

ALAS, POOR YORICK! I KNEW HIM, HORATIO FELLOW OF INFINITE JEST, OF MOST EXCELLENT FAME. HE HAD BORNE ME ON HIS BACK A THOUSAND TIMES, AND NOW, HOW ABHORRED IN MY IMAGINATION,

Chapter 7

The Cyberbard and the Multiform Plot

A plot is . . . a narrative of events, the emphasis falling on causality. "The king died and then the queen died" is a story. "The king died and then the queen died of grief" is a plot.

—E. M. Forster, *Aspects of the Novel*

What will it take for authors to create rich and satisfying stories that exploit the characteristic properties of digital environments and deliver the aesthetic pleasures the new medium seems to promise us? We would have to find some way to allow them to write procedurally; to anticipate all the twists of the kaleidoscope, all the actions of the interactor; and to specify not just the events of the plot but also the rules by which those events would occur. Writers would need a concrete way to structure a coherent story not as a single sequence of events but as a multiform plot open to the collaborative participation of the interactor. At first this kaleidoscopic composition seems like a violent break with tradition, but when we look at how stories have historically developed, we find techniques

of pattern and variation that seem very suggestive for computer-based narrative.

From the nineteenth century on, there has been considerable interest in the striking similarities found between stories from vastly different cultures. Carl Jung hypothesized that these similarities offer proof of a collective unconscious, a set of archetypal tales (the journey, the quest, the rebirth) and archetypal figures (the hero, the trickster, the earth mother) that together define what it is to be human. Some have argued that all of the world's great wisdom stories express the same religious and psychological truths and therefore are just variant versions of a single tale. Joseph Campbell, one of the most passionate and eloquent proponents of the unity of human narrative traditions, saw in stories as diverse as those of Prometheus and Buddha a single "monomyth" about a "hero with a thousand faces" who sets off from the common world, encounters fantastic dangers, and returns to bestow gifts on his society.¹ Although such totalizing views of human culture have fallen out of fashion, the enduring appeal of mythic patterns is indisputable. We have only to look at George Lucas's ubiquitous Star Wars series (which was directly inspired by Campbell's research) to see that age-old story epic formulas remain compelling even in our postmodern and antiheroic era.

But it is not only folktales and adventure stories that have formulaic patterns. Many narrative theorists and writers have insisted that there are a limited number of plots in the world, corresponding to the basic patterns of desire, fulfillment, and loss in human life. Rudyard Kipling counted sixty-nine basic plots, and Borges thought that there were less than a dozen. Ronald B. Tobias, in one of the more competent of the many guidebooks for writers, suggests there are twenty "master plots" in all of literature. Here is his list:²

- Quest
- Adventure
- Pursuit
- Rescue

- Escape
- Revenge
- The Riddle
- Rivalry
- Underdog
- Temptation
- Metamorphosis
- Transformation
- Maturation
- Love
- Forbidden Love
- Sacrifice
- Discovery
- Wretched Excess
- Ascension
- Descension

One would be hard put to name any story that did not belong, at least in part, to one of these categories, whether it is *The Incredible Hulk* (metamorphosis), *King Lear* (descension), or *Seinfeld* (refused maturation). The patterns are constant because human experience is constant, and though cultural differences may inflect these patterns differently from one place to another and one historical period to another, the basic events out of which we tell stories are the same for all of us.

The formulaic nature of storytelling makes it particularly appropriate for the computer, which is made for modeling and reproducing patterns of all sorts. But no one would want to hear a story that was a mere mechanical shuffling of patterns. How do we tell the computer which to use and how to use them? How can the author retain control over the story yet still offer interactors the freedom of action, the sense of agency, that makes electronic engagement so pleasurable? To answer these questions we have to look back to an earlier storytelling technology, the community of oral bards.

The Oral Bard as a Storytelling System

We now know that densely plotted, encyclopedic works like the *Iliad* and the *Odyssey* were produced not by a single creative genius but by the collective effort of an oral storytelling culture that employed a highly formulaic narrative system. From the Renaissance through the beginning of the twentieth century, Homer was considered to be a great *writer*, rather than a preliterate singer, and his epics were taken as the height of Western literature. It was therefore disconcerting when the Harvard classicist Milman Parry and his student, Alfred Lord, documented the similarities between the Homeric poems and those they heard performed by oral bards still active in Yugoslavia earlier in this century. Lord's book, *The Singer of Tales*, published in 1960, describes the actual composition and performance process of the bards and argues from internal evidence that Homer's poems are the result of similar methods.

Oral story composition, as Lord describes it, relies on what we in a literate era devalue as repetition, redundancy, and cliché, devices for patterning language into units that make it easier for bards to memorize and recall. The stories are composed anew for each recitation and are therefore multiform, with no single canonical version. Every performance of a story varies from all others, reflecting the interests of the audience and the dramatic interpretation of the storyteller. Lord's research gives us a detailed picture of these multiform stories and how they achieved a coherency of plot across many varied tellings.³

The bardic tradition is a set of formulas within formulas, starting at the level of the phrase and moving through the organization of the story as a whole. Singers of tales had a repertoire of formulaic ways to describe common people, things, and events, descriptions that could be rearranged and plugged into a template of the chanted line in a way that made for pleasurable variation within an overall pattern of regular rhythms and sounds. Major characters were associated with familiar epithets that helped recall them to the audience and fill out the poetic line: for instance, Homer could refer to Zeus as "the coun-

selor" or "son of Chronos" or "the cloud-gatherer." Lord discovered that a hero might have one typical epithet when invoked in the beginning of a line and another one more commonly used after the caesura in the middle of the line. The appellation would therefore have less to do with how the hero was behaving at a particular moment in the narrative than with where his name fell in the rhythm.

Lord refers to the bard's stock of variant phrases as a "substitution system." This is similar to the Mad Libs parlor game, where a paragraph is given with words missing and players are asked to contribute words based on syntactic or category descriptions (a noun, a body part, a furry animal, etc.) with hilarious results. Early attempts at computer-based literature tried to use similar methods of simple substitution, with equally incongruous results. For instance, here are two of the millions of possible stories based on a language substitution system devised by the French experimental writer Raymond Queneau:

A Story As You Like It, version #1:

Do you wish to hear the story of the three big skinny beanpoles?
The three big beanpoles were watching them.

A Story As You Like It, version #2:

Do you wish to hear the story of the three middling mediocre bushes?

The three middling mediocre bushes were watching them.

Seeing themselves voyeurized in this fashion, the three alert peas, who were very modest, fled.⁴

Although such compositions are provocative as artifacts that play with the theoretical concepts of literature, machines, and originality, no one would read such stories for the sheer pleasure of it. But Web surfers can now visit many entertaining sites where they can generate endless parodies of corporate home pages, candidate's speeches, and even love letters by using substitution programs stocked with the appropriate buzzwords. These pages provide the same pleasure as

ELIZA (see chapter 3); they use the rote utterances of the machine to expose the meaninglessness of such formulaic writing.

But even if a verbal substitution system cannot by itself produce satisfying and coherent digital narratives, it is a useful model for establishing the "primitives" or basic building blocks of a story construction system. In computer programming systems the "primitives" are the smallest components (such as simple arithmetical calculations) upon which the larger operations (such as complex calculus functions) are built. In an interactive narrative the key primitives are the actions of the interactors themselves, as structured by the author. Currently, the most complex sets of primitives are the icon palettes in puzzle games, which contain items like a magnifying glass, a set of objects picked up on the way (tools, treasure, food), communications devices, a way to select who should be speaking or acting, and perhaps an icon for a hand or a foot to allow the interactor to pick things up or move around. Such a palette constitutes an iconographic substitution system, since the interactor can substitute one tool for another, or one item for another as the object of the tool, in order to build up more complex possibilities of action, in the same way that the epic singer could substitute phrases in making up his poetic line.

In order for the medium to mature, storytellers will have to develop more expressive primitives, simple actions that will allow ever-subtler input by the interactor. For instance, game designers have already progressed from an interface that requires the user to type "go north" or even "n" to one that allows users to point and click in three-dimensional space, which changes the interaction from a command structure to a dramatic gesture. The easier these primitives are to learn and the less they call attention to the computer itself—that is, the more transparent they are—the deeper our immersion and the stronger our sense of dramatic enactment. Today's interaction conventions are equivalent to the invention of a few useful epithets for the gods and heroes, basic tools that every storyteller needs but not enough to get you very far with a particular tale.

One of the chief stumbling blocks to mature digital storytelling is

the difficulty of establishing expressive conventions for the interactor's use of language. If we give the interactor complete freedom to improvise, we lose control of the plot. But if we ask the interactor to pick from a menu of things to say, we limit agency and remind them of the fourth wall. Some CD-ROM stories give the interactor the task of deciding the mood or tone of a spoken response rather than picking a statement from a list of possible things to say. This is a more promising route because it seems less mechanical, although the mood selector is often a menu or slider bar that is outside the frame of the story. A more immersive set of primitives might be applied to character gesture. Gestures like placing a hand on the shoulder of another character, making a fist, raising both hands with palms turned up in exasperation—these could become part of an emotional repertoire similar to the supply of epithets used by the bards. Alternately, interactors could be given a limited vocabulary of separate words or perhaps preformed phrases, like the bardic epithets, that could be assembled in many different ways. Such an artificial interface would work best if it is motivated by the situation, as, for example, in a visit to another country or in a conversation in restricted circumstances where things have to be said according to a strict protocol or secret code. But whether a writer creates the set of primitives out of gestures or phrases or a combination of the two, the challenge will be to make them as transparently expressive of emotion and intention as joystick fighting and link-navigation are in the current environment.

The next level of patterning after the stock phrase in the bardic storytelling method is what Lord refers to as the theme, that is, a generic narrative unit that can be fit into multiple narratives, a unit such as the departure of a hero, the catalog of ships, the dressing of a hero for battle, the boast of a hero before battle, and the death of a hero. The theme functions like a scene in a play or a chapter in a book. This is the key unit of segmentation that the poet focused on when memorizing a new story from the recital of another bard. Like the folksinger who concentrates on the chord sequence: 'the general rhyme scheme of the verses rather than on the exact words of a

newly acquired song, the bardic performer did not think about line accuracy but focused instead on reproducing the order of the component themes. With no system of writing or recording with which to compare two renditions, bardic performers repeated the poem with perhaps only 70 percent accuracy of words but with exactly the same order of themes.

The plot events in electronic games and MUDs closely resemble these epic themes, because they draw their material from genres like fantasy, science fiction, and comic book heroics that are very close to the folktale tradition. The more filmic CD-ROMs rely on later formulaic genres such as the murder mystery or the horror film. Genre fiction is appropriate for electronic narrative because it scripts the interactor. When I begin a CD-ROM murder mystery, I know I am supposed to question all the characters I meet about what they were doing at the time of the murder and keep track of all the suspects' alibis. I will use whatever primitives I am given (navigation through the space, conducting an interview, picking up pieces of evidence and looking at them under a microscope, etc.) for enacting these pre-scripted scenes. In a Western adventure I can be counted on to try to shoot at the bad guys, and in a horror story I will always enter the haunted house. I perform these actions not because I have read a rule book but because I have been prepared to do so by exposure to thousands of stories that follow these patterns.

A mature narrative tradition will take advantage of this common base of formulas to refine the scripts, to offer the interactor a richer range of behaviors. For instance, since within the conventions of a mystery story it is already customary to send the detective to a mystery bar, CD-ROMs already include bars and the interrogation of bartenders. A refinement of this convention might mean offering well-lit booths and dark corners for the detective to choose from. A well-lit table might be safer in a confrontation, whereas a dark corner might invite more revealing disclosures. Or we might discover in a more domestic story that bringing breakfast to a lover or a box of crayons to a

child will deepen a relationship and move the plot forward. Patterned activities like these could grow into new thematic units (like making friends or winning trust or showing loyalty) in new genres of electronic stories that focus on textured relationships rather than on puzzle solving and gunfights.

At the highest level of organization, Lord's bardic singers assembled their thematic units into plots. One very common pattern for the Yugoslavian poets was the story of the hero's return, which exhibited both constant and variable elements. The most constant part of the story was the return itself, which always included thematic units detailing disguise, deception, and recognition. Usually the return was preceded by an account of the hero's release from prison and was followed by an account of his return to prison to rescue someone else; often it included a recollection of a much earlier event in which the hero was summoned to war on his wedding day. The wedding story might be told as the beginning of the whole tale or just as a flashback from later events. Sometimes the prison part of the story did not end in the hero's release but in a refusal of release, followed by rescue of the hero by someone else. Sometimes the rescue tale elements were rearranged into a story of a bride being rescued from the enemy.

Lord realized that all the stories that center on rescue and release intertwined with marriage and battle were "basically one song" with many different plot possibilities. Both listeners and performers were constantly aware of other narrative possibilities growing out of the same thematic elements. Therefore, whenever the singer reached a thematic event that belonged to multiple story patterns, he would be "drawn in one direction or another" by "similarities with related groups" of songs:

The intensity of that pull may differ from performance to performance, but it is always there and the singer always relives that tense moment. Even though the pattern of the song he intends to sing is set early in the performance, forces moving in other directions will still be

felt at critical junctures, simply because the theme involved can lead in more than one path.⁵

The singer's "tense moment" is a consciousness of a branching point in the formulaic composition process. Lord points out that the *Odyssey*, which is a similar "return" story, includes significant vestigial elements of another potential plot—in which Telemachus starts to set off to rescue his father—showing that Homer also felt this pull. Although the written tradition is based on a fixed set of events, the oral tradition is much more "fluid" and is based on what Lord calls a multiform story.

Unlike the oral poet, we are not accustomed to thinking in terms of fluidity [of text]. We find it difficult to grasp something that is multiform. It seems to us necessary to construct an ideal text or to seek an original, and we remain dissatisfied with an ever-changing phenomenon. I believe that once we know the facts of oral composition we must cease trying to find an original of any traditional song. From one point of view each performance is an original. From another point of view it is impossible to retrace the work of generations of singers to that moment when some singer first sang a particular song.⁶

cyberspace

The bardic system is fundamentally conservative; it serves to transmit a fixed story from teller to teller and from generation to generation. But what it conserves is not a single particular performance but the underlying patterns from which the bards can create multiple varied performances. Their success in combining the satisfactions of a coherent plot with the pleasures of endless variation is therefore a provocative model of what we might hope to achieve in cyberspace. To do so we must reconceptualize authorship, in the same way Lord did, and think of it not as the inscribing of a fixed written text but as the invention and arrangement of the expressive patterns that constitute a multiform story.

Vladimir Propp and the Bardic Algorithm

Oral composition can even provide us with a specific algorithm for producing multiform stories. Around the same time that Milman Parry first began to notice the oral character of Greek epic, the Russian formalist Vladimir Propp set out to analyze a body of Russian oral narrative in order to arrive at a "morphology of the folktale." He was quite successful in his efforts at reducing a seeming "labyrinth of the tale's multiformity" to an "amazing uniformity." The set of 450 fairy tales Propp studied, though very different from one another on the surface, resolved themselves into variants of a single core tale composed of twenty-five basic "functions," or plot events, which we can think of as Propp's essential morphemes.⁷ (Propp gave each of these morphemes its own symbol, which appears in parentheses to the left of each example below.)

After a brief introductory section (with its own distinctive morphemes, including the following: a family member absents himself from home, an interdiction is violated, a villain attempts reconnaissance, the hero is deceived, and so on), the first element of the story is one of these:

- (A) The villain causes harm or injury to a member of the family (nineteen variants ranging from threats to abduction and murder).
- (a) One member of the family either lacks something or desires something.

These elements are familiar to us from other fairy tales, even if we have never heard the Russian ones Propp studied. Here are some of the key story elements and their symbols:

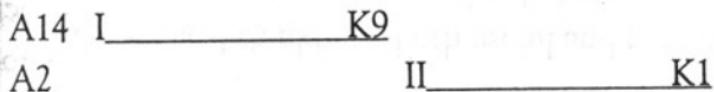
- (↑) The hero leaves home.
- (D) The hero is tested (ten variants ranging from quests for help to challenges to fight).

- (F) The hero acquires a magical agent (a magic hen, a magic horse, magic foods, etc.).
- (H) The hero and the villain join in direct combat.
- (I) The hero defeats the villain.
- (J) The hero is branded.
- (K) The initial misfortune or lack is "liquidated," or resolved (eleven variants).
- (L) A false hero presents unfounded claims.
- (M) The hero is given a difficult task.
- (N) The hero successfully performs the task.
- (↓) The hero returns.
- (Ex) The false hero is exposed.
- (U) The villain is punished.
- (W) The hero is married and ascends the throne.

In addition to identifying the elements, Propp tried to establish the rules by which these morphemes are combined. He found that many morphemes came in related pairs, for example, the establishment of a misfortune/lack and its liquidation, the pursuit of the hero and his rescue, the introduction of a false hero and his exposure. Propp also noticed that the order of the elements in a story seems to be constant, even though any particular version of the story might lack some of the elements. For instance, the test of the hero always occurs after he leaves home and before he acquires the magical agent. In a particular version of the story, the test might be left out, but it would not be transposed. Like a cook who analyzes a dish to understand how it was prepared, Vladimir Propp has arrived at a recipe for the Russian folktale.

More than that, Propp's analysis makes clear that the formulaic underpinning makes folktales more intricate; it allows storytellers to weave together multiple different story sequences without becoming confused. For instance, a hero might receive more than one magical gift in the course of a story, a variation that would require a repetition of the elements that cluster around the gift pattern; or a second hero

could be introduced to go on his own quest, forming a second story sequence that would be embedded within the first. Propp's abstract notation allowed him to chart such complex story structures. For instance, here is his representation of a story that grows out of two acts of villainy, each of which is resolved separately:



Here the villain commits abduction (A2) and murder (A14). The first part of the plot resolves the murder by reviving the dead person (K9). The second part of the plot resolves the abduction when the hero completes a search by an act of cleverness (K1). Propp's notation also reveals some of the rules for creating more divergent variants while still keeping the same basic story line. For instance, he noticed that the "struggle/victor" pattern (elements H-I) could be substituted for a "difficult tasks" pattern (M-N). When he finished analyzing all the extant tales, Propp was able to summarize all the variants of the Russian folktale in one inclusive representation. His work suggests that satisfying stories can be generated by substituting and rearranging formulaic units according to rules as precise as a mathematical formula.⁸

The Computer as Storyteller

Propp's algorithm is much more complex than most electronic games currently on the market but considerably less complex than current attempts to model stories in computer science laboratories.

The story line in most gaming software can be described in terms of two or three morphemes (fight bad guy, solve puzzle, die). MUDs also rely on the repetition of a narrow set of plot actions, often limited to combat, negotiation and ceremonial events. Indeed, the lack of plot progression in MUDs is an advantage, since a limited repertoire of stereotyped activities makes for more easily sustained role-playing. Adventure and puzzle games usually provide only one route through

various game levels, which results in a very linear story despite the high degree of participation activity. Games that do offer choice-points leading to variant plot events are usually constructed with only shallow detours off the main spine of the plot. This is because even a story of less than a dozen branch points, with only two choices at each branching, would require hundreds of endings. Any branching story interesting enough to sustain our attention would therefore be too dense and confusing to write, since writers would have to work their way down each branch separately.⁹

not H

Games that do provide narrative variety often do so through a simple substitution system. Just as one "magic helper" can replace another in a Russian fairy tale, so too can one hero replace another in a fighting game, often changing the emotional tone along with the joystick moves. But games do not allow substitution of thematic plot elements (e.g., a heroic labor instead of a struggle with a villain) the way fairy tales do. Games are limited to very rigid plotlines because they do not have an abstract representation of the story structure that would allow them to distinguish between a particular instantiation and a generic morpheme. That is, "level two" of a fighting game always refers to the same configuration, not to a set of rules by which it can be constructed. A morphological approach (a generic "level two") would require more ambitious programming but it would offer much greater plot variation; it would give the writer the power to tell the system how to generate variants without having to make each possible version individually.

Several kinds of abstract schema have been proposed by computer scientists as ways of representing stories, many of them based on a model of story structure grounded in cognitive theory. Most of these systems, however, have an unnervingly reductive quality to the humanist. For instance, Patrick Winston's analogy-making program Macbeth summarizes the plot like this:

This is a story about Macbeth, Lady Macbeth, Duncan, and Macduff. Macb. is an evil noble. Lady Macbeth is a greedy, ambitious

woman. Duncan is a king. Macduff is a noble. Lady Macbeth persuades Macbeth to want to be king because she is greedy. She is able to influence him because he is married to her and because he is weak. Macbeth murders Duncan with a knife. Macbeth murders Duncan because Macbeth wants to be king and because Macbeth is evil. Lady Macbeth kills herself. Macduff is angry. He kills Macbeth because Macbeth murdered Duncan and because Macduff is loyal to Duncan.¹⁰

This summary certainly fits Forster's definition of a plot as "a narrative of events, the emphasis falling on causality," but it is a sledgehammer causality that few literary critics or psychologists would accept because of its disturbing flattening of motivation. Of course, Winston is not trying to understand the play as a literary critic or a psychologist or to be moved by it as a member of the audience. He wants to use it as a pattern from which to predict behavior in similar situations, as a way of mimicking human reasoning by analogy in complex situations. For instance, here is a story that Winston's system finds analogous to Macbeth:

This is a story about Linda and Dick. Linda is a woman and Dick is a man. Dick is married to Linda. Dick is weak because he is drained. He is drained because Linda is domineering.¹¹

Stereotypical thinking is both useful and pernicious. It is useful because it is a form of abstraction that helps us to organize information. It is pernicious because it distorts the world and can make it hard to see things individually. I had always felt that Lord's Serbo-Croatian bards were a wonderful cultural treasure until I reread his account after the recent war in the region and was chilled to come upon his matter-of-fact mention of the "willing" abduction of women from the enemy as just another variant of the rescue theme. It is important to remember that any abstract story system ultimately refers to the sorrows and pleasures of human life and that the story of a... event de-

pends heavily on who is doing the telling. A storytelling system that further calcifies the distortions of stereotypical thinking would be as destructive as the most bigoted and bloodthirsty bard. We humans already do enough mechanical thinking without enlisting machines to help us.

Furthermore, stories told from an abstract representation of narrative patterns but without a writer's relish for specific material can be incoherent. Here, for instance, is a computer-generated fable based on a representation of a plot as the solving of a problem or the attainment of a goal:

Joe Bear was hungry. He asked Irving Bird where some honey was. Irving refused to tell him, so Joe offered to bring him a worm if he'd tell him where some honey was. Irving agreed. But Joe didn't know where any worms were, so he asked Irving, who refused to say. So Joe offered to bring him a worm if he'd tell him where a worm was. Irving agreed. But Joe didn't know where any worms were, so he asked Irving, who refused to say. So Joe offered to bring him a worm if he'd tell him where a worm was. . . .¹²

The program goes into a loop because it does not know enough about the world to give Joe Bear any better alternatives. The plot structure is too abstract to limit Joe Bear's actions to sequences that make sense.

Several ambitious proposals have been made to ensure coherence in computer-generated narrative by creating plot controllers capable of making intelligent decisions about narrative syntax on the basis of aesthetic values. Brenda Laurel, who sees the computer as an inherently theatrical environment, has proposed an interactive fiction system presided over by a playwright who would shape the experience into the rising and falling arc of classical drama.¹³ Marie-Laure Ryan has proposed a story-generation system, derived from narratology theories, that would shape satisfying tales exhibiting symmetry, sus-

pense, and repetition.¹⁴ The challenge of all such ambitious schemes is in giving the computer enough knowledge of the story elements to decide what constitutes an Aristotelian recognition scene or a suspense-generating event.

One way of avoiding the arduous task of teaching the computer to understand the world well enough to make such aesthetic judgments is to code very specific story elements in terms of their dramatic function. Michael Lebowitz has created a storytelling system along these lines with morphemic segments derived from the staples of daytime soap opera stories, namely, amnesia, murder threats, forced marriages, and adultery. In Lebowitz's Universe system, the automated author is assigned goals, and the system then looks for fragments that will achieve those goals.¹⁵ For instance, one commonly invoked goal is "keeping lovers apart," which could be satisfied by "lover drafted by the army" and "get partner involved with someone else." Like a soap opera author, the program tries to maximize plot fragments so that they serve the purposes of multiple stories. Here is an example of a story sequence generated with this program:

Liz was married to Tony. Neither loved the other, and, indeed, Liz was in love with Neil. However, unknown to either Tony or Neil, Stephano, Tony's father, who wanted Liz to produce a grandson for him, threatened Liz that if she left Tony he would kill Neil. Liz told Neil that she did not love him, that she was still in love with Tony, and that he should forget about her. Eventually, Neil was convinced and he married Marie. Later, when Liz was finally free from Tony (because Stephano had died), Neil was not free to marry her and their trouble went on.¹⁶

Why is the story of Liz and Tony so much more engaging and coherent than the story of Joe Bear? Both are formulaic and machine generated, but Universe starts off with story fragments that are much closer to a writerly source and with a much more particularized repre-

sentation of a plot. But Universe is also a limited model, since it does not provide for a participatory narrative or for a plot that comes to an end.

In fact, very few efforts have yet been made to create a system that accommodates both interactivity and directed plot. Although Brenda Laurel has been urging the development of such systems since the 1980s, they have received very little attention so far, perhaps because they would require closer collaboration between writers and computer scientists than has been possible up to now. The most promising work in this area has been done by the Oz group, at Carnegie Mellon University, led by Joseph Bates. The Oz group is attempting to create a system that a writer could use to tell stories that would include an interactor, a story world with its own objects, computer-based characters who act autonomously, and a story controller that would shape the experience from the perspective of the interactor.

The Oz group has modeled this system as a live-action theater game in which an interactor is placed in a threatening situation in a bus station.¹⁷ Acting students improvised the parts of the computer-based characters, receiving instructions through headsets from an off-stage director who watched the action closely and set off events at appropriate times. The climax of the story is the moment in which the interactor is offered a gun and must choose whether to use it to protect a blind man from a thug, or to escape onto a departing bus. To an observer of the experiment (which was captured on videotape), the action seems painfully slow and the climactic moment rather chaotic. But to the interactor the scene was quite gripping; the offer of the gun was a difficult moral choice, a self-defining moment, because it seemed to be happening in real time. The work of the Oz group suggests that plot satisfaction in an interactive environment is very different from plot satisfaction in an audience situation. In order to ensure the appropriate dramatic pacing, we may need to develop story controllers that monitor all the elements of the environment, adjusting a fictional world with the same precision and forethought as a chess master choosing among complex strategies.

The complexity of pattern manipulation made possible by the computer seems to be pushing stories into the realm of higher degrees of abstraction and variation. But in pursuing complexity and abstraction, we run the risk of incoherence. Since the success of any abstract representation of plot will depend on how much control remains in the hands of the human author, we may find that less computational abstraction will produce more satisfying stories. Or we may discover new abstraction models that are closer to the way writers like to make up stories than the models that have arisen so far from the collaboration between cognitive theorists and computer scientists.

The Shaping Role of the Human Storyteller

Of course, the pleasure of storytelling lies not in the raw formulas but in the particularizing details. No one would curl up at night with a tale made out of a recitation of Propp's abstract morphemes. But, as my Russian-born students regularly remind me, the fairy tales Propp is talking about are beloved childhood memories, part of a rich culture of stories that are savored and delighted in to this day. We can glimpse what is so appealing about them in Propp's lists of variants and subvariants. For instance, here are some of the ways in which the morpheme of "the rescue of the hero" appears in the tales themselves:¹⁸

1. The hero is carried away through the air (e.g., fleeing at the speed of lightning, riding away on a flying horse, flying away on the back of a goose).
2. The hero flees, placing obstacles in the path of his pursuer (e.g., a human hero throws a brush, a comb, a towel, which turn into mountains, forests, lakes, or a superhuman hero tears up mountains and oak trees, placing them in the path of a she-dragon).
3. The hero, while in flight, changes into objects that make him unrecognizable (e.g., a princess turns herself and the prince into a well and dipper, a church and priest).

It is only when we read these enticing specifics that we feel the enchantment of the stories. We do not want to read about a generic Joe Bear even in a fable; we want to read about characters who have assimilated details that are vividly imagined and specific to their stories.

For this we need the shaping presence of an author.

A story is an act of interpretation of the world, rooted in the particular perceptions and feelings of the writer. There is no mechanical way to substitute for this and no reason to want to do so. Our question instead should be, How can we make this powerful new medium for multiform narrative as expressive of the writer's voice as is the printed page? The answer is in coming up with strategies for giving the author direct control over all the many levels of artistic choice. The author must be able to specify all the elements of the abstract structure: the primitives of participation (how an interactor moves, acts, converses); the segmentation of the story into themes or morphemes (the kinds of encounters, challenges, etc., that make up the building blocks of the story); and the rules for assembling the plot (when events happen and to whom). The author must also be able to control the particulars of the story: all the substitution elements (instances of character types, dangers, rewards, places, travel experience, etc.) and all the ways in which each instance will vary. (Can we have a violent confrontation in a scene that includes the hero's mother? What kind of house will each of the possible villains live in?) We have only begun to think about how a writer would go about creating a story world out of such elaborate patterned elements.

Suppose we were to make a "cyberdrama" set in 1940s Casablanca, not an interactive version of the movie but a new narrative experience that uses some of the familiar adventure genre motifs that the movie employs so powerfully. The object would be to offer the interactor an opportunity to have many different adventures, by assuming the role of several distinct characters, all of whom are pursuing their own destinies in the French-controlled colonial city during World War II. We could begin by building a representation of the city itself as an immersive environment, including several nightclubs, with ille-

gal gambling in a back room and a private office for the manager; some seedy hotels with dingy guest rooms; and an outdoor market with vendors' stalls. We might also create taxicabs, a bank, some private homes, and other sites not seen in the movie but necessary to sustain a sense of a real place. In our ideal system we would invent abstract representations of all of these spatial story elements, but we would only create specific ones each time we ran the story. We would also establish some unchanging venues, such as a police station and an airport and perhaps a particular café called Rick's. For the purposes of our new story, however, Rick might be out of town. Or perhaps we would show the events of the movie happening in the background. The familiar events could serve as a kind of timekeeper for the unfolding of each new story and would also make the fictional world more externally defined and therefore more likely to evoke our immersive trance.

We would then have to establish clear primitives of participation. For example, the interactor would be able to buy food and drink, walk and take taxis, touch things and people, and engage in dialogue. We would have some particularly important decisions to make in determining how to use language. There would be a trade-off between the variability of the plot and the extensiveness of the dialogue, since we will want to specify the dialogue separately for every possible interaction. If some of the dialogue is in text (words on the screen rather than prerecorded audio), we would have more freedom to vary it for each separate story, since we could assemble combinations on the fly and without having to record each possible combination in advance with the right dramatic inflection. But even if we could find a way to extend the computer-based character's dialogue, we would still have to limit the interactor's input so we could maintain control of the story. Perhaps we would make the interactor's character a non-English speaker and supply the character with a fixed vocabulary (perhaps in the form of a phrase book), which would require us to anticipate all possible utterances. Since the film has established the improbable premise that everyone is speaking English and since it

contains characters who are using such a phrase book, this might feel dramatically appropriate.

We would then decide on the thematic units or morphemes of the story. Among the most likely would be: arrival in Casablanca (or establishment of story role if the character is a long-term resident), offer of letters of transit, offer of sexual encounter, meeting with the SS, offer of resistance activities, discovery of letters of transit, bargaining for letters of transit, decision between two lovers, confrontation with French police, evasion of the SS, and act of political resistance. These events would be built up from the basic formulaic elements of touching, taking, moving, speaking, and so on, and they would fit together in a prespecified, multiform way, like events in a Russian fairy tale, to form a number of coherent plots. We might want to include multiple confrontations with the French police and the SS for every character and to make sure these happen very early in the narrative experience to motivate the protagonist's need to leave and to resolve the situation. We might also want to introduce the former lover very early in the story, but we would not want every story to take the same shape. Instead, we would always include some summons to a secret meeting. Sometimes this summons would come in a note and sometimes in a phone call or a whispered word on the street. The meeting would always involve someone with whom the protagonist has an ambivalent relationship, not just a former lover but also, perhaps, an old friend who once acted in a crisis, a brother or sister who once betrayed a confidence, or a former enemy who is now fighting for a cause the protagonist believes in. Providing such characters to interact with the protagonist in the secret meeting would reflect our interpretation of the heart of the Casablanca story as the tension between ambivalent intimate relationships and larger moral imperatives.

In setting up the plot we would have to decide on what kind of ending stories would have in this world. Since the danger of Casablanca is not merely death but corruption, the story choices should lead to consequences that are serious on many levels. Some

choices might lead to death, but the death might be noble and satisfying if it entails opposition to the Nazis. Other choices might lead to escape at the cost of moral degradation. For instance, if you, as interactor, were to betray a character like Victor, it might not lead to suicide (because suicide would violate the interactor's sense of agency) but it could lead to the Ilse character finding out and leaving you. Or, in a less gamelike ending you could find yourself sitting at a table with a newspaper report of the death lying in front of you next to a bottle and glass. You would be able to pour the liquor and raise the glass but not get up from the table. This enforced immobility would suggest the despair of a person about to drink himself to death.

The more freedom the interactor feels, the more powerful the sense of plot. Since plot is a function of causality, it is crucial to reinforce the sense that the interactor's choices have led to the events of the story. It is common to talk about the physics of a simulated world, that is, the way visual objects move, whether there are two or three dimensions in the underlying representation, whether there is gravity, friction, and so on. Stories have to have an equivalent "moral physics," which indicates what consequences attach to actions, who is rewarded, who is punished, how fair the world is. By moral physics I mean not only right and wrong but also what kinds of stories make sense in this world, how bad a loss characters are allowed to suffer, and what weight is attached to those losses. In the game world the moral physics is very slight; there are no real choices between good and evil and no consequences to the horrific violence displayed. In a story the moral physics must be more substantial and lifelike. We may be satisfied with stories in which luck is against us if they make sense in the imaginative world. For example, if we are being chased down by Nazis in Casablanca, we may not necessarily expect to survive. The stories in which characters are unsuccessful will add resonance to the ones in which they are.

By generating multiple stories that look very different on the surface but that derive from the same underlying moral physics, an author-directed cyberdrama could offer an encyclopedic fictional-

world whose possibilities would only be exhausted at the point of the interactor's saturation with the core conflict.¹⁹ The plots would have coherence not from the artificial intelligence of the machine but from the conscious selection, juxtaposition, and arrangement of elements by the author for whom the procedural power of the computer makes it merely a new kind of performance instrument.

The Coming Cyberbard

The narrative invention and story coordination necessary for creating a cyberdrama would be considerable but it might be no more daunting than writing a serial Victorian novel or serving for several seasons as head writer of a multithreaded television drama—provided that computer scientists come up with the appropriate authoring tools. Since the writer's task is analogous to composing a multi-instrument musical performance, what is needed is a system for specifying story motifs that is as precise as musical notation and that works something like the packages now available for arranging music, that is, by letting the author specify one part at a time and then try out the combinations and make appropriate adjustments. We are a long way from having such a tool right now, but we are beginning to see some glimmers of how it might be constructed.

One way of giving the author control over both the abstract and the particular elements is to describe all the story elements as a system of interconnected "frames." The frame is a powerful conceptual format of the digital representation of qualitative information. It was first proposed by Marvin Minsky, the influential and controversial pioneer of artificial intelligence whose career has been devoted to representing human consciousness in terms of computational structures.²⁰ Minsky envisions human memory as a set of frames, each of which has "slots" or "terminals" in it. We can think of these frames as multisided blocks with Lego-like connectors of various shapes and sizes. Some of the information stored in the terminals would be specific instances of the item for which the frame is a pure

abstraction, a kind of platonic ideal. For instance, "Grauman's Chinese Theater" would be stored as the specific instance of a movie palace of the 1930s, and "Roy Rogers" would be stored as an instance of "singing cowboy." Other slots would accommodate attributes of the item or procedures for using it, any of which might be a frame in itself. So one slot of the "movie palace" frame might be "glamorous features," which in the case of Grauman's Chinese Theater would include "handprints of the stars in concrete outside." The "singing cowboy" frame might include a slot for a theme song like "Happy Trails" and one for Roy's horse Trigger.

A frame is a good way for specifying formulaic structures, like a hero and his attributes, or elements of a murder mystery. It is also a good way of transcending rote formulas, since it allows multiple particularized representations of the same object or event. For instance, we might have a "toaster frame" in our heads with entries for different toasters we are accustomed to using and for their way of operating and peculiarities. Some of the things we do with toasters (like putting slices of bread into them) might derive from our general "toaster frame" information, and some, like not using bagels with the narrow-opening toaster at our aunt's house, might be specific to individual toasters, part of the quirky specifics of life that give stories authenticity. An advantage of frames is that we can always create a new instance when we meet a new item in the original category (another movie palace or another toaster). We can also subsume frames under other categories (e.g., movie theaters under entertainment venues and toasters under appliances), and we can share information in different frames by sharing terminals (e.g., we can understand that, despite their differences, a nineteenth-century opera house has cultural uses in common with Loew's Paradise movie house in the Bronx and that a toaster oven has things in common with a pop-up toaster).

We can give an item in a frame a state (the theater is open or closed, the toaster is working or broken) and make decisions based on that state without having to respecify everything we know about the general category and the particular object in order to make that

hard liquor while twirling his six-shooter might become involved in a *Gunsmoke*-style fight that would end in a citizen's death and the escape of the killer, whom the marshal would then be asked to track down. A player who dressed up fancy and sat down to gamble might experience a comic saloon fight and many opportunities to outsmart the aggressor and avoid a fight. A player who started with target practice and stopped outside the saloon to help an old man cross the street might be offered a saloon fight in which no one would get hurt but the villains could be subdued by trick shooting. All of these scenes would have common elements—bad guy, citizen, insult, challenge—from the generic Western fight frame.

A frame-based authoring system would allow a writer to enter each element in its generic and particular forms and would keep track of the connections between them, for example, which kinds of characters fit into which kinds of events. It would allow the writer to cycle through the possible plot possibilities, eliminating many of them and specifying appropriate choices or priorities for situations where the story pulls in multiple directions. The off-the-shelf elements would provide most of the story for a purely formulaic writer, but they would provide only the palette for a more inventive one. As in any genre, the more original the writer the more she would have to invent her own elements and the more actively she would inflect the conventional formulas. What the computer would provide would be a means for using formulaic patterning, in much the same way the oral bards did, as a system for assembling multiform plots. The electronic system might be able to generate more variants than the author could ever read in a lifetime (let alone write individually), but since she would have specified all the important details and all the rules of variation, the computer would be merely the instrument of the author, an extension of her memory and narrating voice.

Digital plot making, like other aspects of the medium, is still in an incunabular stage. The technological resources of the gamemakers are directed toward rapidly transforming visuals rather than expressive storytelling. The self-conscious webs of the postmodernists and

the link-happy exhibitionism of the Web soaps send us hopping from screen to screen in search of a coherent story. The more filmic CD-ROMs offer more extended story segments but embed them in a shallow branching structure that frustrates our desire for participation and agency. The MUDs offer extensive opportunities for participation in formulaic narrative environments, but the collectively generated stories are diffuse and repetitive. None of these formats puts the processing power of the computer directly into the hands of the writer. The experiments of the computer lab point to the possibility of much more powerful narrative tools, but they are still very remote from the storyteller's desire to simply enchant us or to grab us by the collar and tell us something more real than reality. Only when these disparate efforts begin to converge will the medium come into its own as an expressive art form. It seems to me quite possible that a future digital Homer will arise who combines literary ambition, a connection with a wide audience, and computational expertise. But for now we have to listen very, very carefully to hear, amid the cacophony of cyberspace, the first fumbling chords of the awakening bard.