The Rhetoric of Video Games

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Animal Crossing is an "animal village simulator" for the Nintendo GameCube and DS video game consoles.[1] As the game begins, the player has just left home to move to the game's small village. There he meets a host of cartoonish animal residents and settles into a new life. The player is penniless upon arrival, and the game quickly thrusts him into the reality of making ends meet. The village's resident real estate tycoon and shopkeeper, Tom Nook, helps the player out, offering him a small shack to live in and a job of planting trees, delivering goods, and creating marketing materials on the town notice board (see figure 1). After completing these chores, Nook releases the player to explore the town on his own. He may then work, trade, and personalize his environment. The game offers a series of innocuous, even mundane activities like bug catching, gardening, and wallpaper designing.

One of the more challenging projects in the game is paying off the mortgage on one's house. *Animal Crossing* allows players to upgrade their homes, but doing so requires paying off a large note the player must take out to start the game in the first place. The player must then pay down renovation mortgages for even larger sums.[2] While the game omits some of the more punitive intricacies of long-term debt, such as compounding interest, improving one's home does require consistent work in the game world. Catching fish, hunting for fossils, finding insects, and doing jobs for other townsfolk all produce income that can be used to pay off mortgage debt or to buy carpets, furniture, and objects to decorate one's house.

When my then five-year-old began playing the game seriously, he quickly recognized the dilemma he faced. On the one hand, he wanted to spend the money he had earned from collecting fruit and bugs on new furniture, carpets, and shirts. On the other hand, he wanted to pay off his house so he could get a bigger one like mine. Once he managed to amass enough savings to pay off his mortgage, Tom Nook offered to expand his house. While it is possible to refrain from upgrading, the unassuming raccoon continues to offer renovations as frequently as the player visits his store. My son began to realize the dilemma facing him: the more material possessions he took on, the more space he needed, and the more debt he had to assume to provide that space. And the additional space just fueled more material acquisitions, continuing the loop. This link between debt and acquisition gives form to a routine that many mortgage holders fail to recognize: buying more living space not only creates more debt, it also drives the impulse to acquire more goods. More goods demand even more space, creating a vicious cycle.

For a more detailed discussion of procedural rhetoric and persuasive games, see Bogost's book on the subject, *Persuasive Games: The Expressive Power of Videogames* (The MIT Press, 2007).

Figure 1
A player near her house in *Animal Crossing*. While it looks like just an idyllic cartoon world, the game also models commerce and debt.

In real life, when we pay our mortgage bill we don't see where that money ends up. But in *Animal Crossing*, the player experiences the way his debt makes bankers wealthy. After a player makes a major payment to his mortgage, Tom Nook closes his shop and upgrades it; the game starts with Nook's Cranny, a wooden shack general store, and ends with Nookington's, a two-story department store. Each upgrade allows Tom Nook to sell more goods. None of the townsfolk ever appear in Tom Nook's shop, although they occasionally refer to it somewhat disdainfully; the animals seem to have little drive to consume. *Animal Crossing*'s nonplayer characters (NPCs) are much less materialistic. The cute animals that occupy the village sternly berate the player if they haven't seen him around for many days, but they seem to have no concern for the quantity or type of material properties that the players possess. Occasionally, animals will express desire for a shirt or furniture item the player carries with him around the village, and they will offer to trade for it. But this type of transaction is both rare and charming; the animals frame their requests in terms of inveterate longing— "I've always wanted a Modern Lamp!"—quite a different refrain from the mallgoer's "one overriding interest, to spend money."[3]

In contrast, the player participates in a full consumer regimen: he pays off debt, buys and sells goods. Tom Nook buys the player's goods, which he converts to wealth. As the player pays off debt and upgrades his home to store more goods, he sees Tom Nook convert that wealth into increased commercial leverage—one's own debt makes the bank rich. Tom Nook then leverages that wealth to draw more capital out of the player, whose resources remain effectively constant. While the player spends more, Nook makes more. By condensing all of the environment's financial transactions into one flow between the player

and Tom Nook, the game models the redistribution of wealth in a way even young children like my five-year-old can understand. Tom Nook is a condensation of the corporate bourgeoisie.

Animal Crossing simulates the social dynamics of a small town, complete with the material demands of keeping up with the Joneses. As such, the game serves as a sandbox for experimenting with the ways one can recombine personal wealth. While the player diligently works to pay off that new upstairs addition, the other animals retain their small shacks perpetually. They never sell old belongings or acquire new ones, seemingly unconcerned that their homes are filled only with fish, or rocks, or fruit furniture. *Animal Crossing*'s animals enjoy walks outdoors. They snooze on their porches at twilight. They stop to watch the player fish. They meander aimlessly and take great care to partake in the community events that transpire on holidays. They are not consumers but naturalists, more Henry David Thoreau than Paris Hilton.

Animal Crossing is a game about everyday life in a small town. It is a game about customizing and caring for an environment. It is a game about making friends and about collecting insects. But *Animal Crossing* is also a game about long-term debt. It is a game about the repetition of mundane work necessary to support contemporary material property ideals. It is a game about the bittersweet consequences of acquiring goods and keeping up with the Joneses. *Animal Crossing* accomplishes this feat not through moralistic regulation, but by creating a model of commerce and debt in which the player can experience and discover such consequences. In its model, the game simplifies the real world in order to draw attention to relevant aspects of that world.

We often think that video games have a unique ethos. Video game players have their own culture and values. Video game players often self-identify as "gamers" and devote a major part of their leisure time to video games. They discuss games online, follow new trends, and adopt new technology early. Video game play could be understood as a "community of practice," a name Jean Lave and Etienne Wenger have given to a common social situation around which people collaborate to develop ideas.[4] In this sense, the people who play video games develop values, strategies, and approaches to the practice of play itself. For example, a large group of *Animal Crossing* players contribute to an online community called Animal Crossing Community (ACC for short) to discuss the game, share things they've made, find strategies, or look up the value of different fish, insects, or furniture.[5] Within this community, as in all communities, cultural values develop, both by design and by evolution. For example, ACC offers players the option of "getting adopted." A veteran "Scout" is assigned to a new member as a "foster buddy" to help the newbie "learn the ropes of ACC . . . They'll also help you with any of your Animal Crossing questions, and may even give you a free item as a welcoming gift!"[6] Venues like ACC show that video game play is a cultural activity where values develop over time.

But the values of a video game community like ACC exist *outside* the game. While the neighborliness of the foster buddy program might suggest a carryover of values from the video game, the ACC is primarily focused on the social practices *of playing* the game, rather than the social practices *represented in* the game. This is an important distinction: video games are not just stages that facilitate cultural, social, or political practices; they are also media where cultural values themselves can be represented—for critique, satire, education, or commentary. When understood in this way, we can learn to read games as deliberate expressions of particular perspectives. In other words, video games make claims about the world, which players can understand, evaluate, and deliberate. Game developers can learn

to create games that make deliberate expressions about the world. Players can learn to read and critique these models, deliberating the implications of such claims. Teachers can learn to help students address real-world issues by playing and critiquing the video games they play. And educators can also help students imagine and design games based on their own opinions of the world. When games are used in this fashion, they can become part of a whole range of subjects.

Play

One of the reasons we tend not to consider video games as legitimate venues for learning to take place is precisely because they are *games*, playthings. Play is often considered a children's activity, a trifle that occupies or distracts kids and which they eventually grow out of, turning to more serious pursuits. Play and learning have been segregated from one another in contemporary schooling, further cementing their perceived disparity. Children learn while seated in desks, listening attentively to a teacher or reading from a book. This sort of valid learning is interrupted by recess, where children are allowed to play. Understood in this way, play is a distraction useful only to let off the necessary steam to allow kids (or adults) to get back to the serious business of learning (or working).

  Video games also subscribe to this value model. They are a part of the "entertainment software" industry, and they are generally considered a leisure practice by players and the general public alike. Video game play is considered an unproductive expenditure of time, time that fills the breaks between work. This goes for children playing games at home after school as well as adults playing games after work. Parents might worry about their children playing video games after school instead of doing their homework or playing outside. Video games are perceived to interrupt learning and social life, acting as a leech on normal childhood development. During the 1990s dot-com boom, many offices teeming with young workers took lunch or after-work breaks to play networked games on the office computers, taking respite from the "productive" practices of work. While it is rarely discussed directly, this conflation of work and play at the office serves as an archetype for the ill-founded business acumen of that era. These early Internet companies failed because they weren't serious; they were merely "playing" at business.

  But this association of video games with leisure is not a necessary condition. It is, rather, a by-product of a misunderstanding of the nature of play. Instead of understanding play as child's activity, or as the means to consume games, or even as the shifting centers of meaning in poststructuralist thought, I suggest adopting Katie Salen and Eric Zimmerman's useful, abstract definition of the term: "play is the free space of movement within a more rigid structure."[7] Understood in this sense, play refers to the "possibility space" created by constraints of all kinds. Play activities are not rooted in one social practice, but in many social and material practices. For example, Salen and Zimmerman use the example of the play in a mechanism like a steering column, in which the meshing gears create "play" in the wheel before the turning gesture causes the gears to couple.

  The possibility space of play includes all of the gestures made possible by a set of rules. As Salen and Zimmerman explain, imposing rules does not suffocate play, but makes it possible in the first place. On a playground, the possibility space refers to the physical properties of the play space, as well as the equipment, time allotted, and number and type of children. Kids are particularly adept at inventing new games based on the constraints of their environment; if one listens closely to children at play, one of the most common things

to overhear is the establishment of new rules ("Now you be the monster," "This square is safe!"). When children play, they constantly renegotiate their relationship with a possibility space.

In more traditional media like poetry, the possibility space refers to the expressive opportunities afforded by rules of composition, form, or genre. For example, the poetic form of haiku enforces three lines of five, seven, and five syllables each.[8] The imposition of these restrictions constrains poetic authorship. To write haiku means exploring configurations of language that intersect with these rules of composition.

While possibility spaces like haiku develop over time (in this case, dating from a linked verse style of the fifteenth century), other literary practices have invented new possibility spaces with the specific purpose of creating new forms of expression. The artistic movement known as Oulipo (*Ouvroir de littérature potentielle*), founded in Paris in 1960, adopted precisely this practice. The group's members invented, revived, or adopted forms for literary expression, each of which changes the possibility space of literary expression. One familiar example is the palindrome, a word or phrase that reads the same forward and backward. Georges Perec wrote "Le Grand Palindrome" of roughly 1,500 words, although writers Nick Montfort and William Gillespie topped Perec's record with 2002, a palindromic novel of 2,002 words, authored in the year 2002.[9] Another Oulipian construct is the lipogram, a text in which use of a particular letter is forbidden. The most famous lipogrammatic text is Georges Perec's *La Disparition*, a lipogram in *E* (i.e., the letter *e* appears nowhere in the work).[10] The prisoner's constraint is a lipogram in ascenders and descenders; that is, letters that stick up or down from the line are forbidden (*b, d, f, g, h, j, k, l, p, q, t,* and *y*).

The constrained forms of Oulipo practitioners impose even more stringent restrictions than those of natural grammar and "ordinary" literary convention, but more importantly these artists deliberately *invented* new constraints, rather than adopting the forms provided by a particular historical and cultural moment. By designing the rules of literary composition, Oulipian writers share much in common with children on a playground: first they create a possibility space, then they fill that space with meaning by exploring the free movement within the rigid structure of literary rules. Likewise, readers of work like Perec's must take into account the rules of its composition, which tightly couple to the meaning of the work ("la disparition" means "the disappearance"; the novel follows a group of people who cannot find a hunting companion). Likewise, the rules children adopt in playground play alter the experience and meaning of the play. For example, consider a game of hide-and-seek in which an older player must count for a longer time to allow younger players a better chance to hide more cleverly. This rule is not merely instrumental; it suggests a value of equity in the game and its players.

In a video game, the possibility space refers to the myriad configurations the player might construct to see the ways the processes inscribed in the system work. This is really what we do when we *play* video games: we explore the possibility space its rules afford by manipulating the symbolic systems the game provides. The rules do not merely create the experience of play—they also construct the meaning of the game. That is to say, the gestures, experiences, and interactions a game's rules allow (and disallow) make up the game's significance. Video games represent processes in the material world—war, urban planning, sports, and so forth— and create new possibility spaces for exploring those topics. That representation is composed of the rules themselves. We encounter the meaning of games by exploring their possibility spaces. And we explore their possibility spaces through play.

Procedurality

We rely on the practice of *procedurality* to craft representations through rules, which in turn create possibility spaces that can be explored through play. Procedurality is a somewhat technical term that requires explanation. The term *procedure* itself does not usually give rise to positive reactions. We typically understand procedures as established, entrenched ways of doing things. *Procedure* often invokes notions of officialdom, even bureaucracy. In common parlance, a procedure is a static course of action, perhaps one established long ago and in need of revision. Often, we talk about procedures only when they go wrong: *after several complaints, we decided to review our procedures for creating new accounts*. But in fact, procedures in this sense of the word structure behavior of all types. Procedures (or processes) are sets of constraints that create possibility spaces, which can be explored through play.

In her influential book *Hamlet on the Holodeck*, Janet Murray defines four essential properties of digital artifacts: procedurality, participation, spatiality, and encyclopedic scope.[11] Murray uses the term *procedural* to refer to the computer's "defining ability to execute a series of rules."[12] Procedurality in this sense refers to the core practice of software authorship. Software is composed of algorithms that model the way things behave. To write procedurally, one authors code that enforces rules to generate some kind of representation, rather than authoring the representation itself. Procedural systems generate behaviors based on rule-based models; they are machines capable of producing many outcomes, each conforming to the same overall guidelines. The "brain" or "heart" of a computer is its *processor*, the chip that executes instructions. *Procedurality* gets its name from the function of the processor—procedurality is the principal value of the computer, which creates meaning through the interaction of algorithms. While Murray places procedurality alongside three other properties, these properties are not equivalent. The computer, she writes, "was designed . . . to embody complex, contingent behaviors. To be a computer scientist is to think in terms of algorithms and heuristics, that is, to be constantly identifying the exact or general rules of behavior that describe any process, from running a payroll to flying an airplane."[13] This ability to execute computationally a series of rules fundamentally separates computers from other media.

Among computer-based media, video games tend to emphasize procedurality more than other types of software programs. Chris Crawford has used the term *process intensity* to refer to the "degree to which a program emphasizes processes instead of data."[14] Higher process intensity—or in Crawford's words a higher "crunch per bit ratio"—suggests that a program has greater potential for meaningful expression. That is to say, video games more frequently and more deeply exploit the property of the computer that creates the kind of possibility spaces that we can explore through play. Furthermore, unlike productivity software such as word processors and spreadsheets, video games are usually created with some expressive purpose in mind; they represent models of systems or spaces that players can inhabit, rather than serving as mere tools.

Video games depict real and imagined systems by creating procedural models of those systems, that is, by imposing sets of rules that create particular possibility spaces for play. Often, when we think of video games we think of the themes of fantasy and power, like the space marine of *Doom* who must combat demons to save the world.[15] But these themes represent only part of the expressive capacity of games. Other games go beyond models of fantasy worlds, creating representations of the ordinary world that might give players new perspectives on the world they inhabit. For example, *Animal Crossing* creates a representation of everyday

life in which labor and debt are a part. When video games represent things—anything from space demons to long-term debt—they do so through procedurality, by constructing rule-based models of their chosen topics. In *Doom*'s model of the world, emphasis is placed on the trajectory and power of weaponry. In *Animal Crossing*'s model of the world, emphasis is placed on work, trade, and arrangement of the environment.

In the context of digital media and learning, video games offer two overlapping opportunities. In one, players can learn about aspects of the world that particular games model, such as consumption in *Animal Crossing* or urban planning in *Sim City*.[16] This is a kind of subject-centered literacy focused on examples of human practice. In the other, players can learn about procedurality itself, an inscriptive practice that will become more important only as computers continue to expand their role in society.

Rhetoric

Some games' procedural representations serve mostly to create an entertainment experience, a fantastic situation that transports the player to another world. But other games use procedurality to make claims about the cultural, social, or material aspects of human experience. Some do this deliberately, while others do it inadvertently. When we talk about making claims or arguments about things, we enter the domain of *rhetoric,* the field of communication that deals with persuasive speech. I would like to take a brief historical detour through the field of rhetoric in order to connect it to procedurality, learning, and to video games in turn.

Like procedurality, rhetoric is not an esteemed term. Despite its two-and-a-half-millennia-long history, today rhetoric invokes largely negative connotations. We often speak of "empty rhetoric," elaborate and well-crafted speech that is nevertheless devoid of actual meaning. Rhetoric might conjure the impression of *hot* air, as in the case of a fast-talking con who crafts pretentious language to hide barren or deceitful intentions. Academics and politicians are particularly susceptible to this sort of criticism, perhaps because we (and they) tend to use flourish and lexis when coherence runs thin, as in this very sentence. Rhetoric is often equated with a type of smoke screen; it is language used to occlude, confuse, or manipulate the listener.

However, turgidity and extravagance are relatively recent inflections to this term, which originally referred only to persuasive speech, or oratory. The term rhetoric ($\dot{\varrho}\dot{\eta}\tau\omega\varrho\iota\varkappa\eta$) first appears in Plato's *Gorgias*, written some 2,500 years ago, in reference to the art of persuasion. The term itself derives from the rhetor ($\dot{\varrho}\dot{\eta}\tau\omega\varrho$), or orator, and his practice, oratory ($\dot{\varrho}\dot{\eta}\tau\omega\varrho\epsilon\acute{\upsilon}\omega$).[17] Rhetoric in ancient Greece meant public speaking for civic purposes.

Because of the importance of public speech in Golden Age Athens, rhetorical training became a promising business opportunity. Technical rhetoric, as this type is sometimes called, is useful for the everyman but perhaps too simplistic for the professional orator. Skilled orators developed numerous other techniques in much the same way as motivational business speakers do today. These experts charged for their services, and were called *sophists*. The popularity of books and sophistry bred critique. Such approaches motivated the work of Socrates and Plato, who rejected the social and political contingency of the court and the assembly in favor of more lasting philosophical truths.

Responding to Plato, Aristotle attempts a systematic, philosophical approach to the art of persuasive oratory; he argues that rhetorical practice has the final cause of persuasion to correct judgment. For Aristotle, rhetoric is "the faculty of observing in any given case

the available means of persuasion."[18] The adept rhetorician does not merely follow a list of instructions for composing an oratory (technical rhetoric), nor does he merely parrot the style or words of an expert (sophistic rhetoric), but rather he musters reason to discover the available means of persuasion in any particular case. This variety of rhetoric implies an understanding of both the reasons to persuade and the tools available to achieve that end.

Classical rhetoric passed into the Middle Ages and modern times with considerable alteration. Civil rhetoric never disappeared entirely, and indeed it remains a common form of rhetoric today. But the concept of rhetoric expanded to account for new modes of inscription—especially literary and artistic modes. Writers and artists have expressive goals, and they deploy techniques to accomplish those goals. Here, persuasion shifts from the simple achievement of desired ends to the effective arrangement of a work so as to create a desirable possibility space for interpretation. In contemporary rhetoric, the goal of persuasion is largely underplayed or even omitted as a defining feature of the field, replaced by the more general notion of elegance, clarity, and creativity in communication. In this sense, rhetoric "provides ways of emphasizing ideas or making them vivid."[19] Success means effective expression, not necessarily effective influence.

Twentieth-century rhetorician Kenneth Burke identifies the need to identify with others as the ancestor of the practice of rhetoric. He extends rhetoric beyond persuasion, instead suggesting "identification" as a key term for the practice.[20] We use symbolic systems like language, says Burke, as a way to achieve this identification. While rhetoric still entails persuasion for Burke, he greatly expands its purview, arguing that it facilitates human action in general. In addition to expanding the conception of rhetoric, Burke expands its domain. In the tradition of oral and written rhetoric, language remains central. But Burke's understanding of humans as creators and consumers of symbolic systems expands rhetoric to include nonverbal domains known and yet to be invented or discovered.

The wide latitude Burke affords to rhetoric won him both champions and critics, but his expansion of the concept is particularly useful for our interest in video game rhetoric.[21] Thanks to the influence of Burke, and amplified by the increasingly inescapable presence of nonoral, nonverbal media, increasing interest has mounted around efforts to understand these other, newer modes of inscription that also appear to serve rhetorical ends. In particular, the emergence of photographic and cinematic expression in the nineteenth and twentieth centuries suggested a need to understand how those new, nonverbal media mount arguments. This subfield is called *visual rhetoric*. Visual communication cannot simply adopt the figures and forms of oral and written expression, so a new form of rhetoric must be created to accommodate these media forms.

Visual rhetoric offers a useful lesson in the creation of new forms of rhetoric in the general sense. One would be hard pressed to deny that advertisements, photographs, illustrations, and other optical phenomena have no effect on their viewers. To be sure, visual rhetoric is often at work in video games, a medium that deploys both still and moving images. But visual rhetoric does not account for procedural representation. This is not a flaw in the subfield of visual rhetoric; in procedural media like video games, images are frequently constructed, selected, or sequenced in code, making the stock tools of visual rhetoric inadequate. Image is subordinate to process.

Other efforts to unite computers and rhetoric do not make appeals even to visual rhetoric, instead remaining firmly planted in the traditional frame of verbal and written rhetoric. *Digital rhetoric* often abstracts the computer as a consideration, focusing on the text and image content a machine might host and the communities of practice in which that content

is created and used. E-mail, Web sites, message boards, blogs, and wikis are examples of these targets. To be sure, all of these digital forms can function rhetorically, and they are worthy of study. James P. Zappen begins his integrated theory of digital rhetoric on this very note: "Studies of digital rhetoric," he writes, "help to explain how traditional rhetorical strategies of persuasion function and are being reconfigured in digital spaces."[22] But for scholars of digital rhetoric, to "function in digital spaces" often means mistaking subordinate properties of the computer for primary ones. Other digital rhetoricians likewise focus on the use of digital computers to carry out culturally modified versions of existing oral and written discourse; letters become e-mails, conversations become instant message sessions.

Procedural Rhetoric

I suggest the name *procedural rhetoric* for the practice of using processes persuasively, just as verbal rhetoric is the practice of using oratory persuasively and visual rhetoric is the practice of using images persuasively.[23] Procedural rhetoric is a general name for the practice of authoring arguments through processes. Following the classical model, procedural rhetoric entails persuasion—to change opinion or action. Following the contemporary model, procedural rhetoric entails expression—to convey ideas effectively. Procedural rhetoric is a subdomain of procedural authorship; its arguments are made not through the construction of words or images, but through the authorship of rules of behavior, the construction of dynamic models. In computation, those rules are authored in code, through the practice of programming.

My rationale for suggesting a new rhetorical domain is very similar to the one that motivates visual rhetoricians. Just as photography, motion graphics, moving images, and illustrations have become pervasive in contemporary society, so have computer hardware, software, and video games. Just as visual rhetoricians argue that verbal and written rhetorics inadequately account for the unique properties of the visual expression, so I argue that verbal, written, and visual rhetorics inadequately account for the unique properties of procedural expression. A theory of procedural rhetoric is needed to make commensurate judgments about the software systems we encounter everyday and to allow a more sophisticated procedural authorship with both persuasion and expression as its goal. As a high process intensity medium, video games can benefit significantly from a study of procedural rhetoric.

Procedural rhetoric affords a new and promising way to make claims about *how things work*. As I argued earlier, video games do not simply distract or entertain with empty, meaningless content. Rather, video games can make claims about the world. But when they do so, they do it not with oral speech, nor in writing, nor even with images. Rather, video games make argument with *processes.* Procedural rhetoric is the practice of effective persuasion and expression using processes. Since assembling rules together to describe the function of systems produces procedural representation, assembling particular rules that suggest a particular function of a particular system characterizes procedural rhetoric.

Another way to understand procedural representation is in terms of *models*. When we build models, we normally attempt to describe the function of some material system accurately—for example, in this volume James Paul Gee offers a number of ways one might create a model of a plane, from child's toy to engineer's wind tunnel stress test.[24] Models of all kinds can be thought of as examples of procedural rhetoric; they are devices that attempt to persuade their creators or users that a machine works in a certain way. Video games too can adopt this type of goal; for example, a flight simulator program attempts to model how

Figure 2
Molleindustria's *McDonald's Videogame* makes a procedural argument about the business ethics of fast food. Here, the player manages corporate communications.

the mechanical and professional rules of aviation work. But since procedurality is a symbolic medium rather than a material one, procedural rhetorics can also make arguments about conceptual systems, like the model of consumer capitalism in *Animal Crossing.* Gee argues that modeling allows "specific aspects of experience to be interrogated and used for problem solving in ways that lead from concreteness to abstraction."[25] Games like *Animal Crossing* demonstrate that such models include, but extend far beyond physical and formal models to include, arguments about how social, cultural, and political processes work as well.

Artifacts that deploy procedural rhetoric can also make arguments about how things *don't* work just as easily as they can make arguments about how they do. Consider a particularly sophisticated example, *The McDonald's Videogame.* The game is a critique of McDonalds's business practices by Italian art collective Molleindustria, an example of a genre I call anti-advergames, games created to censure or disparage a company rather than support it. The player controls four separate aspects of the McDonald's production environment, each of which he has to manage simultaneously: the third-world pasture where cattle are raised as cheaply as possible; the slaughterhouse where cattle are fattened for slaughter; the restaurant where burgers are sold; and the corporate offices where lobbying, PR, and marketing are managed (see figure 2). In each sector, the player must make difficult business choices, but more importantly he must make difficult moral choices. In the pasture, the player must create enough cattle grazing land and soy crops to produce the meat required to run the business. But only a limited number of fields are available; to acquire more land, the player must bribe the local governor for rights to convert his people's crops into corporate ones (see figure 3). More extreme tactics are also available: the player can bulldoze rain forest or

Figure 3
The player of the *McDonald's Videogame* makes ethical and material choices about third-world farming and governance.

dismantle indigenous settlements to clear space for grazing. These tactics correspond with the questionable business practices the developers want to critique.

To enforce the corrupt nature of these tactics, public interest groups can censure or sue the player for violations. For example, bulldozing indigenous rainforest settlements yields complaints from antiglobalization groups. Overusing fields reduces their effectiveness as soil or pasture; too much use without crop cycling creates dead earth, which angers environmentalists. However, those groups can be managed through PR and lobbying in the corporate sector. Corrupting a climatologist may dig into profits, but it ensures fewer complaints in the future. Regular corruption of this kind is required to maintain allegiance. Likewise, in the slaughterhouse players can use growth hormones to fatten cows faster, and they can choose whether to kill diseased cows or let them go through the slaughter process. Removing cattle from the production process reduces material product, thereby reducing supply and thereby again reducing profit. Growth hormones offend health critics, but they also allow the rapid production necessary to meet demand in the restaurant sector. Feeding cattle animal by-products cheapens the fattening process, but is more likely to cause disease. Allowing diseased meat to be made into burgers may spawn complaints and fines from health officers, but those groups too can be bribed through lobbying. The restaurant sector demands similar trade-offs, including balancing a need to fire incorrigible employees with local politician's complaints about labor practices.

The McDonald's Videogame mounts a procedural rhetoric about the necessity of corruption in the global fast food business, and the overwhelming temptation of greed, which leads to more corruption. In order to succeed in the long-term, the player must use growth hormones, he must coerce banana republics, and he must mount PR and lobbying campaigns.

Furthermore, the temptation to destroy indigenous villages, launch bribery campaigns, re-cycle animal parts, and cover-up health risks is tremendous, although the financial benefit from doing so is only marginal. As Patrick Dugan explains, the game imposes "constraints simulating necessary evils on one hand, and on the other hand . . . business practices that are self-defeating and, really just stupid."[26] Players learn to "read" this argument in the system of play and can interpret the relevance of the argument in the context of their own lives.

Ways of Using Procedural Rhetoric: Interrogating Ideology

I have argued for procedural rhetoric as a representational form, and as the specific com-munication practice at work in games like *Animal Crossing* and *The McDonald's Videogame*. But to use games for learning purposes requires general approaches that might be applied to many games and many subjects. As such, it is worth sketching a few of the different ways video games can be used rhetorically, whether for design, critique, or learning.

One use of procedural rhetoric is to expose and explain the hidden ways of thinking that often drive social, political, or cultural behavior. We often call such logics *ideology*, a term with a long and conflicted intellectual history. In Plato's famous parable of the cave in the *Republic*, humans' understanding of the world is likened to prisoners watching shadows cast on the wall of a cave by objects and agents passing above. The prisoners see only a flawed shadow of the ideal form ($\varepsilon\iota\delta o\zeta$) of the object.[27] For Plato, the disparity between the ideal and material realms can only be reconciled through a recollection of the forms, a claim that assumes that our souls were once connected to these forms and, therefore, are also immortal. The term *ideology* itself can be traced to eighteenth-century French revolutionary Antoine Destutt de Tracy, who conceived of it as a science of the origin of ideas, that is, of how humans access the ideal realm from the material.[28] As Raymond Boudon clarifies, it was Napoleon's response to de Tracy that gave ideology its more familiar meaning:

When Destutt de Tracy and Volney tried to thwart Napoleon's imperial ambitions, he scornfully called them *ideologues*, meaning people who wanted to substitute abstract considerations for *real* politics, as it was later called. From that time on, ideology signified those abstract (and rather dubious) theories allegedly based on reason or science, which tried to map out the social order and guide political action.[29]

Karl Marx understood the concept this way, and gave it perhaps its most famous char-acterization, "they aren't aware of it, but they do it [*Sie wissen das nicht, aber sie tun es*]."[30] Ideology thus lost the sense of a weapon against entrenched ideas and gained a decidedly negative connotation, as the very entrenchment of those ideas.

Like all cultural artifacts, no video game is produced in a cultural vacuum. All bear the biases of their creators. Video games can help shed light on these ideological biases. Sometimes these biases are inadvertent and deeply hidden. Other times, the artifacts themselves hope to expose their creators' biases as positive ones, but which of course can then be read in support or opposition.

In 2002, the U.S. Army released an unprecedented government-funded first-person shooter (FPS) game. *America's Army: Operations*[31] was conceived and openly publicized as an Army recruiting and communications tool, one crafted "to recreate the US Army for the benefit of young civilians."[32] The game represented a major step for the military-entertainment complex; it was created on the then-current Unreal 2 engine, a costly professional-grade game engine, and released for free on the Army's Web site (see figure 4). Within the first six months, over a million users had registered, of which over 600,000 had completed the

Figure 4
America's Army, a high production value simulation of life in the U.S. Army, meant for recruiting and public relations.

game's basic rifle marksmanship and combat training (BCT), a necessary step before gaining access to combat missions.[33]

While *America's Army* shares a genre with other popular multiplayer FPS games, the Army's desire to offer "a realistic look at army personal and career opportunities via sophisticated role-playing" altered or eliminated many of the conventions of movement in both conventional and tactical first-person shooters.[34] But the game's political simulation is more interesting than its mechanical and physical simulation. *America's Army* enforces strict Army Rules of Engagement (ROE), preventing the brouhaha of typical squad-based fighting games. Whereas *Counter-Strike* encourages the player to log as many kills as possible, *America's Army* players collaborate in short missions, such as rescuing a prisoner of war, capturing an enemy building, or assaulting an enemy installation. The ROE guides play with an iron fist. Writing about the game, designers Michael Zyda et al. explain:

All players abide by rules of warfare. If a player violates the Uniform Code of Military Justice, rules of engagement, or laws of land warfare, reprisal is instant. He will find himself in a cell at Fort Leavenworth, accompanied by a mournful harmonica playing the blues. Continued violation of the rules may cause a player to be eliminated from the game. To rejoin, he must create a new ID and restart.[35]

Many players discover this constraint in basic training; turning a weapon on one's drill sergeant immediately lands the player in the brig. The direct mapping of in-game behavior

to the very ability to continue playing serves as a convincing procedural rhetoric for the chain of command, the principle structure new recruits must understand immediately. Even the use of foul language is grounds for in-game discipline.

But the game also ties ROE and chain of command directly to the moral imperative of the U.S. Army. As in many similar games, when players successfully complete levels, they earn points that persist on Web-based global statistics boards. At specified point targets, a player character's Honor statistic increases. Since Honor telegraphs commitment and expertise, disincentives to violate the ROE and chain of command become especially strong; losing a character through violation would require considerable effort to rebuild.

The correlation of honor with the performance of arbitrary and politically decontextualized missions offers particular insight into the social reality of the U.S. Army. While the use of arbitrary honor points may seem contrived at first, the system bears much in common with the practice of military decoration. Ribbons, medals, and other designations reward successful completion of military objectives. Training, professional development, wounds, completion of missions, and many other events earn soldiers decorations, which when worn on a dress uniform speak to the honor and nobility of the bearer. The average citizen's lack of familiarity with the specific actions that warrant a ribbon or medal ensure that these designations signify the soldier's abstract worth rather than his individual achievements. *America's Army*'s Honor mechanic successfully proceduralizes this value system. As Zyda et al. summarize, "The game insists on the mission orientation of the US Army. Above all, soldiers must be team players, following army values and rules."[36]

This approach is similar to, but different from, the idea of epistemic games advanced by David Williamson Shaffer.[37] Shaffer argues that games can model how professions work, offering an incomplete, yet embodied experience of real-world jobs. As Gee explains in this volume, these types of games "already give us a good indication that even young learners, through video games embedded inside a well-organized curriculum, can be inducted into professional practices as a form of value-laden deep learning that transfers to school-based skills and conceptual understandings."[38] On first blush, *America's Army* would appear to be a superb example of epistemic games: the game models the values and practices of the army, giving the player an embodied experience of the recruit. However, *America's Army* also shows that epistemic games bear a risk: sometimes, we may want to question the values of professional practices rather than assume those values blindly. Procedural rhetoric offers an approach to do so.

Ways of Using Procedural Rhetoric: Making and Unpacking an Argument

Video games that expose ideology may or may not do so intentionally. But video games can also be created to make explicit claims about the way a material or conceptual system works. *The McDonald's Videogame* is an example of such a one, albeit a satire and a political commentary meant to critique the processes employed in the fast food business. Other games strive to explain and support a particular method for accomplishing a political or social goal; these games use procedural rhetoric to make an argument, and players unpack that argument through play.

In the early fall 2004, the Illinois House Republicans commissioned a game I designed to represent their positions on several public policy issues at the center of their 2004 state legislative election. These issues—medical malpractice tort reform, education standards policy,
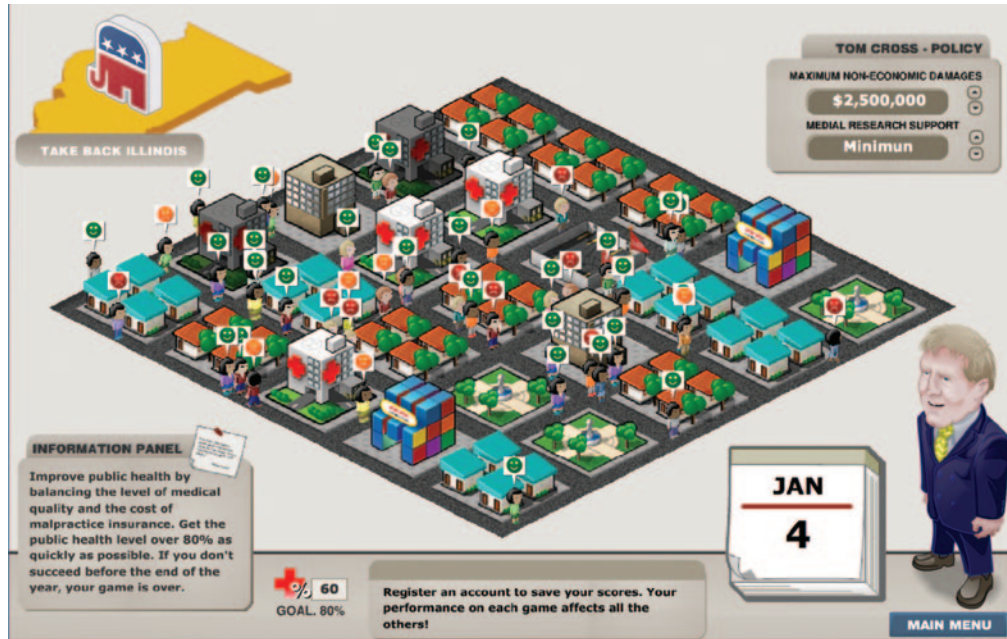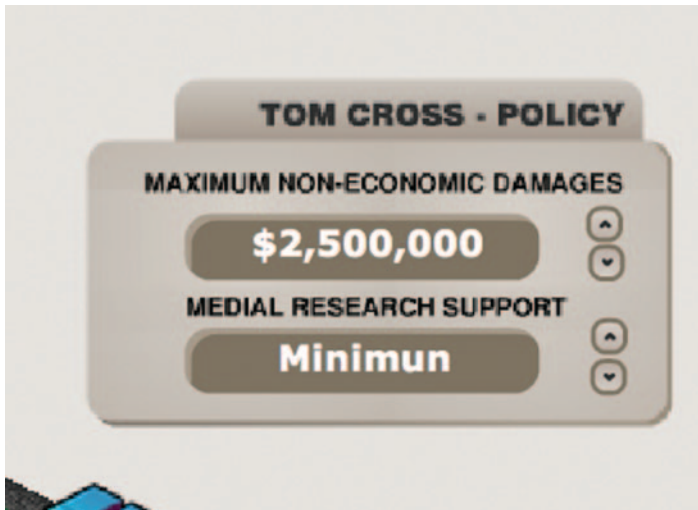
Figure 5
A public policy game in *Take Back Illinois*, this one about tort reform.

and local economic development—are abstract and dry at best. As such, citizens were even less likely to engage with them in the public or private forum, which provided only soapbox sound bites or lengthy, unreadable policy documentation. Moreover these topics, like most public policy issues, are tightly interwoven. Educational quality affects job qualification, which in turn affects economic welfare. *Take Back Illinois* attempts to create a complex, interrelated procedural rhetoric that communicated the candidates' positions on these topics.[39]

Four subgames comprise the game, three for each of the policy issues and one game about citizen participation. These subgames interrelate; play in one affects performance in the others. Each subgame provides a goal for the player to reach. For example, in the medical malpractice reform subgame, the player must raise the public health level to a predefined target. The subgame goal and the player's progress toward it are displayed directly under the game field. A small calendar serves as a timer for the game, starting at January 1, and counts up one day for every few seconds of game time. To win, the player must reach the goal before the calendar reaches the end of the year. Faster success yields a lower, and therefore better, score (see figure 5).

The procedural rhetoric for each policy issue was designed to compress as much detail into the smallest possible rule-set. For example, in the medical malpractice reform subgame, a representation of a city was filled with citizens of varying health—healthy, ill, gravely ill. Unwell citizens were contagious, and healthy citizens nearby them would eventually become ill themselves. If left untreated, gravely ill citizens would die. The city contained several medical offices, and the player could send sick citizens to those offices for treatment. However, Illinois suffered higher medical malpractice insurance rates than its neighboring states. The

Figure 6
Levers allow the player to make simple policy.

candidates' positions on tort reform were partially motivated by the potential reduction in insurance rates such changes would encourage. The game provides a "policy panel" that allows the player to change simple public policy settings for the game environment (see figure 6). In this case, the player could alter maximum noneconomic damages awarded in medical malpractice lawsuits as well as investment in medical research to prevent repeat tragedies. In the medical malpractice subgame, maintaining a high threshold on noneconomic damages keeps insurance rates high, which is likely to cause doctors to leave the state. Once this happens, the medical office dims and the player can no longer treat citizens there.

The other policy subgames created similar procedural rhetorics for each of the issues. In the education reform subgame, players simultaneously manage a handful of school districts across the state. Some districts start out with different educational standards in place, while other districts enjoy disproportionate funding and teacher-to-student ratios. To play the game, the player has to "teach" in each district by keying in a Simon-like memory sequence that corresponds with the educational standard in each district (see figure 7). This procedural rhetoric embodies the candidate's policy position: maintaining multiple standards across the state made the educational system on the whole difficult to manage. Players would quickly understand this position upon being forced to remember four or five different memory sequences for all the schools. To play more efficiently, the player could reassign standards on a district-by-district basis by changing policy. The player could also reassign funding to needy schools in order to raise their educational output.

In public forums, policy issues are often discussed independently, even though most are bound to one another in significant ways. To communicate the rhetoric of interrelations, *Take Back Illinois* maintained a set of scores for each subgame and used those scores as inputs for settings in other games. For example, higher performance in the educational reform subgame increased the efficiency of job training centers in the economic development game. The parameterized interaction between simulation models serves as a rudimentary
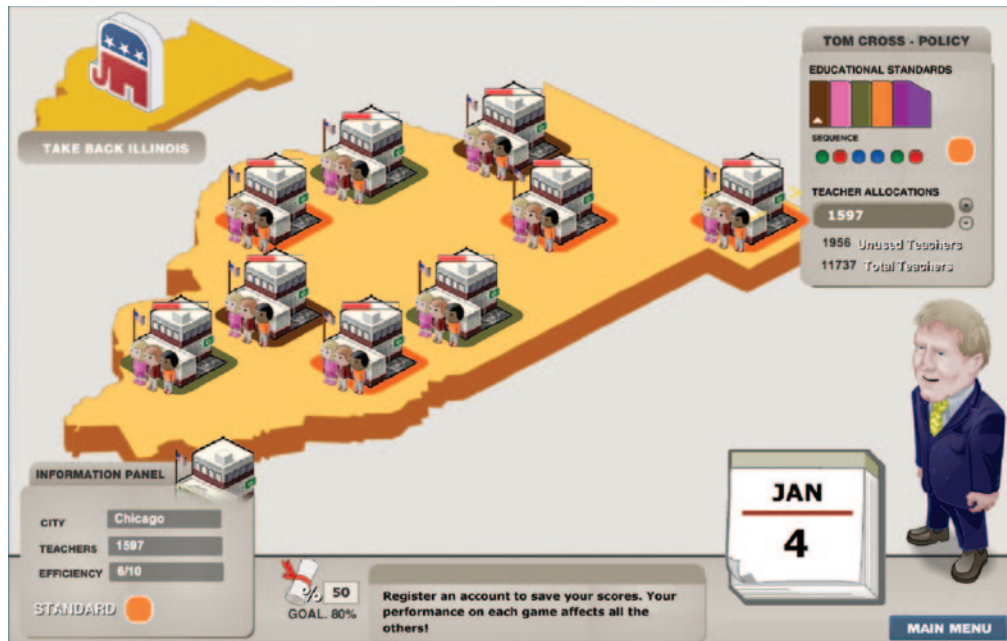
Figure 7
A *Simon*-like matching game operationalizes a public policy position on educational reform.

procedural rhetoric for the interrelationship of these issues in particular, and other issues by extension.

To play the game successfully, the player is forced to acknowledge the campaign's position on the issues it represents—for example, it is impossible to win the medical malpractice reform subgame without reducing maximum noneconomic damages for malpractice lawsuits (although reducing them beyond reason decreases the likelihood of faults). The game's procedural rhetoric is a compressed version of the campaign's policy position. In playing the game, the player is not "brainwashed" or otherwise fooled into adopting the candidates' policy position. Rather he is afforded an understanding of that position for further inquiry, agreement, or disapproval. However, none of the subgames argue that policy change alone is sufficient to create social change. In each of the games, the player must perform nontrivial actions to accomplish goals like improved health care and education. These actions trace the interconnectedness of political conditions.

Take Back Illinois and *The McDonald's Game* are specialty titles, created for specific purposes in which their persuasion outweighs entertainment. But procedural rhetoric is not limited to the narrow domain of educational or political games; the same properties can be found in commercial titles as well.

Consider *Bully*, from Rockstar Games, the creators of the *Grand Theft Auto* series.[40] In *Bully*, the player takes the role of Jimmy Hopkins, an adolescent just dropped off at Bullworth Academy by his disinterested mother and stepfather, who are on the way to their lavish honeymoon. The school is riddled with bullies and troublemakers, and Jimmy struggles to get by amidst the conflicted social situation of high school politics. The game has been reviled for supposedly glorifying bullying, but the experience it creates is anything but celebratory.

Figure 8
Although many critics though *Bully* was a celebration of schoolyard harassment, it is a model of the social politics of high school more than a hazing sim.

Even if the player struggles to steer Jimmy away from trouble, it catches up to him thanks to the petty malevolence of his peers. Students mill in the quad and buildings, either verbally and physically abusing each other or receding from verbal and physical attacks. Staying out of the way of the bullies (bullies in the game conveniently have their own clique, and all wear the same clothes) allows a player to avoid tussles. If a player stands in front of the wrong locker, he or she should expect to get shoved out of the way (see figure 8). *Bully* models the social environment of high school through an expressive system of rules, and makes a procedural argument for the necessity of confrontation. Confronting bullies is not a desirable or noble action in the game, but it is necessary if one wants to restore justice. The game privileges the underdogs—nerds and girls—and the player spends most of his time undermining the bullies and the jocks in order to even the social pecking order.

Bully is part social commentary, part satire. But it also bears the usual features of an entertainment title. While games like *The McDonald's Game* are more didactic, games like *Bully* are more subtly expressive. Neither technique is inherently more or less valid than the other, but each accomplishes a different kind of video-game-based speech, each of which might be more or less appropriate in different circumstances.

Rockstar does not generally discuss or acknowledge the procedural rhetorics they build into games like *Bully*. But other designers make more deliberate efforts to frame the ideas they put forward in their games. Consider the Will Wright/Maxis game *Spore*.[41] In *Spore*, the player starts with a microorganism and grows it into a complex sentient creature, then

Figure 9
Spore advances a perspective on the development of planetary life by simulating a theory from astro-biology.

a civilization, then a military power, and finally a space-traveling superrace. The game is a rich and complex one that clearly addresses a number of topics, most notably the tension between evolution and natural selection (creatures evolve, but the player carefully designs their attributes). But in a discussion of the game at the annual Game Developers Conference, Wright explained that the real topic he hoped to address in the game was astrobiology, the study of life throughout the cosmos.[42] Often when we wonder if there is intelligent alien life in the universe, we assume that life arises naturally and evolves slowly. Thus the chance of finding intelligent life seems remarkably small; to do so would require the greatest of coincidences in a place as large as the (ever expanding) universe. In the theory Wright hopes to advance in his video game, intelligent life does not occur and grow naturally, but is cultured and transported from planet to planet by other, more advanced civilizations. The perspective on astrobiology Wright advocates borrows the concept of seed spread by wind or other environmental factors; these reproductive structures are called *spores*. *Spore* adopts the logic of this particular view on astrobiology, subtly arguing through its game play that the spread of life in the universe is most likely caused by sentient beings transporting other creatures from star to star (see figure 9). While a book might make this argument by explaining the process, in *Spore* the player discovers the argument by playing in the possibility

space the game's rules create. This act of discovering a procedural argument through play is endemic to procedural rhetoric.

Learning From Procedural Rhetoric

Video games are models of real and imagined systems. We always *play* when we use video games, but the sort of play that we perform is not always the stuff of leisure. Rather, when we play, we explore the possibility space of a set of rules—we learn to understand and evaluate a game's meaning. Video games make arguments about how social or cultural systems work in the world—or how they could work, or don't work. Video games like *Spore* and *Take Back Illinois* make arguments about abstract, conceptual systems the way mechanical models make them about material ones. When we play video games, we can interpret these arguments and consider their place in our lives.

In this way, playing video games is a kind of literacy. Not the literacy that helps us read books or write term papers, but the kind of literacy that helps us make or critique the systems we live in. By "system," I don't just mean large-scale, impersonal things like political systems. Any social or cultural practice can be understood as a set of processes, and our understanding of each of them can be taught, supported, or challenged through video games. *Animal Crossing* presents a model of consumer capitalism that players might embrace, reinforcing their interest in property in the material world. Or, through their experience of the game, players might question the goals they set for themselves, particularly the often endless feedback loop between the desire for material goods and the work needed to support it. When we learn to play games with an eye toward uncovering their procedural rhetorics, we learn to ask questions about the models such games present.

The kind of technology literacy that procedural rhetoric offers is becoming increasingly necessary for kids and adults alike. As more of our cultural attention moves from linear media like books and film to procedural, random-access media like software and video games, we need to become better critics of the latter kind. This process starts at home where parents can help their kids play games critically, just as they might help their kids understand novels or films by virtue of their own familiarity with those media. Of course, such a future requires parents who are themselves literate in the medium of video games. Parents of all kinds can learn to play video games, but those who grew up with video games themselves are already raising the next generation of children—a six-year-old who played the Atari VCS in 1978 was thirty-five years old in 2007. These parents must play games with their kids just as a previous generation watched westerns or read comic books with them. And before they do so, they must begin playing games critically themselves, perhaps unlearning decades of treating video games as mere distraction.

Educators also have a role to play. When video games are used in schools, we often think that they should be used pedagogically. That is, if video games have any purpose in schools, it is for supplementing or replacing lesson plans for concrete, factual learning, such as principles of chemistry. But once we understand video games as procedural representations that make arguments about systems in the world, they resemble creative artifacts as much as—and perhaps more so—than they do pedagogical tools. Educators should consider adopting video games as artifacts to be discussed alongside traditional media in subjects like literature, language arts, history, and art, teaching game playing as an argumentative and expressive practice alongside reading, writing, and debating.

Finally, procedural rhetoric has a role to play in the way we teach programming and video game development. As interest in games as a cultural activity increases, and as the importance of computing itself has increased, some educators have hoped to teach game development as an entry point into computer science.[43] Video games are appealing, kids want to play them, and they also want to make them. By luring kids into computer science through video game development, we can attempt to increase dwindling interest in math, science, and technology.

This is not a bad approach to programming education. But unfortunately, such approaches risk assuming that creating any kind of video game offers the same pedagogical value. Programming education must take care to ensure that it supports sophisticated responses to the medium, rather than reinforcing the idea that play is equivalent to leisure, and that video games are intended to produce fun and distraction rather than critical response. In addition to using video games to teach kids how to write computer programs (procedural literacy), we can use them to teach kids how to write computer arguments (procedural rhetoric). When kids program, just as when they write, they can learn to make their own claims about the world in the form of processes. Such a practice reframes video game development as a rhetorical practice, not just a craft practice or a technical practice. By actively teaching kids to mount arguments in procedural form—even simple ones like models of their everyday life—video games can become a carrot medium for both programming and expression. Work in teaching kids to program games has already begun (examples include MIT's Scratch,[44] the MacArthur-funded University of Wisconsin/Gamelab Game Designer project,[45] the London Knowledge Lab's Making Games Project,[46] Carnegie Mellon University's Alice,[47] among others). Efforts like these can be used as the basis for a combined program in procedural literacy and rhetoric.

Video games are not mere trifles, artifacts created only to distract or to amuse. But they are also not *automatically* rich, sophisticated statements about the world around us. Video games have the power to make arguments, to persuade, to express ideas. But they do not do so inevitably. As we evolve our relationship with video games, one of the most important steps we can take is to learn to play them critically, to suss out the meaning they carry, both on and under the surface. To do this requires a fluency in procedurality, the core representational form of computing. But programming or using computers is not the sole answer to such a charge. Rather, we need to play video games in order to understand the possibility spaces their rules create, and then to explore those possibility spaces and accept, challenge, or reject them in our daily lives.

Notes

1. Nintendo, *Animal Crossing* (Kyoto, Japan: Nintendo, 2002); and idem., *Animal Crossing: Wild World* (Kyoto, Japan: Nintendo, 2005).

2. Just to give the reader a sense of the magnitude of work that faces players of *Animal Crossing*, the final renovation mortgage is over 700,000 "bells" (the currency unit in the game). The most lucrative fish and insects one can catch in the game sell for 10,000 bells, but they are quite rare. More typical items sell for 300–1,000 bells.

3. John de Graaff, David Wann, and Thomas H. Naylor, *Affluenza: The All-Consuming Epidemic* (San Francisco: Berrett Koehler, 2005).

4. Jean Lave and Etienne Wenger, *Situated Learning: Legitimate Peripheral Participation* (Cambridge, UK: Cambridge University Press, 1991).

5. See http://www.animalcrossingcommunity.com/. Accessed June 1, 2006.

6. See http://www.animalcrossingcommunity.com/getting_started.asp. Accessed June 1, 2006.

7. Katie Salen and Eric Zimmerman, *Rules of Play: Game Design Fundamentals* (Cambridge, MA: The MIT Press, 2004).

8. In Japanese, the divisions are not precisely commensurate with English syllables, although this is usually the way we adapt haiku for Western languages.

9. Georges Perec, Le Grand Palindrome, in *La clôture et autres poèmes* (Paris: Hachette/Collection POL, 1980).

10. Idem., *La disparition*, trans. Georges Perec (Paris: Gallimard, 1990); and idem., *La disparition*, trans. Gilbert Adair (Boston: Verba Mundi, 2005).

11. Janet Murray, *Hamlet on the Holodeck* (New York: Free Press, 1997), 71.

12. Ibid.

13. Ibid., 72.

14. Chris Crawford, Process Intensity, *The Journal of Computer Game Development* 1, no. 5 (1987). http://www.erasmatazz.com/library/JCGD_Volume_1/Process_Intensity.html.

15. iD Software, *Doom* (Mesquite, TX: iD Software, 1993).

16. Maxis, *Sim City* (Alameda, CA: Brøderbund, 1989).

17. Plato, *Plato: Complete Works* (New York: Hackett, 1997), 453a.

18. Aristotle, *The Rhetoric and Poetics of Aristotle* (New York: McGraw Hill, 1984), 24, see I.2, 1355b26.

19. George A. Kennedy, *Classical Rhetoric and Its Christian and Secular Tradition* (Chapel Hill, NC: University of North Carolina Press, 1999), 3.

20. Kenneth Burke, *A Rhetoric of Motives* (Berkeley and Los Angeles, CA: University of California Press, 1969), 19.

21. Sonja K. Foss, Karen A. Foss, and Robert Trapp, *Contemporary Perspectives on Rhetoric* (Prospect Heights, IL: Waveland Press, 1985), 214.

22. James P. Zappen, Digital Rhetoric: Toward an Integrated Theory, *Technical Communication Quarterly* 14, no. 3 (2005): 319.

23. A much more detailed version of this argument, with additional examples from the domains of politics, advertising, and education, can be found in my book on the subject, Ian Bogost, *Persuasive Games* (Cambridge, MA: The MIT Press, 2007).

24. James Paul Gee, Learning and Games, in *The Ecology of Games: Connecting Youth, Games, and Learning*, ed. Katie Salen (Cambridge, MA: The MIT Press, 2007), 21–40.

25. Ibid.

26. Patrick Dugan, Hot Off the Grill: La Molleindustria's Paolo Pedercini on the McDonald's Video Game, *Gamasutra* February 27, 2006. http://www.gamasutra.com/features/20060227/dugan_pfv.htm.

27. Plato, 515a–16a.

28. Raymond Boudon, *The Analysis of Ideology* (Chicago: University of Chicago Press, 1989), 25.

29. Ibid.

30. Karl Marx, *Capital: Vol. 1, A Critique of Political Economy*, trans. Ben Fowkes (New York: Penguin, 1992), 166–67. The translation here has been modified.

31. Modeling, Simulation, and Virtual Environments Institute (MOVES), *America's Army: Operations* (Washington, DC: U.S. Army, 2002).

32. Michael Zyda, John Hiles, Alex Mayberry, Casey Wardynski, Michael V. Capps, Brian Osborn, Russell Shilling, Martin Robaszewski, and Margaret J. Davis, Entertainment R&D for Defense, *IEEE Computer Graphics and Applications* 23, no. 1 (2003): 28–36.

33. Ibid., 34.

34. Ibid., 28.

35. Ibid., 30.

36. Ibid.

37. David Williamson Shaffer, Epistemic Games, *Innovate* 1, no. 6 (2005); and idem., *How Computer Games Help Children Learn* (New York: Palgrave/MacMillan, 2007).

38. Gee, Learning and Games.

39. Persuasive Games, *Take Back Illinois* (Atlanta, GA: Persuasive Games/Illinois House Republicans, 2004).

40. Rockstar Games, *Grand Theft Auto III* (New York: Take Two Interactive, 2001); idem., *Grand Theft Auto: Vice City* (New York: Take Two Interactive, 2003); idem., *Grand Theft Auto: San Andreas* (New York: Take Two Interactive, 2004); and Rockstar Vancouver, *Bully* (New York: Take Two, 2006).

41. Maxis, *Spore* (Redwood Shores, CA: Electronic Arts, Forthcoming). As of this writing, *Spore* is expected to be released in 2009.

42. Will Wright, What's Next in Content? Paper presented at the Game Developers Conference, San Jose, CA, 2006.

43. For examples, cf. Brenda Cantwell Wilson and Sharon Shrock, Contributing to Success in an Introductory Computer Science Course: A Study of Twelve Factors, *ACM SIGCSE Bulletin* 33, no. 1 (2001): 184–88; and Randolph M. Jones, Design and Implementation of Computer Games: A Capstone Course for Undergraduate Computer Science Education, *ACM SIGCSE Bulletin* 32, no. 1 (2000): 260–64.

44. See http://scratch.mit.edu/. Accessed March 1, 2007.

45. As of this writing, the Game Designer project is still in the early stages of development. An overview of the project can be found at http://website.education.wisc.edu/gls/research_gamedesigner.htm. Accessed March 1, 2007.

46. See http://www.lkl.ac.uk/research/pelletier.html. Accessed March 1, 2007.

47. See http://www.alice.org/. Accessed March 1, 2007.