

Peeling the onion: Layers of interactivity in digital narrative texts.

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Peeling the Onion: Layers of Interactivity in Digital Narrative Texts

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Is there such a thing as an interactive story? It all depends on who you ask. In the 2003 and 2004, four books have been published on the topic of interactive narratives of them—by Carolyn Handler Miller and Mark Meadows—regard the existence of interactive narratives as an indisputable fact. To make their case they crowd about existence, both on the Internet and elsewhere, of a wide variety of interactive texts involve a story. For instance: computer games, interactive TV, interactive movies toys (like talking dolls), augmented reality gaming, interactive cartoons, hypertext interactive fiction, Web sites devoted to history, people putting together digital autobiographies or family histories that combine pictures and text, even news st

Google and CNN that let the user click and choose between audio, visual and written documents pertaining to the story. Since interactive narrative is everywhere, Mil Meadows do not regard the combination of narrativity and interactivity as a problem, and their books limit themselves to rather superficial advice on how to improve the design of digital stories.

Another author, Andrew Glassner, believes that the purpose of interactive narrative should be entertaining, and he finds that the only type of product that truly fulfills this purpose are computer games. Hypertext, by contrast, only kills the narrative pleasure that we get from novels and movies. Glassner recognizes that there is ample room for improvement in computer game stories, but he concludes his book on an optimistic note: "One of the pleasures of thinking about story environments is that everything is still open: we haven't even scratched the surface of what's possible" (2004, 469).

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The fourth author, Chris Crawford, is much more pessimistic about both the past and the future. He claims that to date, "not a single interactive storyworld that commands widespread respect has been created" (2003, 259) and he complains that narrative is generally treated by game designers as "just another tacked-on feature," like animation, sound effects, and music, instead of forming the defining aspect of games (2004, 69). After a successful career as a computer game designer, Crawford became dejected with the triteness and lack of variety of the stories found in computer games. Almost all of them are variations on the same archetypal pattern, the quest of the hero to conquer a desired object or to save the world by defeating the forces of evil (though some recent computer games have inverted this pattern by making the hero a bad guy). Crawford retired from the computer game business and has devoted the past 13 years to designing a computer program, the Erasmatron that generates interactive stories. But in a recent post to Grand Text (March 23, 2005), he expressed deep frustration with the project. The Erasmatron is still in the development stage and has yet to produce a single story that meets Crawford's standards of narrative excellence. But even if the program met its goals, Crawford believes it would be a commercial failure, because the game industry does not like to take risks. Why experiment with narrative content, when there will be millions of people ready to buy the next shooter, as the huge success of the new installments of *Doom* and *Half-Life* has shown?

Who is right? The optimists or the pessimists? It all depends on what we mean by "interactive story". In this paper, I would like to argue that digital texts are like an onion, made of different layers of skin, and that interactivity can affect different levels. Those who regard the existence of interactive stories as a *fait accompli* are satisfied with interactivity that operates on the outer layers; those who regard interactive stories as an elusive unicorn we can imagine but have yet to capture," to quote Brenda Laurel (1991, 72), want interactivity to penetrate the core of the story. On the outer layers, interactivity concerns the presentation of the story, and the story pre-exists to the running of the software; on the middle layers, interactivity concerns the user's personal involvement with the story, but the plot of a story is still pre-determined; on the inner layers, the story is created dynamically through the interaction between the user and the system. How

propose to peel the interactive onion, by discussing texts that illustrate the different layers of interactivity, all the way to the still resistant core.

But let me first say a few words about my conception of interactivity. I realize the term has been under assault by some theorists, for instance by Espen Aarseth, who finds it too vague and wants to replace it with “ergodism.” But just because interactivity comes in many forms there is no reason to discard the term, because it presents the significant advantage of being self-explanatory and intuitively meaningful. When I say “interactivity” in relation to a digital text, you all understand what I have in mind: the user’s ability to provide input to the computer, and the computer’s ability to adjust its behavior according to this input. Chris Crawford believes that an interactive text is a text that offers a choice to the user. I agree that choice is a necessary condition of interactivity, but not sufficient. Not all objects that offer choices are themselves interactive. For instance, a road sign at a crossroad that points in several directions offers many destinations to the traveler, but a printed menu in a restaurant offers many options to the customer. But I would not consider the road sign and the menu interactive objects, because they lack the ability to respond to themselves in response to the user’s decisions. For the same reason, I would not consider a branching print text like a *Choose Your Own Adventures* story truly interactive, because the text is static. The reader turns the pages, but the text itself does not do anything. On the other hand, a digital text is interactive, because when the user performs an action, the program reacts by executing a certain module of code that alters the global state of the system. For me a genuinely interactive text involves not only choice, but also a two-way effort that creates a feed-back loop. The two sides can be two human minds, as in a conversation or oral storytelling, they can be a human agent and the world, because the world “kicks back” when the agent performs an action; or they can be a human agent and a programmable system, because a system can simulate a mind or a dynamic environment.

The mode of participation of the user in an interactive text can take four major forms (Ryan, 2001b). First, the user can exist as a character within the environment, or the user can experience this environment from an outside perspective, such as a god-like point-of-view. I call this dichotomy internal versus external interactivity. And second, the user’s actions can have an effect on the evolution of the environment—on its destiny and its history—or they can be limited to observation. I call this ontological versus exploratory interactivity. If we cross-classify the two dichotomies, we get four major types of interactivity, which we can arrange on a wheel. This leaves some room for intermediate cases. These four categories relate to different layers of the interactive onion. On the inner layers, interactivity tends to be exploratory, while it must be ontological on the innermost layer. And on the outer layers, interactivity tends to be external, while it is internal on the innermost layer. The core of the onion is consequently occupied by the internal-ontological participation and the outer layers by external-exploratory participation. The mixed categories of internal-exploratory and ontological-external are more difficult to categorize with respect to the layers of the onion; but we will find internal-exploratory on an outer layer and external-ontological as close to the core as we will get.

Now that we have gathered the necessary theoretical tools, we are ready to peel the onion. I promise that it will not make us cry until we reach the innermost layer. For the convenience of the presentation I will divide the onion into four layers, but a given layer may present several types of interactivity, and may therefore straddle several layers.

Level 1. Peripheral Interactivity

Here the story is framed by an interactive interface, but this interactivity affects neither the story itself, nor the order of its presentation. I will discuss several variations of this idea.



Figure 1. Screenshot from “Cruising” by Ingrid Ankerson and Megan Sapnar

My first example is the poem “Cruising,” by Ingrid Ankerson and Megan Sapnar. 1). The “story” of the poem is a memory of growing up in a small Wisconsin town, a full-fledged narrative, because it describes a somewhat repetitive action, and it can reach any kind of narrative closure. But the reader can relate emotionally to the content and the setting sparks the imagination of anybody familiar with small towns of the Midwest. The user’s action consists of controlling the display. By moving the cursor, the reader can make the text and its graphic background grow or shrink, move left or right, and move at different speeds. The goal is to get a combination of size, speed, and direction that allows the text to be deciphered; for most of the time, the letters are small, and they move too fast for the eye to make out the words. The user’s control of speed and direction simulates the driving of a car; and indeed, driving a car is what the text is all about. This creates a nice unity, not only of form and content, but also of interface. But no matter how fast or slow the car moves, no matter whether it goes forward or backward, it is the same text that rolls before the reader’s eyes. Sometimes we can read it, sometimes we cannot, but we cannot stop it, we cannot skip any of its parts, and we cannot change its internal order.

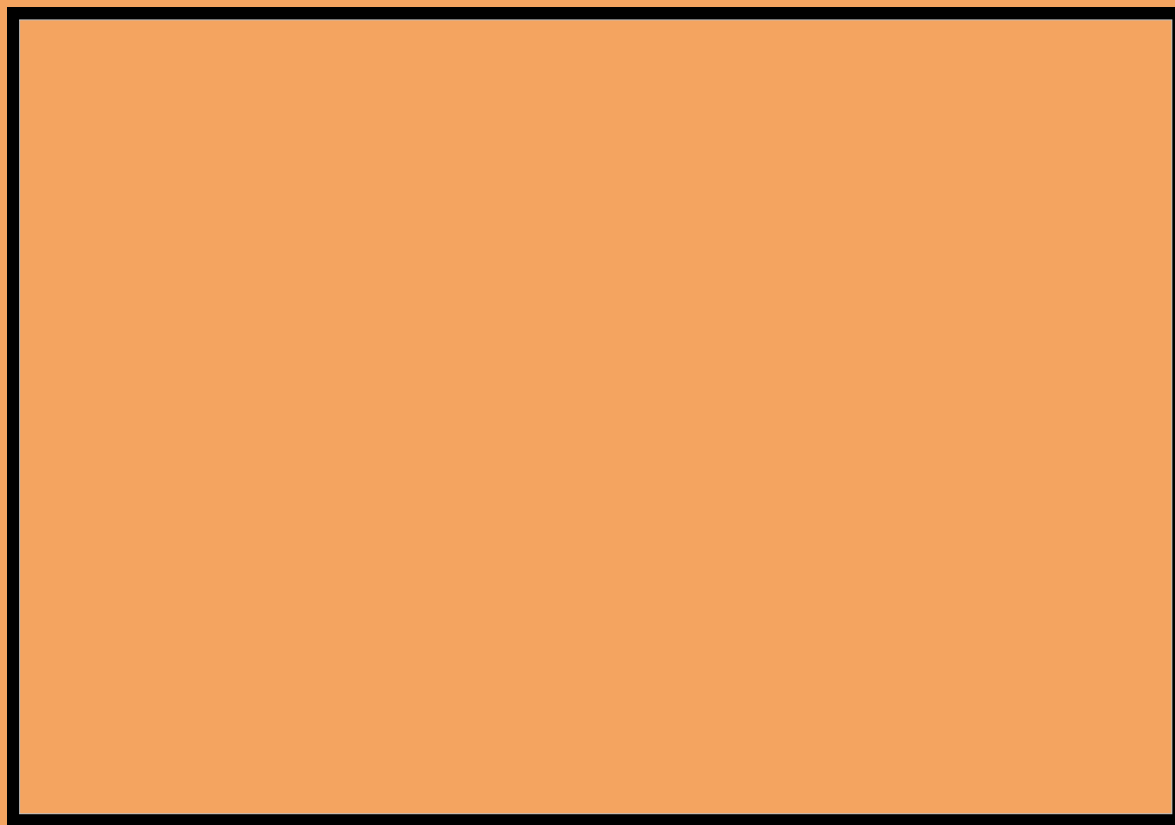


Figure 2. Screenshot from “Marginal ” by Stuart Moulthrop

The viewing of the text is turned into a more challenging operation in my next example, an interactive interface, *Marginal* by Stuart Moulthrop (figure 2). The text consists of story fragments that seem to be cut out from newspaper columns—an obvious reference to the cutout technique of William Burroughs. But the text is hidden by an opaque cover. A hole in this cover travels on the screen, revealing parts of the stories, but without allowing the user to read them, because it moves too fast and too randomly. The

interactivity of the text depends on a second hole whose movement can be fully controlled. By walking this hole slowly over the screen, the user will be able to choose which part of the hidden text to expose, and by moving it from left to right over a fragment, she will be able to read it. When the controllable hole passes over a certain spot, the page is replaced by another, but since the user does not know where the spot is located, she has only indirect control over this event. Sometimes the text is instantly replaced, before the user can read anything, sometimes it stubbornly refuses to give way to the next page. The effect is like reading a book with a magnifying glass that in this case the user is not free to turn the pages. The interface brings attention to the reading process by de-automatizing the scanning of the text by the eye, but its relation to the themes of the text (mostly sexual and humorous) is much more problematic. “Cruising.”

Another way to combine story and interactivity, without directly affecting the story, is through what I call the playground or “activity book” design. I am referring here to activity books that accompany some beloved children’s stories. The Tintin series of comics has for instance inspired a number of companion books that offer such activities as helping Tintin escape from a crypt (by solving a maze), rescuing Professor Calculus from kidnappers (by playing a board game), or building a model of Tintin’s moon lander (by using patterns and directions included in the book). I have tried to implement this idea in *Symbol Rock*, a CD ROM that I have co-authored. The CD ROM tells a true story of the inhabitants of an abandoned ranch in Colorado. The resources provided to display include text, original documents, artworks by members of the ranching family, transcripts and audiotapes of oral storytelling, black and white family photos and color pictures of the landscape. The interface allows the user to consult freely the various documents. To enliven the reading experience, the project casts the reader into the role of an investigator who tries to crack the mystery of the abandoned house. The steps of the reader’s progression reproduce my co-author’s discovery of the story: walk to the house to explore it; go to the library to find information; and visit the graves of the people who lived there. The various frames offer not only text to read and documents to consult, but also activities that relate to the story. For instance, the user can explore the abandoned house and meet the ghosts of the people who lived there; walk around the house to discover the landscape; look for and identify wildflowers; apply color to a sketch or painting created by one of the characters; consult books in the library; and, by visiting the episodes, uncover gradually a photograph that reveals the love affair between the rancher and the schoolteacher who lived with him and his wife in the ranch for 30 years. These activities are like the toys on a playground: the reader can either proceed with the story, or stop and play along the way. While some activities involve puzzles to solve, such as finding the ranch on the map, or meeting all the ghosts by running a maze—they always have a way to avoid them, and none of them constitutes a roadblock.

This idea of surrounding a story with interactive documents that offer opportunities for play has also been implemented in interactive TV. For instance, the BBC series *Sherlock* (a standard, non-interactive spy story) is accompanied by game-like documents that the user can download after each show. During the first five weeks of the series, these

documents are training sessions that teach the user how to become a spy. Then accesses an “interactive mission” that places him in the (repurposed) world of the show. This enrichment of the world of shows through supplementary activities is the main strategy of interactive TV. Despite the hype that has surrounded the technology, the amount of money sunk into it by the industry, interactive TV hasn’t yet broken the surface skin of the onion. The interactivity of its narrative shows has been restricted to: providing peripheral documents on demand, giving access to chat groups, offering quizzes related to the content of the show, inviting viewers to vote on issues, linking shows to interactive Web sites (an approach that requires a dual screen) or letting the spectator select one of the many cameras that record a scene, in order to choose a character to watch.

Level 2. Interactivity affecting narrative discourse and the presentation of the story

On this level, the materials that constitute the story are still fully predetermined, but thanks to the text’s interactive mechanisms, their presentation to the user is highly variable. Narratologists would say that interactivity operates here on the level of narrative discourse, as opposed to the level of story. This type of interactivity requires a collection of documents interconnected by digital links, so that, when the user selects a link, a new document comes to the screen. This type of structure is widely known as hypertext. The narrative forms of hypertext can rely on different configurations of links and structures that embody different philosophies. Here I will discuss two types of philosophies and design that implement them. These designs are the two poles of a continuum, and we can find many hypertext that combine their features.

My first type of structure is what that Lev Manovich would call the database structure. Actually, Manovich believes that “narrative and database are natural enemies” (1999) because narrative involves an implicit order dictated by chronology and causality, while a database is a collection of documents which can be consulted by the user in any order. But if the database is properly structured, and if its subject matter is appropriate, the probes of the user and his always incomplete exploration will not prevent the retrieval of narrative meaning. Consider for instance the large Web site devoted to the Lewis and Clark expedition. The story of Lewis and Clark is known, in its broad lines, to most people, and there is no need to follow it in chronological order. We can, for instance, read a diary entry that relates to the discovery of the Columbia river in Oregon before we read about the crossing of Wyoming. As the chronicle of an expedition, the story of Lewis and Clark is neatly divided into episodes that relate to the various stages of the journey. Thanks to this modular character, the reader can bring a magnifying glass to certain parts of the story without losing sight of the whole. The Web site is structured like a sea anemone (Figure 3, left) that allows the reader to retrieve more and more documents as he or she to dig deeper and deeper into the database. With each of these probes the story expands and reveals more stories, as the reader’s attention shifts from the main characters to the secondary characters, who then become main characters surrounded by the casts of secondary characters, in a potentially infinite regression. But if we feel that we have strayed too far from the center, we can always return to the main menu with

click and reconnect with the diary of the expedition. With this type of interactivity, users are able to move freely around the story and to customize it to their own interests.

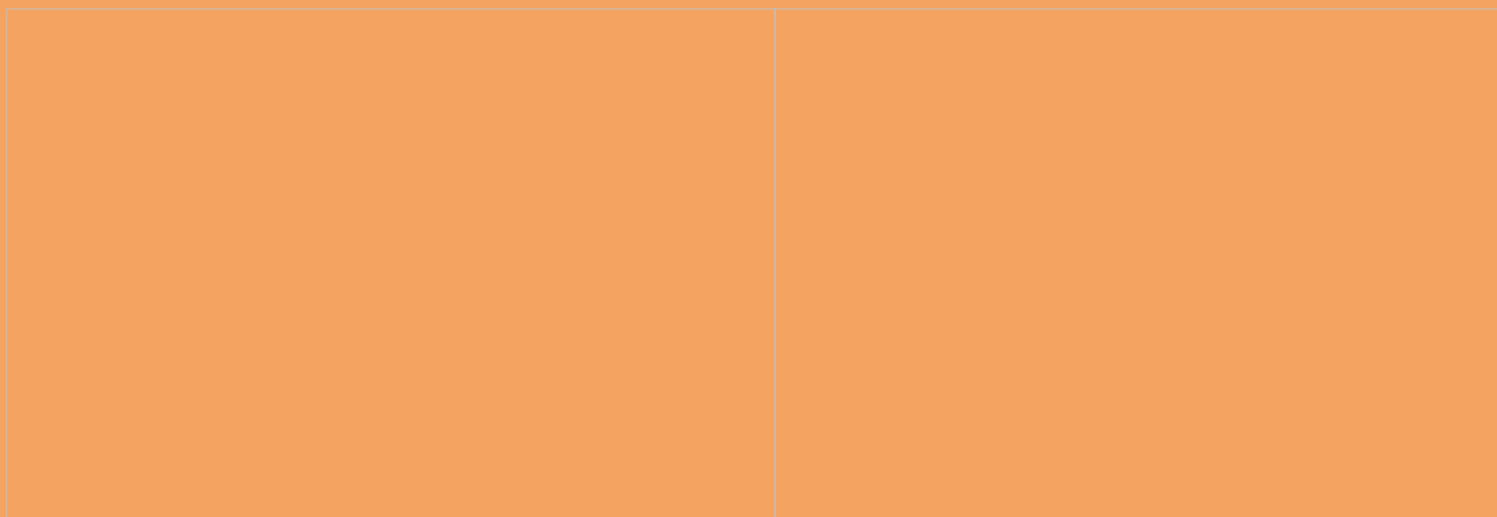


Figure 3. A sea anemone and a maze structure. (On the sea anemone, all nodes are connected to the central one through one link)

My second example of discourse-level interactivity is classical hypertext fiction—mean a text based on a network or maze structures that looks like figure 3 (right). Examples of this structure are the hypertext produced in the early nineties with the program Storyspace, for instance *afternoon* by Michael Joyce or *Victory Garden* by Moulthrop. (By contrast, more recent hypertexts, such as Shelley Jackson's *Patchwork* and M.D. Coverley's *Califia* have been influenced by the idea of the searchable and they adopt the radiating design of the sea anemone, at least on the top level.) A formal characteristic of the network structure is the existence of loops that offer different ways to get to the same node. These loops make it possible to circle forever around the network. This explains why the image of the labyrinth and the notion of “book world” play such an important role in hypertext theory. To reinforce the reader's experience of being lost in a labyrinth, classical hypertext favors opaque links, which lead to selection and blind navigation. In Michael Joyce's *afternoon*, links are not visible in other texts, they are signaled by underlined words, but in contrast to the links of a database, the words themselves have no evident informational value, and the relationship between the words that anchor the links and the text that comes to the screen is as a puzzle to be solved by the reader. Hypertext aesthetics favors the serendipitous emergence of meaning over a goal oriented, deliberate retrieval of information. But is it possible to respect narrative logic under these conditions? Early hypertext theorists thought so. They presented hypertext as a storytelling machine that generates a unique narrative with every run of the program. As Michael Joyce put it: “Every reading becomes a new text...Hypertext narratives become virtual storytellers” (193). Since there is an infinite number of different paths through a network, this means that hypertexts produce an infinite number of stories. If this claim were tenable, hypertext fiction could implement the type of interactivity that affects the inner layers of the onion: an interactivity that creates stories on the fly, rather than disclosing a preexisting story. For this to happen, the order in which the reader encounters the lexia would have to correspond rigidly to the chronological order of the events narrated in the lexias;

lexia could be mentally rearranged by the reader, different paths through the net could be read as the same story. But the loops of the network structure of classic hypertext prevent the interpretation of the sequence of lexia as a faithful image of chronological order.

To see what is wrong with associating the sequence of lexias seen by the reader with the sequence of events in the storyworld, consider the lexia in Joyce's *afternoon* where the narrator witnesses an accident, and fears the victims were his ex-wife and son:

Die?

I felt certain it was them. I recognized her car from that distance, no more than a hundred yards off along the road to the left when she would turn if she were taking him to the Country Day School.

Two men stood near the rear of the grey buick and a woman in a white dress sprawled on the wide lawn before them, two other men crouching near her. Another, smaller beedy

Now imagine that after reading a certain number of other lexia you return to this second and perhaps a third time. There are at least four different ways to interpret the recurrence.

1. The narrator has seen two, three or four similar accidents, depending on how many times the reader returns to the lexia. We are in a world where events strangely repeat themselves.
2. The narrator travels back in time, and sees the same accident over and over again.
3. The narrator is obsessed with the experience of the accident, and the return to the same lexia stands for the replaying of the scene in the narrator's mind. The text represents the stream of consciousness of the narrator.
4. Return to the scene of the accident is nothing more than a return to the same text, and has no significance within the storyworld.

The first two interpretations affect the level of story, but they involve a fantastic or science-fictional element that is totally absent from *afternoon*, and this makes them rather silly. The last two interpretations, which I find much more acceptable, involve a different level of discourse: the inner discourse of the narrator in 3, and more abstractly, the discourse of the text in 4. In both of these interpretations there is only one accident. Interactivity provides many glimpses at the same scene, rather than creating different sequences of physical events within the storyworld. But interpretation 3 comes close to affecting the level of story, because it naturalizes the text as the mental activity of a character that exists within the storyworld. In different runs of the text, the narrator's mind will consequently follow different paths and visit different memories. In interpretation 4, by contrast, the textual mechanisms are no longer interpreted mimetically. Interactivity becomes a game of putting a coherent story back together from a fragment that come to the reader in a variable order, like the pieces of a jig-saw puzzle.

For a hypertext to tell a different story every time, without losing narrative coherence, would have to be organized on a tree structure that prevents loops. Since a tree structure offers only one way to reach a given node, it allows a strict control of the logical relations between lexia. Each branch on the tree can be made to correspond to a different development of events out of a common situation, and interactivity becomes a choice between several pre-defined stories. This structure has been implemented in *Choose Your Own Adventures* children's stories. But since the branches of a tree eventually come to an end, the price to pay for guaranteed narrative coherence is the self-reliance and the emergent meaning of classical hypertext fiction—for meaning in literature does not have to be narrative: relations between lexias can be analogical and lyrical rather than standing for chronological and causal relations. The tree structure constitutes the easiest way to penetrate the next layer of the onion, but it is also the least interesting because the reader—or user—does not get more out of the system than what they put into it. To take interactivity to the level of story without freezing the narrative of the text, we need more flexible schemes.

Level 3. Interactivity creating variations in a partly pre-defined story

On this level the user plays the role of a member of the storyworld, and the system offers him some freedom of action, but the purpose of the user's agency is to progress through a fixed storyline, and the system remains in firm control of the narrative trajectory. This type of interactivity is typical of computer games, such as : adventure games, shoot 'em up, mystery-solving games.

In the texts discussed so far, participation was external and exploratory. Here it is internal and either ontological or exploratory. Internal participation means that the user identifies with a body, or avatar, in the fictional world, and that the actions available to him are not abstract ways to see more of the text, but represent a physical engagement of the user with the surrounding world, such as moving, jumping, building, shooting, killing, picking up objects and looking around. When the actions available to the user consist mainly of moving around the world and looking at objects, participation is exploratory; when the user has the power to change the world or to affect the destiny of the avatar, participation is ontological. Internal-exploratory participation is found in those games in which the mission of the player consists of solving a mystery, such as a murder case. These games connect two narrative levels: the level of the story being investigated by the player, which is written into the game, and the level of the investigation, which is variable and is created by the actions of the player. But by far the most common form of participation in videogames is ontological. We find it whenever the life of the avatar is at stake. In this case we can say that each run of the game creates a new life story for the avatar and a new history for the fictional world.

Figure 4. Pre-determined narrative arc

The dominant narrative structure for ontological participation is the archetypal quest of the hero, as described by Vladimir Propp and Joseph Campbell. In a narrative, the hero fulfills his mission by performing a series of tasks of increasing difficulty. The game determines the theme of the mission and the sequence of the tasks, but the player's performance creates variations on this fixed frame. These variations differ from each other in how the avatar solves problems, in the success or failure of his quest, and in the case of failure, in the time and manner of his death. The different ways to implement the same narrative arc can be represented like figure 4. But a quest narrative can also present several branches and many different endings. In this case its underlying structure will look like a flowchart (figure 5). To respect narrative logic, this type of structure should only allow strands to merge when it does no longer matter which path the avatar has taken. For instance, the hero may arrive at the dragon's lair with or without a certain magic aide. This represents a merging of paths in the space of the game, but not in the logical space of narrative possibilities, because without the magic aide the hero cannot defeat the dragon. On a diagram like this, branches can only merge when actions of the past no longer cast a shadow on the future. Merging points are frequent, which generally correspond to the various levels of the game. But the flowchart structure can present partial merging points, corresponding to the many different ways to reach a subgoal.

Figure 5. Predetermined narrative with multiple endings

The formula of layer 3 has been very successful, as the huge popularity of computer games demonstrates. But the reason for this success may be the fact that game players are very discriminative when it comes to narrative. Most players do not play for the story, but for the adrenaline rush of competition and for the thrill of beating the game, and as they get stunning graphics and their dose of fast action, they are satisfied with the same old storyline clothed in different themes and visual motifs. It will take lots of imagination on the part of game designers to make games worth playing for the sake of the story. According to Chris Crawford (2004, 69), the standard practice has been to design action schemes and modes of interaction, and to hire a scriptwriter in the developing stages to wrap up the game in a story. The alternative would be to start with a narrative blueprint written by a talented author, and to create opportunities for interaction within this blueprint, but I doubt that this approach would solve the problem of designing narratively compelling games, because it is not any easier to tack interaction on a story, than to tack a story on a game. Both elements must be developed concurrently and in relation to each other. For a game to be worth playing out of narrative interaction, the storyline must grow out of opportunities for interaction, and vice-versa, these opportunities must grow naturally out of the story. There is no recipe for achieving this feat.

The easiest way to combine narrative development and interactivity is to present the story by means of non-interactive movie clips known as "cut scenes." Cut scenes introduce into games the narrative power of film, and for many players they constitute a reward for being promoted to a new level, but if the story only moves forward during cut scenes, the strategic significance of the player's actions is reduced to passing

roadblocks, in order to get more of the story. For the player who truly cares for this this necessity to take tests of often dubious connection to the narrative theme can be exasperating. Chris Crawford (131) calls this approach a “constipated story,” and Poole regards it as frustrating for both lovers of games and lovers of stories:

It is as if you were reading a novel and being forced by some jocund imp at the end of each chapter to go and win a game of table tennis before being allowed to get back to the story. Actually, with some games it’s worse than that: it’s the other way round. You want a good exciting game of ping pong, but you have to read a chapter of some crashingly dull science-fantasy blockbuster every time you win a game...” (*Trigg* 109).

A more elegant and dynamic way to reveal the story than non-interactive cut scenes is to make the actions of the user contribute directly to the disclosure and development of the plot. This is not easy to do, but a fairly successful technique is to send non-playing characters in the player’s way and to have them converse with the player, telling the player the backstory of the gameworld, giving advice, or instructing the player of his next task. In these conversations, the character generally uses spoken language, but the player can communicate by means of a menu of possible questions to ask. Another “in game” storytelling strategy is to scatter documents within the gameworld that give information about its past history and have the player pick them up and read them. But this technique should not be overused (as it is in *Myst*), because playing a video game should not be turned into reading a novel.

A promising variation on the idea of built-in narrativity is to design what Henry Jenkins calls a narrative architecture: a rich gameworld brimming with hidden tales. In this architecture, every place would hold a story to be dug up, every object would offer opportunities for playful manipulation, and non-playing characters would be full of gossip. The gameworld would tempt the user to pause, explore, visit roadside attractions, respond to affordances, gather stories, and set up his own goals, rather than being relentlessly driven forward by the desire to beat the game.

The main problem with current game design is its inability (or is it unwillingness) to diversify the repertory of actions available to the player. Games of progression and fixed script are very similar to each other on the level of the archetypal deep structure of the hero-quest; reasonably varied on the level of the motifs that concretize that structure; but very similar again on the levels of the actions available to the player. For instance, *Doom*, Harry Potter and *Morrowind* create vastly different storyworlds, but the actions available to the player are virtually the same: fighting, moving, dodging and renewing one’s health in order to fight more, and solving puzzles to gain access to new spaces within the gameworld. In these games, the user’s actions connect the various points on the trajectory of the story in all-too-predictable fashion, rather than making a significant contribution to the development of narrative meaning. Games won’t be playing for the sake of the story until they introduce actions that engage the player in strategic relations with other characters and require a construction of the character

mind: actions such as asking for help, forming alliances, betraying, deceiving, pulling the other way, breaking up with, threatening, flattering, seeking revenge, promising and breaking promises, convincing or dissuading. For what is narrative, if not the evolution of a network of relations between intelligent agents?

Level 4. Real time story generation

On level 4, stories are not pre-determined, but rather, generated on the fly out of context. It comes in part from the system, and in part from the user. Every run of the program should result in a different story, and the program should therefore be replayable. To date, this day, we do not really have a story-generating system sufficiently sophisticated to produce a wide variety of interesting stories out of data internal to the system. In fact, the user's input in the generating process only raises the difficulty to a higher power.

What makes the project appear so daunting is the utopian model proposed by Janet Murray in her book *Hamlet on the Holodeck*. This title refers to a technology that exists only in science fiction. The Holodeck is a VR installation in the TV series *Star Trek: Voyager* that provides rest and entertainment to the crew of the starship Voyager. In the Holodeck, a computer runs a three-dimensional simulation of a fictional world, and the interaction becomes in make-believe a character in a digital novel. The plot of this novel is generated live, through the interaction between the human participant and the computer-generated virtual characters. The technical and phenomenological characteristics of the Holodeck are as follows:

1. The user acts in the virtual world through language and gestures. He has total freedom of behavior.
2. Characters are driven by AI modules and respond intelligently to the user's actions.
3. Each different action of the user creates a different response from the system and consequently generates a different story. The system is able to construct an infinite number of appropriate responses.
4. The Holodeck creates three forms of immersion: spatial (thanks to the 3D environment), temporal (the action takes place in real time), and emotional (the user deeply cares for his avatar).

Needless to say, most of the features of the Holodeck are way beyond the capabilities of current AI and VR systems. But the most problematic aspect of the Holodeck—of any system of interactive narrative-- is logical and artistic rather than technological. How can the freedom of the user be reconciled with the need to produce a well-formed, aesthetically satisfactory story? VR researchers Ruth Aylett and Sandy Louchart refer to this problem as the "narrative paradox": "On one hand the author seeks control over the direction of a narrative in order to give it a satisfactory structure. On the other hand the participating user demands the autonomy to act and react without explicit authorial constraint."

Another way to formulate the paradox is in terms of the discrepancy between the

authors and the goals of people engaged in living their own life. This discrepancy captured by the formula: "Life is lived looking forwards, but it is told looking back." When we live our life we ask: what action can I take to solve my problems and reach a more satisfactory state of affairs in the future? But when we tell a story, we start from a situation that we find interesting, and we ask: what course of events led to this situation? The visitors of an interactive narrative system play the role of a character in a virtual world, and they adopt the forward-looking perspective of life. When we are faced with a problem in real life, we want to resolve it as quickly and as efficiently as possible. The author who creates a story is more interested in actions that produce opportunities for interesting plot developments than in efficient problem solving.

A particularly telling example of the conflict between character goals and authorial goals is the fairytale *Little Red Riding Hood*. When the hungry wolf meets the little girl in the forest, why doesn't he eat her on the spot, rather than waiting until she reaches the house of her grandmother? He is taking the risk that Little Red Riding Hood will never find the house, or that another wolf will eat her in the meantime. But from the perspective of the storyteller, the plan of the wolf is infinitely superior to the practical solution, because it prepares the highly dramatic episode of the wolf tricking the girl by taking the place of the grandmother in bed and the climactic event of their confrontation.

Little Red Riding Hood is not a very promising scheme for interactive narrative, but the other options that offer themselves to the wolf or to the little girl are vastly inferior in terms of dramatic interest and tellability to the actual tale. The most sophisticated VR technology will not help conquer the inner layer of the onion if designers do not come up with stories that truly benefit from active user participation. Aristotle has written the rules for traditional drama, but there is to this day no poetics and no set of guidelines for interactive drama.

From a programming point of view, the major problem to be resolved on the inner layer of the onion is to find a reasonably satisfactory compromise between a top-down design that reflects author's goals and guarantees proper narrative form, and a bottom-up emergent design that simulates life by generating events chronologically, as the user experiences them. (There doesn't seem to be room for discourse effects such as flashbacks and flash forward on the inner layer of the onion.) The proven algorithm for top-down generation is an adaptation of Chomsky's generative grammar. Chomsky-style grammars are able to generate the syntactic structure of all the sentences in a given language by means of a finite collection of rewrite rules that create a tree-shaped diagram. The basic rewrite rule of Chomsky's grammar takes the form

$S = NP + VP$

Each symbol on the right is then expanded through a rewrite rule in which the symbol appears on the left. For instance, VP can be rewritten by the rules:

VP= V

VP=V+ NP

VP=V+NP+PP The choice of rule will consequently produce different types of sentence. The process of rewriting is repeated recursively until the grammar reaches the level of terminal, non-rewritable symbols. In language generation, these terminal symbols correspond to the actual words of the sentence. When words are inserted at the end of branches, semantic rules take over to prevent the generation of syntactically well-formed but non-sense, such as Chomsky's famous example "Colorless green ideas sleep furiously."

In a narrative application of the grammar, the top rules may read:

Story=Beginning +Middle+ End

Beginning=Exposition

Middle=Complication + Crisis

End=Resolution of crisis + Epilogue

The product would be a strictly author-controlled Aristotelian plot, though I don't know how we could rewrite the rules below "complication," "crisis" and "resolution" to balance both narrative coherence and narrative diversity. It would probably be necessary to introduce additional conditions on the choice of re-write rules, and these conditions would transform the grammar from context-free to context sensitive. (Note that a story produced in such a way would be read left to right, on the level of the terminal nodes, in contrast to the story-trees discussed above, where the story is read along the descending branches.) Chomsky-type grammars have been occasionally used for the computer generation of texts, for instance in Jean-Pierre Balpe's novel *Trajectoires*, but these are not interactive, and they do not offer a great deal of narrative variety, because they prescribe the development of the plot very narrowly.

Figure 6. Rules for a bottom-along narrative system

A bottom-up system, by contrast, would start from the detailed description of the state of a world and of its characters, specifying their desires, their fears, their dislikes, etc. The database of the system would consist of a very large number of rules made up of three components: a set of prerequisites, specifying under which conditions—in what state of the world—the rule can apply; an “event” part, describing what happens in the storyworld when the rule is chosen; and a “consequences” part, which would describe the changes in the world effected by the application of the rule. (See figure 6 for some examples of rules.) The application of a rule would lead to a new state of the storyworld, and another group of rules would become applicable. The system’s selection of one or many applicable rules in a given state would generate different sequences of events, and consequently, different stories. Thanks to the prerequisites, the selection of rules would always respect logical coherence. In such a system, the generation and presentation of the story would follow the chronological order of its events and reflect the temporal experience of the characters. It would be, in a full sense, a forward-looking simulation of life.

This type of system could be made interactive by handing over some decisions to the user. The user and the system could take turns generating events, and the story would be the product of their collaboration. The balance of control could be adjusted by giving more turns to the user or to the system. From a narrative point of view, the main drawback of this approach is its lack of teleology. Since both the system and the

produce events in response to the current state, the storyworld will evolve somewhat randomly, rather than striving toward a global narrative pattern.

A compromise between the two modes of generation could be achieved by making the system consult global templates before deciding which rule to implement. The top-down system could for instance tell the system that after a certain number of events it is time to introduce some surprise, or to conclude the story. The system would then have to evaluate each rule with respect to two criteria: (1) how well it fits with respect to the current situation; and (2) how well it satisfies the top-down requirements. This is easier said than done because it doubles the task of the system. Imagine for instance our top-down template tells the system: now generate a surprising action, a sudden change of events. We cannot tag the rules in the database as inherently “surprising” or “story turn producing”, because these effects depend on the context. It would consequently require a fairly complicated process of evaluation to decide which events, in the current situation, will produce the desired narrative effect.

Yet despite the difficulties of combining top-down guidance with bottom-level simulation, many designers believe that without the former, interactive narrative systems would put an excessive burden on the user. The systems must be *authored*, and should respond to affordances built into the virtual world and programmed into the system, rather than being entirely responsible for the construction of the story. Most of us prefer writing plays and novels to watching and reading them; by the same reasoning, most users of interactive narrative systems prefer being invited into a story rather than having to create it from ground zero. Nicolas Szilas, developer of the system IdTea, advocates for instance a module he calls the “Virtual Narrator,” whose function is to guarantee “storiness” by selecting rules and events on the basis of their effect on the story rather than (exclusively?) on the basis of the behavior of characters. (“A New Approach to Interactive Narrative”) Aylett and Louchart believe that narrativity in VR systems should “emerge directly from the interactions between the protagonists,” rather than from a scripted plot, but they recommend a “drama manager” function, inspired by the “game master” of RPGs, who monitors the story through indirect communication with the players, such as sending non-playing characters in the player’s way to influence their decisions (“The Emergent Narrative”).

Figure 7. Screenshot from *Façade* by Michael Mateas and Andrew Stern

All this explains why there aren't many systems in existence that both generate stories the fly, and allow active user participation. Here I would like to discuss two projects that represent the state of the art in interactive narrativity, and illustrate widely different design philosophies. My first example, *Façade* by Michael Mateas and Andrew Stern is a project in interactive drama that combines the top-down and the bottom up approaches. *Façade* is designed for a short, but intense fifteen minute experience, rather than extended sessions that players devote to their favorite on-line role-playing games. The authors believe that the best way to fill the short duration of the drama is through condensed action that follows an Aristotelian pattern of exposition, complication, and resolution. Here is how Mateas and Stern describe the plot:

In *Façade*, you, the player, play the character of a long-time friend of Grace and Trip, an attractive and materially successful couple in their early thirties. During an evening spent together at their apartment that quickly turns ugly, you become entangled in the conflict dissolution of Grace and Trip's marriage. No one is safe as the accusations on both sides are taken and irreversible decisions are forced to be made. By the end of this one-act play you will have changed the course of Grace and Trip's lives—motivat

to replay the drama to find out how your interaction could make things turn out differently the next time. (Mateas and Stern online, 2)

The user interacts with the characters by typing text, and the characters respond with spoken dialogue. Since the spoken dialogue must be entirely pre-recorded, the narrative is assembled during run-time out of fairly large units of text, and the combination of these units does not allow a great deal of variation. The user hears about 30% of the available dialogue during each run, and after five or six runs, the database is exhausted. All variants follow the same global pattern:

Exposition: Grace and Trip welcome the visitor to their apartment, and engage in a talk with their guest.

Crisis: The small talk degenerates into an argument between Grace and Trip that reveals the disastrous state of their marriage.

Denouement: The visitor is asked to leave.

Whether or not replaying the drama affects the course of Grace's and Trip's lives—as the authors intend—is a matter of interpretation, rather than a matter of generating significantly different sequences of event. In all versions the couple fights bitterly, and the only open question is the survival of their marriage: in some runs the user leaves with the impression that Grace and Trip will stay together despite the disastrous state of their marriage, because fighting is essential to their relations, while in other runs, they leave the apartment convinced that Grace and Trip will break up, because the events brought to light deep resentments that the dysfunctional couple had denied until now. But these variations are subtle and very subjective.

The natural language interface represents an elegant way to participate in the action, as it gives an unlimited freedom of expression to the user, but the drawback of this approach is the parser's inability to process more than a small proportion of the user's input. In a natural language-understanding system, a large number of possible user actions must be mapped onto a small number of different system options, and many of these options are not logically compatible with the user's input. For every situation, the system maintains a list of "discourse acts" that represent appropriate conversational responses: acts such as agree, disagree, thank, criticize, hug, comfort, or judge. For instance if Grace asks "How are you," and the user replies "I feel terrible" the system understands that the user expressed unhappiness, and it will make Grace respond with a sad expression. When the user types "I fell great," Grace will respond with a smile. (Unfortunately, when you type "I feel terrific," she understands "terrible," and she frowns.) When the system cannot understand the user's input, it simply ignores it, and it selects from its database a response that may or may not make sense in the current situation.

But the frequent incoherence of the dialogue does not lead to a serious loss of credibility because it can be explained by the self-centered personalities of Grace and Trip. As the conversation turns into a domestic fight, it is not too surprising that Grace and Trip increasingly ignore the visitor. With its theme of marital feud, *Façade* is very successful.

minimizing the limitations of its AI module. Grace and Trip control the flow of the conversation, and the user's contribution to the development of the action is largely limited to answering questions. For instance, she can say "you" or "Trip" when Grace is responsible for the deterioration of the marriage. Her response will influence the development of the dialogue, but she cannot predict in which way. By making Grace and Trip run the show, and by limiting the user to a marginal role, *Façade* is able to generate dialogue sequences on the fly, while remaining in control of the general direction of the plot. A "drama manager" ensures that each successive dialogue unit (called by the designers) increases the tension of the previous unit, until a climax is reached; at this point the drama manager switches to units that decrease tension and lead to the resolution (Crawford 319). In its combination of top-down design and bottom-up user input, *Façade* heavily favors the top-down direction. The user can say whatever she wants, and sometimes Grace and Trip will listen to her, but she has next to no active (but not mean calculated) influence on the narrative arc.

A totally different design is found in the computer game *The Sims*, perhaps the most powerful interactive narrative system in existence today, at least for those who do not insist on Aristotelian form and narrative closure. *The Sims*, as most readers already know, is a life simulation game in which the user creates a family, and controls the behavior of its members. Since the player holds the strings of many family members, she does not identify with a specific character. Her participation in the gameworld is consequently ontological but external. Thematically patterned after the TV soap opera, *The Sims* is played on a PC, and it is designed for lengthy playing sessions that create never-ending stories. The principal mode of interaction is the selection of items from a menu. For instance, if the user is currently controlling Jim, and if she mouses over Nina, a menu will appear that shows a list of behaviors that Jim can adopt toward Nina: flirt, kiss, argue, or to have a baby. Or if she mouses over the TV set, the menu will offer the choice of having Jim exercise (good for his athletic shape) or having him watching a soap opera (good for his mood). While menus are a far more restrictive, and far less immersive mode of participation than natural language, they present the significant advantage of allowing a coherent response of the system for every choice of the user. As for the characters, they talk to each other in a gibberish that leaves the content of their exchanges to the user's imagination. In the latest version of the game, they can also talk about specific topics, though visual icons.

The generative algorithm of *The Sims* operates from a strictly bottom-up (or more precisely, bottom-along) perspective. When the user selects an action, the system computes its consequences and updates the current state of the gameworld, opening up a new set of possible actions. The system also plays the role of blind fate, by occasionally throwing in random events, such as a burglar stealing objects from the house, neighbors dropping by unexpectedly, the house catching fire, or Death taking a character away, even when the system takes a turn at implementing events, it does not operate on the basis of narrative templates. The game simulates the randomness of life, rather than the teleology of narrative. But in life as in stories, people must learn to deal with the randomness of fate, and this is why *The Sims* is both a believable simulation of life and a powerful

story-generating system.

The implicit goal of the game is to make the Sims climb the social ladder by acquiring more and more commodities, but the player must also take care of the daily needs of the characters, such as hunger, rest, bladder, entertainment and social life. It can be argued that because of the importance of these daily needs, *The Sims* is more a game of management than a narrative system. *The Sims 2*, which appeared in 2004, tries to enhance the narrative interest of the game by placing a greater emphasis on interpersonal relations and on the mental life of characters. The Sims now have memories, fears, and personalized life goals (“aspirations”), but except for the aspirations, which are set by the player at character creation time out of a fixed menu, these aspects of mental life are all determined by the system. The player may not be able to specify the contents of a character’s mind, but she can take physical actions that lead to certain mental and emotional states, or that implant certain memories. For instance, kissing or arguing has obvious effects on the degree of love of the patient for the agent. In other words, the player cannot make Nina develop a sudden crush on Jim—she must patiently build up this love, by having Jim take appropriate actions toward Nina. Through this indirect control of minds, the player can spice up the biographies of their characters with stock emotions like love, hate, betrayal and jealousy—the proper stuff of soap operas.

It is ultimately the limited control of the player that makes the game narratively rewarding. When the player performs an action, he has a goal in mind, otherwise the action would not be meaningful, but he cannot predict the result with absolute certainty, and he is not aware of all the consequences. (Similarly, in life, our actions can have unintended produce undesirable side-effects). Let’s say that Jim wants to kiss Nina. The panel that shows his inner life tells us that his greatest fear is to be rejected by Nina. Ninety percent of the time Nina will be pleased and accept the kiss, and the love-quotient of Nina and of Jim for Nina will be increased, but perhaps ten percent of the time the system will implement the rejection. There is consequently a little bit of risk and of suspense at the time the user selects the “kiss” option on the menu. This combination of anticipation of result and uncertainty of outcome is essential to the narrative interest of an action in a game, to the strategic interest of a move in a game.

The Sims is not only a system for creating lifestories, it is also a narrative space rich with backstories that influence the destinies of the characters controlled by the user. The user-created stories are enacted in the mimetic mode of animated movies, through the movements and gestures of characters on the screen, the backstories are revealed to the user in the diegetic mode of written narrative. At the beginning of the game, the player chooses a setting between three neighborhoods: Pleasantview, Strangetown and Veronaville. By clicking on a button, she gets a text that reveals the past history of the neighborhood and of its inhabitants:

Veronaville

Two houses, alike in dignity...

The Capps and Montys have been feuding for years, but that hasn’t stopped the young

generation from crossing boundaries and falling in love. Will their actions lead to bring the families together?

Patrizio Monty never forgot Consort Capp's broken promise. But his grandson Romeo has fallen for the Capp heiress.

Will the Elders live to see the two families united?

Juliette Capp has fallen for Romeo, golden child of the rival Monty clan.

Can the Capps set aside their grudges and put Juliette's happiness first?

The Summerdreams' kindly nature and zest for life have cast a romantic spell over Veronaville's youth.

But will there be any magic left for Puck ?

Players can either create their own family from scratch, writing the biography of members in a book, or they can adopt one of the existing families, together with history. Here for instance is the history of one of the branches of the Montys:

Recently widowed, Antonio must either give up his job at the family restaurant and savings to raise his twins Beatrice and Benedick, or hire help and keep the job he lost. What will be his role in the family feud that have cost him his wife ?

By browsing through Antonio's memories, the user can also reconstruct his biography: meeting his wife, Hero; kissing her for the first time; getting engaged and married; the birth of the twins; teaching them to walk; the death of Hero and of other members of the Monty family. If the user decides to adopt Antonio and his family, she will have to continue this storyline. On the other hand, if she create a new family from scratch, the Montys may drop by their house and become secondary characters, bringing the system-created personal histories and personalities into the developing story.

Another form of system-created narrative lies in the hidden plot possibilities that the user activates unknowingly by selecting certain actions, or that the system initiates by implementing random events. In one of the most exotic of these pre-scripted mini-stories, male characters are abducted by space aliens and return pregnant with a monstrous hybrid. The pleasure of the game lies as much in discovering the possibilities embedded into the system as in managing the life of the Sims family members according to the goals set for them by the player. Here is an example of the kind of narrative that the user can produce by activating the narrative affordances inherent to the gameworld:

The Noovorich family started from nothing, but now they live in a large mansion. The family is slightly dysfunctional—father Paul has his eyes on Jenni, one of the Boob sisters who lives across the street, mother Linda is a frustrated novelist, and Britney, the daughter, has become known to skip school in order to go shopping at the Community Ground, where she spends inordinate amounts of the family money. Paul sells all of her clothes to pay the mortgage bills, and Britney is quite mad at her dad. One day the Noovorich house is robbed, and the burglar, Chris, is arrested. As the police car is about to take him to jail, Britney opens the back door and he escapes. He now becomes a regular guest in the Noovorich house.

Britney seduces Chris and she becomes pregnant. Chris moves in with the Noovoric when the baby is born, the house becomes overcrowded. Exasperated with the situation Linda decides to move out. This is just what Paul wanted—he invites the Boob sister party, hoping to start something with Jenni. Meanwhile, Britney fails to take proper care of her baby, and the social worker places the baby in a foster home. (To be continued indefinitely.)

Not a literary masterpiece, admittedly, though no worse than TV soap opera. (But a deceptive comparison, because soap operas, being human-generated, are capable of greater complexity and variation). What my summary leaves out, however, is the actions which must be performed to keep the Sims alive between the highlights of the plot. As Chris Crawford writes:

Players of *The Sims* guide their characters in going to the bathroom, taking showers, preparing and eating meals, cleaning the dishes, taking out the garbage, cleaning, sleeping, and earning a living. This is not drama; this is a housekeeping simulation. Hitchcock once described drama as 'life with the dull bits cut out.' *The Sims* is life with the dramatic bits removed. (143).

Crawford makes an important point about the difference between raw life and its narrative shaping, but he underestimates the potential of *The Sims* for dramatic (rather, melodramatic) events. For those who want to play the game for the sake of stories, the main problem with the current version is that it tries to be three different things at the same time: resource management game, construction game (the user builds fancy houses for his family), and story-generating system. The game will not improve its narrative appeal until it downplays the simulation of everyday life, and offers richer possibilities of interaction between the characters. What the system most needs is a way to compress and expand time, so that the Sims can spend less time washing dishes, and more time building the networks of interpersonal relations that produce dramatic situations.

In the final analysis, the prospects for interactivity on the inner layer of the onion are as bleak as Crawford suggests, because the thrill of being in a virtual world and of interacting with it, or, in the case of *The Sims*, of discovering its affordances, relieves of the burden that falls upon narrative aesthetics. As Kelso et al. have argued, a plot seems trivial when watched by a spectator may become exciting when experienced by an interactor. The good news is that we may not need characters as complex as Hamlet, dialogue as witty as Jane Austen's, or a plot as thrilling as *The Da Vinci Code* to enjoy active participation in a fictional world. In an interactive setting, narrative follows different aesthetics rules than in literature, and these rules are slowly being discovered through trial and error in projects like *Façade* or *The Sims*.

Meta-interactivity.

In addition to the four layers of interactivity internal to the onion, I would like to

mention a fifth type of user involvement: meta-interactivity. On this level, the user is not consuming the onion, but rather, preparing new ways to cook it for other users, such as designing a new level for a computer game, creating new costumes for the avatar, or introducing new objects, associating existent objects with new behaviors, and generally expanding the possibilities of action offered by the storyworld. To constitute a genuine “meta” interactivity, this must be done by writing code and patching up the source code rather than by using tools internal to the game, such as the house-building mod for *The Sims*. It is on this level that the idea of the user as co-author becomes more than a hyperbolic cliché, but the two roles do not merge, since users cannot simultaneously immerse themselves in a storyworld and write the code that brings this world to life.

The inner layers of the onion are much harder to conquer than the outer layers, but one should not confuse problem-solving difficulty with aesthetic value. There is a tendency in digital culture to evaluate a work as a feat of programming virtuosity. I call this the WYSIGYG aesthetics, because you have to imagine the code that lies behind the work to appreciate the text. By these standards, a work of level 4 is automatically superior to a work of level 1, regardless of its narrative quality, because it requires much more original coding. If we applied the same aesthetics to print literature, a palindromic story or a novel written without the letter “e” (such as Georges Perec’s *La disparition*) would automatically represent a greater artwork than a novel like Marcel Proust’s *recherche du temps perdu*, which was written without stringent formal constraint (but certainly not without form). Another aesthetic criterion popular in digital culture that favors the works of the inner layer is the idea of emergence and self-renewability. A game can be replayed half a dozen times with different results, and *The Sims* virtually encourages infinite replay, while the texts of level 3 will rarely be replayed once the game has been beaten. And even if it is possible to fiddle for a long time with a hypertext of level 2 like *afternoon*, the texts of level 1 quickly yield all of their substance. But for the reader who truly cares for the quality of an interactive work that produces a relatively fixed plot but gives intense pleasure in its unique run is not inherently inferior to a system that creates a wide variety of possible stories. I am not saying that diversity of output does not contribute positively to aesthetic value, but rather, that a work can compensate for lack of replayability with other qualities. There are consequently good and bad solutions, success and failure, entertainment and boredom on all the layers of the interactive onion.

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[Return](#)