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Semiotic Domains: Is Playing Video Games a "Waste of Time?"

James Paul Gee

Context

What Video Games Have to Teach Us About Learning and Literacy *(Palgrave/Macmillan, 2003) was written because watching my then six-year-old son play video games inspired me to try playing them myself. I was amazed by how hard they were and yet, at the same time, deeply motivating and engaging. When I stuck with them, I also became fascinated by how well they dealt with learning as part of the deep pleasure of playing.*

Speaking of Games

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Literacy and Semiotic Domains

When people learn to play video games, they are learning a new *literacy*. Of course, this is not the way the word "literacy" is normally used. Traditionally, people think of literacy as the ability to read and write. Why, then, should we think of literacy more broadly, in regard to video games or anything else, for that matter? There are two reasons.

First, in the modern world, language is not the only important communicational system. Today images, symbols, graphs, diagrams, artifacts, and many other visual symbols are particularly significant. Thus, the idea of different types of "visual literacy" would seem to be an important one. For example, being able to "read" the images in advertising is one type of visual literacy. And, of course, there are different ways to read such images, ways that are more or less aligned with the intentions and interests of the advertisers. Knowing how to read interior designs in homes, modernist art in museums, and videos on MTV are other forms of visual literacy.

Furthermore, very often today words and images of various sorts are juxtaposed and integrated in a variety of ways. In newspaper and magazines as well as in textbooks, images take up more and more of the space alongside words. In fact, in many modern high school and college textbooks in the sciences images not only take up more space, they now carry meanings that are independent of the words in the text. If you can't read these images, you will not be able to recover their meanings from the words in the text as was more usual in the past.

In such *multimodal* texts (texts that mix words and images), the images often communicate different things from the words. And the combination of the two modes communicates things that neither of the modes does separately. Thus, the idea of different sorts of multimodal literacy seems an important one. Both modes and multimodality go far beyond images and words to include sounds, music, movement, bodily sensations, and smells.

None of this is news today, of course. We very obviously live in a world awash with images. It is our first answer to the question why we should think of literacy more broadly. The second answer is this: Even though reading and writing seem so central to what literacy means traditionally, reading and writing are not such general and obvious matters as they might at first seem. After all, we never just read or write; rather, we always read or write *something in some way*.

There are many different ways of reading and writing. We don't read or write newspapers, legal tracts, essays in literary criticism, poetry, rap songs, and on through a nearly endless list in the same way. Each of these domains has its own rules and requirements. Each is a culturally and historically separate way of reading and writing, and, in that sense, a different literacy. Furthermore, in each case, if we want to "break the rules" and read against the grain of the text—for the purposes of critique, for instance—we have to do so in different ways, usually with some relatively deep knowledge of how to read such texts "according to the rules."

So there are different ways to read different types of texts. Literacy is multiple, then, in the sense that the legal literacy needed for reading law books is not the same as the literacy needed for reading physics texts or superhero comic books. And we should not be too quick to dismiss the latter form of literacy. Many a superhero comic is replete with post-Freudian irony of a sort that would make a modern literary critic's heart beat fast and confuse any otherwise normal adult. Literacy, then, even as traditionally conceived to involve only print, is not a unitary thing but a multiple matter. There are, even in regard to printed texts and even leaving aside images and multimodal texts, different "literacies."

Once we see this multiplicity of literacy (literacies), we realize that when we think about reading and writing, we have to think beyond print. Reading and writing in any domain, whether it is law, rap songs, academic essays, superhero comics, or whatever, are not just ways of decoding print, they are also caught up with and in social practices. Literacy in any domain is actually not worth much if one knows nothing about the social practices of which that literacy is but a part. And, of course, these social practices involve much more than just an engagement with print.

One can know a good deal about a social practice—such as arguing before the Supreme Court, carrying out an experiment in nuclear physics, or memorializing an event in gang history through graffiti—without actually being able to participate in the social practice. But knowing about a social practice always involves recognizing various distinctive ways of acting, interacting, valuing, feeling, knowing, and using various objects and technologies that constitute the social practice.

Take something so simple as the following sentence about basketball: "The guard dribbled down court, held up two fingers, and passed to the open man." You may very well know what every word in this sentence means in terms of dictionary definitions, but you cannot

read the sentence with any real worthwhile understanding unless you can recognize, in some sense (perhaps only in simulations in your mind), guards, dribbling, basketballs, open men, and basketball courts. But to be able to recognize these things is already to know a good deal about basketball as a game, that is, as a particular sort of social practice. The same thing is equally true about any sentence or text about the law, comic books, a branch of science, or anything else for that matter.

We can go further. One's understanding of the sentence "The guard dribbled down court, held up two fingers, and passed to the open man" is different—in some sense, deeper and better—the more one knows and can recognize about the social practice (game) of basketball. For example, if you know a good bit about basketball, you may see that one possible meaning of this sentence is that the guard signaled a particular play by holding up two fingers and then passed to the player the play left momentarily unguarded.

But then this brings us to another important point. While you don't need to be able to enact a particular social practice (e.g., play basketball or argue before a court) to be able to understand texts from or about that social practice, you can *potentially* give deeper meanings to those texts if you can. This claim amounts to arguing that producers (people who can actually engage in a social practice) *potentially* make better consumers (people who can read or understand texts from or about the social practice).

A corollary of this claim is this: Writers (in the sense of people who can write texts that are recognizably part of a particular social practice) *potentially* make better readers (people who can understand texts from or about a given social practice). Note that by "writers" here I do not mean people who can just write down words appropriate to a particular practice such as field biology. I mean people who can write a text that field biologists would recognize as an acceptable text within their family of social practices.

Why do I say "potentially" here? Because there is a paradox about producers. On one hand, producers are deeply enough embedded in their social practices that they can understand the texts associated with those practices quite well. On the other hand, producers are often so deeply embedded in their social practices that they take the meanings and values of the texts associated with those practices for granted in an unquestioning way. One key question for deep learning and good education, then, is how to get producer-like learning and knowledge, but in a reflective and critical way.

All these claims are pretty obvious. It is, thus, fascinating that they are so often ignored in schools. In school, many times children are expected to read texts with little or no knowledge about any social practices within which those texts are used. They are rarely allowed to engage in an actual social practice in ways that are recognizable to "insiders" (e.g., field biologists) as meaningful and acceptable, before and as they read texts relevant to the practice.

Indeed, children are regularly given reading tests that ask general, factual, and dictionarylike questions about various texts with no regard for the fact that these texts fall into different genres (i.e., they are different kinds of texts) connected to different sorts of social practices. Children often can answer such questions, but they learn and know nothing about the genres and social practices that are, in the end, the heart and soul of literacy.

Schools will continue to operate this way until they (and reading tests) move beyond fixating on reading as silently saying the sounds of letters and words and being able to answer general, factual, and dictionarylike questions about written texts. You do have to silently say the sounds of letters and words when you read (or, at least, this greatly speeds up reading). You do have do be able to answer general, factual, and dictionarylike questions about what you read: This means you know the "literal" meaning of the text. But what so many people—unfortunately so many educators and policymakers—fail to see is that if this is all you can do, then you *can't really read*. You will fail to be able to read well and appropriately in contexts associated with specific types of texts and specific types of social practices.

For example, consider once again our sentence about basketball: "The guard dribbled down court, held up two fingers, and passed to the open man." A typical reading test would ask a question like this: "What did the guard do to the ball?" and give "bounce it" as one of the choices. Unfortunately, you can answer such general, factual, dictionarylike questions and really have no idea what the sentence means in the domain of basketball. When we see that the same thing applies to sentences from science or any other school subject, we immediately see why so many children pass early reading tests but cannot learn later on in the subject areas.

This phenomenon is so pervasive that it has been given a name by researchers: "the fourth-grade slump." It is called this because, in the past, the first three years of school were largely devoted to learning to read (in the sense of being able to decode print and get the literal meanings of texts), and fourth grade was where children began to read to learn (in the subject areas). However, very often today children are being asked to read to learn things like science and math from first or second grade on, at least in affluent schools.

However, let's leave school aside, and return to our main question as to why we should be willing to broaden how we talk about literacy. I can now note that talking about literacy and literacies in this expanded, nontraditional way (as multiple and connected to social practices) leads us at once to an interesting dilemma: What do we want to say of someone, for instance, who can understand and even compose rap songs (words and music), but cannot read or write language or musical notation?

Of course, in traditional terms, this person is illiterate in terms of both language and musical notation. But yet he or she is able to understand and compose in a language style that is distinctively different from everyday language and in a musical form that is distinctively different from other forms of music. We might want to say that the person is literate in the domain of rap songs (as a distinctive domain combining language and music in certain characteristic ways), though the person is not print literate or musical-notation literate.

Cases like this display the limitations of thinking about literacy first and foremost in terms of print. We need, rather, to think first in terms of what I call *semiotic domains* and only then get to literacy in the more traditional terms of print literacy. "Semiotic" here is just a fancy way of saying we want to talk about all sorts of different things that can take on meaning, such as images, sounds, gestures, movements, graphs, diagrams, equations, objects, even people like babies, midwives, and mothers, and not just words. All of these things are signs (symbols, representations, whatever term you want to use) that "stand for" (take on) different meanings in different situations, contexts, practices, cultures, and historical periods. For example, the image of a cross means Christ (or Christ's death) in the context of Christian social practices, and it means the four points of the compass (north, south, west, and east) in the context of other social practices (e.g., in some African religions).

By a semiotic domain I mean any set of practices that recruits one or more modalities (e.g., oral or written language, images, equations, symbols, sounds, gestures, graphs, artifacts, etc.) to communicate distinctive types of meanings. Here are some examples of semiotic domains: cellular biology, postmodern literary criticism, first-person-shooter video games, high-fashion advertisements, Roman Catholic theology, modernist painting, midwifery, rap music, wine connoisseurship—through a nearly endless, motley, and ever-changing list.

Our sentence about basketball—"The guard dribbled down court, held up two fingers, and passed to the open man"—is a sentence from the semiotic domain of basketball. It might seen odd to call basketball a semiotic domain. However, in basketball, particular words, actions,

objects, and images take on distinctive meanings. In basketball, "dribble" does not mean drool; a pick (an action where an offensive player positions him or herself so as to block a defensive player guarding one of his or her teammates) means that some defensive player must quickly switch to guard the now-unguarded offensive player; and the wide circle on each end of the court means that players who shoot from beyond it get three points instead of two if they score a basket.

If you don't know these meanings—cannot read these signs—then you can't "read" (understand) basketball. The matter seems fairly inconsequential when we are talking about basketball. However, it quickly seems more consequential when we are talking about the semiotic domain of some types of science being studied in school. Equally here, if you don't know how to read the distinctive signs (words, actions, objects, and images), you can't read (understand) that sort of science.

If we think first in terms of semiotic domains and not in terms of reading and writing as traditionally conceived, we can say that people are (or are not) literate (partially or fully) in a domain if they can recognize (the equivalent of "reading") and/or produce (the equivalent of "writing") meanings in the domain. We can reserve the term "print literate" for talking about people who can read and/or write a language like English or Russian, though here, still, we will want to insist that there are different ways to read and write different things connected to different social practices so, in that sense, there are multiple print literacies. Thus, the rap artist who could understand and compose rap songs but not read print or musical notation is literate in the semiotic domain of rap music but not print literate.

In the modern world, print literacy is not enough. People need to be literate in a great variety of different semiotic domains. If these domains involve print, people often need the print bits, of course. However, the vast majority of domains involve semiotic (symbolic, representational) resources besides print and some don't involve print as a resource at all. Furthermore, and more important, people need to be able to learn to be literate in new semiotic domains throughout their lives. If our modern, global, high-tech, and science-driven world does anything, it certainly gives rise to new semiotic domains and transforms old ones at an ever faster rate.

This book deals with video games as a semiotic domain, actually as a family of related, but different domains, since there are different types or genres of video games (e.g., first-person shooter games, fantasy role-playing games, real-time strategy games, simulation games, etc.). People can be literate, or not, in one or more of these videogame semiotic

domains. However, in talking about learning and literacy in regard to video games, I hope to develop, as well, a perspective on learning, literacy, and semiotic domains that applies more generally to domains beyond video games.

However, if we want to take video games seriously as a family of semiotic domains in which one can learn to be literate, we face an immediate problem. Many people who don't play video games, especially older people, are sure to say that playing video games is "a waste of time." In the next section, I sketch out one version of what I think this claim often amounts to, using a specific example involving a six-year-old child.

Learning and the Problem of Content

To spell out what I think the claim that playing video games is a waste of time often means, I need first to tell you about the game the six-year-old boy was playing, a game called *"Pikmin."* *Pikmin* is a game for the Nintendo GameCube, rated "E," a game acceptable for all ages.

In *Pikmin*, the player takes on the role of Captain Olimar, a small (he's about the size of an American quarter), bald, big-eared, bulbous-nosed spaceman who crashes into an unfamiliar planet when a comet hits his spaceship. Captain Olimar (i.e., the player) must collect the spaceship's lost parts, scattered throughout the planet, while relying on his spacesuit to protect him from the planet's poisonous atmosphere. Thus, the player must carefully monitor the damage done to Captain Olimar's suit and repair it when needed. To make matters more complicated, the spacesuit's life support will fail after 30 days, so the captain (the player) must find all the missing parts in 30 days (each day is 15 minutes of game-time play). So the game is a race against time and represents the rare case of a game that one can play to the end and still "lose."

However, Captain Olimar gets help. Soon after arriving on the strange planet, he comes upon native life that is willing to aid him. Sprouts dispensed from a large onionlike creature yield tiny (they're even smaller than Captain Olimar) cute creatures that Olimar names "Pikmin" after a carrot from his home planet. These little creatures appear to be quite taken with Olimar and follow his directions without question. Captain Olimar learns to raise Pikmin of three different colors (red, yellow, and blue), each of which has different skills. He learns, as well, to train them so that each Pikmin, regardless of color, can grow through three different, ever stronger forms: Pikmin sprouting a leaf, a bud, or a flower from their heads.

His colorful Pikmin following him as his army, Captain Olimar uses them to attack dangerous creatures, tear down stone walls, build bridges, and explore a great many areas of the strange planet in search of the missing parts to his spaceship. While Captain Olimar can

replace killed Pikmin from remaining Pikmin, he must, however, ensure that at no point do all his Pikmin perish—an event called, by the game and by the child player, "an extinction event."

It is quite a sight to watch a six-year-old, as Captain Olimar, lead a multicolored army of little Pikmin to fight, build, grow more Pikmin, and explore a strange landscape, all the while solving multiple problems to discover and get to the locations of the spaceship's missing parts. The child then orders his Pikmin to carry the heavy parts back to the ship. When this child's grandfather watched him play the game for several hours, the grandfather made the following remark, which I think captures at least one of the common meanings of the playing video games is a waste of time theme: "While it may be good for his hand-eye coordination, it's a waste of time, because there isn't any content he's learning." I call this the *problem of content.*

The problem of content is, I believe, based on common attitudes toward school, schooling, learning, and knowledge. These attitudes are compelling, in part because they are so deeply rooted in the history of western thought, but, nonetheless, I think they are wrong. The idea is this: Important knowledge (now usually gained in school) is content in the sense of information rooted in, or, at least, related to, intellectual domains or academic disciplines like physics, history, art, or literature. Work that does not involve such learning is "meaningless." Activities that are entertaining but that themselves do not involve such learning are just "meaningless play." Of course, video games fall into this category.

A form of this viewpoint has long existed in western culture. It is akin to the viewpoint, held by Plato and Aristotle, for example, that knowledge, in something like the sense of content above, is good in and of itself. Other pursuits, including making practical use of such knowledge—pursuits that do not involve learning and reflecting on such content in and of itself outside the realm of practical applications—are lesser; in some sense, mundane and trivial. Such a view, of course, makes the grandfather's remark about the child playing *Pikmin* seem obvious.

The problem with the content view is that an academic discipline, or any other semiotic domain, for that matter, is not primarily content, in the sense of facts and principles. It is rather primarily a lived and historically changing set of distinctive social practices. It is in these social practices that "content" is generated, debated, and transformed via certain distinctive ways of thinking, talking, valuing, acting, and, often, writing and reading.

No one would want to treat basketball as "content" apart from the game itself. Imagine a textbook that contained all the facts and rules about basketball read by students who never played or watched the game. How well do you think they would understand this

textbook? How motivated to understand it do you think they would be? But we do this sort of thing all the time in school with areas like math and science. We even have politicians and educators who condemn *doing* math and science in the classroom instead of drilling-and-skilling on math and science facts ("content") as "permissive."

There is, however, an alternative way to think about learning and knowing that makes the content view seem less obvious and natural. I turn to developing this viewpoint in the following sections. Under this alternative perspective it will become less clear that playing video games is necessarily "a waste of time," though it will be a while until I can return to that claim and answer it directly.

An Alternative Perspective on Learning and Knowing

The alternative perspective starts with the claim that there really is no such thing as learning "in general." We always learn *something*. And that something is always connected, in some way, to some semiotic domain or other.

Therefore, if we are concerned with whether something is worth learning or not, whether it is a waste of time or not—video games or anything else—we should start with questions like the following: What semiotic domain is being entered through this learning? Is it a valuable domain or not? In what sense? Is the learner learning simply to understand ("read") parts of the domain or also to participate more fully in the domain by learning to produce ("write") meanings in the domain? And we need to keep in mind that in the modern world, there are a great many more potentially important semiotic domains than just those that show up in typical schools. I return to these questions later in regard to the child playing *Pikmin*.

Once we learn to start with such questions, we find that it is often a tricky question as to what semiotic domain is being entered when someone is learning or has learned something. For example, consider college freshmen who have taken their first college-level physics class, passed it with good grades, and can write down Newton's laws of motion. What domain have they entered? It will not do to say "physics" and leave the matter at that, though the content view would take this position.

Lots of studies have shown that many such students, students who can write down Newton's laws of motion, if asked so simple a question as "How many forces are acting on a coin when it has been thrown up into the air?" (the answer to which can actually be deduced

from Newton's laws) get the answer wrong. Leaving aside friction, they claim that two forces are operating on the coin, gravity and "impetus," the force the hand has transferred to the coin. Gravity exists as a force and, according to Newton's laws, is the sole force acting on the coin when it is in the air (aside from air friction). Impetus, in the sense above, however, does not exist, though Aristotle thought it did and people in their everyday lives tend to view force and motion in such terms quite naturally.

So these students have entered the semiotic domain of physics as passive *content* but not as something in terms of which they can actually see and operate on their world in new ways. There may be nothing essentially wrong with this, since their knowledge of such passive content might help them know, at some level, what physics, an important enterprise in modern life, is "about." I tend to doubt this, however. Be that as it may, these students cannot produce meanings in physics or understand them in producerlike ways.

They have not learned to experience the world in a new way. They have not learned to experience the world in a way in which the natural inclination to think in terms of the hand transmitting a force to the coin, a force that the coin stores up and uses up ("impetus"), is not part of one's way of seeing and operating on the world (for a time and place, i.e., when doing modern physics).

When we learn a new semiotic domain in a more active way, not as passive content, three things are at stake:

1. We learn to experience (see, feel, and operate on) the world in new ways.

2. Since semiotic domains usually are shared by groups of people who carry them on as distinctive social practices, we gain the potential to join this social group, to become affiliated with such kinds of people (even though we may never see all of them, or any of them, face to face).

3. We gain resources that prepare us for future learning and problem solving in the domain and, perhaps, more important, in related domains.

Three things, then, are involved in active learning: *experiencing* the world in new ways, forming new *affiliations,* and *preparation* for future learning.

This is "active learning." However, such learning is not yet what I call "critical learning." For learning to be critical as well as active, one additional feature is needed. The learner needs to learn not only how to understand and produce meanings in a particular semiotic

domain that are recognizable to those affiliated with the domain, but, in addition, how to think about the domain at a "meta" level as a complex system of interrelated parts. The learner also needs to learn how to innovate in the domain—how to produce meanings that, while recognizable, are seen as somehow novel or unpredictable.

To get at what all this really means, though, I need to discuss semiotic domains a bit more. This will allow me to clarify what I mean by critical learning and to explicate the notions of experiencing the world in new ways, forming new affiliations, and preparation for future learning a bit more.

More on Semiotic Domains: Situated Meanings

Words, symbols, images, and artifacts have meanings that are specific to particular semiotic domains and particular situations (contexts). They do not just have general meanings.

I was once a cannery worker; later I became an academic. I used the word "work" in both cases, but the word meant different things in each case. In my cannery life, it meant something like laboring for eight straight hours in order to survive and get home to lead my "real" life. In my academic life, it means something like chosen efforts I put into thinking, reading, writing, and teaching as part and parcel of my vocation, efforts not clocked by an eight-hour workday. In the domain of human romantic relationships, the word means something else altogether; for example, in a sentence like "Relationships take work." Later I will point out that a word like "work," in fact, has different meanings even within a single domain, like the cannery, academics, or romantic relationships, meanings that vary according to different situations in the domain.

But here we face one of the most widespread confusions that exists in regard to language and semiotic domains. People tend to think that the meaning of a word or other sort of symbol is a general thing—the sort of thing that for a word, at least, can be listed in a dictionary. But meaning for words and symbols is specific to particular situations and particular semiotic domains. You don't really know what a word means if you don't carefully consider both the specific semiotic domain and the specific situation you are in.

We build meanings for words or symbols "on the spot," so to speak, so as to make them appropriate for the actual situations we are in, though we do so with due respect for the specific semiotic domain in which we are operating. What general meaning a word or other symbol has is just a theme around which, in actual situations of use, we must build more specific instantiations (meanings).

To understand or produce any word, symbol, image, or artifact in a given semiotic domain, a person must be able to situate the meaning of that word, symbol, image, or artifact within embodied experiences of action, interaction, or dialogue in or about the domain. These experiences can be ones the person has actually had or ones he or she can imagine, thanks to reading, dialogue with others, or engagement with various media. This is what our college physics students could not do: They could not situate the components of Newton's laws in terms of specific situations and embodied ways of seeing and acting on and within the world from the perspective of the semiotic domain of mechanical physics.

Meaning, then, is both situation and domain specific. Thus, even in a single domain, the meaning of a word varies across different situations. Let me give an example of what I am talking about by taking up again the example of the word "work." In semiotic domains connected to academics, the word "work" takes on a range of possible situated meanings different from the range possible in other semiotic domains (e.g., law, medicine, manual work, etc.).

In one situation I might say of a fellow academic, "Her work has been very influential" and by "work" mean her research. In another situation I might say the same thing, but now in regard to a particular committee she has chaired, and by "work" mean her political efforts within her discipline or institution. To understand the word "work" in these cases, you need to ask yourself what you take the situation to be (e.g., talk about contributions to knowledge or about disciplinary or institutional political affairs) and what semiotic domain is at stake (here academics, not law offices).

The same thing is true in all domains. Even in the rigorous semiotic domain of physics, one must situate (build) different specific-meanings for the word "light" in different situations. In different situations, one has to build meanings for the word that involve thinking, talking about, or acting on different things like waves, particles, straight lines, reflection and refraction, lasers, colors, and yet other things in other situations. Even in physics, when someone uses the word "light," we need to know whether they are talking about waves or particles, colors or lasers, or something else (perhaps they are talking about the general theory of electromagnetism?).

In a different domain altogether, the same word takes on yet different meanings in different situations. For example, in religion, one has to build meanings for the word "light" that involve thinking, talking about, or acting on and with different themes like illumination, insight, life, grace, peace, birth, and yet other things in other situations.

If you cannot even imagine the experiences and conditions of an academic life, you really can't know what "work" means, either specifically or in terms of its possible range of meanings, in a sentence like "Her work was very influential." Of course, you don't have to be an academic to imagine academic life. But you do have to be able to build simulated worlds of experience in your mind (in this case, the sorts of experiences, attitudes, values, and feelings an academic might have), however unconsciously you do this. And, perhaps, you can do this because of your reading or other vicarious experiences. Perhaps you can do it through analogies to other domains with which you are more familiar (e.g., you might equate your hobby as an artist with the academic's research and understand how "work" can mean, in a certain sort of situation, efforts connected to a vocation).

Why I am belaboring this point? For two reasons: first, to make clear that understanding meanings is an active affair in which we have to reflect (however unconsciously) on the situation and the domain we are in. And, second, because I want to argue that learning in any semiotic domain crucially involves learning how to situate (build) meanings for that domain in the sorts of situations the domain involves. That is precisely why real learning is active and always a new way of experiencing the world.

Furthermore, I want to argue later that video games are potentially particularly good places where people can learn to situate meanings through embodied experiences in a complex semiotic domain and meditate on the process. Our bad theories about general meanings; about reading but not reading something; and about general learning untied to specific semiotic domains just don't make sense when you play video games. The games exemplify, in a particularly clear way, better and more specific and embodied theories of meaning, reading, and learning.

More on Semiotic Domains: Internal and External Views

There are two different ways to look at semiotic domains: internally and externally. Any domain can be viewed internally as a type of content or externally in terms of people engaged in a set of social practices. For example, first-person shooter games are a semiotic domain, and they contain a particular type of content. For instance, as part of their typical content, such games involve moving through a virtual world in a first-person perspective (you see only what you are holding and move and feel as if you yourself are holding it) using weapons to battle enemies. Of course, such games involve a good deal more content as well. Thus we can talk about the typical sorts of content we find in first-person shooter games. This is to view the semiotic domain internally.

On the other hand, people actually play first-person shooter games as a practice in the world, sometimes alone and sometimes with other people on the Internet or when they connect several game platforms or computers together. They may also talk to other players about such games and read magazines and Internet sites devoted to them. They are aware that certain people are more adept at playing such games than are others. They are also aware that people who are "into" such games take on a certain identity, at least when they are involved with those games. For example, it is unlikely that people "into" first-person shooter games are going to object to violence in video games, though they may have strong views about how that violence ought to function in games.

I call the group of people associated with a given semiotic domain—in this case, first-person shooter games—an *affinity group*. People in an affinity group can recognize others as more or less "insiders" to the group. They may not see many people in the group face-to-face, but when they interact with someone on the Internet or read something about the domain, they can recognize certain ways of thinking, acting, interacting, valuing, and believing as more or less typical of people who are "into" the semiotic domain. Thus we can talk about the typical ways of thinking, acting, interacting, valuing, and believing as well as the typical sorts of social practices associated with a given semiotic domain. This is to view the domain externally.

What I have said about viewing first-person shooter games internally or externally applies to any semiotic domain. Take, for instance, my own academic field of linguistics, viewed as a semiotic domain. Within linguistics there is a well-defined subdomain often referred to as theoretical linguistics or the theory of grammar, a field largely defined by the work of the noted linguist Noam Chomsky and his followers. (Even alternative views in the field have to be defined in reference to Chomsky's work.) If we view this semiotic domain internally, in terms of content, we can point out that a claim like "All human languages are equal" is a recognizable one—is recognizably a possible piece of content—in this semiotic domain, though Chomskian linguists give very specific meanings to words like "language" and "equal," meanings that are not the same as these words have in "everyday" life.

On the other hand, a claim like "God breathed life into the word" is not a recognizable claim—is not recognizably a possible piece of content in—the semiotic domain of theoretical linguistics. If history had been different, perhaps there would have been a field called linguistics in which this was a possible piece of content. But given how history did happen, and how we therefore now define the nature of science and academic fields, this is not a possible piece of content in the semiotic domain of theoretical linguistics.

So far, then, we have been talking about and viewing the semiotic domain of theoretical linguistics internally in terms of its content. But we can also talk about and view the domain externally in terms of the ways in which such linguists tend to think, act, interact, value, and believe when they are being linguists. This is to ask about the sorts of identities they take on when they are engaged with, or acting out of their connections to, the semiotic domain of theoretical linguistics. This is to view the domain externally.

Theoretical linguists tend to look down on people who study the social and cultural aspects of language (people like me now). They tend to believe that only the structural aspects of language (e.g., syntax or phonology) can be studied rigorously and scientifically in terms of deducing conclusions from quite abstract and mathematically based theories. In turn, they tend to see affiliations between themselves and "hard scientists" like physicists. Since physics has high prestige in our society, theoretical linguistics tends to have higher prestige within the overall field of linguistics than does, say, sociolinguistics.

The claim here is not that each and every theoretical linguist looks down on linguists who study social and cultural affairs (though when I was a theoretical linguist earlier in my career I did!). Rather, the claim is that each and every such linguist would recognize these ways of thinking and valuing as part of the social environment in and around the field of theoretical linguistics. This is to view the domain externally.

The external view of theoretical linguistics, and not the internal one, explains why this subbranch of linguistics is regularly called theoretical linguistics when, in fact, people who study language socially and culturally also engage in building and arguing over "theories" (though less abstract and mathematically based ones). Given its assumptions about being rigorous science in a wider culture that values physics more than literature or sociology, for instance, this branch of linguistics has easily been able to co-opt the term for itself. People who study language socially and culturally often use the term "theoretical linguistics" just for Chomskian (and related) work, thereby enacting their own "subordination." This last comment, of course, is an external view on the larger semiotic domain of linguistics as a whole.

Do the internal and external aspects of a semiotic domain have anything to do with each other? Of course, if we are talking about academic disciplines as semiotic domains, most academics would like to think that the answer to this question is no. But the answer is, in fact, yes. Content, the internal part of a semiotic domain, gets made in history by real people and their social interactions. They build that content—in part, not wholly—in certain

ways because of the people they are (socially, historically, culturally). That content comes to define one of their important identities in the world. As those identities develop through further social interactions, they come to affect the ongoing development and transformation of the content of the semiotic domain in yet new ways. In turn, that new content helps further develop and transform those identities. The relationship between the internal and external is reciprocal.

I am not trying to make some postmodern relativistic point that nothing is true or better than anything else. The potential content of a semiotic domain can take a great many shapes. Some of them are better than others for certain purposes (e.g., as truth claims about grammar or language), but there is always more than one good (and bad) shape that content can take, since there are so many fruitful and correct facts, principles, and patterns one can discover in the world.

For example, Noam Chomsky and his early students spoke English as their native language and, thus, tended to use this language as their initial database for forming their theories. These were, in fact, theories not about English but about what is universal in language or common to the design of all languages. This early emphasis on English (treating English as the "typical" language) gave the theory a certain sort of initial shape that helped lead to certain developments and not others. Later the theory changed as more languages—ones quite different from English—received more careful consideration. Nonetheless, no matter how good the theory is now (assuming for the moment the theory is good), if Chomsky and others had been speakers of Navajo, it might be equally good now but somewhat different.

There are a myriad of things to get right and wrong, and theoretical linguistics as it is now undoubtedly has some things right and some things wrong. Theoretical linguistics as it might have been had Chomsky spoken Navajo would have had other things right and wrong, though it may well have had some of the same things right and wrong as well. The American philosopher Charles Sanders Pierce argued that "in the end," after all the efforts of scientists over time, all possible theories in an area like theoretical linguistics would converge on the "true" one. But you and I won't be here for "the end" of time, so we are stuck with the fact that the internal and external aspects of semiotic domains—even academic fields and areas of science—influence each other.

More on Semiotic Domains: Design Grammars

Semiotic domains have what I call *design grammars*. Each domain has an internal and an external design grammar. By an internal design grammar, I mean the principles and patterns in terms of which one can recognize what is and what is not acceptable or typical content in a semiotic domain. By an external design grammar, I mean the principles and patterns in terms of which one can recognize what is and what is not an acceptable or typical social practice and identity in regard to the affinity group associated with a semiotic domain.

Do you know what counts as a modernist piece of architecture? What sort of building counts as typical or untypical of modernist architecture? If you do, then you know, consciously or unconsciously, the internal design grammar of the semiotic domain of modernist architecture (as a field of interest).

If all you know is a list of all the modernist buildings ever built, then you don't know the internal design grammar of the domain. Why? Because if you know the design grammar—that is, the underlying principles and patterns that determine what counts and what doesn't count as a piece of modernist architecture—you can make judgments about buildings you have never seen before or even ones never actually built, but only modeled in cardboard. If all you have is a list, you can't make any judgments about anything that isn't on your list.

Do you know what counts as thinking, acting, interacting, and valuing like someone who is "into" modernist architecture? Can you recognize the sorts of identities such people take on when they are in their domain? Can you recognize what counts as valued social practices to the members of the affinity group associated with the semiotic domain of modernist architecture and what counts as behaving appropriately in these social practices? If the answer to these questions is "yes," then you know, consciously or unconsciously, the external design grammar of the semiotic domain.

Do you understand what counts and what doesn't count as a possible piece of content in theoretical linguistics? Do you know that claims like "All languages are equal" (in one specific meaning) and "The basic syntactic rules in the core grammar of any language are optimal" count as possible claims in theoretical linguistics and that claims like "God breathed life into the word" and "Nominalizations are very effective communicative devices in science" don't? Do you know why this is so, how it follows from the ways in which the elements of the content of theoretical linguistics relate to each other as a complex system? If you do, you know the internal design grammar of theoretical linguistics. If all you know is a list of facts from the domain, you will never know whether a claim not on your list should or shouldn't count or even whether the matter is open to debate or not. You can't "go on" in the domain.

Are you aware that theoretical linguists don't value work on the social aspects of language as much as they do work on the structural aspects of grammar? Do you know that even when they are assessing work in the social sciences and humanities, they tend to value logical deductive structure and abstract theories in these domains over richly descriptive but less abstract and less theoretical studies? Are you aware that the term "descriptive" is (or, at least, used to be) a term of insult and "explanatory" a term of praise when such people are talking about academic work inside and outside their field? Do you know why? If you know things like this, you know the external design grammar of the semiotic domain of theoretical linguistics. You find certain ways of thinking, acting, and valuing expectable in the affinity group associated with the domain, others not.

Of course, the internal and external grammars of a domain change through time. For example, it was once common to find linguists who saw studying issues germane to the translation of the Bible, for example into Native American languages, as a core part of their academic work and identity as linguists. They hoped to facilitate the work of missionaries to the speakers of these languages. They saw no conflict between doing linguistics and serving their religious purposes at the same time. Other linguists, not involved in Bible translation, did not necessarily dispute this at the time and often did not withhold professional respect from such religious linguists. The external grammar of the domain (and this was certainly influenced by the wider culture at the time) allowed a connection between linguistic work as science and religious commitments as an overt part of that work.

Today most linguists, theoretical and otherwise, would be skeptical of any connection between linguistic work and religion. They would not see translating the Bible into languages connected to cultures without the Bible, to facilitate the work of missionaries, as a central part of any branch of linguistics. Today the external design grammar of the field does not readily allow for a connection between work as a linguist and religion, for identities as a linguist that are formed around this connection or for social practices germane to it.

So why I am being so perverse as to use the term "design grammar" for these matters? Because I want us to think about the fact that for any semiotic domain, whether it is first-person shooter games or theoretical linguistics, that domain, internally and externally, was and is designed by someone. But who was/is this someone who designed the semiotic domains of first-person shooter games and theoretical linguistics?

Obviously real game designers and producers determine what counts as recognizable content for first-person shooter games by actually making such games. Over time, as they apply certain principles, patterns, and procedures to the construction of such games, the content of first-person shooter games comes to have a recognizable shape such that people not only say things like "Oh, yeah, that's a first-person shooter game" or "No, that's not a first-person shooter" but also "Oh, yeah, that a typical first-person shooter game" or "Oh, no, that's a groundbreaking first-person shooter game."

Yet these designers and producers are only part of the people who produce the external grammar of first-person shooter games. People who play, review, and discuss such games, as well as those who design and produce them, shape the external design grammar of the semiotic domain of first-person shooter games through their ongoing social interactions. It is their ongoing social interactions that determine the principles and patterns through which people in the domain can recognize and judge thinking, talking, reading, writing, acting, interacting, valuing, and believing characteristic of people who are in the affinity group associated with first-person shooter games.

And, of course, the acts of people helping to design the domain externally as a set of social practices and typical identities rebound on the acts of those helping to design the domain internally as content, since that content must "please" the members of the affinity group associated with the domain as well as recruit newcomers to the domain. At the same time, the acts of those helping to design the domain internally in terms of content rebound on the acts of those helping to design the domain externally as a set of social practices and identities, since that content shapes and transforms those practices and identities.

Just the same things can be said about those who design the semiotic domain of theoretical linguistics, internally and externally. Linguists who write and publish and give talks at conferences shape the internal design grammar of the domain through their research. They shape and transform the principles and patterns that determine what counts as the content of theoretical linguistics.

All linguists shape the external grammar of the domain through their social interactions and the identities they take on in those interactions. It is their ongoing social interactions and related identity work that determine the principles and patterns through which people in the domain can recognize and judge thinking, talking, reading, writing, acting, interacting, valuing, and believing characteristic of people who are in the affinity group associated with theoretical linguistics.

It is crucial, as I have pointed out, to see that the internal and external grammars and designs of semiotic domains interrelate with each other, mutually supporting and transforming each other. Let me exemplify this point, and further clarify the notion of design grammars, by returning to video games.

Some people play video games on game platforms like the Sony Playstation (1 or 2), the Nintendo GameCube, or the Microsoft Xbox. Some people play them on computers like the one on which I am typing this book. When people play video games on game platforms, they use a handheld controller with various buttons and often a little built-in joystick or two. They never use the sort of keyboard associated with a computer.

It is part of the external design of the semiotic domain of video games for game platforms that games and handheld controllers go together and part of the design of the semiotic domain of video games on computers that games and keyboards or handheld controllers go together, since some players do, in fact, plug handheld controllers into their computers to replace the keyboard.

So far this just seems to be a matter of brute technological facts. But things work in the world in certain ways because people make them do so, or, at the very least, are willing to accept them as such. Then, when they work that way, people come to expect them to do so and build values and norms around them working that way.

One could conceivably get a keyboard to work with a game platform. At the very least, it would be easy for designers to modify a platform so that it would work with a keyboard. However, you don't understand the external design grammar of the domain of platform-based video-game playing if you don't realize that doing this would "break the rules." It would be a serious departure from what the affinity group associated with this domain expects, wants, and values. Many platform-game players think keyboards are a bad way to play video games, while some computer-game players think they are a good way. In turn, these matters are connected to their identities as game players (e.g., the editors of *PC Gamer* magazine regularly "apologize" when they have spent time playing games on a game platform and not on a computer, and look down on the enterprise).

When Microsoft's Xbox came out in 2002, it was the first game platform to contain a computerlike hard drive. Hard drives allow games to be saved at any point. Heretofore, games played on game platforms, thanks to the technological limitations of the platforms, could be saved much less regularly than computer games. Players on typical game platforms, for

example, can save only at the end of a level or when they have found a special save symbol in the game. This means that in an action game, they have to stay alive long enough to get to the end of the level or find the save symbol, no matter how long they already have been playing.

In a computer game, thanks to the computer's hard drive, players can save their progress at any time they wish. (There are some games made for computers in which this is not true). This can make a difference in the strategies one uses. When playing on a computer, the player can save after a particularly hard battle and not ever have to repeat that battle. If the player dies a bit later, he or she starts again from the game that was saved after the big battle was already won.

On a game platform, if there was no save symbol after the big battle or if the battle was not the end of a level, the player could not save and must move on. If he or she dies, the big battle will have to be fought again, since the game will reload from an earlier saved game that did not contain that battle. Indeed, the last save could have been quite far in the past, and the player may be required to repeat a good deal of the game.

However, again, these are not just technological matters. Platform users do not necessarily see being unable to save whenever they want as a limitation. Many of them see it as a virtue; they say it adds more excitement and challenge to a game. Computer-game players who save after each big battle or dangerous jump might be thought of as "wimps" who can't last any length of time against rigorous challenges. Furthermore, in my experience, many platform users do not see playing large parts of a game over and over again as repetition in the way in which I do. They see it an opportunity to perfect their skills and get more play out of a game they enjoy.

So we see here the ways in which external technological and material facts become social facts and values. The Xbox's coming out with a hard drive led to a debate that anyone who understands the external design grammar of the platform domain could have predicted. Was the Xbox really a game platform? Could a real game platform have a hard drive? Perhaps the Xbox is really a computer in disguise. This is a debate over the very external design grammar of the domain: Is the pattern "video game, game platform, hard drive" acceptable within the external design grammar of the domain? Does it count as an acceptable part of valued social practices and identities in the domain? Should it?

It is not surprising, either, that of the games Microsoft initially brought out for the Xbox some used the hard drive to allow players to save whenever and wherever they wanted

(e.g., *Max Payne*) and others did not and functioned like a "proper" platform game (e.g., *Nightcaster*). The company obviously wanted to entice both platform players and computer-game players onto its system, though this can, in some cases, be a bit like enticing cats and dogs to play ball together.

A good number of people play both platform games and computer games, of course. Nonetheless, somewhat different affinity groups, with different attitudes and values, have arisen around each domain, with lots of overlap in between. There are people who play in both domains but have strong opinions about what sorts of games are best played on platforms and what sorts are best played on computers. All this is typical: Semiotic domains and affinity groups often don't have sharp boundaries (though some do), and in any case the boundaries are often fluid and changing.

Since the Xbox has the capacity to break the pattern that associates game platforms and limited saves while still retaining some of the other patterns typical of game platforms, it has the potential to create a new affinity group and/or to transform old ones. In the act, it and the social interactions of people around it might eventually create a new semiotic domain within the bigger domain of videogame playing, a new domain with a new external design grammar determining new social practices and identities. Indeed, the matter is already in progress, as the Xbox has already generated (with the help of Microsoft, of course) its own magazines, Internet sites, and aficionados.

But all this transformation and change in the external design grammar will rebound on and change the internal design grammar. Designers and producers will use the hard drive on the Xbox together with its more typical platform features to design new games. Hybrids between typical platform games and typical computer games will arise. The distinction in content between platform games (which tended to stress fast action) and computer games (which can store more information and stress deeper stories) may blur. As new content arises and new principles and patterns regarding the acceptable content of various different types of games also arise, the affinity groups associated with those different types of games will change their social interactions, values, and identities, and so, too, the external design grammar of their respective domains.

Some of these changes will be small, some large. But that is the way of all semiotic domains in the world. They are made, internally and externally, by humans and changed by them as these humans take up technological and material circumstances in certain ways and not others and as they shape and reshape their social interactions with each other.

Lifeworlds

Our talk about semiotic domains may lead some to think that everything said thus far only applies to "specialist" areas like video games, theoretical linguistics, law, or the workings of urban gangs, not "everyday," "ordinary" life. However, "everyday," "ordinary" life is itself a semiotic domain. In fact, it is a domain in which all of us have lots and lots of experience. It is what I call the *lifeworld domain*.

By the lifeworld domain I mean those occasions when we are operating (making sense to each other and to ourselves) as "everyday" people, not as members of more specialist or technical semiotic domains. Not everyone does physics or plays video games, but everyone spends lots of time in his or her lifeworld domain. And, of course, people move quite readily between specialist domains and their lifeworld domain. For example, a group of physicists at a dinner meeting might, at one moment, be discussing physics as specialists in physics and, at the next moment, be discussing the weather or movies as "everyday" nonspecialists. (Of course, there are people who can and do discuss the weather or movies as specialists in a specialist semiotic domain devoted to the weather or movies.)

Lifeworld domains are culturally variable; that is, different cultural groups have, more or less, different ways of being, doing, feeling, valuing, and talking as "everyday people." Thus there are many lifeworld domains, though they overlap enough to allow for, better or worse, communication across cultures.

If we look at lifeworld domains internally, we can say that their content is just the wide range of nonspecialist experiences of the world that people share with other people with whom they share various group memberships, up to and including the human race. Once a group has carved out an area of this experience (whether this is playing in the guise of video games or dealing with the weather as a science) and created "specialist" ways of talking and thinking about it ("policed" by themselves as "insiders," who determine what is acceptable and what not, who is adept and who is not), then they have left the lifeworld (and the rest of us behind) and created a specialist semiotic domain.

If we look at lifeworld domains externally, we can ask about the ways of thinking, talking, acting, interacting, valuing, and, in some cases, writing and reading that allow a particular culturally distinctive group of people to recognize each other as being, at a time and place, "everyday" or "ordinary" nonspecialist people. For example, how do you know when a friend of yours who is a theoretical linguist (and you are not) is talking to you and engaging with you not as a specialist linguist but just as an "everyday" nonspecialist person? How do you know this even when, in fact, you happen to be talking about language?

And, of course, these matters will differ if you and the linguist are from quite different cultures—say you are an African American and the linguist is a Russian. But, again, I caution against assuming too much variation across human beings. People can and very often do recognize "normal" human behavior across cultural groups, however problematic this sometimes may be (even to the point of leading to violence).

It is important to realize that meanings are no more general—they are just as situated—in lifeworld domains as they are in any other semiotic domain. For example, in different situations, even such a mundane word as "coffee" has different situated meanings. Consider, for instance, what happens in your head when I say "The coffee spilled, get a mop" versus "The coffee spilled, get a broom." In different situations, the word "coffee" can mean a liquid, grains, beans, tins, or a flavor. It can mean yet other things in other situations, and sometimes we have to come up with novel meanings for the word; for example in a sentence like "Her coffee skin glistened in the bright sunshine," "coffee" names a skin color.

For another example, think of the different situated meanings of the word "light" in everyday interactions in these sentences: Turn the light on. This light isn't giving much light. I can see a far off light. I am just bathing in this light. The effects of light in this part of the country are wonderful. The last thing I saw was a bright light. Of course, when we consider, in the context of lifeworld domains, words like "truth," "good," "democracy," "fairness," "honesty," and so forth, things get yet more variable, more deeply rooted in specific situations in specific culturally relative lifeworld domains.

There are a number of important points to make about lifeworld domains. First, we are all used to making claims to know things based not on any specialist knowledge we have but just as "everyday" human beings. However, in the modern world, specialist domains are taking more and more space away from lifeworld domains wherein people can make non-specialist claims to know things and not face a challenge from a specialist.

For example, I once lived in Los Angeles. Every nonspecialist in Los Angeles "knows" the air is polluted and dangerous, and they are usually willing to say so. Nonetheless, it was not at all uncommon to read in the newspaper, say, that "lay people" didn't really know what they were talking about (and choking on). Specialists in the matter claimed that there was no technical "evidence" that the air was particularly unsafe. Tobacco companies tried the same thing for years in regard to the dangers of smoking. Companies that pollute ground and water often engage in the same tactic when people in their areas of operation claim to feel sick (or drop dead) from their pollution.

Helping students learn how to think about the contrasting claims of various specialists against each other and against lifeworld claims to knowledge certainly ought to be a key job for schools. To do this, students would have to investigate specialist domains and different culturally distinctive lifeworlds, internally in terms of content and externally in terms of social practices and identities.

A second point to be made about lifeworld domains is this: In the modern world, we are used to having to face the fact that children, including our own, are specialists when and where we are not. Many children are adept at the semiotic domain of computers—sometimes because they play video games and that interest has led them to learn more about computers—where the adults in the house are intimidated by computers.

Kids have turned video games, roller-blading, skateboarding, and snowboarding into specialist domains that internally in terms of content and externally in terms of social practices bewilder adults. Many children have learned through the Internet and television more about stock trading or even law than many of the adults around them could ever imagine knowing. (One teenager had the top rating for legal advice on a legal Internet site in which many of the others on the highly ranked list were professional lawyers.)

Adults are getting used to the fact that they are "immigrants" in many a domain where their own children are "natives" (specialists). The lifeworld—the domain in which people can claim to know and understand things as "everyday" people and not as specialists—is shrinking, not just under the attack of specialist domains like science but because our children are creating and mastering so many specialist domains themselves.

A third point I want to make is this: I firmly believe we need to protect lifeworld domains from the assaults of specialists (yes, even our own children). We need to understand and value people's "everyday" knowledge and understandings. At the same time, I believe it is crucial, particularly in the contemporary world, that all of us, regardless of our cultural affiliations, be able to operate in a wide variety of semiotic domains outside our lifeworld domains.

It is very often in these non-lifeworld domains that people form affiliations with others outside their own cultural groups and transcend the limitations of any one person's culture and lifeworld domain. Of course, it is important not to insult anyone's culture or lifeworld domain; it is important, as well, to build bridges to these when introducing people to new semiotic domains. But in my view, it is a poor form of respect for anyone to leave people trapped in their own culture and lifeworld as the whole and sole space within which they can move in the modern world. If this view comports poorly with some versions of multiculturalism, so be it.

Back to *Pikmin*: Critical Learning

If learning is to be active, it must involve experiencing the world in new ways. I have spelled this out in terms of learning new ways to situate the meanings of words, images, symbols, artifacts, and so forth when operating within specific situations in new semiotic domains. Active learning must also involve forming new affiliations. I have explained this in terms of learners joining new affinity groups associated with new semiotic domains.

Active learning in a domain also involves preparation for future learning within the domain and within related domains. I will deal with this issue below, when I draw a comparison between the sorts of learning that take place when playing good video games and the sorts of learning that take place in good science classrooms and when I discuss the notion of precursor domains.

However, as I said earlier, critical learning involves yet another step. For active learning, the learner must, at least unconsciously, understand and operate within the internal and external design grammars of the semiotic domain he or she is learning. But for critical learning, the learner must be able consciously to attend to, reflect on, critique, and manipulate those design grammars at a metalevel. That is, the learner must see and appreciate the semiotic domain as a *design space*, internally as a system of interrelated elements making up the possible content of the domain and externally as ways of thinking, acting, interacting, and valuing that constitute the identities of those people who are members of the affinity group associated with the domain.

Let me return to the child playing *Pikmin* for a specific example of what I mean. What does it take just to play a game as an active learner? To do this the player must understand and produce situated meanings in the semiotic domain that this game, and games like it, constitutes. Elements in the content of *Pikmin*—for example, a yellow Pikmin—do not have just one general meaning or significance in the game world. Learners must learn to situate different meanings for such elements within different specific situations within the domain.

For example, when a player is faced with a rock wall, his yellow Pikmin (who can throw bomb rocks) take on the situated meaning *the type of Pikmin who can use bombs* (unlike red and blue Pikmin), since a good strategy for destroying walls in the game is to have yellow Pikmin throw bombs at them. However, when attacking a fat, sleeping, dangerous spotted creature (a Spotty Bulborb) found throughout the first levels of the game, the yellow Pikmin take on the situated meaning *the sorts of Pikmin who can be thrown farther than other sorts of*

Pikmin, since a good strategy when fighting big creatures like these is to have Captain Olimar tell the red Pikmin to run up and attack from the rear, while he throws the yellow Pikmin onto their backs to attack from up top.

Additionally, players need to know what patterns or combinations of elements the game's internal design grammar allows. They need to know, given the situated meanings they have given to each element in the pattern or combination, what the whole pattern or combination means in a situated way useful for action.

For example, the internal design grammar of *Pikmin* allows the player to bring together (by moving Captain Olimar and his Pikmin) the combination of Pikmin, a rock wall, and a small tin can laying near the wall, containing little rock bombs. Of course, the game did not need to allow this pattern or combination to be able to occur; its design grammar could have been built differently. Even given that the design grammar does allow this combination, players still have to build a situated meaning for this combination out of the situated meanings they have given to each element in the game based on the situation they take themselves to be in and their own goals.

If this is a point in the game where the player needs to get past the wall, and given the fact that he or she can build a situated meaning for yellow Pikmin like *the type of Pikmin that can throw bombs,* the player can build a situated meaning for this combination something like: *Equip the yellow Pikmin with the rock bombs and have them use the bombs to blow up the wall.*

Here is another example from *Pikmin* of a combination of elements allowable by the internal design grammar of the game. The player often finds a Spotty Bulborb—a creature with big teeth and jaws suitable for swallowing Pikmin whole—sleeping peacefully in a fairly exposed space. So the design grammar of the domain allows the combination: Spotty Bulborb, sleeping, in exposed area. Depending on what situation the player takes him- or herself to be in, this combination can be assigned several different situated meanings. For instance, it could be taken to mean: *Attack the Spotty Bulborb carefully from the rear before it wakes up;* or it could be taken to mean: *Sneak quietly by the Spotty Bulborb to get where you want to go without trouble.* Nothing stops the player from assigning the combination a more unexpected situated meaning, perhaps something like: *Wake the Spotty Bulborb up so you can get a more exciting (and fair?) fight.*

Since the child can successfully break down rock walls and attack Spotty Bulborbs, he can understand ("read") and produce ("write") appropriate situated meanings for elements and combinations of elements in the domain (game). But all of this is "just" playing the game

in a proactive way—that is, using situated meanings and the design grammar of the game to understand and produce meanings and actions (which are a type of meaning in the domain). Of course, one could just ritualize one's response to the game and try pretty much the same strategy in every situation, but this would not be a proactive way to play and learn.

All these meanings and actions are a product of what I have called active learning, but they are not yet critical learning that leverages the design grammar at a metalevel in a reflective way that can lead to critique, novel meanings, or transformation of the domain. However, the child is learning to do this as well—that is, his process of learning the game is not only active, it is increasingly critical.

When the child had recovered 5 of the spaceship's 30 missing parts, he was able to search in a new area called The Forest's Navel. This area had a much harsher and more dangerous-looking landscape than the previous areas the child had been in. It had different dangerous creatures, including a number of closely grouped creatures that breathed fire. And the background music had changed considerably. Since the player has already found five parts, the game assumes that he is now more adept than when he began the game; thus, the landscape and creatures are getting harder to deal with, offering a bigger challenge. At the same time, these changes in features communicate a new mood, changing the tone of the game from a cute fairy tale to a somewhat darker struggle for survival.

The child was able to think about and comment on these changes. He said that the music was now "scary" and the landscape much harsher-looking than the ones he had previously been in. He knew that this signaled that things were going to get harder. Furthermore, he was aware that the changes signaled that he needed to rethink some of his strategies as well his relationship to the game. He was even able to comment on the fact that the earlier parts of the game made it appear more appropriate for a child his age than did the Forest Navel area and considered whether the game was now "too scary" or not. He decided on a strategy of exploring the new area only a little bit at a time, avoiding the fire-breathing creatures, and returning to old areas with the new resources (e.g., blue Pikmin) he got in the Forest Navel area to find more parts there more quickly and easily (remember, the player has only 30 game days to get all the parts and so wants to get some of them quickly and easily.)

What we are dealing with here is talk and thinking about the (internal) design of the game, about the game as a complex system of interrelated parts meant to engage and even manipulate the player in certain ways. This is metalevel thinking, thinking about the game as a

system and a designed space, and not just playing within the game moment by moment. Such thinking can open up critique of the game. It can also lead to novel moves and strategies, sometimes ones that the game makers never anticipated. This is what I mean by critical learning and thinking. Of course, the six-year-old is only beginning the process of critical learning in regard to *Pikmin* and other video games, but he is well begun.

The child is learning to think reflectively about the internal design grammar (the grammar of content) of *Pikmin* and games like it. As he interacts with others, he will have opportunities to reflect on the external design grammar (the grammar of social practices and identities) too. For example, he has already learned that he can search the Internet for helpful tips about playing the game, including what are called Easter Eggs (little surprises players can find in a game if they know where and how to look for them). He considers these tips part of playing the game. On the other hand, he characterizes advice about how to play as "bossing him around" and claims he can "do his own thinking."

These are early moments in the child's induction into the affinity groups associated with videogame playing, their characteristic social practices, and the sorts of identities people take on within these groups and practices. If he is to engage with these external aspects of game playing critically, he will need to reflect in an overt way on the patterns and possibilities he does and does not find in these social practices and identities. Doing this is to reflect on the external design grammar of the domain.

Critical learning, as I am defining it here, involves learning to think of semiotic domains as design spaces that manipulate us (if I can use this term without necessary negative connotations) in certain ways and that we can manipulate in certain ways. The child has much more to learn about *Pikmin* as a design space (internally and externally). He also has much more to learn about not just the single game *Pikmin* but the genre (family) of games into which *Pikmin* falls (adventure strategy games) as a design space. And he has much more to learn about not just this genre but about video games in general (a larger and more loosely connected family) as a design space.

Then there is the crucial matter of learning how these design spaces relate to each other and to other sorts of semiotic domains, some more closely related to video games as semiotic domains, some less closely related. That is, the child can learn how to think about, and act on, semiotic domains as a larger design space composed of clusters (families) of more or less closely related semiotic domains.

So, then, why do I call learning and thinking at a metalevel about semiotic domains (alone and in relation to each other) as design spaces *critical* learning and thinking? For this reason: Semiotic systems are human cultural and historical creations that are designed to engage and manipulate people in certain ways. They attempt through their content and social practices to recruit people to think, act, interact, value, and feel in certain specific ways. In this sense, they attempt to get people to learn and take on certain sorts of new identities to become, for a time and place, certain types of people. In fact, society as a whole is simply the web of these many different sorts of identities and their characteristic associated activities and practices.

Some of these identities constitute, within certain institutions or for certain social groups in the society, social goods. By a "social good" I mean anything that a group in society, or society as a whole, sees as bringing one status, respect, power, freedom, or other such socially valued things. Some people have more or less access to valued or desired semiotic domains and their concomitant identities. Furthermore, some identities connected to some semiotic domains may come, as one understands the domain more reflectively, to seem less (or more) good or valuable than one had previously thought.

Finally, one might come to see that a given identity associated with a given semiotic domain relates poorly (or well)—in terms of one's vision of ethics, morality, or a valued life—with one's other identities associated with other semiotic domains. For example, a person might come to see that a given semiotic domain is designed so as to invite one to take on an identity that revels in a disdain for life or in a way of thinking about race, class, or gender that the person, in terms of other identities he or she takes on in other semiotic domains, does not, on reflection, wish to continue. In this sense, then, semiotic domains are inherently political (and here I am using the term "political" in the sense of any practices where the distribution of social goods in a society is at stake).

Let me make this discussion more concrete. A game like *Pikmin* recruits from our six-year-old a complex identity composed of various related traits. The game encourages him to think of himself an active problem solver, one who persists in trying to solve problems even after making mistakes; one who, in fact, does not see mistakes as errors but as opportunities for reflection and learning. It encourages him to be the sort of problem solver who, rather than ritualizing the solutions to problems, leaves himself open to undoing former mastery and finding new ways to solve new problems in new situations.

At the same time, the boy is encouraged to see himself as solving problems from the perspective of a particular fantasy creature (Captain Olimar) and his faithful helpers (the Pikmin) and, thus, to get outside his "real" identity and play with the notions of perspectives and identities themselves. He is also encouraged to focus on the problem-solving and fantasy aspects of his new identity and not, say, his worries about killing (virtual) "living" creatures, however odd they may be, though he can choose to avoid killing some of the creatures by running from them or sneaking around them. The learner, in this case, gets to customize the identity the game offers him to a certain extent—this, in fact, is an important feature of good video games.

The identity that *Pikmin* invites the player to take on relates in a variety of ways to other identities he takes on in other domains. I believe, for example, that the identity *Pikmin* recruits relates rather well to the sort of identity a learner is called on to assume in the best active science learning in schools and other sites.

If this is true, then our six-year-old is privileged in this respect over children who do not have the opportunity to play such games (in an active and critical way). An issue of social justice is at stake here in regard to the distribution of, and access to, this identity, whether through video games or science. We can note, as well, that the boy is using the video game to practice this identity, for many hours, at an early age, outside of science instruction in school, which may very well take up very little of the school day. Other children may get to practice this identity only during the limited amount of time their school devotes to active and critical learning in science of the sort that lets children take on the virtual identity of being and doing science rather than memorizing lists of facts—which often is no time at all.

Video Games: A Waste of Time?

I have now discussed a perspective on learning that stresses active and critical learning within specific semiotic domains. So, let me now return to the grandfather's remark that playing video games is a waste of time because the child is learning no "content."

If children (or adults) are playing video games in such a way as to learn actively and critically then they are:

1. Learning to experience (see and act on) the world in a new way
2. Gaining the potential to join and collaborate with a new affinity group

3. Developing resources for future learning and problem solving in the semiotic domains to which the game is related

4.Learning how to think about semiotic domains as design spaces that engage and manipulate people in certain ways and, in turn, help create certain relationships in society among people and groups of people, some of which have important implications for social justice

These, of course, are just the four things one learns when engaging actively and critically with any new semiotic domain. So the questions in regard to any specific semiotic domain become: Are these good or valuable ways to experience the world? Is this a good or valuable affinity group to join? Are these resources for future learning applicable to other good and valued semiotic domains? Is this domain leading the learner to reflect on design spaces (and the concomitant identities they help create), and their intricate relationships to each other, in ways that potentially can lead to critique, innovation, and good or valued thinking and acting in society?

The answers to these questions will vary along a variety of parameters. But they show that a great deal more is at stake than "content" in the grandfather's sense. This book offers a positive answer to these questions in regard to a good many (certainly not all) video games, as long as people are playing them in ways that involve active and critical learning. Video games have the potential to lead to active and critical learning. In fact, I believe that they often have a greater potential than much learning in school (even though school learning may involve learning "content"). Indeed, I hope my discussion of the child playing *Pikmin* already suggests some of the lines of my argument.

What ensures that a person plays video games in a way that involves active and critical learning and thinking? Nothing, of course, can ensure such a thing. Obviously, people differ in a variety of ways, including how much they are willing to challenge themselves, and they play video games for a great variety of different purposes. But two things help to lead to active and critical learning in playing video games.

One is the internal design of the game itself. Good games—and the games get better in this respect all the time—are crafted in ways that encourage and facilitate active and critical learning and thinking (which is not to say that every player will take up this offer). The other is the people around the learner, other players and nonplayers. If these people encourage

reflective metatalk, thinking, and actions in regard to the design of the game, of video games more generally, and of other semiotic domains and their complex interrelationships, then this, too, can encourage and facilitate active and critical learning and thinking (though, again, the offer may not be taken up). And, indeed, the affinity groups connected to video games do often encourage metareflective thinking about design, as a look at Internet game sites will readily attest.

This last point—that other people can encourage in the learner metareflective talk, thinking, and actions in regard to a semiotic domain as a design space—leads to another point: Often it is critical learning—focusing on the semiotic domain one is learning as a design space in a reflective way—that actually encourages and pushes active learning. One can learn actively without much critical learning, but one cannot really learn much critically without a good deal of active learning in a semiotic domain. The critical is not a later add-on. It should be central to the process of active learning from the beginning.

There is another important issue here that bears on deciding whether a given semiotic domain—like video games—is valuable or not: Semiotic domains in society are connected to other semiotic domains in a myriad of complex ways. One of these is that a given domain can be a good precursor for learning another one. Because mastering the meaning-making skills in, and taking on the identity associated with, the precursor domain facilitates learning in the other domain. Facilitation can also happen because being (or having been) a member of the affinity group associated with the precursor domain facilitates becoming a member of the affinity group associated with the other domain, because the values, norms, goals, or practices of the precursor group resemble in some ways the other group's values, norms, goals, or practices.

Let me give a concrete example of such connections. In the larger semiotic domain of video games, first- and third-person shooter games are a well-defined subdomain. However, such games often have elements that are similar to features found in arcade games, games (like *Space Invaders, Pacman,* and *Frogger*) that involve a good deal of fast hand-eye coordination to move and respond quickly. (In fact, one of the original first-person shooter games, a game that helped start the genre—*Wolfenstein 3D*—operates very much like an arcade game.) Thus, someone who has mastered the domain of arcade games has mastered a precursor domain for shooter games, though such games now contain many other elements, as well.

On the other hand, fantasy role-playing games are another well-defined subdomain of the videogame domain. People who have earlier played and mastered the *Dungeons and Dragons* semiotic domain (as make-believe play or with books and cards) are advantaged when they play fantasy role-playing games, since such games developed out of *Dungeons and Dragons*, though they now contain a good many additional elements.

Both the shooter domain and the fantasy role-playing domain have other precursor domains, and they share some precursor domains (e.g., make-believe play wherein one is willing to take on different identities—a domain that some cultures and social groups do not encourage in children or adults). Some of these videogame (sub-) domains may well serve as precursor domains for other semiotic domains. For example, it may well be that the popular (sub-) domain of simulation games (so-called god games, like *SimCity, The Sims, Railroad Tycoon,* and *Tropico*) could be, for some children, a precursor domain for those sciences that heavily trade in computer-based simulations as a method of inquiry (e.g., some types of biology and cognitive science).

In interviews my research team and I have conducted with videogame players, we have found a number of young people who have used the domain of video games as a fruitful precursor domain for mastering other semiotic domains tied to computers and related technologies. Indeed, several of these young people plan to go to college and major in computer science or related areas.

So we can ask: Can various subdomains in the larger domain of videogame playing serve as precursor domains facilitating later learning in and out of school? I believe that the sorts of active and critical learning about design—and the type of problem-solving identity—that a game like *Pikmin* can involve may well relate to later learning in domains like science, at least when we are talking about teaching and learning science as an active process of inquiry and not the memorization of passive facts.

I am convinced that playing video games actively and critically is not "a waste of time." And people playing video games are indeed (*pace* the six-year-old's grandfather), learning "content," albeit usually not the passive content of school-based facts. (Many games, such as the *Civilization* games, do contain a good number of facts.) The content of video games, when they are played actively and critically, is something like this: *They situate meaning in a multimodal 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.* That's not at all that bad—and people get wildly entertained to boot. No wonder it is hard for today's schools to compete.

Learning Principles

The discussion in this chapter suggests a variety of learning principles that are built into good video games, games like *Pikmin*, as will the discussion in each of the following chapters. Some of the learning principles suggested in this chapter are a bit more general than are those in later chapters. Here I bring together these principles to start a list that will continue in subsequent chapters.

I state only five very basic principles, since quite a number of other principles that are implicated in the earlier discussion will be discussed in greater detail later. The order of the principles is not important. All the principles are equally important, or nearly so. Some of the principles overlap and, in actuality, reflect different aspects of much the same general theme. Furthermore, these principles are not claims about all and any video games played in any old fashion. Rather, they are claims about the potential of good video games played in environments that encourage overt reflection. (While good video games do indeed encourage overt reflection, this feature can be greatly enhanced by the presence of others, both players and viewers.)

I state each principle in a way that is intended to be equally relevant to learning in video games and learning in content areas in classrooms.

1. Active, Critical Learning Principle

All aspects of the learning environment (including the ways in which the semiotic domain is designed and presented) are set up to encourage active and critical, not passive, learning.

2. Design Principle

Learning about and coming to appreciate design and design principles is core to the learning experience.

3. Semiotic Principle

Learning about and coming to appreciate interrelations within and across multiple sign systems (images, words, actions, symbols, artifacts, etc.) as a complex system is core to the learning experience.

4. Semiotic Domains Principle

Learning involves mastering, at some level, semiotic domains, and being able to participate, at some level, in the affinity group or groups connected to them.

5. Metalevel Thinking about Semiotic Domains Principle

Learning involves active and critical thinking about the relationships of the semiotic domain being learned to other semiotic domains.

Bibliographical Note

See Kress 1985, 1996, and Kress & van Leeuwen 1996, 2001 for insightful discussions on reading images and multimodal texts, that is, texts that mix words and images. For work on literacy as involving multiple literacies, see Cope & Kalantzis 2000; Heath 1983; Scollon & Scollon 1981; and Street 1984.

The discussion of physics students who know Newton's laws of motion but cannot apply them to a specific situation is taken from Chi, Feltovich, & Glaser 1981. For further discussion, see Gardner 1991 and Mayer 1992.

On the nature of reading tests, see Hill & Larsen's 2000 superb analyses of actual test items in relationship to different ways of reading. On reading more generally, see Adams 1990; Coles 1998; Gee 1991; Snow, Burns, & Griffin 1998; see Pearson 1999 for discussion of the range of controversy in the area. The "fourth-grade slump" is discussed in Gee 1999; see Chall 1967 for an early and influential discussion.

On Noam Chomsky's work, see McGilvray 1999. For C. S. Peirce's work, see Kloesel & Houser 1992.

On semiotics and content learning, especially in regard to science education, see Kress, Jewitt, Ogborn, & Tsatsarelis 2001; Lemke 1990; and Ogborn, Kress, Martins, & McGillicuddy 1996. On the notion of affiliation and affinity groups, see Beck 1992, 1994; Gee 2000–2001; Rifkin 2000; and Taylor 1994. For the idea of preparation for future learning, see Bransford & Schwartz 1999, a very important and illuminating paper for anyone interested in learning. On the notion of design and design grammars, see New London Group 1996, a "manifesto" written by an international group of scholars (a group of which I was a member) working in the area of language and literacy studies.

My notion of critical learning combines work on situated cognition, especially work on metacognition—see, for example Bereiter & Scardamalia 1989; Bruer 1993: pp. 67–99; Pellegrino, Chudowsky, & Glaser 2001; Schon 1987; and Paulo Freire's 1995 work on critical thinking and literacy as "reading the world" and not just "reading the word." On the concept of the lifeworld, see Habermas 1984.

For discussions of game design relevant to the concerns of this chapter, see Bates 2002 and Rouse 2001.

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