countercultural values propagated by superhero fictions, see Fawaz, New Mutants. On the ethical codes and political positions advanced by superhero fictions that make the stakes of heroic action legible in historical context, see Kaveney, Superheroes!, and DiPaolo, War, Politics and Superheroes.

22. See Marshall, “Borders and Bodies in City of Heroes.” On toxic discourse and antisocial practices in gamer communities, see Nakamura, “Don’t Hate the Player, Hate the Game”; Consalvo, “Confronting Toxic Gamer Culture”; and Salter and Blodgett, “Hypermasculinity and Dickwolves.”


27. On the function of exodus and immigration narratives in shaping the figure of the superhero and the emergence of the U.S. comic-book industry, see Tye, Superman.
32. Lefebvre, “End of the City of Heroes.” Nonfictional discussion of these issues, including the ramifications of legal versus illegal routes and examples of ongoing efforts in both directions, have taken place on various message boards, including the Titan Network forums. For example, see the discussion thread started by sindy, “OK, What Now? I Need a Private Server or the Ability to Run My Own,” Titan Network forums, December 6, 2012, https://www.cohtitan.com/forum/index.php?topic=6673.20.
34. The media scholar Amanda Phillips, in her talk “Game Over: Permadeath, Virtuosity, and the Mechropolitics of Precarious Masculinities,” given at the National Women’s Studies Association annual conference in November 2015, has analyzed Iron Man mode as a performance of durability that addresses the uncertainties of social change and the fragility of heteronormative manhood. On the extensive ways in which gamers invent alternative modes of play like Iron Man mode, see Boluk and LeMieux, Metagaming.
36. On the ways in which Iron Man and other cyborg superheroes have informed discourses of human enhancement, see Oehlert, “From Captain America to Wolverine”; Pedersen and Simcoe, “Iron Man Phenomenon”; Milburn, Mondo Nano; and Jeffery, Posthuman Body in Superhero Comics.


42. A Guest, “#OpMaryville—Anonymous,” Pastebin, October 14, 2013, https://pastebin.com/3rq0ZSrY. The events of the Maryville case are recounted in the documentary *Audrie & Daisy* (2016, dir. Bonni Cohen and Jon Shenk), which also addresses the 2012 rape and subsequent suicide of Audrie Pott, as well as other cases of rape involving cyberbullying and the compounding of tragedy through online media.


45. honestbleeps, reply to pizzatime, “Is Missing Student Sunil Tripathi Marathon Bomber #2?,” Reddit, April 19, 2013, https://www.reddit.com/r/boston/comments /1cn9ga/is_missing_student_sunil_tripathi_marathon_bomber/.


48. *Batman: Arkham Knight* (Rocksteady Studios, 2015). The Joker—or rather, the haunting figure of the Joker, emerging from a virus in Bruce Wayne’s DNA, tinged by the Scarecrow’s fear toxin and Wayne’s own growing guilt—refers specifically to the events of Alan Moore and Brian Bolland’s *Batman: The Killing Joke* (1988) and Jim Starlin and Jim Aparo’s *Batman: A Death in the Family* (1988–89), as well as the overall arc of the Rocksteady “Arkham” games. While there is a self-critical dimension to the
repeated destruction of Batman’s allies in *Batman: Arkham Knight*, drawing attention to Batman’s share of culpability in a never-ending cycle of violence, the development of this theme disproportionately makes women into sexualized victims to prop up Batman’s character development, recalling the notorious “women-in-refrigerators syndrome.” See Gail Simone et al., *Women in Refrigerators*, 1999, http://www.lby3.com/wir/. The game is awkwardly aware of its own reliance on such plot devices—at one point, a captive Catwoman makes a sarcastic quip about serving as Batman’s “motivation”—ironizing its own narrative even while raising questions about the effectiveness of irony in subverting recalcitrant tropes.

49. See Alyssa Royse, “Business Lessons from Batman and The Dark Knight,” *Start Her Up: For Women Entrepreneurs*, SeattlePi, August 2, 2008, http://blog.seattlepi.com/startherup/2008/08/02/business-lessons-from-batman-and-the-dark-knight/. Although SeattlePi closed and removed the comments from this blog post, Royse reproduced a selection of the attacks in her follow-up reflections on this incident. See Royse, “My First Death Threats—And They Weren’t from Batman,” *Start Her Up: For Women Entrepreneurs* blog, SeattlePi, August 3, 2008, http://blog.seattlepi.com/startherup/2008/08/03/my-first-death-threats-and-they-weren’t-from-batman/; and Royse, “Rape and Death and Batman, OH MY!” Alyssa Royse, August 8, 2008, https://alyssaroyse.wordpress.com/2008/08/08/batman/. The legal scholar Danielle Keats Citron has analyzed this incident and dozens of others as evidence for the ways in which the internet creates the conditions not simply for new kinds but also for new scales of hate crime: “The Internet was key to the formation of the anonymous cyber mob that attacked the journalist [Royse]. It is easy to bring large groups of people together online. Gone are the physical and time restraints that make it difficult and expensive for people to meet in real space. All that is needed is an Internet connection. Whereas cost and geography once prevented individuals from finding one another and from meeting, search engines make it happen with little effort. Networked technologies remove practical barriers that once protected society from the creation of antisocial groups.” See Citron, *Hate Crimes in Cyberspace*, 61–62.

50. On the history of these attacks in connection to longer controversies about sexism in video games, see Chess and Shaw, “Conspiracy of Fishes”; Chess, *Ready Player Two*; Kocurek, *Coin-Operated Americans*; and Boluk and LeMieux, *Metagaming*, 275–89. On the role of Quinn’s *Depression Quest* within GamerGate conspiracy theories and debates over its status as a game, see Jagoda, “Videogame Criticism and Games in the Twenty-First Century,” 208–10. Quinn has offered her own perspective on these events; see Quinn, *Crash Override*. For some GamerGate supporters, journalistic critiques of the movement were taken as evidence of a nefarious plan to invalidate gamers as a demographic. For example, shortly after the creation of the #GamerGate hashtag, several journalists and media critics published their reactions to the harassment of prominent feminists in gaming. A few suggested that the harassment was symptomatic of an ongoing identity crisis, an effort to preserve the subcultural status of the “gamer” identity at a moment when video games had become a ubiquitous and even dominant media form. See, for example, Dan Golding, “The End of Gamers,” *Dan Golding* Tumblr blog, August 28, 2014, http://dangolding
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51. animemoemoney, “ A Quick History of 4chan and the Rightists Who Killed It ( Guest Post ),” Noahpinion, May 2, 2015, http://noahpinionblog.blogspot.com/2015/05/a-quick-history-of-4chan-and-online.html. On the transitions of online trolling cultures and the wider implications for political discourse, see W. Phillips, Beyer, and Coleman, “ Trolling Scholars Debunk the Idea That the Alt-Right’s Shitposters Have Magic Powers ,” and W. Phillips and Milner, Ambivalent Internet . On situating the political tenor of early 4chan discourse and Anonymous—made especially complicated by certain “ lulzy ” practices on the 4chan / b/ board that have often used the language of misogyny and racism even if allegedly parodying it—see Manivannan, “ Tits or GTF0 ”; Ravetto-Biagioli, “ Anonymous ”; Mitchell, “ Because None of Us Are as Cruel as All of Us ,” Fuchs, “ Anonymous ”; and W. Phillips, This is Why We Can’t Have Nice Things .


56. The posting was widely recopied—and also widely parodied. The first appearance seems to have been Ssilversmith, in response to SellTheSun, “‘[Feminists] Did It to Scientists, They Did It to Sports—The Gamers Were the First Group . . . That Really Fought Back . . . They Like to Win . . . They Were Not the Right Group to Pick a Fight With’—Christina Hoff Sommers,” KotakuInAction, Reddit, October 10, 2015, https://np.reddit.com/r/KotakuInAction/comments/3o68ia/feminists_did_it_to_scientists_they_did_it_to/.


/silencing-milo_us_586f3975e4boeb9e49bfb52; and Bob Ostertag, “Milo Yiannopoulos on Pedophilia and ‘This Arbitrary and Oppressive Idea of Consent,’” Huffington Post, February 20, 2017, http://www.huffingtonpost.com/entry/milo-yiannopoulos-on-pedophilia-and-this-arbitrary_us_58ab52a5e4bo29c1d1df88d77. On GamerGate as an element contributing to the rise of the alt-right, see Nagle, Kill All Normies.


67. See Braithwaite, “It’s about Ethics in Games Journalism?,” and Mortensen, “Anger, Fear, and Games.”

SIX. Green Machine

1. See Dyer-Witheford and de Peuter, Games of Empire, 222–24, and Maxwell and Miller, “‘Warm and Stuffy.’” On the material infrastructures and global supply chains of media technologies that contribute to environmental risk, see Bozak, Cinematic Footprint; Cubitt, Finite Media; Maxwell and Miller, Greening the Media; Parikka, Geology of Media; Starosielski and Walker, Sustainable Media; and Taffel, “Escaping Attention.”


3. See Montague, “Stolen Goods”; Jackson, “Making a Killing”; Moyroud and Katunga, “Coltan Exploration in Eastern Democratic Republic of the Congo”; Mantz, “Improvisational Economies”; and Smith, “Tantalus in the Digital Age.” In the United States, the 2010 Dodd-Frank Act included a provision requiring electronics manufacturers to prove that their supply chains do not support armed conflict in Africa. While it was an important step in trying to address the problem of conflict minerals, the long-term efficacy of this kind of legislation remains unclear, because the global mineral trade often promotes mystery and obfuscation.

4. Oona King, quoted in Hari, “Congo’s Tragedy.”


7. Redmond, Coltan Boom, Gorilla Bust, 4. For a similar, updated assessment of the situation, see Plumptre et al., Status of Grauer’s Gorilla and Chimpanzees in Eastern Democratic Republic of Congo. For further context, see Hayes and Burge, Coltan
Mining in the Democratic Republic of Congo, and Glew and Hudson, “Gorillas in the Midst.”

8. See Gabrys, Digital Rubbish; Grossman, High Tech Trash; and Parks, “Falling Apart.”


12. Foucault, Discipline and Punish, 202–3. See also Foucault, Birth of the Clinic and Order of Things. On the history of the carceral function as rendered through narrative fictions and the structures of novelistic discourse, see Bender, Imagining the Penitentiary. On ways that video games promote social discipline, see Chess, “Playing the Bad Guy.”

14. See Agamben, Homo Sacer; Agamben, State of Exception.
16. See Wiener, Cybernetics; Wiener, Human Use of Human Beings.

17. On the history of cybernetics and its impact on scientific and cultural production, see Hayles, How We Became Posthuman; Galloway, Protocol; Halpern, Beautiful Data; Heims, Constructing a Social Science for Postwar America; Edwards, Closed World; L. Kay, Who Wrote the Book of Life?; Pickering, Cybernetic Brain; and B. Clarke and Hansen, Emergence and Embodiment. On the role of cybernetic models in the ecological sciences, see Bowler, Earth Encompassed; Hagen, Entangled Bank; Golley, History of the Ecosystem Concept in Ecology; Edwards, Vast Machine; B. Clarke, “Steps to an Ecology of Systems”; Horton, “Collapsing Scale”; and Schwarz and Jax, Ecology Revisited.

18. Galloway, Gaming, 106. On games as self-figuring instances of cybernetic systems and the form of control societies, see also Nichols, “Work of Culture in the Age of Cybernetic Systems”; Salen and Zimmerman, Rules of Play; Wark, Gamer Theory; Dyer-Witheford and de Peuter, Games of Empire; and Jagoda, “Gamification and Other Forms of Play.” While games often reinforce the experience of cybernetic control, they sometimes work to confound or diminish control, emphasizing elements of uncontrollability and nonsovereign connections in network systems; see Jagoda, Network Aesthetics, 143–80.

24. Haraway, When Species Meet, 71.
25. On countergaming, see Galloway, Gaming; Dyer-Witheford and de Peuter, Games of Empire; and Raley, Tactical Media.
26. On gray goo and its figurative role in nanotechnology discourse, see Milburn, Nanovision.
31. For discussions of playbor and other forms of immaterial labor that sustain the digital economy, see Kücklich, “Precarious Playbour”; Postigo, “From Pong to Planet Quake”; Dyer-Witheford and de Peuter, Games of Empire; Terranova, Network Culture; Castronova, Synthetic Worlds; Yee, “Labor of Fun”; Goggin, “Playbour, Farming and Labour”; Scholz, Digital Labor; and Jagoda, “Gamification and Other Forms of Play.”
34. ferdk16, response to BlackFeathers, “Shadow of the Colossus.”

SEVEN. Pwn


11. The concept of ludonarrative dissonance was coined by the game designer Clint Hocking. For discussion, see Bissell, Extra Lives.


13. On ways that games compel learning through error, see Juul, Art of Failure. On ways that characteristics of game avatars affect perceptions and behaviors of their players, see Yee, Proteus Paradox. On Cloud as a self-reflexive avatar of the player, see Burn, “Playing Roles.”


17. While the ambiguous ending makes it unclear whether the whole of civilization, or instead Midgar alone, was destroyed in the final conflict, the 2005 sequel movie Final Fantasy VII: Advent Children retcons in favor of the latter situation, indicating that the remaining human population eventually transitioned away from the Mako economy. Regardless, the thematic implications of the game’s coda remain the same, as several players have argued:

When watching the ending to ff7, you have to remember that the crux of the story is based around themes of environmentalism. When you do that, then the meaning of the ending becomes entirely clear: No matter how badly we mistreat it, the planet will always eventually recover, and it will always defend itself. But when it does respond to the pollution and the abuse that we have put it to, it may well decide (symbolically of course) that humanity is no longer welcome, and in defending itself it may well wipe us out. That is what the ruins of Midgar stand for. The planet is still there, and it is still alive, but it may well be that while the planet was able to survive, humanity was not.
When you look at the impending threat of climate change, the melting of the ice caps and the rising of the sea levels, the increase in drought and famine across the world, then it is easy to see the poignancy of the game’s message. It would be the simplest thing for Planet Earth to wipe out humanity in the course of responding to the pollution and stripping of the environment we are responsible for, and such a cataclysm becomes more likely every day that we leave these environmental issues unaddressed. (j-e-f-f-e-r-s, in response to Firefilm, “Worst Videogame Ending Ever,” *The Escapist*, April 23, 2012, http://www.escapistmagazine.com/forums/read/6.372664-Worst-Videogame-Ending-Ever?page=1)

18. Some politically conservative players adore the game intensely even while denying the reality of global warming and other environmental problems. See the discussion started by LuvBatnKaitos, “Does Anyone Else Get These Vibes? (Possible Spoilers),” *GameFAQs*, November 11, 2013, http://www.gamefaqs.com/boards/197341-final-fantasy-vii/67872771. Other players find such attitudes to be shocking: “I wondered immediately, ’How can someone who views environmentalism as ‘annoying hippyism’ possibly be a fan of a decade of FF games more or less devoted to that very theme?’ . . . I’m still really shocked that someone who’d chalk up one of the major themes of the game as ‘annoying hippyism’ could possibly finish FF7, having to hear all of this information about the lifestream and how to use it to save the world. . . . I’m still rather mystified as to how people so averse to what I consider to be major themes through the FF series can sit through hundreds of hours of FF gameplay and dialogue.” See Paul Goshi, “Conservative Attitudes and Final Fantasy,” *RPG Gamer*, 2004, http://www.rpgamer.com/editor/2004/q1/030104pg.html.


26. Stiegler, “Distrust and the Pharmacology of Transformational Technologies.” On the pharmakon—and, in particular, the extent to which the history of occidental thought has rendered the technics of writing as pharmakon, both poison and remedy—see Derrida, Dissemination.

Conclusion


2. The technical systems underlying the world of Animal Crossing: Wild World have become especially pronounced since the discontinuation of the Nintendo WFC service in 2014. Today, players wanting to travel to other villages in this game must either rely on the local multiplayer function of the DS or instead figure out how to connect to rogue servers using illicit software or hardware hacks. The disappearance of Nintendo’s official remote networking service for the game has therefore rendered the bucolic narrative frame inextricable from high-tech skills and knowledge. On the ways in which the aesthetics of video games and other forms of twenty-first-century media make visible the cultural imaginaries of computational networks, see Jagoda, Network Aesthetics.

3. Chun, Updating to Remain the Same, 19.

4. Chun, Updating to Remain the Same, 89–90.

5. See the October 2012 discussion between Satoru Iwata (Nintendo’s president from 2002 until his death in 2015) and the Animal Crossing: New Leaf developers Koji Takahashi, Isao Moro, and Ana Kyogoku, “Iwata Asks—Animal Crossing: New Leaf,” Iwata Asks, Nintendo website, April 2013 (English translation), http://iwataasks.nintendo.com/interviews/#/3ds/animalcrossing-newleaf. Kyogoku reported, “We really weren’t sure about [including] Mr. Resetti, as he really divides people. Some people love him, of course, but there are others who don’t like being shouted at in his rough accent.” Iwata confirmed this anecdotal evidence: “It seems like younger female players, in particular, are scared. I’ve heard that some of them have even cried.” It could be asked whether such rumors, seemingly based on gender stereotypes, might rather imply that some players have understood the deeper meanings of Resetti’s philosophical rants—and their legitimately disconcerting implications—more intelligently than others.

6. Doctorow, For the Win, 443.

7. Cline, Ready Player One, 60.

8. Cline, Ready Player One, 364.

9. On the thesis that the foundations of contemporary technoculture were shaped in the 1980s, especially by the decade’s pop media, see Sirota, Back to Our Future. Cline’s Ready Player One as well as his 2016 novel Armada present more or less the same thesis, albeit in the guise of fiction.
10. *Ready Player One* is narrated retrospectively, written from Wade's first-person perspective as an older man looking back on his youth. He introduces himself at the beginning of the text as a well-known celebrity, composing his memoirs for an imagined audience in the future eager to know all about his exploits as a teenager. However, this fabulated future audience does not seem to know much about the *oasis*, because Wade actually has to explain what it meant to him back in the day: "I'd heard of Halliday, of course. Everyone had. He was the videogame designer responsible for creating the *oasis*, a massively multiplayer online game that had gradually evolved into the globally networked virtual reality most of humanity now used on a daily basis" (1). Wade's presumption that his readers may not quite remember Halliday or the world-defining impact of the *oasis* may imply that that system no longer exists or has significantly changed its nature by the time Wade sits down to write his memoirs.

11. See Haraway, *Staying with the Trouble*; Alaimo, *Exposed*; and Weston, *Animate Planet*. As Haraway suggests, in the midst of trouble, we must not give in to what she calls a "game over" attitude: "In fact, staying with the trouble requires learning to be truly present, not as a vanishing pivot between awful or edenic pasts and apocalyptic or salvific futures, but as mortal critters entwined in myriad unfinished configurations of places, times, matters, meanings" (1).