Procedural Literacy

Are videogames educational? The answer depends largely on what “educational” means, a controversial question. Rather than searching for a rationalistic yes/no answer, it is more productive to ask how a particular user community understands things to be educational. If something is educational, what does it teach? And how does it teach it?

In popular discourse, education most often relates to didactic pedagogy, conjuring visions of classrooms and textbooks. In this sense, we can understand “education” most easily as the outcome of successful interactions between teachers and students. What makes such interactions “successful” is the subject of ongoing debate in the educational community. As with any field, trends have come and gone over time. I will not attempt to summarize the history of educational theory in this context, but a few key moments helpfully contextualize the problem of learning in videogames.

According to early behaviorists like Edward Thorndike and B. F. Skinner, learning is about reinforcement. Organisms (behaviorists generally group humans among animals of all sorts) respond to positive and negative incentives. When organisms find themselves in similar situations with similar incentives, they will respond in similar ways. Transfer of learning—a pervasive and problematic concept in educational theory—takes place via repetition and reinforcement. Reinforcement theory privileges stimulus–response learning arranged in steps to ratchet up a student’s abilities.

Objections to behaviorism abound. Principally, behaviorists have been accused of ignoring the private, mental processes inherent in individual
human beings. According to this objection, materialist, empiricist understandings of learning leave no room for human subjectivity. Such a state of affairs is partly born from behaviorism’s attempt to account for not only human behavior, but also animal behavior. The objectivism inherent in behaviorist underscores a general belief that psychology is a “natural science” based in empirical observation, like the natural sciences. Thus introspection is unaccounted for in the most extreme forms of behaviorism.

With Jean Piaget, the understanding of learning became more connected to theories of mind, correcting the immoderate scientism of behaviorism. Piaget outlined overall cognitive structures or “development stages”: sensorimotor (0–2 years), preoperation (3–7 years), concrete operational (8–11 years), formal operational (12–15 years). Each structure demands different processes of adaptation, and therefore different modes of learning. Piaget insisted that cognitive development entails adaptation to the environment, a founding principle of other constructivist learning theories. Nevertheless, Piaget’s scientific cognitivism still relied on a universalist approach to learning, even if that universalism was grounded more in biology than in rationalism. The cognitive structure of the individual, constrained by a particular stage of development, undergirds the learner’s ability to actively construct new ideas based on his or her experiences and past knowledge. Often traced to the epistemology of John Dewey, which rejects the rationalist notion that knowledge exists immutably in nature, constructivist learning assumes that the learner “constructs” knowledge individually, that learning is inseparable from the learner’s interaction with the environment. The more popular forms of social constructionism, founded on the theories of Lev Semenovich Vygotsky, draw particular attention to the role of social interaction in cognitive development. Social constructionism includes approaches like the Soviet activity theory that descended from Vygotsky’s own contributions, as well as situated learning theory, which focuses on “learning by doing.”

Constructivism too faces challenges. Social psychologist James K. Doyle has argued that the correlation between constructivist-style embodied thinking has not been convincingly tied to actual future behavior. Doyle argues that changes in “thought, behavior, or organizational performance” are limited to anecdotal and bias, with little sound, demonstrable scientific basis. In response, one might argue that constructivism necessarily resists generalizable results as a matter of principle, focusing instead on the particularities of individual learners. Seymour Papert’s version of Piagetian constructivism, which he called constructionism, focuses on the active creation of things in the material world. Constructivism refocuses education on the practice of individualized cognitive development as a goal in itself, a goal not always reconnected with subject-specific learning outcomes.

No matter the educational theory, every philosophy assumes that the correct approach to learning involves cultivating the student according to the principles of that philosophy. This is a noncontroversial generalization; learning theories are intended to guide and structure educational practice. At the risk of oversimplification, most contemporary understandings of (formal) education fall largely in either the behaviorist or the constructionist theory of education. The “traditional” classroom relies on behaviorist learning strategies. Students practice within question/answer frames that reinforce knowledge of a subject matter. Students respond (in speech or writing, for example) and receive immediate feedback in the form of positive and negative reinforcement. The behaviorist classroom assumes that reinforced behavior will recur; and because of its empirical assumptions, such a learning environment believes that one type of positively reinforced behavior is adequate. Teacher-directed rote learning is the norm in behaviorist-influenced educational practices.

Despite contemporary education’s propensity toward behaviorist education, the commonest form of constructivist learning comes from the first classroom many of us experience: kindergarten. Nineteenth-century German educator Friedrich Fröbel, inventor of kindergarten, held great esteem for the individual student and his particular needs. Wrote Fröbel in his 1826 treatise On the Education of Man, “The purpose of education is to encourage and guide man as a conscious, thinking and perceiving being in such a way that he becomes a pure and perfect realization of that divine inner law through his own personal choice.” Fröbel’s kindergarten relied on play, materials, and activities as a means to encourage creativity and thereby, fulfillment. In the kindergarten classroom, personal experience yields an understanding of the world.

Similarly, Italian educator Maria Montessori encouraged a child-centered that focused first on the senses, then on the intellect—this approach was based largely on her experience with mentally retarded children. Unlike Fröbel, Montessori encouraged more “practical” learning, based around material exercises intended to ratchet up learning through increasingly demanding real-world experiences.
In general, the contemporary behaviorist classroom is expected to function like a scientific instrument in which the successful student develops an increasingly accurate ability to reflect the veracity of the material world. That world contains facts and principles, or "learning content," which education successfully transfers into the mind of the learner through reinforcement. Constructivist approaches to education remain almost entirely confined to the arena of very early childhood. Even though this developmental period bears high cultural visibility, it is generally less controversial to allow the very young to experiment with their own emerging identities. And some object to the mystical freedom of educational environments like the Montessori classroom, versus the structured formalism of other situations. Constructivist learning environments risk devolving into relativistic playpens, where the abstract, individual growth of learners occludes actual educational substance.

Current theories of videogames as educational tools mirror our views on classrooms. While they are too new a phenomenon to definitively attach to educational philosophies, we can roughly split perspectives on videogame learning into behaviorist and constructivist modalities.

If behaviorism relies on an empirical, scientific worldview—that of a singular, knowable universe of concepts—then a behaviorist model of educational videogames transfers that universe onto the game world. Videogames may not be complete models of the material world, but they are certainly microcosms. These worlds, in the opinion of behaviorist-influenced educators, stand in for the material world in a one-to-one fashion. In so doing, videogames simulate the actual dynamics of the material world, and playing such games has the same effect as would real learning in the material world. That is to say, reinforcement through gameplay establishes repeat behavior, to which the player/learner adapts. If that behavior corresponds with the sort of content that an educator would positively reinforce in the material world, then the videogame serves a (potentially) commensurate purpose, both in function and value. If, however, the behavior corresponds with the sort an educator would negatively reinforce, then the videogame is dangerous and undesirable. In short, videogames teach their content, and that content transfers to real-world experience.

Consider a few examples. *Microsoft Flight Simulator*, one of the longest-running videogame series, is a game about flying aircraft. The game simulates the mechanics of a variety of equipment, atmospheric, and weather conditions, providing a plausible simulated representation of aircraft flight. From the behaviorist perspective, the game transfers its subject matter to the player. One might understand *Flight Simulator* as a game that teaches something about aviation, which players can then use to understand how real planes fly. This might be reasonable, but as Bill Buxton has pointed out, even though computer simulations have frequently been used to train pilots, very few of us would want to step into an aircraft whose pilot had only played *Flight Simulator*.4

Or consider *Sin City*, the popular urban management game.1 In the game, players construct cities by zoning land, choosing energy sources, and investing in infrastructure like roads, rail, and public services. From the content perspective, the game teaches something about urban planning, which players could then use to plan real cities. As with *Flight Simulator*, some experiences are clearly abstracted out of *Sin City*, but a behaviorist videogame educator might say that the game teaches the "basics" of urban planning.

What about a game like *Ninja Gaiden*, first a side-scrolling arcade game for the Nintendo Entertainment System (NES) and other platforms of that era,16 and more recently a popular and critically acclaimed Xbox fighting game?19 Both versions are adventures in which the player directs a ninja against innumerable, very difficult enemies. As ninjas are wont to do, the player character in *Ninja Gaiden* deploys stealth, melee, and projectile attacks to take his revenge. The behaviorist view leaves little room for interpretation regarding such a game. By the logic we applied to *Flight Simulator* and *Sin City*, it follows that *Ninja Gaiden* teaches something about Japanese feudal stealthiness, which, again following the same logic, the player could then use in real espionage and retaliation. So-called media effects arguments attempt to correlate such representations with youth aggression and violence. This approach is classically behaviorist; the videogame positively reinforces a "bad" representation (in this case, ninja violence), which the player will then understand as appropriate behavior.20

The behaviorist-influenced content perspective opens up a Pandora's Box of media effects arguments. If videogames teach their content, and if that content ought to be negatively reinforced, then exposure to such games positively reinforces negative content. While only the staunchest behaviorist would suggest that exposure to *Ninja Gaiden* will produce armies of black-hooded stealthy warriors, many more would squint suspiciously at a game like *Grand Theft Auto*. The contemporary verisimilitude of Liberty City or San Andreas might suggest that the game teaches something about criminality,
which the player can then use to perpetrate real crimes. Such representations, when patched up through the successive positive reinforcement provided by an involved game like Grand Theft Auto, has been blamed for numerous social ills, from general dereliction to school shootings.

This dark side of the behaviorist conception of educational videogames is not limited to violence. Controversy erupted over Flight Simulator after the September 11, 2001 terrorist attacks. Three days after the attacks, Microsoft announced that it would remove the World Trade Center towers from the 2002 version of the game, "because we do not want to cause anyone pain in the future versions of the software." The manual calls the game "as real as it gets," and the promotional introduction to the game reportedly depicted two people playing, one telling the other, "John, you just about crashed into the Empire State Building! Hey, that would be cool," sentiments that worried behaviorist-minded educators, lawmakers, and parents. In 2004, a mother asked about Flight Simulator for her ten-year-old son at a Staples office supply store in Massachusetts. According to published reports, the clerk was so alarmed "at the prospect of the ten-year-old learning to fly" that he called the police. The mother, an Air Force Reserve pilot, discovered an FBI agent snooping around her house a few days later. As one commentator reported, "the authorities moved into action, leaving nothing to chance." The risk that a videogame could teach the right things to the wrong people is a grave concern in behaviorist circles. As I discussed earlier, Sim City has likewise been criticized for indoctrinating young people into an American model of taxation, and for advancing an overly simplistic understanding of urban dynamics. This same perspective underlies objections of these kinds.

The behaviorist view is problematic for numerous reasons. For those who wish to reject media effects arguments, this position all but requires players to accept that games that positively encourage negative incentives can only be damaging, never beneficial. But playing a role in a videogame does not automatically imply validation for the behavior the game models. As I have argued, videogames can also give players the opportunity to empathize with people and situations they might not ordinarily encounter, as in the case of Darfur is Dying and Diaspora. Even though the player of a game might carry out the actions of the criminal, or the ninja, or the humanitarian, he does not necessarily endorse, reject, or adopt them outside of the game. Behaviorist approaches to games foreclose what I have previously called the simulation gap, the breach between the game's procedural representation of a topic and the player's interpretation of it. Indeed, behaviorism's general tendency to ignore the individual contexts for learning fail to account for both different player contexts and the ambiguity of meaning inherent to creative artifacts of all kinds. Such an absolute appeal to scientific logic occludes cultural nuance and the subjectivity of representation, a feature I have argued is inherent to videogame analysis.

What about the constructivist-influenced approach to videogames? In Montessori, robotic interaction with abstract shapes and puzzles is not intended to produce abstract expressionist sculptors. Rather, the creative and menial work Montessori recommend of her students—including sweeping and polishing door handles—was conducted "[to make] them accomplish everything with an enthusiasm that is almost excessive." Lego christened their computer-aided brick robote-building system with the term "Mindstorms," borrowed from constructionist Seymour Papert. Mindstorms are primarily intended to teach computer programming and creative, expressive construction. While robotics are integral to the process, they serve principally as a carrot to draw child interest; the educational value of the toys are understood in terms of their potential to develop general abilities in programming and creative expression.

From this perspective, videogames teach abstract principles that service general problem-solving skills and learning values. Returning to our previous examples, a constructivist might understand Microsoft Flight Simulator as a game that teaches professional knowledge through "performance before competence," a concept of pedagogical apprenticeship. Such an attitude might very well catalyze interest in aeronautics, but more generally it encourages the learner to experiment within knowledge domains freely, without fear of incompetence due to incomplete mastery.

Sim City likewise could serve as a similar catalyst for professional experimentation of the general kind, but the game offers another example of general constructivist learning principles. Under the shiny, credible graphics of Sim City towns is an abstract simulation of urban development, based largely on Jay Forrester's concept of urban dynamics. But beneath even that layer of abstraction, the game marshals interactions between units of urban development via cellular automata, a technique that governs interaction between units (cells) of a system. Just as Mindstorms robotics supply access to general programming techniques, constructivist approaches to educational videogames sometimes see games as uncovering the abstract systems that underlie them.
*Sin City* could be understood as a game that teaches about complexity and other approaches to the general operation of dynamic processes, such as systems theory and autopoietics. Through engagement with the game, players learn to reflect on the natural or artificial design of systems in the material world.11

Under such a conception, the "ninjaess" of *Ninja Gaiden* becomes a secondary, if not almost incidental, tool for general learning principles. In a demonstration of the game's learning principles at the 2005 Serious Games Summit, games and learning scholar James Paul Gee argued that the game uses exploration and small problems of increasing difficulty to teach players its rules of play. The design of successive challenges—climbing a wall, using a particular ninja attack on a particular type of opponent—is demonstrated, checked, and then challenged. All told, the game teaches players how to transform skills into strategies, and to turn failure into success.11 *Ninja Gaiden* serves as an especially salient example of this technique owing to the game's characteristic difficulty. Unless the player learns the game effectively, he will never get very far.

This approach underscores videogames' ability to cultivate higher-order thinking skills. In a related example, Gee has argued that the real-time strategy (RTS) game *Rise of Nations* "encourages players to think in terms of relationships, not isolated events or facts."12 This expanded view on a subject allows the player to see the problem abstractly and at a distance unavailable to the narrowly focused subject of a behaviorist classroom. The game, argues Gee, helps the player "see clearly how each piece of information we are given and each skill we are learning (and doing) is inter-connected to everything else we are learning and doing. We see the game as a system, not just a set of discrete skills."12 John Beck and Mitchell Wade have called this abstract technique in videogames "going meta," or "taking a step back from the immediate situation, analyzing the choices and the odds, and finding the right strategy."13 Beck and Wade argue that the "videogame generation"—people 33 and under as of 2005—are uniquely positioned for success in business because of this abstract ability to "go meta" learned from videogame playing in general.

The behaviorist position is perhaps as undesirable as the constructivist, but for different reasons. Behaviorism ascribes a singular, rationalist approach upon the content of videogames. Such a turn ignores Marshall McLuhan's suggestion that we understand media themselves as shapers of human experience, not just carriers of content. And constructivism risks total divestiture of the specificity of a particular videogame in favor of the general, abstract principles it embodies. While well-intentioned, Beck and Wade's approach to videogames represents a version of videogame constructivism that raises particular concerns for the medium's expressive potential. Instead of seeing videogames as an expressive medium, each artifact worthy of consideration and respect as a unique artifact, Beck and Wade see them as only a cultural trend, a population of minds properly conditioned for corporate influence. This approach to videogames recalls the ills of serious games, which try to leverage the properties of games to support existing hegemony. As Gee admits in his analysis of *Ninja Gaiden*, what the game really teaches is how to play the game.13 We can understand the phrase two ways: how to play this game—*Ninja Gaiden*—and how to play the abstract game—business leadership.

If we reject both of these positions, what type of understanding of educational videogames emerges? Let's begin with Gee's useful summary of how he believes learning takes place in videogames, from his sustained study on the subject, *What Video Games Have to Teach Us about Learning and Literacy*:

The content of videogames, when they are played actively and critically, is something like this: They situate meaning in a multidimensional space through embodied experiences to solve problems and reflect on the intricacies of the design of imagined worlds and the design of both real and imagined social relationships and identities in the modern world.14

In other words, videogames simulate specific experiences that provide insights into the general relationships that drive those experiences. Gee calls this practice "situated" or "embodied learning."14 I do not want to suggest that Gee's position is invalid, but rather that it is not strong enough. Videogames do not just offer situated meaning and embodied experiences of real and imagined worlds and relationships; they offer meaning and experiences of particular worlds and particular relationships. The abstract processes that underlie a game can confer general lessons about strategy, mastery, and interconnectedness, but they also remain coupled to a specific topic. The particular representations of taxation in *Sin City*, of criminality in *Grand Theft Auto*, and of humanitarianism in *Fool Force* are not merely contingent. The underlying models of a videogame found a particular procedural rhetoric about its chosen subjects. Put differently, rhetorical positions are always particular positions; one does not argue or express in the abstract. A game's procedural rhetoric
influences the player's relationship with it by constraining the strategies that yield failure or success.

The notion of graphical skins discussed in chapters 1 and 2 provides another perspective on this problem. The surface representation or graphical skin in a game is not a mere dressing for the abstract rules, such that any particular presentation of a procedural model is essentially arbitrary and dispensable. Likewise, the coupling of different graphical skins to similar procedural models does not necessarily couple the logic of the processes to the subject of the skin. This is why games like Congo Jumps and the Raiders of the Lost Ark, White House Jumps, and Mr. Match lose coherence: their topics are tied only to graphical skins and not to the processes underneath. Jesper Juul has called these two layers of a game *rules and fiction*, and he suggests that the two are not inseparable. To exemplify the claim, Juul compares two games with identical processes but different graphical skins, both derivatives of *Space Invaders*-style shooters: "In the first game, the player controls a spaceship in a battle against the heads of the host of a television program. In the second game, the player controls a spaceship in a battle against various [narratology] theories." Despite the similarities of these games, which have identical underlying code, Juul concludes that "the relation between rules and fiction... is not arbitrary... In the first case [players] stage the love/hate relationship that viewers may have with television personalities as a deep-space battle. In the second case they stage an academic discussion... as a deep space battle. Both are based on a background of some existing antagonism—and that is why they work, because the rules fit the representation—in an allegorical way." In the case of these games, unlike Congo Jumps, the procedural representation is deliberately chosen for its applicability to the games' respective topics.

Game designer Raph Koster offers an even stronger example. Koster imagines a hypothetical reworking of the classic puzzle game *Tetris*. This new version replaces the game's abstract tetrominobs with dead bodies contorted into the different shapes. The abstract playfield of *Tetris* becomes a mass grave, and the game itself becomes a simulation of genocide. Koster explains:

You the player are dropping innocent victims down into the gas chamber, and they come in all shapes and sizes. There are old ones and young ones, fat ones and tall ones. As they fall to the bottom, they grab onto each other and try to form human pyramids to get to the top of the well. Should they manage to get out, the game is over and you lose. But if you pack them in tightly enough, the ones on the bottom succumb to the gas and die.

The abstract goals of the two games remains the same, drop bodies to form near, efficient rows in the tomb. But the adoption of a new context for identical rules changes the game from a harmless puzzle into a morally debatable cultural object. As Koster says of the hypothetical Holocaust simulator, "I do not want to play this game. Do you? Yet, it is *Tetris*." Here, as in all videogames, the coupling of abstract processes to particular topics produce particular meanings that represent particular positions. Or, as Koster puts it, "the bare mechanics of the game do not determine its semantic freight."

When Gee discusses "embodied experiences" in games, he is not referring to the type of individual encounter with a particular procedural claim about a particular topic in the examples just discussed. Instead, Gee connects embodied experience to *semiotic domains*, the sets of practices in which meaning is situated for a particular community. While this idea may sound very similar to a procedural rhetoric, Gee's primary use of the term is quite general: the semiotic domain of videogames, or genres of videogames and the practices of players who learn and master them. In this context, the learning that takes place in a videogame becomes an analogy for the way learning might take place in other contexts. For example, when people play first-person shooters, they learn the conventions and standards of those games, as well as the values and communications practices of players who play them, both inside and outside the game. The semiotic domain of all first-person shooters might be similar due to the genre's common procedural model (unit operations for movement, projectiles, stealth, etc.), but the meaning of individual first-person shooters vary based on the way those processes are used rhetorically. *Doom* is about saving the world from hellspawn; *War of Reckonings* is about the politics of religious fanaticism. Gee's notions of semiotic domains and embodied experiences do clarify the qualitative differences between the kind of learning that takes place in videogames compared with traditional classrooms, but his approach maintains an ambiguous relationship with the educational significance of specific games. The higher-order thinking skills still matter, but so does the ninja.

To be fair, Gee never really intended his own analyses of the educational structure of videogames as an apotheosis of the medium's educational potential. Says Gee, "while I talk a good deal about actual video games, I really
intend to discuss the potential of video games. This sentiment breeds both encouragement and concern. On the one hand, it opens the door to an expanded possibility space for videogames that includes a variety of subject domains normally reserved for formal education and, thereby, normally excluded from commercial development. On the other hand, it suggests that the type of learning that takes place in current videogames is somewhat derelict, or that the only learning possible in contemporary commercial off-the-shelf (COTS) games is of the abstract, subject-unspecific sort, a model for how learning might be more effective in other formal or informal settings, with or without the use of videogames. Thus, the notion that games teach you “how to play the game” stands as an open invitation for videogames of more varied genres and subject domains, where the game you learn to play has a greater and more meaningful coupling with real experience. More importantly, Gee’s suggestions imply the need for a new understanding of educational games that reconciles subject-specificity and abstraction. As a means of entry into such a project, I propose a new understanding of procedural literacy.

From Programming to Culture

By the mid-1970s, early personal computers spawned a surge of interest in programming education, especially in getting children to program. At the Xerox Palo Alto Research (PARC) group, Alan Kay and Adele Goldberg proposed an environment in which anyone could program simulations. Using their object-oriented Smalltalk language, Kay and Goldberg argued that computers could be used expressively by anyone. Soon after, Seymour Papert outlined a program for teaching children to program with Logo, a language he co-developed in the 1960s at MIT. A student and colleague of Piaget, Papert built on the former’s constructivist approach, extending his approach to knowledge as a practice of actively making real things, which he dubbed constructionism. By the early 1980s, programming began to gain recognition not only as a kind of professional training but also as a kind of literacy in its own right. This new trend has been called procedural literacy.

Such efforts to teach programming to the uninitiated, and especially the very young, have continued since. Recently, Ken Perlin and Mary Flanagan have led a National Science Foundation (NSF)-funded initiative called the RAPUNSEL project, a programming environment designed specifically for preteen and early-teenage girls (a time when many girls lose interest in science and technology). Like Papert’s Mindstorms, RAPUNSEL relies on subject-matter “carrots” as incentives to program. But whereas the former uses abstract geometric art created by computer “turtles” and later robots as its carrot—a decidedly male-gendered bias—the latter uses dancing—equally gendered, perhaps, but far more appealing to girls. In RAPUNSEL, users embed dance-step programs into articles of clothing worn by avatars in the environment. RAPUNSEL programmers can trade parts of outfits to create new dances. Its creators haven’t yet formalized RAPUNSEL into a fully functional system, but they currently envision it as a multiplayer game whose natural social dynamics will stimulate initial and continued interest in computer programming.

RAPUNSEL follows on the heels of numerous reports suggesting that the United States is falling far behind other nations in science and engineering. Computational literacy is fundamental to many careers in the basic and applied sciences, and as such it is increasingly plausible to consider programming a foundational ability. But computer programming constitutes only one register of procedurality. More broadly, I want to suggest that procedural literacy entails the ability to reconfigure concepts and rules to understand and process, not just on the computer, but in general. The high degree of procedural representation in videogames suggests them as a natural medium for procedural learning. But, as I have suggested the learning that takes place in videogames is not just comprised of abstract processes, following the constructivist tradition, nor their surface content, following the behaviorist tradition. Rather, videogames use abstract processes to make procedural claims about specific topics. Expressive AI and interactive drama researcher/designer Michael Mateas offers a revised definition of procedural literacy that helps accomplish part of this correction:

By procedural literacy I mean the ability to read and write processes, to engage procedural representation and aesthetics, to understand the interplay between the culturally-embedded practice of human meaning-making and technically-mediated processes.

Mateas’s definition couples procedural reputation to culture and aesthetics, suggesting that procedural literacy is not just a practice of technical mastery, but one of technical-cultural mastery. I want to clarify a point left implicit in Mateas’s position: procedural literacy should not be limited to the abstract
ability to understand procedural representations of cultural values. Rather, it should use such an understanding to interrogate, critique, and use specific representations of specific real or imagined processes.

Before we can think about how videogames might help students become procedurally literate in this particular way, it is useful to consider how conceptions of "ordinary" literacy, in the literal sense of reading and writing "letters," have both addressed and confused the issue.

Shortly after World War II, Dorothy Sayers, a medievalist and friend of J. R. R. Tolkien and C. S. Lewis, gave a talk at Oxford entitled "The Lost Tools of Learning." In the presentation, Sayers argued that we have failed to teach children what is most important. Instead of simply bombarding students with subject-specific content, Sayers suggests we first teach them how to learn. She points to the medieval method of education, based on the trivium, as a guide. The trivium comprised three parts: grammar, dialectic, and rhetoric. Aristotle first outlined this approach, mostly in works that were lost until the fifth and sixth centuries, when they were rendered into Latin for broader popular use. Sayers was a medievalist and Christian apologist, and thus she points explicitly to the medieval version of the trivium, which focused more on Latin authors as opposed to the Greeks one who had formed the basis for learning in antiquity, including Latin-speaking ancient Rome.

On first blush, it is tempting to interpret Sayers' views as protoconstructivist. If Sayers decrees "subjects" in favor of "the art of learning," doesn't this mean replacing content-specific learning with abstract principles? In fact, this is not at all what Sayers wished to propose. "Subjects of some kind," says Sayers, "there must be, of course. One cannot learn the theory of grammar without learning an actual language, or learn to argue and orate without speaking about something in particular." Sayers draws her suggestions for the particular subjects in which to ground a principles-based education from her background as a medievalist; they include post-classical Latin, theology, classical myth and European legend, historical figures and dates, and the natural sciences and mathematics. In this way, Sayers reconnects grammar with all subjects of all sorts, instead of relegating it to the single subject of language. Dialectic builds on this mastery of the basics of particular topics and moves into the realm of analysis ("Many lessons—on whatever subjects—will take the form of debates"; "The conclusion of the statesman justified"); "Theology... will furnish material for argument about conduct and morals"). And rhetoric demands the student to synthesize critical, expressive, and argumentative perspectives about a wide range of topics, using the tools of dialectic.

Traditional classroom instruction, both in Sayers' time and our own, privileges subject learning in isolation and without mechanisms for synthesis; such is the source of the now-familiar pupil's aphorism, "when am I going to use this in the real world?" But rather than suggesting that the exercise of Latin, or mathematics, or history themselves strengthen the mind through generic exercise, Sayers' proposes that the embedded logics of such subjects provide the tools necessary to interrogate new, unfamiliar questions. These tools become the basis for living a productive adult life, or for interrogating a new, more advanced subject at university (the equivalent of the medieval quadrivium, which follows the trivium). Sayers' proposal is still that of a traditional medievalist, and it is stereotypically Western in its values. We might accept or reject the content of Sayers' proposal for literacy, but its structure is instructive: abstract approaches to specific subjects found the basis for learning.

Sayers does not propose the direct adoption of the medieval trivium, but a revision to it, a modernization. Her proposal is hypothetical and high-level, not adequate to support a complete curriculum. In recent years, educators influenced by Sayers' proposal in "The Lost Tools of Learning," have attempted to adopt her model for contemporary instruction. Sayers' influence is particularly pronounced in private and parochial schools, which appreciate her emphasis on the church, but secularized versions have also become increasingly common. Such schools often call their approaches "classical," a reference to the classical origins of the trivium itself. But since Sayers' own proposal is a revision of the medieval tradition's own adoption of the classical trivium, such new approaches are more properly called neoclassical: they revise the medieval trivium for a new era.

Despite the clarity of Sayers' proposal, modern adaptations of it have decoupled the trivium from its subject-specific roots, following the errors of constructivism. Among the more popular recent attempts to codify a neoclassical education is that of Jessie Wise and Susan Wise Bauer, who coauthored The Well-Trained Mind, an influential book on neoclassical education. At first blush, Wise and Bauer's neoclassical trivium looks just like Sayers' proposal. The three stages of grammar, dialectic, and rhetoric are present (although Wise and Bauer rename dialectic logic). They also implement Sayers' suggestion to map these three stages to developmental level: grammar in the
elementary grades, logic in the middle-school grades, and rhetoric in the high-school grades. But unlike Sayers’ approach, Wise and Bauer divest the specific intellectual canon imposed by the trivium’s subjects, such as Latin, theology, and epic in favor of instrumental, abstract ones. On the one hand, their neoclassicism divorces learning from the social and cultural traditions that serve as objects of knowledge, paralleling the constructivist privilege of abstraction over concreteness. But on the other hand, Wise and Bauer also don’t revise Sayer’s Occidentalism and traditionalism; for example, despite the implication of modernization in a neoclassical approach, the two still privilege verbal and especially written expression, castigating visual and computational media. This fault parallels the behaviorist insistence on a single mode of legitimate learning. Understanding the way a traditional approach to literacy broke down the bond between abstraction and subject-specificity will help us understand how to avoid such a one in the domain of procedural literacy.

Let’s look at an example. One of the subjects that neoclassical philosophies privilege is Latin. Consider Dorothy Sayers’ thoughts on the use of Latin in learning:

I will say at once, quite firmly, that the best grounding for education is the Latin grammar. I say this, not because Latin is traditional and medival, but simply because even a rudimentary knowledge of Latin cuts down the labor and pains of learning almost any other subject by at least fifty percent. It is the key to the vocabulary and structure of all the Teutonic languages, as well as to the technical vocabulary of all the sciences and to the literature of the entire Mediterranean civilization, together with all its historical documents.

Sayers accounts for Latin’s influence in the evolution of European languages, but she gives equal weight to its influential place in the texts of Western civilization. Now consider the way Wise and Bauer’s invoke Latin in The Well-Trained Mind:

Latin trains the mind to think in an orderly fashion. Latin . . . is the most systematic language around. The discipline of assembling the endings and arranging syntax . . . according to sets of rules is the mental equivalent of a daily two-mile jog. And because Latin demands precision, the Latin-trained mind becomes accustomed to paying attention to detail.

Here, Latin is revered as a structured mental exercise, not for its value as a window into key components of Western culture, especially the culture of ancient Rome and the medieval church. More appropriately, Latin would be allowed to oscillate between its formal and cultural registers; on the other hand, the language itself possesses formal features of syntactic inflection that structure expression, and through that syntactic inflection, specific cultural output can be consumed or created. Additional formal constraints arise from time to time, for example metrical authorship in dactylic hexameter.

Now let’s try to apply the lessons from neoclassical approaches to literacy onto procedural literacy. The formal logics of syntactic inflection and meter constrain and construct the expressive potential of Latin literature. More formal constrained writing practices like those of the Oulipo—palindrome, lipogram, and prisoner’s constraint, for example—impose even more stringent restrictions than those of natural grammar and “ordinary” literary convention, but such practice was founded explicitly to create new patterns for written expression. Computers constrain expression even more, through both hardware and design of programming language. One could easily replace the word Latin in Wise and Bauer’s claim with the name of a computer programming language like Java or Smalltalk or C, effectively parodying the value of any subject for abstract goals alone. In many ways, programming and Oulipian writing offer even stronger evidence for the benefits of systematic training than Latin; after all, natural language is subject to human failing and misinterpretation.

Latin, C, and other language systems share basic properties. Languages impose internally checked compositional rules, which in turn produce the possibility space for expressive output. The languages themselves thus enforce a procedural rhetoric in each of their created artifacts; rules of syntax, grammar, composition, and so forth form the foundation of what it is possible to say or execute in a natural or computer language. But the cultural, historical, and material contexts for Latin and C are far from similar. Mastering the syntax and grammar of one over the other both opens up and closes down whole worlds of future knowledge and expression.

A behaviorist might argue that Latin is useful for learning classics and C for learning programming. A constructivist might argue that either Latin or C is useful for learning logic and syntax. Procedurality offers a possible bridge between the abstraction-poor behaviorist approach and the subject-poor constructivist approach, focusing on the way processes come together to create
meaning. But I want to suggest an important break from previous conceptions of procedural literacy as programming.

From the first proposals to recent efforts like RAPUNSEL, procedural literacy has been a derivative of constructivist educational practice. Consider A. J. Perlis' 1961 proposal for a course in programming, which Meara claims is the earliest argument for "universal procedural literacy". Over time, the purpose of my proposed first course in programming... is not to teach people how to program a specific computer, nor is it to teach some new languages. The purpose of a course in programming is to teach people how to construct and analyze processes.

Now consider the broader educational frames that Gee draws around the use of videogames for learning:

"situated cognition"... argues that human learning is not just a matter of what goes on inside people's heads but is fully embedded (situated within) a material, social, and cultural world. ... [Another] area is work on so-called connectionism, a view that stresses the ways in which human beings are powerful pattern-recognizers. This body of work argues that humans don't often think best when they attempt to reason via logic and general abstract principles detached from experience.

At first glance, the objection of the situated cognitivists might seem very similar to more general constructivist arguments. After all, constructivism reconnects learning with individual experience. But the basic premise of situated cognitivism still challenges the type of experience that intersects with specific abstract principles. Gee continues,

Rather (than via abstract principles), they think best when they reason on the basis of patterns they have picked up through their actual experiences in the world, patterns that, over time, can become generalized but that are still rooted in specific areas of experience.

It is precisely specific areas of experience that have been expunged from our understanding of constructivist learning and procedural literacy in particular; it is also the corrective for the practice of divorcing subject-specificity from learning. Even popular paeans for the cognitive benefit of television and videogames argue principally for abstract (although individualized) conceptual learning. Consider the following selections from pop-critic Stephen Johnson's *Everything Bad Is Good For You*:

Word problems... are good for the mind on some fundamental level: they teach abstract skills in probability, in pattern recognition, in understanding causal relations that can be applied in countless situations... The problems that confront the gamers of *Zelda* can be readily translated into this form... When we marvel at the technological savvy of average ten-year-olds, what we should be celebrating is not their mastery of a specific platform—Windows XP, say, or the GameBoy—but rather their seemingly effortless ability to pick up new platforms on the fly, without so much as a glimpse at a manual. What they've learned is not just the specific rules intrinsic to a particular system; they've learned abstract principles that can be applied when approaching any complicated system.

Johnson also discusses intelligence tests that deploy spatial relations like the Raven Progressive Matrices or the various Wechsler measures. These measures demand synthesis of a kind that rote learning does not; this is why they are used to measure general performance intelligence. Johnson argues that puzzle games like *Tetris* provide widespread experience in complex relations, leading to increased performance on intelligence measures of this kind. Videogames have thus perhaps made us smarter insofar as they allow us to understand the strategies of intelligence measures. But who would substitute mastery of intelligence measures for contributions to human progress?

Claims like Johnson's assume that what is cognitively beneficial is necessarily socially, culturally, or politically beneficial. To take up one of his examples, the specificity of a computer operating system like Windows XP is not merely incidental. Certainly the general principles of human–computer interaction benefit consumers in a world of saturated with electronics, in which corporate oligarchies force users to upgrade annually. But what about the specific affordances and constraints of Windows XP? Like the cultural and formal specificity of Latin versus Inuit or the formal properties of C versus LISP, the procedural affordances of a computer operating system matter; they constrain and enable the kinds of computational activities that are possible atop that operating system.
Some procedural approaches to learning take small steps in avoiding content or abstraction as exclusive learning outcomes. One such effort is Mitchel Resnick’s version of the Logo language, which he named StarLogo. StarLogo uses the same LISP-based Logo syntax, but instead of driving a stenographic turtle, it drives multiple turtles configured for agent-based simulation of decentralized systems—things like bird flocks, traffic, and other emergent phenomena. Yet despite their promise as introductions to social and biological systems in particular, such efforts still focus largely on the mechanical—StarLogo has much in common with the view of Sim City that highlights its cellular automatic and emergent mechanics as a principal, general learning outcome. What does procedural literacy look like when it privileges the representation of culture as much as that of dynamic systems?

Procedural History

Among their neoclassical revisions, Wise and Bauer stress what they call the “interrelatedness of knowledge.” They advocate an approach to learning across disciplines, specifically an iterative four-year pattern of literature, history, and science from the ancients, the middle ages, early modern times, and modern times, respectively. Interrelatedness for Wise and Bauer has to do with creating links between knowledge fields, for example history, literature, and the sciences. In their conception, these connections are defined almost entirely by shared historical era, for example, the Greek epic, the notion of heroism, and Greek history form an interrelated, cross-disciplinary group.

Wise and Bauer hope to break down the barriers between disciplines created in contemporary behaviorist classrooms, where history, literature, and science are considered separate, subjects with their own drills, assessments, and teachers. But in so doing they also risk obscuring the nature of historical progress across eras, effectively separating the events of history (history as “content”) from the logic of history (history as “abstraction”).

Jared Diamond takes a different approach in Guns, Germs, and Steel. During Diamond’s time as an evolutionary biologist studying birds in New Guinea, a native friend of his posed the question, why do white men from the West have so many possessions, while natives have so little? Diamond reframed this question, observing that we know what happened in history—the conquest of much of the world by Europeans through the use of oceangoing vessels and horses, pistols and other forged weapons, and nonnative diseases like smallpox. But we don’t understand why the history of the world unfolded in such a way that the Europeans possessed such advantages. If guns, germs, and steel are the proximate causes of the flow of history as we know it, what are the ultimate causes? Why, asks Diamond, didn’t the Aztecs sail their ships to Europe and conquer the Spaniards?

Noting that much of human history has assumed that some basic difference in ability or intelligence among human peoples can explain why some have so much and others so little, Diamond argues that the answer to this question doesn’t rest in anything inherent to people, but in a few fundamental accidents of geography and natural resources. In areas with especially abundant land, such as Mesopotamia and China, ancient peoples happened upon agricultural innovation. This allowed them to remain in one place longer, rather than wandering from place to place as nomads after they had expended a region’s resources. Such locations, as it happened, also offered a variety of more easily domesticated animals such as horses and pigs, suitable for food, burden, and work. Sedentary communities of farmers were able to grow larger and eventually, through creating food surpluses, to relieve portions of their population from devoting most of their time to feeding their immediate families. In geographies with large east–west axes, such as Eurasia, similar climates across broad longitudinal distances facilitated the transfer of crops, animals, agricultural methods, and techniques of animal husbanding—facilitating massive social growth across long distances. Landmasses with north–south axes, such as North and South America, couldn’t support the same crops and livestock over commensurate distances, owing to rapid climate changes along the latitudes and natural geological obstacles like the impassable Andes and the narrow isthmus of Panama.

Once food storage freed some from the burden of farming, growing societies could devote these populations to other tasks, such as soldiering, shipbuilding, technology, religion, and politics. The latter two classes especially provided the structure necessary to develop clans of people into chiefdoms and later states. Inventors created new crafts, including methods of metallurgy necessary to forge strong steel tools and weapons for war.

As communities grew into towns and cities housing people and domesticated animals in close quarters, disease transferred easily between them. While these scourges decimated local populations, they also bred strong resistances to even the most afflicting of diseases. As these societies took their ships and swords to war, the peoples they met had weapons, armor, political systems,
and immune systems far inferior to those of their invaders. In short, Diamond argues that the proximate causes of European conquest via horses, guns, germs, and steel resulted from the accidental ultimate causes of land fertility, geographic distribution, and variety of plants and animals that occupied such regions.

One consequence of Diamond’s concept of history is the de-emphasis of individual achievement; he presents invention and innovation as the outcome of situations rather than the radical ingenuity of individuals. For Diamond, the “interrelatedness of knowledge” (to appropriate Wise and Bauer’s term) turns out to be less relevant to historical moments than to the underlying conditions out of which such moments arose. Those conditions comprise both the actual events that took place and the configuration of geographic and material circumstances that bore them.

Diamond describes a procedural system in which political and social outcomes result from configurations of constrained material conditions. This abstract system founds the specific outcomes of history. Just as Sayers couples an abstract learning process with a specific ideology of cultural value, Diamond couples an abstract material process with a specific historical timeline. Such an approach to history asks the learner to understand a sequence of events in relation to the material logics that produce them. The procedural history Diamond presents in Guns, Germs, and Steel also has its own rhetoric about how history takes place—one in which geographic accidents generate historical events.

Diamond presents his procedural view of history in a book, using written rhetoric. To deploy its processes, the reader must imagine historical examples and perform thought experiments to trace their connection to material conditions. As I mentioned in chapter 4, videogames like Civilization and Empire Earth operationalize a theory of history similar to Diamond’s. In Civilization, the player runs a society from its humble roots to empire. But empires grow on a base of stable food supplies and other natural resources, which facilitate political stability and, over time, investment in military forces or technologies (social, political, and material). Despite its similarities to Guns, Germs, and Steel in abstract material processes, Civilization offers only a limited window on the actual events of lived history. The player can opt to play as a particular civilization, such as the Mongols or the Romans, but the choice changes little more than the graphical representation of the culture. Furthermore, geography in Civilization is rendered anew in each game, so the

player’s starting conditions may vary greatly from those of the historical conditions of the civilization under whose name he chooses to play. Of course, generative geography also affords the game great richness in its procedural representation of the relationships between natural resources and cultural progress.

Other games couple the procedural rhetoric of material accident to the actual progression of lived history. In Europa Universalis, the player controls a European nation during the colonial period, from 1492 to 1792. The game focuses on colonial expansion through militarism, religious influence, diplomacy, and trade. Europa Universalis accurately reproduces the geographic reality of the European continent, along with its inherent physical, material, and political conditions. Even though the player may not choose to follow the events of the historical record, the relative strengths and weaknesses of each nation in Europa Universalis derive from their actual historical situation.

Historical divergence serves as both a limitation and an opportunity for videogames like Civilization and Europa Universalis. On the one hand, to connect the games’ abstract model to the particulars of lived history, the player must muster knowledge from outside the game, perhaps from traditional educational media. On the other hand, the games’ use of factual information about historical civilizations (names and landmarks in the case of Civilization, geographic and material circumstances in the case of Europa Universalis) underscore the inconsistencies between played and lived history in each run of the game. These contrary-to-fact conditions open a simulation gap for the player to interrogate: the player also learns by meditating on what is different in the game’s representation of Egypt or Russia compared with the historical (and geographical) record. All told, artifacts like Guns, Germs, and Steel, Civilization, and Europa Universalis suggest that procedural literacy means more than writing computer code; it also comes from interacting with procedural systems themselves, especially procedural systems that make strong ties between the processes in a model and a representational goal—those with strongly argued procedural rhetorics. Otherwise said, we can become procedurally literate through play itself.

From its early stages, Papert’s Mindstorms project used the computer language Logo to allow children to instruct their own robot creations. Starting in the mid-1980s, Papert and his colleagues collaborated with toymaker Lego to combine their configurative toys with the Logo language. Children built structures like elevators and robots with Lego bricks, then connected them to an
interface box they could program in Logo. But even without a Logo interface, Legos offer their own lessons in procedurality. The feature fundamental to Legos' "creativity" is in fact the logic of their physical coupling: individual Legos can be reconfigured in many different ways to create new objects or systems, according to simple rules of assembly. Even without Papert-style Logo instruction, playing with Legos develops procedural literacy: Legos recombine in multiple patterns to create new, previously unpredictable meaning.

Lego play focuses on physical construction. In comparison, consider Playmobil, another type of children's toy. Like Lego, Playmobil are made of molded plastic and sold in themes like airport, pirate, and knight. But unlike Lego, units of Playmobil are larger and less materially recombinant, but more richly invested with cultural meaning. For example, a "Castaway" Playmobil kit comes with castaway, small island with palm tree, dead tree with torn white flag, torn lean-to, message in a bottle, three crabs, three fish skeletons, two starfish and pile of driftwood. When I began buying Playmobil for my kids, I originally thought there was no way they could offer the same kind of creative play as Lego, since the latter can be recombined in many more ways. But on further reflection, the high specificity of Playmobil pieces offers procedural learning on a much more deeply culturally embedded level than Lego. We don't see just knights in Playmobil, we see Crusaders. We don't see just fighters, we see Mongol Warriors. By providing a specific point of reference bound to human culture, the toys come equipped with specific cultural meaning as well as abstract processes for substitution. The components of each collection provide adequate context to allow kids to recombine their toys in a way that preserves, interrogates, or disrupts the cultural context of each piece. When children (or adults!) play with Playmobil, they recombine units of cultural relevance—mermaids, chimney sweeps, frothing beer mugs, airport security checkpoints (see figure 8.1 for an example). In so doing, they gain a richer understanding of the individual meanings of cultural markers through experimenting with their hypothetical recombination in circumstances outside their sphere of influence.

Procedural Rhetoric as Procedural Literacy

Procedural literacy has been largely understood as learning to program—a valuable and worthwhile goal in a world increasingly reliant on computation. But the value of procedural literacy goes far beyond the realm of program-

Figure 8.1. Playmobil toys allow children (and adults) to construct social and cultural situations. This unusual situation was constructed and photographed by the author.

ming alone; indeed, any activity that encourages active assembly of basic building blocks according to particular logics contributes to procedural literacy. Written and spoken language does require conceptual effort, but it is fallacious to think that media such as toys and videogames do not demand conceptual effort. Yet, it is equally fallacious to think that videogames automatically engender synthetic abstraction outside their specific subject matter. The procedurally literate subject is one who recognizes both the specific nature of a material concept and the abstract rules that underwrite that concept.

To distinguish videogames from narrative media, Heather Chaplin and Aaron Ruby argue that the former use models, whereas the latter use descriptions. As an example, the two compare learning the orbits of planets from textbook or lecture descriptions versus learning from an orrery, a mechanical model of the planets on a system of gears that models their rotations and orbits at the correct relative velocities. The orrery, explain Chaplin and Ruby, "represents the solar system not by describing it but by serving as a model of it."
Models that depict behavior, like an orrery, facilitate experimentation, a more formal kind of procedural play where the rules of the mechanical system constrain manipulation of the device.

Both models and toys also enforce procedural rhetorics. The orrery constrains its planets' behavior according to mechanical rules, which represent the laws of physics that guide celestial orbit. Planetary orbit is perhaps a non-controversial topic today, but before Copernicus advanced the heliocentric theory of the solar system in the early fifteenth century, belief in it was scarce. The orrery in its current form dates from the eighteenth century, but Copernicus and his contemporaries also used mechanical models to illustrate their theories, representing their arguments for celestial movement in the mechanical processes that made these models function. Some toys function like models too, enforcing behavior based on mechanical processes. Toys like Playmobil do not enforce procedural rhetorics directly, but they do allow their players to build procedural rhetorics. When a child constructs a Playmobil scenario combining HAZMAT-crew parts and pirate parts, he constructs an argument for how such a character would behave. This argument is carried out through the rules of play itself, the types of behavior the child chooses to encourage or prohibit.

Procedural rhetoric is a type of procedural literacy that advances and challenges the logics that underlie behavior, and how such logics work. Procedural literacy entails the ability to read and write procedural rhetorics—to craft and understand arguments mounted through unit operations represented in code. The type of "reading" and "writing" that form procedural rhetorics asks the following questions:

What are the rules of the system?
What is the significance of these rules (over other rules)?
What claims about the world do these rules make?
How do I respond to those claims?

Let us return to some of our previous examples of educational videogames with these questions in mind.

Consider again Microsoft Flight Simulator and Sim City. One productive means of assessing the educational value of these games is via an expansion of what Gee calls embodied experiences. In one such approach, David Williamson Shaffer has studied how games help individuals see the world through particular professional eyes. Shaffer sees games as an instance of "epistemic frames," or ways that participants in a particular community of practice both structure their behavior and contribute to the ongoing development of that community of practice. Shaffer gives the name epistemic game to "a process [of] simulation that preserves the connections between knowing and doing central to the epistemic frame."

Both Flight Simulator and Sim City can be understood as epistemic games; they are simulations of professional situations. As simulations, the games embody procedural rhetorics about operating logics of aviation and urban planning. Note that the epistemic game, or the procedural rhetoric of a profession, implies not that players are learning to complete the work of such a profession, but rather that they are learning to understand the system of rules that drive the function of that profession. They are learning about the kinds of tasks, problems, and solutions involved in flying planes and building cities.

While Shaffer is principally (but not exclusively) interested in epistemic games as a pedagogical praxis for specific professional situations, I am equally—if not more—interested in procedural rhetoric as a critical practice. Recalling the disturbing account of the mother visited by the FBI after buying the game, one way to play would be to ask how the rules of aviation might encourage or avert terrorist acts. Earlier I discussed the procedural rhetorics of nutrition, class, and criminality in Grand Theft Auto: San Andreas. Playing the game with an interest in these procedural affordances for advancement allows the player to read its claims about crime and nutrition in light of his experience of those issues in the material world.

A game like Take Back Illinois, also discussed earlier, advances a procedural rhetoric of a particular position on medical malpractice reform, educational management, and job incentives. Those logics are presented not as natural law to be internalized and positively reinforced, but as systems to be interrogated and questioned—one of the principles of rhetoric as we normally understand it anyway.

The Sims has been criticized for its procedural rhetoric of consumer capitalism. Undeniably, it privileges the acquisition of material goods as a primary factor in sim success and happiness. Some argue that the game is a parody of consumption, the homogeneous goals of the sims acting as a caricature of contemporary U.S. ideals—an "American television culture." Critic Gonzalo Frasca disagrees.
I met some people that firmly believe that The Sims is a parody and, therefore, it is actually a critique of consumerism. Personally, I disagree. While the game is definitively cartoonish, I am not able to find satire within it. Certainly, the game may be making fun of suburban Americans, but since it rewards the player every time she buys new stuff, I do not think this could be considered parody.  

The “real” answer to this objection is not important (although designer Will Wright maintains that the game is a caricature); but some of the educational value of the game comes from engaging and unpacking the relationship between the rules of consumption and the pursuit of virtual satisfaction.

At the start of this chapter, I asked: if videogames are educational, what do they teach, and how do they teach it? To summarize the reply given here: videogame players develop procedural literacy through interacting with the abstract models of specific real or imagined processes presented in the games they play. Videogames teach biased perspectives about how things work. And the way they teach such perspectives is through procedural rhetorics, which players “read” through direct engagement and criticism.
Persuasive Games
The Expressive Power of Videogames

Ian Bogost

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