

Cyberdrama

Janet Murray, who coined the term *cyberdrama*, uses it to discuss a new type of storytelling — and a new type of story — that she sees emerging as the computer becomes an expressive medium. Cyberdrama appears to tell the story of our lives now, much as the novel emerged to tell the story of a previous culture and time. As Murray writes, the term emphasizes as well “the enactment of the story in the particular fictional space of the computer.” Inevitably the term also turns our attention toward those (“dramatic”) new media artifacts that resemble theater, cinema, or television — as we were similarly directed by the title of Murray’s seminal *Hamlet on the Holodeck* (1997).

Murray’s *Hamlet* followed Brenda Laurel’s *Computers as Theatre*, which had, six years earlier, made dramatic experience a central topic of discussion in the new media community. Laurel’s book was itself picking up themes from her 1986 Ph.D. thesis, which focused on forms of interactive, first person, computer-enabled storytelling. In both works Laurel offered Aristotelian dramatic experience as the model toward which designers of interactive computer experiences should aspire.

It is generally agreed that cyberdrama must give human participants an experience of *agency*. Usually this has meant that the participant’s actions have an appropriate and understandable impact on the world the computer presents to them (though the term is given a somewhat different spin by Ken Perlin in his essay included here). Other goals defined by Murray include *immersion* and *transformation*. To achieve these goals through a combination of experience design, computer graphics, and artificial intelligence — especially in a form reminiscent of interactive Shakespearian tragedy — has become a sort of “holy grail” for cyberdrama.

There are profound difficulties in achieving these goals, but the three authors presented here continue to work actively on the design and development of cyberdramatic experiences. They persevere, perhaps, because they and many others believe that a large number of new media’s most successful creations (*Zork*, *Myst*, *Everquest*, *The Sims*) incline toward cyberdrama. Perhaps also because cyberdrama exists as a powerful force of imagination (on- or off-board the *Enterprise*) even if it has not yet been fully realized.

The essayists in this section are theorist-practitioners of cyberdrama, and each addresses a major question for cyberdramatists (also a primary theme of this volume): Is there a game-story? Many in the new media field see cyberdrama as an attempt to marry the structures of games and stories — and many of cyberdrama’s harshest critiques come from those who believe this to be impossible. The first essay here is from Murray herself, who postulates that the “game-story” question is fundamentally misformulated. Ken Perlin follows, who finds engaging characters to be the element missing from even the most successful game-story examples to date. Finally, Michael Mateas offers what may be the “unified field theory” of Laurel’s and Murray’s work: giving a definition of neo-Aristotelian interactive drama, as well as describing the project he and Andrew Stern are creating through its guidance — a project that may allow them finally to take hold of cyberdrama’s grail.

From Game-Story to Cyberdrama

Janet Murray

Is there a game-story? I think this is the wrong question, though an inevitable one for this moment.

In our discussion here, *game-story* means the story-rich new gaming formats that are proliferating in digital formats: the hero-driven video game, the atmospheric first person shooter, the genre-focused role-playing game, the character-focused simulation. All of these are certainly more storylike than, say, checkers. But, as Celia Pearce has pointed out, not more storylike than chess or Monopoly. Games are always stories, even abstract games such as checkers or *Tetris*, which are about winning and losing, casting the player as the opponent-battling or environment-battling hero.

But why are we particularly drawn to discussion of digital games in terms of story? And why is so much storytelling going on in electronic games? First of all, the digital medium is well-suited to gaming because it is procedural (generating behavior based on rules) and participatory (allowing the player as well as creator move things around). This makes for a lot of gaming. Secondly, it is a medium that includes still images,

moving images, text, audio, three-dimensional, navigable space — more of the building blocks of storytelling than any single medium has ever offered us. So gamemakers can include more of these elements in the game world.

Furthermore, games and stories have in common two important structures, and so resemble one another whenever they emphasize these structures. The first structure is the contest, the meeting of opponents in pursuit of mutually exclusive aims. This is a structure of human experience, of course, from parenting to courtship to war, and as a cognitive structure it may have evolved as a survival mechanism in the original struggle of predator and prey in the primeval world. Games take this form, enacting this core experience; stories dramatize and narrate this experience. Most stories and most games include some element of the contest between protagonist and antagonist.

The second structure is the puzzle, which can also be seen as a contest between the reader/player and the author/game-designer. In a puzzle story, the challenge is to the mind, and the pacing is often one of open-ended rearranging rather than turn-based moves. Mystery stories are puzzles, and are often evaluated as games in terms of how challenging and fairly constructed they are. In fact, it makes as much sense to talk about the puzzle-contest (Scrabble) as it does to

Response by Bryan Loyall

In her essay, Janet Murray paints a compelling landscape of the varied forms of cyberdrama and presents criteria for their creation. Especially interesting to me is the *replay story*, and its ability to draw attention to the ramifications of the stream of choices each of us takes for granted each day.

One property of Murray's three main examples is that the participant is consciously aware of the story and actively manipulating it. These forms give powerful ways to tell new types of stories, but for me, one of the joys of a story is when I forget about it being a story. I am simply there. The experience is dense and powerful, and I like the characters, or hate the characters, or am disturbed by them.

I would like to extend Murray's landscape with

another form that has this property, and, following her lead, then suggest criteria to guide its creation.

The form I would like to add is one that combines the high interactivity and immersion of many computer games with the strong story and characters of traditional linear stories. Viewers can enter a simulated world with rich interactive characters, be substantially free to continuously do whatever they want, and yet still experience the powerful dramatic story that the author intended. My colleagues and I at Zoesis Studios and the Carnegie Mellon Oz Project call this form *interactive drama*, and we have been working to create it since the late 1980s.

Some have argued that this combination is impossible. As Murray points out, there are those who say that games and stories are opposed, and what

talk about the story-game. Most stories and most games, electronic or otherwise, include some contest elements and some puzzle elements. So perhaps the question should be, is there a story-game? Which comes first, the story or the game? For me, it is always the story that comes first, because storytelling is a core human activity, one we take into every medium of expression, from the oral-formulaic to the digital multimedia.

Stories and games are also both distanced from the real world, although they often include activities that are done “for real” in other domains. The stock market, for example is a betting game, but real world resources are exchanged and people’s out-of-game or out-of-trading-floor lives are profoundly changed by events taking place there. Baseball, on the other hand, is run as a business and has economic and emotional impact on the lives of the players and observers, but the hits-and-misses on the field are in themselves only game moves. Similarly, a dramatization of a murder may be problematic in many ways to a community, but it does not directly result in anyone’s death. A story is also different from a report of an event, though we are increasingly aware of how much about an event is invented or constructed by the teller, even when the intention is to be purely factual. Stories and games are like one another in their insularity from the real world,

makes a good story makes a bad game and vice versa. Yet, we and others working to create interactive drama think this combination is possible. As evidence for our position let me describe a working implementation. (An interesting side note pointed out by this implementation is that interactive drama does not require computers to exist.)

Imagine collecting an acting company whose sole job is to allow a single person to participate in an interactive drama. The actors each have a role to play, and the author writes a story that places the participant directly in the center of the action. The director is able to communicate privately to the actors through radio headsets. The director’s job is to watch the flow of action, particularly what the participant does as the central character, and give direction to the

the world of verifiable events and survival-related consequences.

In a postmodern world, however, everyday experience has come to seem increasingly gamelike, and we are aware of the constructed nature of all our narratives. The ordinary categories of experience, such as parent, child, lover, employer, or friend, have come to be described as “roles” and are readily deconstructed into their culturally invented components. Therefore the union of game and story is a vibrant space, open to exploration by high and low culture, and in sustained and incidental engagements by all of us as we negotiate the shifting social arrangements of the global community and the shifting scientific understandings of our inner landscape. The human brain, the map of the earth, the protocols of human relationships, are all elements in an improvised collective story-game, an aggregation of overlapping, conflicting, constantly morphing structures that make up the rules by which we act and interpret our experiences.

We need a new medium to express this story, to practice playing this new game, and we have found it in the computer. The digital medium is the appropriate locus for enacting and exploring the contests and puzzles of the new global community and the postmodern inner life. As I argued in *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (1997),

actors to subtly guide the flow of activity toward the author’s story.

Interactive dramas such as this have been created. One of best-documented versions gave the participant the experience of witnessing the evolution of a mugging, having the power to stop it, and facing the continually arising questions of how to react in such a situation as it unfolds (Kelso, Weyhrauch, and Bates 1993).

One obvious problem with this implementation, though, is that not everyone can afford their own dedicated acting troupe. The main advantage that computers give us, once we learn how to make simulated interactive characters and interactive directors for specific stories, is the ability to distribute interactive dramas widely, and thereby encourage their

we can see a new kind of storytelling emerging to match the need for expressing our life in the twenty-first century. The first signs of this new storytelling are in the linear media, which seem to be outgrowing the strictures of the novel and movie in the same way that we might imagine a painting outgrowing the frame and morphing into a three-dimensional sculpture. Stories like Borges' "The Garden of Forking Paths" (1962) and films like *Groundhog Day* (1993) are harbingers of the emerging new story form. The term "story-game" is similar to the term "photoplay" that was used of early movies, as if the new format were merely the addition of photography to theater. We need a different term and a different take on the emerging form, one that recognizes it as moving beyond the additive into a shape unique to its medium. Neal Stephenson, in his science fiction novel *The Diamond Age* (1995), proposes the term "ractive," which is a contraction of "interactive." In *Hamlet on the Holodeck*, I reluctantly coined the term *cyberdrama*, emphasizing the enactment of the story in the particular fictional space of the computer. Espen Aarseth (1997) uses the term "ergodic literature," which he defines as "open, dynamic texts where the reader must perform specific actions to generate a literary sequence, which may vary for every reading." Some such term is needed to mark the change we are experiencing, the invention of a new genre

creation. (Computers also allow for a wider range of worlds and characters, but this is secondary to the practical enablement of the form in the first place.)



1.response.1. *OttoAndIris.com*.(Zoesis)

altogether, which is narrative in shape and that includes elements we associate with games.

The forms of cyberdrama that I described in *Hamlet on the Holodeck* have proliferated since the book was published in 1997. Role-playing games have blossomed into a new genre, the Massively Multiplayer Online Role-Playing Game, starting with *Ultima Online* (1997), reaching a usership of over 400,000 with *Everquest* (1999), and perhaps reaching over a million with *Star Wars Galaxies*, which as of this writing is planned for release in the summer of 2003. Interactive characters have also become wildly popular, starting with the Tamagotchi, which came out in the United States at the same time as my book, and moving to the current most popular game in digital form, Will Wright's imaginative *The Sims* (2000), which is like a novel-generating system. If there is to be a Charles Dickens or Charlotte Brontë of the digital medium, then Will Wright is surely one of his or her key antecedents. In *The Sims*, Wright has created a multivariant world of rich events and complex character interactions that is open to endless exploration and extension. *The Sims* embodies an ambivalent vision of consumerism and suburban life inside a structure that seems simply to celebrate it. It engages players in building up households in a fictional world that has its own momentum and generates its own plot events. Duplicitous neighbors and morbid

We believe widely distributable interactive drama will become a reality, and as it does it will be important to find criteria to guide the work of creators. I would like to describe some of the criteria we have used while trying to create interactive drama, focusing on criteria that illuminate relations to traditional games and stories.

Murray suggests agency as a criterion for all forms of cyberdrama, and it is central to effective interactive dramas as well. It is a core part of the freedom I mentioned earlier — and, like game designers, we focus our interactive dramas on the participant's constraints and options to help enable agency.

Another important property for interactive drama that comes from its definition is one Murray mentions in her book: immersion. Two related criteria apply to

clowns come to visit and destroy the happiness of the household. The time clock pushes relentlessly forward, with every day a workday, with carpools to meet and chores to do for those at home. The world of *The Sims* has its own moral physics: education leads to job success; a bigger house means more friends; too many possessions lead to exhausting labor; neglect of a pet can lead to the death of a child. The losses in *The Sims* are oddly poignant, with neighbors joining in the prolonged and repeated mourning process. Looking back one hundred years from now, *The Sims* may be seen as the breakthrough text of cyberdrama, just as *Don Quixote* (1605) was for the novel or *The Great Train Robbery* (1905) was for the movies.

The Sims offers strong evidence that a new genre title is needed and it persuades me that “cyberdrama” is probably the best one currently proposed. *The Sims* is neither game nor story. It is a simulation world driven by a new kind of synthetic actor, an actor authored by Will Wright, but also (in the case of the protagonists) instantiated by the interactor who sets the parameters of the character’s personality. The actions of the world are also a collaborative improvisation, partly generated by the author’s coding and partly triggered by the actions the interactor takes within the mechanical world. It is a kind of Rube Goldberg machine in which a whimsical but compelling chain of events can move in

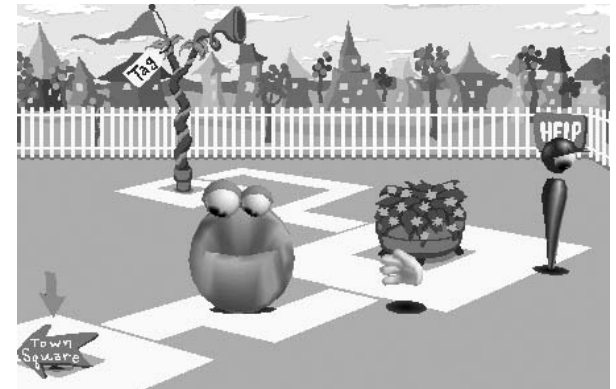
many ways. The story of *The Sims* is the collective story of all its many instantiations, and users share their events in comic strip “albums” — screenshots with captions that narrate the events of the simulated world. They also trade characters and will soon be able to send their characters on dates together. It is a simulation, a story world, opening the possibility of a *David Copperfield* or *Middlemarch* or *War and Peace* emerging some day, built around other compelling experiences of the global community: not just consumerism in the suburbs, but survival struggles among the underclass of the industrialized nations or postcolonial or ethnically divided countries.

Another community of practice that has grown since 1997 is in the domain of interactive video. As television and computing converge, there are increasing experiments in interactive storytelling, including several prototypes sponsored by the Corporation for Public Broadcasting, or emerging from the Hollywood-based Enhanced TV Workshop of the American Film Institute (which has convened yearly since 1998), or from the Habitat program of the Canadian Film Centre. Of course, our assumptions about the hardware for delivering interactive video have also changed significantly since 1997, and the situation is far from resolved. In spring 2001 there were fewer than five million homes in the United States with set-top boxes,

the characters. For immersion to take place, the characters in the world need to seem real to the participant. This means that they need to be believable enough that the participant cares about them (whether that caring is liking them, hating them or being disturbed by them). Further, we have found that they need to be real enough that the participant respects them. If the participant feels that she can do whatever she wants to the characters (as though they are toys to be played with), then the stakes of the experience and the ability of the characters to seem alive are both weakened.

Our most recent system, *OttoAndIris.com*, is an attempt to create a world that has these properties (see figures 1.response.1–4). It is a playful space that one can enter to play games with two characters, Otto and

Iris. Otto and Iris treat you as an equal, as one of them. Even though you are special in the sense that the whole experience is for you as the participant, the characters



1.response.2. *OttoAndIris.com*. (Zoesis)

but as many as sixty million homes in which the television and the computer were in the same room.

Ford Motor Company sponsored a set of interactive commercials in Spring 2000 in which viewers contributed dialog suggestions and voted on branching choices for a four-episode story broadcast live within a single hour of prime-time network television. In the first episode a couple (chosen from among several possible characters over the internet) leave on a blind date for the surprising destination of the laundromat. The audience is invited to submit a flirtatious remark by which the nerdy male can retrieve the situation. Suggestions poured in over the internet and were scanned on the set during the 15-minute interval before the next episode aired. A witticism about “static cling” was selected and credited to a viewer. Audiences were then asked to guess the number of dirty shirts in the trunk, and later to choose whether the hero should use his last quarter to buy his date a trinket from a vending machine or to pay the parking meter. East coast audiences paid the parking meter and west coast audiences opted for the more romantic plotline. The directing of the story by the audience in real time on a mass stage is similar in its way to the sharing of stories from *The Sims*. It offers us a public stage for remotely controlled actors in structured situations. Most of all, it offers us the sense of a world in which things can go

more than one way.

Since *Hamlet on the Holodeck* came out I’ve also moved personally: from MIT (where I was directing projects aimed at educational uses of the digital medium and teaching a single undergraduate/graduate course in interactive narrative), to Georgia Tech, where I now direct the Information Design and Technology Program (IDT). IDT is the oldest humanities-based graduate program in interactive design in the world — although it is still only ten years old — and welcomes around twenty graduate students a year. Here we are beginning to see a community of practice arise among the students, including considerable work in new storytelling genres. One of the most promising aspects of this practice, which I have been actively encouraging, is a subgenre I have begun to think of as the *replay story*.

Replay is an aspect of gaming, one of the most pleasurable and characteristic structures of computer-based gaming in particular, which is usually accomplished by saving the game state at regular intervals (before and after each major decision point in the game “script”). In a procedural world, the interactor is scripted by the environment as well as acting upon it. In a game, the object can be to master the script, to perform the right actions in the right order. (This is also an aspect of harbinger storytelling — as in *Groundhog Day* or *Back to the Future* or *Run Lola Run*, in

have their own egos. For example, if you spend too long ignoring Iris, Iris will lose interest in you and leave. Similarly, if you are repeatedly mean to Otto by not

letting him play, he will mope, and stop trying to play with you. If you want him to play again, you will have to wait for his sadness to subside, try to cheer him up,



1.response.3. *OttoAndIris.com*. (Zoesis)



1.response.4. *OttoAndIris.com*. (Zoesis)

which the protagonist inexplicably gets the chance of a “do-over” in the real world.) But it also can reflect our sense of the multiple possibilities of a single moment, the “pullulating” moment, as Borges called it, in which all the quantum possibilities of the world are present. A replay story world allows the interactor to experience all the possibilities of a moment, without privileging any one of them as the single choice.

One successful version of such a replay story is Sarah Cooper’s *Reliving Last Night*, initially created as a masters project for the IDT program in spring 2001. In Cooper’s interactive video, a woman wakes up confused about who is in bed with her. The rest of the story is a flashback of an evening in which an acquaintance comes over for a study date and an almost-ex-boyfriend shows up hoping to reconcile. The interactor can trace the events of the evening, changing three parameters: what she wears, what beverage she serves, what music she chooses. All of the outcomes reflect the personalities and previous experiences of the characters, and taken as a whole they present a fuller understanding of who they are individually and of the intriguingly rich space of possibilities within a seemingly simple encounter. The story works because of the careful segmentation of the drama into parallel moments, and the well-framed navigation, which allows the interactor to change only one parameter at a time.¹

or try to coax him into playing again.

Informal reactions from participants suggest that such strong egos add to, rather than detract from, participants’ feeling of immersion and belief in the life of the characters. In an early version of the system, kids testing it drew pictures afterwards of Otto as a “crybaby,” and kept talking about the time he refused to sing. The refusal was a bug that caused part of Otto’s mind to completely freeze. We thought the bug had ruined the test, but to the kids it showed Otto’s strong will and made him seem more alive.

Another criterion we have found important for interactive dramas is that they have compressed intensity. It is important that the story move at a reasonable pace and never get stuck. This is at odds with many games based on solving puzzles. If the

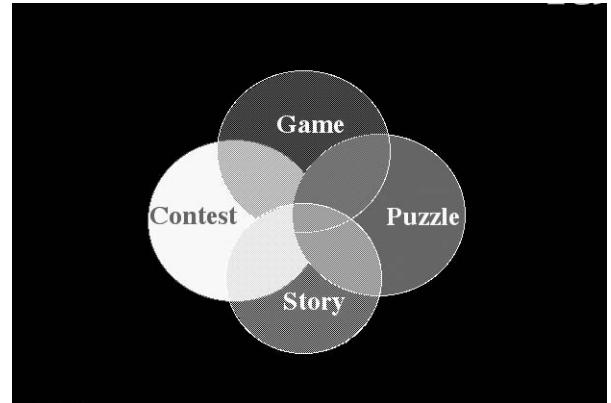
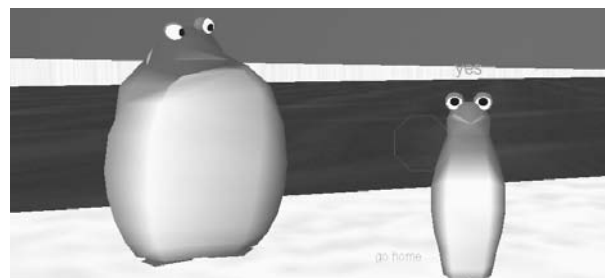


Figure 1.sidebar.1:
The areas of game and story have both independent and overlapping features, and for our discussion the areas of contest and puzzle are equally relevant.

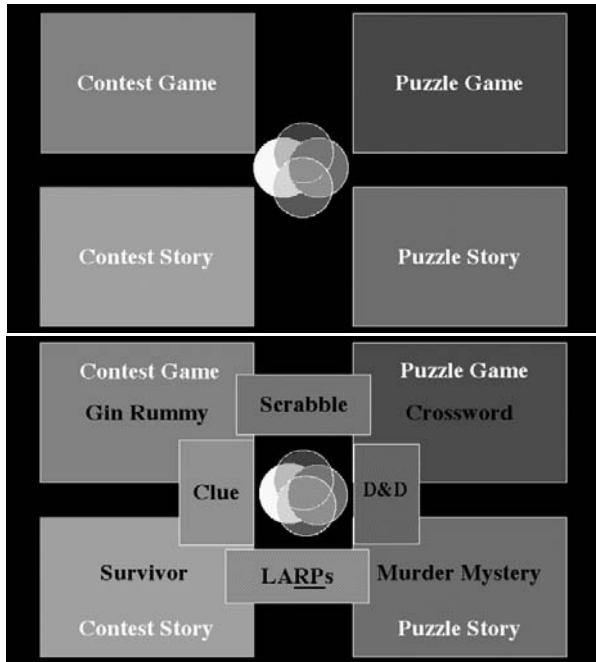
We could call *Reliving Last Night* a game-story or a story-game, because it contains elements of gaming. We could call it “new media,” which is an increasingly popular term, although both words are problematic: “new” because it is too vague and ephemeral, and “media” because the computer is a single new medium. Or we could call it “ergodic” or ‘ractive or cyberdrama. The important thing, to my mind, is to encourage it. The computer is the most powerful pattern-making medium we have available to us, and it includes the legacy patterns of “old” media, but it is not merely

participant can get stuck, then the story doesn’t progress, and the compressed intensity that is a hallmark of many traditional stories suffers.

Compressed intensity can be achieved by sharing the advancement of the story between the participant and the world. In a prototype interactive drama system, *The*



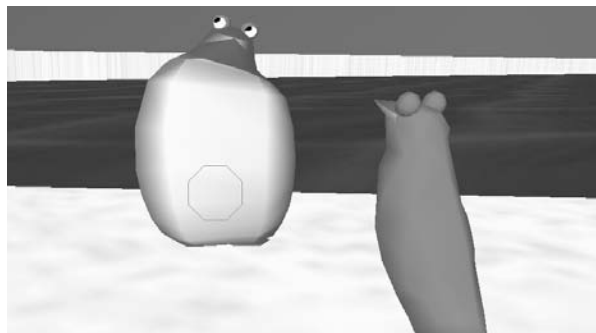
1.response.5. *The Penguin Who Wouldn’t Swim*. (Zoesis)



Figures 1.sidebar.2 - 1.sidebar.3. Thinking about nondigital overlap cases, in multiple directions, may be a particularly fruitful activity.

limited to these patterns. It is not merely “new” media or “multimedia” or story-game or game-story. It is redefining the boundaries of storytelling and gaming in its own way.

Penguin Who Wouldn't Swim (1999), the participant is a penguin who is trapped on a chunk of ice with two other penguins, drifting out to a dangerous sea (see figures 1.response.5–7). One of the penguins wants to

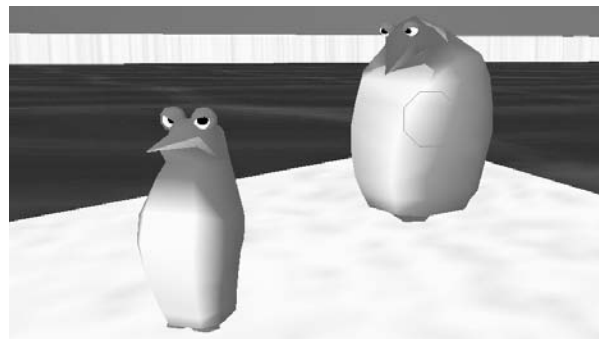


1.response.6. *The Penguin Who Wouldn't Swim*. (Zoesis)

Just as there is no reason to think of mystery novels or role-playing games as merely versions of chess, there is no reason to think of the new forms of story telling as extensions of filmmaking or board games, though they may include elements of all of these. Storytelling and gaming have always been overlapping experiences and will continue to be so. Human experience demands every modality of narration that we can bring to it. The stories we tell reflect and determine how we think about ourselves and one another. A new medium of expression allows us to tell stories we could not tell before, to retell the age-old stories in new ways, to imagine ourselves as creatures of a parameterized world of multiple possibilities, to understand ourselves as authors of rule systems which drive behavior and shape our possibilities.

The computer is a medium in which the puzzle and the game, the instantiated artifact and the performed ritual, both exist (see sidebar). It has its own affordances, which I describe in chapter 3 of *Hamlet on the Holodeck*. The computer is procedural, participatory, encyclopedic, and spatial. This means it can embody rules and execute them; it allows us to manipulate its objects; it can contain more information in more forms than any previous medium; and it can create a world that we can navigate and even inhabit as well as observe. All of these characteristics are appealing for

stay, and the other wants to try to swim back to shore. The participant is always free to do as she wishes in the situation. To adjust the pacing, there is a dramatic guidance system that continuously estimates the



1.response.7. *The Penguin Who Wouldn't Swim*. (Zoesis)

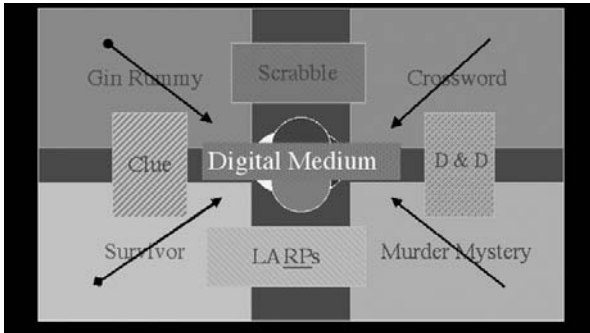


Figure 1.sidebar.4. When we get to the digital medium, we find a medium that can accommodate the features of all these nondigital examples.

gaming; all of these characteristics are appealing for storytelling. Gaming and storytelling have always overlapped. They are both being expanded at this moment as authors take advantage of these new affordances, and they have increased opportunities to develop in their areas of overlap. But there is no reason to limit the resulting form to the dichotomies between story and game, which are more rigidly established in legacy media. We can think instead of matters of degree. A story has greater emphasis on plot; a game has greater emphasis on the actions of the player. But where the player is also the protagonist or the god of the story world, then player action and plot event begin to merge. The task before us, to my mind, is not to

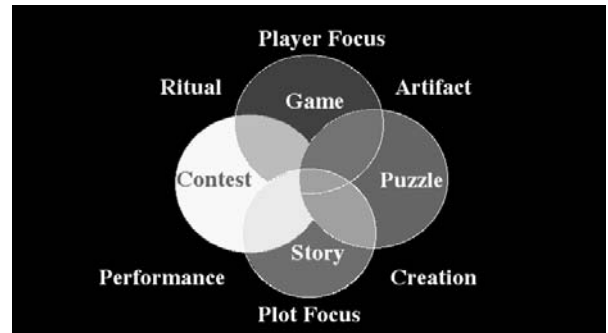


Figure 1.sidebar.5. We can also think of the game/story axis as a player focus/plot focus axis.



Figure 1.sidebar.6. But what if we take a step back, and reconsider the notion that game and story represent two directions of an axis? An interesting territory may open.

participant's subjective feeling of pacing. If that pacing is good, the system does nothing, leaving space for the participant's actions. When the subjective pacing is bad, the system acts to advance or slow down the story as appropriate, using the characters and other active elements. (As this is going on, the dramatic guidance system is also acting to guide the flow of events toward the author's story.)

All of these criteria are related to those of traditional stories and games, yet many are different in important ways needed for interactive drama. Murray urges us to not be limited by the dichotomy between stories and games, but rather to recombine and reinvent their primitive elements. In working to build these systems we have found that this is not just useful, but necessary. Interactive drama allows us to tell stories that we

couldn't tell before. It combines strengths and elements of stories and games, and is both and yet neither. If we are to reach the potential of expression that it offers, we must work directly in the new medium to explore, experiment and build.

enforce legacy genre boundaries, but to enhance practice within this new medium.

The question that most often arises, in one form or another, in “new media” practice, is how do we tell a good one from a bad one? How do we make it better if we don’t know what it is? Too often, the criteria of divergent disciplines or genres are set against one another. We hear, for example, that games and stories are opposed and what makes a good story makes a bad game and vice versa.

But the more useful question is, how do we make a better cyberdrama? One criterion that I have found useful is the concept of dramatic agency. Agency is the term I use to distinguish the pleasure of interactivity, which arises from the two properties of the procedural and the participatory. When the world responds expressively and coherently to our engagement with it, then we experience agency. Agency requires that we script the interactor as well as the world, so that we know how to engage the world, and so that we build up the appropriate expectations. We can experience agency in using a word processing program, when our direct manipulation of the text makes it appropriately change to italics or boldface, for example. In an interactive story world, the experience of agency can be intensified by dramatic effect. If changing what a character is wearing makes for a change in mood within the scene,

if navigating to a different point of view reveals a startling change in physical or emotional perspective, then we experience dramatic agency. Dramatic agency can arise from a losing game move, as when we wind up imprisoned at the end of *Myst*. It is the fittingness of the result to the action taken that makes it satisfying.

Critique of the game-story or story-game or ergodic-’ractive-cyberdrama will be most useful when it helps us to identify what works, especially what works in new ways. A new genre grows from a community of practice elaborating expressive conventions. I would argue that we stop trying to assimilate the new artifacts to the old categories of print- or cinema-based story and board- or player-based game. We should instead think of the characteristics of stories and games and how these separable characteristics are being recombined and reinvented within the astonishingly plastic world of cyberspace.

From Espen Aarseth’s Online Response

That the problematic, largely unreplayable, story-game hybrid will dominate the future of digital entertainment seems no more likely than a future with only one kind of sport. While there might be a future for narrative and new forms of storytelling in this cornucopia of new digital and cultural formats, the largest potential seems to be in new types of games, forms that blend the social and the aesthetic in creative ways and on an unprecedented scale. As a new generation of gamers grows up, the word “game” will no longer be as tainted as it is today. Then euphemisms such as “story-puzzles” and “interactors” will no longer be necessary. Games will be games and gamers will be gamers. Storytelling, on the other hand,

still seems eminently suited to sequential formats such as books, films, and e-mails, and might not be in need of structural rejuvenation after all. If it ain’t broke, why fix it?

<http://www.electronicbookreview.com/thread/firstperson/aarsethr1>

Murray Responds

In the end, it does not matter what we call such new artifacts as *The Sims*, *Façade*, or “Kabul Kaboom”: dollhouses, stories, cyberdramas, participatory dramas, interactive cartoons, or even games. The important thing is that we keep producing them.

<http://www.electronicbookreview.com/thread/firstperson/murrayr2>

Note

1. Parameters can, however, be changed at any time — and the parameter choice controls are always exposed on the interface of *Reliving Last Night*. As Noah Wardrip-Fruin points out, this allows for continual “at-will” switches between alternate versions during the flow of the story. This is different from most game replay, in which seeing another version requires restoring to a previous game state and then making new choices from that point forward. Only by recording several play-throughs of different game options and running these recordings in parallel could the continual, in-flow comparisons of *Reliving Last Night* be achieved.

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Can There Be a Form between a Game and a Story?

Ken Perlin

Why does a character in a book or movie seem more “real” to us than a character in a computer game? And what would it take to make an interactive character on our computer screen seem real to us the way that a character on the page or silver screen does? In other words, is there something intermediate between a story character and a game character? As I write this I’m looking at my computer screen, where an interactively animated character that I’ve created appears to be looking back at me. In what sense can that character be considered “real”? Obviously it’s all relative; there’s no actual person in my computer, any more than a character in a movie is an actual person. We’re talking about a test of “dramatic” reality. But what sort of dramatic reality?

If I’m seeing a movie and the protagonist gets hurt, I feel bad because I’ve grown to identify with that character. The filmmakers have (with my consent) manipulated my emotions so as to make me view the

world from that character’s point of view for 100 minutes or so. I implicitly consent to this transference process; I “willingly suspend my disbelief.” As I watch the movie, I am continually testing the protagonist’s apparent inner moral choices against my own inner moral measuring stick, looking for affirmation of higher goals and ideals, or for betrayal of those ideals. That transference is why a character such as Tony Soprano, for example, is so gripping: the narrative and point of view lead us forcefully into his vulnerable inner landscape, into the way, for example, that he finds connection with his own need for family by nurturing a family of wild ducklings. And then we are led to scenes of him being a brutal mob boss, hurting or maiming adversaries who get in his way. The power of the work lies in pulling us into the point of view of a character who makes moral choices wildly at odds with the choices that most of us would make. In some strange sense we “become” Tony Soprano for a time, a very novel and unsettling experience for most of us.

This transference can be effected in such a focused and powerful way only because we agree (when we start watching) to give over our choice-making power, and to passively allow the narrative to lead us where it will. When this is done well, then we are drawn inside the head of one character (or in some cases several characters). In that mode we are taken to places that we

Response by Will Wright

Ken Perlin raises some very good points in his article. I think the question of “agency” is particularly relevant (who’s in control) but first I would like to step back a bit and look at a somewhat larger view.

Since the dawn of computer games (a mere 20 years ago) there has always been this underlying assumption that they would one day merge somehow with the more predominant media forms (books, movies, TV). A strong, compelling (but still interactive) story seems to be the thing that people feel is missing from games. I agree that the believable, virtual actors that Ken envisions would be a major step towards this goal.

However, I’ve always had a hard time accepting the idea that games should aspire to tell better stories.

There seems to be this expectation that new media forms will evolve smoothly from older forms (Books → Radio → Movies → TV) and then go on to find their niche. The jump from linear media to nonlinear is in many ways a much more fundamental shift, though.

From a design viewpoint the dramatic arc (and its associated character development) is the central scaffolding around which story is built. The characters that we become immersed in as an audience are inextricably moving through a linear sequence of events that are designed to evoke maximum emotional involvement. Everything else (setting, mood, world) is free to be molded around this scaffolding. They are subservient to it. The story is free to dictate the design of the world in which it occurs.

might never reach in our actual lives.

The form I have just described, of course, arises from what I will call “The Novel,” which has for some time been the dominant literary form of Western civilization. Whether it is in the form of oral storytelling, written text, dramatic staging, or cinema, the basic premise is the same. A trusted storyteller says to us, “Let me tell you a story. There was a guy (or gal), and one day the following conflict happened, and then this other thing happened, and then . . .” and by some transference process we become that guy or gal for the duration of the story. His conflict becomes our conflict, his choices our choices, and his fictional changes of character seem, oddly, like a sort of personal journey for our own souls. My focus here will be more on those variants of the novel in which the narrative is literally played out by embodied actors, such as staged theater, cinema and figurative animation, because those are the narrative media with the closest connection to modern computer games.

There’s an odd sort of alchemy at work in the way that the transference process by which viewer identifies with the protagonist succeeds precisely because it is not literal. For example, imagine a novel in which countless millions of innocent people die a senseless and brutal death, with much of the world’s population being wiped out, yet in which the protagonists, when faced with

difficult moral choices, acquit themselves admirably and stay true to their ideals. This will probably result in an uplifting story. (This is precisely the recipe, for example, of the films *When Worlds Collide* and *Independence Day*.) In such a story, the protagonist doesn’t even need to survive — as long as he dies nobly, exiting with a suitably stirring speech on his tongue or a grim gleam of stoic heroism in his steely eye.

On the other hand, imagine another novel in which nobody is killed or even hurt, but in which the sympathetic protagonist betrays his inner ideals. This is inevitably a tragic tale, and reading or viewing it will fill us with despair. *The Bicycle Thief* is a classic example.

Note that there are certainly other art forms that convey personality, soul, and character without following the paradigm of linear narrative. Figurative sculpture, for example, does not impose a narrative on us, although it certainly can transport us to a different emotional state or psychological point of view. There is no fixed viewpoint from which we are expected to look at a sculpture. There isn’t even a recommended sequence of successive viewpoints. And yet sculpture, without narrative, can powerfully convey emotions, personality, struggle.

So, there is something very particular about the way the novel, in all its many variants, goes about its business. By telling us a story, it asks us to set aside

A game is structured quite differently. The paramount constructs here are the constraints on the player. As a game designer I try to envision an interesting landscape of possibilities to drop the player into and then design the constraints of the world to keep them there. Within this space the landscape of possibilities (and challenges) need to be interesting, varied, and plausible (imagine a well-crafted botanical garden). It is within this defined space that the player will move, and hence define *their own* story arc.

My aspirations for this new form are not about telling better stories but about allowing players to “play” better stories within these artificial worlds. The role of the designer becomes trying to best leverage the agency of the player in finding dramatic and

interesting paths through this space. Likewise, I think that placing character design and development in the player’s hands rather than the designer’s will lead to a much richer future for this new medium.

Back to Ken’s points, I do agree that there is a strong linkage between the believability of the characters and the dramatic potential of the work. This has been perhaps the most technically limiting factor to dramatic game design. In *The Sims* we fell back on abstraction to address this issue. By purposely making the Sims fairly low-detail and keeping a certain distance from them we forced the players to fill in the representational blanks with their imaginations (an amazingly effective process which is well-covered in Scott McCloud’s (1993) *Understanding Comics*).



2.sidebar.1. A promotional image of Lara Croft. (Eidos Interactive, Core Design)

our right to make choices — our agency. Instead, the agency of a protagonist takes over, and we are swept up in observation of his struggle, more or less from his point of view, as though we were some invisible spirit or angel perched upon his shoulder, watching but

What excites me the most about Ken's work is the idea that I can create a character with a few simple brush strokes (personality, quirks, hidden flaws) and then unleash that character into a world and watch what naturally emerges from those traits. The chaotic interaction of this simple (but plausible and believable) character with its environment has the potential to drive empathy to a much higher level than nonlinear media because I'm not just an observer; I'm her creator. She is not only controlled by me (potentially) but her flaws and quirks were defined by me; she contains a part of me in a way that other media forms can only loosely approximate.

never interfering.

By way of contrast, look at games. A game does not force us to relinquish our agency. In fact, the game depends on it.

When you play *Tomb Raider* you don't actually think of Lara Croft as a person the same way, say, you think of Harry Potter as a person (see sidebar images). There is a fictional construct in the backstory to the game. But while you're actually playing the game, the very effectiveness of the experience depends on you becoming Lara Croft. The humanlike figure you see on your computer screen is really a game token, and every choice she makes, whether to shoot, to leap, to run, to change weapons, is your choice.

When you stop the game play momentarily, there is no sense that the personality of Lara Croft is anywhere to be found. While you're taking inventory, changing weapons, etc., the game figure on the screen stands impassively, and you know that the figure would stand that way forever if you were never to reenter gameplay mode. In other words, even a bare minimum of suspension of disbelief is not attempted. In fact, you are supposed to "become" Lara Croft — it is that immediacy and responsiveness that makes the game so exciting.

So let's compare Harry Potter to Lara Croft. When I am reading one of the Harry Potter books, and I put the

From Victoria Vesna's Online Response

Perlin's discussion of hyper-real responsive characters, that would presumably allow for a real actor with agency to emerge, does not explain the popularity of game formats such as MUDs and MOOs. These simple text-based early game genres (*Multi-User Domain*, and *MUD*, *Object Oriented*, respectively) were successful in working with the player's imagination, allowing for identification to happen on the basis of world-building and interaction with an online community. MUDs and MOOs are excellent examples of using words and stories that come from conventional literature in such radically different ways that an entirely new form of literature, if it can be called this, emerged.

book aside for a while, I can easily sustain the pleasant fiction that there is an actual Harry Potter, with a continued set of feelings and goals, living “offstage” somewhere. This is because to read Harry Potter is to experience his agency, as he navigates the various difficult challenges that life presents him. In contrast, when I walk away from my computer screen, I cannot sustain the fiction that an actual Lara Croft continues to exist offstage, because I have not actually experienced her agency. All I have really experienced is *my* agency.

Of course, linear narrative forms and games are intended to serve very different purposes. The traditional goal of a linear narrative is to take you on a vicarious emotional journey, whereas the traditional goal of a game is to provide you with a succession of active challenges to master. A “character” in a game is traditionally merely a convenient vehicle for framing and embodying these challenges. In this sense, a game is traditionally all about player control, since without active control, the player cannot meet the challenges that the game poses.

So how could the two forms, story and game, grow closer together? Well, to start, let’s look at narrative structure. Here’s a classic story arc: in the beginning, we are introduced to the basic characters, and some introductory conflicts are played out in small scale.

Choices are made early on by the protagonists that have ramifications only much later in the drama (foreshadowing). Over time, the stakes get raised; the conflict becomes stripped to its essentials, culminating in a dramatic climax near the end. When the dust settles, in the release of dramatic tension that inevitably follows climax, there is a clear outcome.

Of course what I’ve just described is the basic gameplay of both *Monopoly* and chess. One obvious thing that distinguishes these games from narrative literature is that their protagonists are the players. In contrast, the conflicts in a work of narrative literature are played out by fictional characters, and the author’s deeper purpose in building the narrative structure is generally to take the reader through the dynamic psychological journey of these characters. It was once said of writing narrative fiction that: “Plot’ is the drugged meat that you throw over the fence to put the guard dog to sleep so you can rob the house.” In other words, story is about conveying character. To do that interactively would require some sort of plausible psychological agency on the part of somebody within the interactive narrative.

If we look at “linear narrative” and “interactive game” as a dialectic, how can we really get into intermediate states along this dialectic? In other words, can we create a form in which the wall between “my agency” and “the

Perlin Responds

The main point on which I take issue with Vesna’s response is her characterization of what I’m proposing as a sort of “hyper-realism.” More accurately, I’m proposing a sort of “hyper-believability,” as compared to the game genre in its current form.

<http://www.electronicbookreview.com/thread/firstperson/perlinr2>



2.sidebar.2. A screenshot from the PDA version of *Tomb Raider*. (Eidos Interactive, Core Design)

agency of an entity that seems psychologically present and real to me” can be removed or blurred?

But what exactly would intermediate agency look like? A fascinating insight is provided by Philip Pullman’s trilogy of novels *His Dark Materials*. These novels take place in an alternate universe in which the soul of a person is an external, embodied entity. In this universe your soul is neither distinctly “self” nor “other,” but rather an embodied familiar, or daemon, who always travels with you, who helps you to wrestle with choices, and with whom you can converse. Interestingly, the daemons of two people can converse with each other directly. If one imagines a similar relationship between a player and a character, this dramatic structure could plausibly lead to a form of creative work with is intermediate between “linear narrative” and “game,” by enabling a psychologically present entity which is somewhere in between “me” and “other.”

There has been some movement in the computer gaming world toward something that one could call “character.” But these attempts have been hindered by the fact that characters in games can’t act within an interactive scene in any compelling way. Of particular interest are “god-games” — those games, such as Will Wright’s *SimCity*, in which the player takes a “God’s eye view” of the proceedings. More recently, Wright introduced *The Sims* — a simulated suburban world in which the player nurtures simulated people, sort of as pets (see sidebar image). The player directs these virtual

people, who have no knowledge of the existence of the player, to buy things, marry, have children, take care of their physical and psychological needs, and so forth.

In a sense, the player is asked to take on some of the traditional role of an author — *The Sims* itself is more of a simulator toy than a game. By playing with this simulator, the player becomes a sort of author. As in many god-games, the player himself is expected to design much of the dramatic arc of the experience — it is up to him to starve or to feed his Sims characters, to introduce them, encourage them to acquire possessions or children. Given the current state of technology, it would be impossible to sustain the dramatic illusion if these characters were to attempt to speak to each other in clear English. For this reason, Wright has made the clever design decision to have the characters “talk” to each other in a sort of gibberish. This allows us to buy into the illusion that they are engaging each other in substantive conversations about something or other. In this way, *The Sims* replaces some social activity in its simulated world with the *texture* of social activity.

Playing *The Sims* is lots of fun, but one thing conspicuously lacking from the experience is any compelling feeling that the characters are real. Much of this lack comes from *The Sims*’ reliance on sequences of linear animation to convey the behavior of its characters. For example, if the player indicates to a Sims character that the character should feed her baby, then the character will run a canned animation to walk over to the baby’s bassinet, pick up the baby, and make feeding movements. If the player then tells her to play with the baby, she will put the baby down, return to a previous position, then begin the animation to approach the bassinet, again pick up the baby, and start to play. One result of this mechanical behavior is that there is no real possibility of willing suspension of disbelief on the part of the player as to the reality of the character.

The player ends up thinking of *The Sims* as a sort of probabilistic game, not really as a world inhabited by feeling creatures. A player quickly realizes that anything that happens that is not caused by his own agency is being caused by the equivalent of a set of dice being thrown inside the software, not through the agency of



2.sidebar.3. Caring for baby in *The Sims*. (Electronic Arts, Maxis)

thinking, feeling characters. *The Sims* remains, dramatically, a world-building game, not a psychological narrative in which one believes in the agency of the characters.

In the gaming world, one can also see a small step in the direction of intermediate agency in the game *Black and White*, a god-game in which the player has the use of embodied daemons to do his bidding. Yet the daemons in this game do not seem like interestingly real characters. I believe that one key reason for this is that the key ingredients of successful narrative film are simply not yet available for use in games.

In order to create a psychological suspension of disbelief, a visual narrative medium requires all three of the following elements: writing, directing, and acting. If any of these is missing, then a narrative on stage or film cannot provide observers with the essential framework they need to suspend their disbelief.

Of these elements, in computer games to date, acting has been conspicuously missing. Even in the most badly executed films (e.g., the films of Ed Wood) the essential humanity of the actors playing the characters somehow manages to come through. We believe the actor is attempting to convey a specific character within a specific scene, and we respond by agreeing to pretend that the actor has become that character, responding to the psychological challenges of the moment.

Yet imagine that film or theater did not have acting as we know it — but that instead all cast members

were constrained to act in the most rote mechanical way, repeating lines of dialogue and movements without any feeling that was specific to the scene (think of the mother putting down the baby only to pick it up again, in *The Sims*).

This is precisely the situation that game designers are faced with today when they foray into more narrative-based forms. If, as a creator, you have a nonlinear, interactive narrative structure, but it is embodied in such a way that acting is essentially nonexistent, then there is no way to create emotional buy-in for that character — the willing suspension of disbelief by the audience in that character's existence. *Myst* cleverly got around this by creating an interactive narrative in which there were no people (they were all gone before the observer shows up). But when the sequel *Riven* introduced actual fictional characters, the results were far less compelling, because it became immediately apparent that these were mere precanned game characters — windup toys — about whom the player could not really suspend disbelief.

A number of people have been working very hard over the years on “nonlinear” or interactive narrative. It is my contention that these efforts cannot move forward to merge film and games, and that we will not



2.sidebar.4. A promotional image of Lara Croft. (Eidos Interactive, Core Design)



1.1: NYU's Responsive Face.

be able to find a way to create an intermediate agency that will allow the viewer to find their way into caring about characters, until we provide a way that characters can act well enough to embody an interactive narrative.

For this reason, and to lay the groundwork for interactive media that are intermediate in the “agency” dialectic, a number of us have been working on various techniques for “better interactive acting ability” by computer-based virtual actors. This work involves body language, facial expression, rhythm of conversational response, varieties of ways to convey focus and attention between actors, and various ways to convey internal emotional states and awareness while playing a scene.

Right now, we're all in a learning stage, trying to figure out what works to make effective emotionally interactive actors. For example, presented here (figure 2.1) is the control panel for an interactive applet we made at NYU that teaches its user how to build a large vocabulary of facial expressions by combining a small

number of emotional primitives. You can see to the right of the face the basic elements of facial expression. Just above those are some example “presets” — complex facial expressions that are simply linear combinations of the lower-level primitives. Above that are some tools to let the user string together sequences of expressions to tell an emotional story.

Tools such as this one can help us to learn what works (or doesn't work) to make an effective interactive actor. With any luck (and some hard work), we will have good

interactive acting on our computer screens by the time the next edition of this book comes out. And that capability will, in turn, provide one of the key tools needed to properly explore the space of an interactive narrative form intermediate between story and game.

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A Preliminary Poetics for Interactive Drama and Games

Michael Mateas

Introduction

Interactive drama has been discussed for a number of years as a new AI-based interactive experience (Laurel 1986; Bates 1992). While there has been substantial technical progress in building believable agents (Bates, Loyall, and Reilly 1992; Blumberg 1996, Hayes-Roth, van Gent, and Huber 1996), and some technical progress in interactive plot (Weyhrauch 1997), no work has yet been completed that combines plot and character into a full-fledged dramatic experience. The game industry has been producing plot-based interactive experiences (adventure games) since the beginning of the industry, but only a few of them (such as *The Last Express*) begin to approach the status of interactive drama. Part of the difficulty in achieving interactive drama is due to the lack of a theoretical framework guiding the exploration of the technological and design issues surrounding interactive drama. This paper proposes a theory of

interactive drama based on Aristotle's dramatic theory, but modified to address the interactivity added by player agency. This theory both provides design guidance for interactive dramatic experiences that attempt to maximize player agency (answering the question "What should I build?") and technical direction for the AI work necessary to build the system (answering the question "How should I build it?"). In addition to clarifying notions of interactive drama, the model developed in this essay also provides general framework for analyzing player agency in any interactive experience (e.g., interactive games).

This neo-Aristotelian theory integrates Murray's (1998) proposed aesthetic categories for interactive stories and Aristotle's structural categories for drama. The theory borrows from Laurel's treatment of Aristotle in an interactive context (Laurel 1986, 1991) but extends it by situating Murray's category of agency within the model; the new model provides specific design guidelines for maximizing user agency. First, I present the definition of interactive drama motivating this theory and situate this definition with respect to other notions of interactive story. Next, I present Murray's three categories of immersion, agency, and transformation. Then, I present a model of Aristotle's categories relating them in terms of formal and material causation. Within this model, agency will be

Response by Brenda Laurel

Michael Mateas begins by noting that AI has, so far, failed to produce a viable example of interactive dramatic experience. Ain't it a horrible disappointment? But this author brings a fresh approach to AI that may save the day after all. In any case, it is far nobler to go for the grail than simply admire all the different ways you can look at the stained-glass windows.

I agree with Mateas that agency is essential to robust interaction. In my dissertation research, I learned that "significance" was a key aspect of agency — that is, that the effect that a player's actions has on the plot needs to be substantial. I used the example of changing the color of the flowers in the King's garden — an early example of interactivity that we built into an interactive fairy tale at Cybervision (1977). We couldn't

imagine significant interaction, probably because it wasn't possible with only 2K of RAM and programs being loaded from cassette tape. Later in my experience with virtual reality (VR), I learned that immersion and agency are deeply related. Without agency, we are simply looking at absorbing images, or, as in the case of motion-platform rides, having ourselves shaken around by some other agency. Mateas's formulation of the "primacy of agency" is an excellent translation of Aristotle's "primacy of action" to a first-person, interactive context.

An experiential or phenomenological analysis of dramatic experience is not new. Aristotle addressed the emotional effects of drama in terms of empathy — the ability to "feel with" characters — and catharsis, the release of emotion when the outcome of an action

situated as two new causal chains inserted at the level of character. Finally, I use the resulting model to clarify conceptual and technical issues involved in building interactive dramatic worlds, and briefly describe a current project informed by this model.

Defining Interactive Drama

Many game designers, writers, and theorists have wrestled with the vexing question, “What is interactive story?” This paper continues a specific thread of discussion with respect to this question, the thread begun by Laurel’s adoption of an Aristotelian framework first for interactive drama (Laurel 1986) and then more generally for interactive experiences (Laurel 1991) and continued by Murray’s description of the experiential pleasures and properties of interactive stories (Murray 1998). Whereas Murray explores a variety of interactive story types, this essay focuses explicitly on the notion of interactive drama as defined in Laurel’s thesis (Laurel 1986) and pursued by the Oz

Project at Carnegie Mellon University (Bates, Loyall, and Reilly 1992; Weyhrauch 1997).

In this conception of interactive drama, the player assumes the role of a first-person character in a dramatic story.

MUD stands for Multi-User Dungeon, Multi-User Dimension, or Multi-User Dialogue. MOO stands for MUD, Object-Oriented.

becomes clear. These can be seen as transformative experiences. Empathy might be seen as a weak form of masquerade, using Murray’s terms, in the sense that an audience member “tries on” the inner experiences of a character. Catharsis can be seen as “personal transformation” — indeed, in Greek tragedy, this personal transformation was the end cause. The idea of variety is inherent in the very nature of drama itself, which represents actions that are other than “reality.”

Mateas states that “the formal cause is the authorial view of the play.” Actually, in Aristotelean terms, the author’s intent and work are the efficient, not the formal, cause (*Physics*, *Metaphysics*). The idea of theme does not appear in the *Poetics*. A more purist definition would be that the author has constructed a plot in order to represent a whole action. A theme would,

The player does not sit above the story, watching it as in a simulation, but is immersed *in* the story.

Following Laurel, dramatic (Aristotelian) stories are distinguished from narrative stories by the following properties:

Enactment vs. Description

Intensification vs. Extensification

Unity of Action vs. Episodic Structure

Enactment refers to action. Dramas utilize action rather than description to tell a story. Intensification is achieved by arranging incidents so as to intensify emotion and condense time. In contrast, narrative forms often “explode” incidents by offering many interpretations of the same incident, examining the incident from multiple perspectives, and expanding time. Unity of action refers to the arrangement of incidents such that they are all causally related to a central action. One central theme organizes all the incidents that occur in the story. Narratives tend to employ episodic structure, in which the story consists of a collection of causally unrelated incidents.

Certainly not all interactive story experiences must have the properties of Aristotelian drama. In fact, most interactive story experiences built to date have either been highly episodic (generally those narrative

however, fall in the category of efficient cause, along with the author and the tools used.

Mateas also asserts that “the material cause is the audience view of the play.” Again, to be a purist about it, Aristotle does not couch material causality in terms of the audience, but rather as the materials that are successively formulated by the playwright into the plot. Interestingly enough, the audience’s “a-ha” experience may be thought of as the end cause of a play rather than its formal cause; that is, the form of drama is deployed to the end of providing catharsis or understanding for the audience.

Mateas’s new causal chains (as represented in his Figure 3.2) are based on a very interesting analysis and a good inversion. Speaking in Aristotelean terms, however, the player does not provide formal causality.

experiences built by the game industry, e.g., adventure games), have employed a hypertextual logic of association rather than a logic of dramatic probability and causality (generally those experiences built by fine artists and writers), or have focused on story not as a highly structured experience created by an author for consumption by an audience, but rather as a shared social construction facilitating human communication (e.g., multiuser worlds such as MUDs, MOOs, and avatar spaces; massive multiplayer games such as *Everquest* and *Ultima Online*; and games such as Purple Moon's *Rocket* series or Will Wright's *The Sims*). Additionally, the interaction in an interactive story does not necessarily have to be first-person interaction as a character within the story. The neo-Aristotelian poetics developed here informs a specific niche within the space of interactive narrative and provides a principled way of distinguishing this niche from other interactive narrative experiences.

Murray's Aesthetic Categories

Murray (1998) proposes three aesthetic categories for the analysis of interactive story experiences: immersion, agency, and transformation.

Immersion is the feeling of being present in another place and engaged in the action therein. Immersion is related to Coleridge's "willing suspension of disbelief"

but contributes efficient causality to the extent that she shares authorship of the plot, and also contributes materially to the plot by presenting thought and character (patterns of choice) that can influence the shape of the particular plot. Later, Mateas correctly implies that knowledge (or intuition) about the form can act as a constraint on the player's actions. Mateas's key contribution, in my view, is his novel and extremely useful observation that "in order to invoke a sense of agency, an interactive experience must strike a balance between the material and formal constraints."

I think it's brilliant to place "the mechanism of interaction" (as an affordance) at the level of spectacle, referring specifically what the interface presents to the player as the possible modes of interaction. It is consistent with Aristotelean spectacle in that it must be

— when a participant is immersed in an experience, they are willing to accept the internal logic of the experience, even though this logic deviates from the logic of the real world. A species of immersion is telepresence, the feeling of being physically present (from a first-person point of view) in a remote environment.

Agency is the feeling of empowerment that comes from being able to take actions in the world whose effects relate to the player's intention. This is not mere interface activity. If there are many buttons and knobs for the player to twiddle, but all this twiddling has little effect on the experience, there is no agency. Furthermore, the effect must relate to the player intention. If, in manipulating the interface elements, the player does have an effect on the world, but they are not the effects that the player intended (perhaps the player was randomly trying things because they didn't know what to do, or perhaps the player thought that an action would have one effect, but it instead had another), then there is no agency.

Transformation is the most problematic of Murray's three categories. Transformation has at least three distinct meanings.

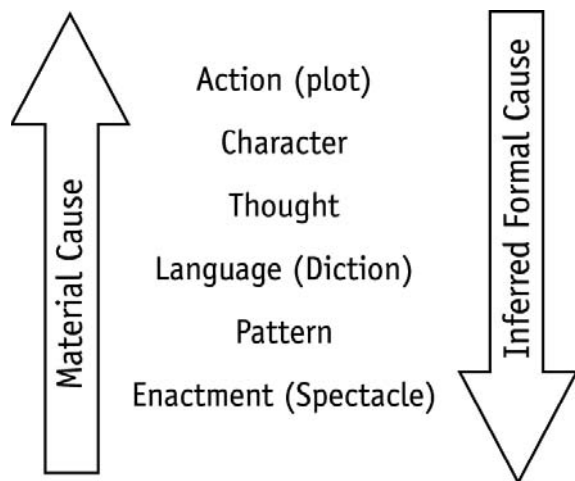
Transformation as masquerade. The game experience allows the player to transform

available to the senses. We should add that a player may be enabled to impinge on the evolving plot at various levels, and that this may suggest some new criteria for judging the robustness of interactivity. An interface that enables language or symbolic communication enables a player to contribute material at the level of diction. How far-ranging the player's choices may be (from predetermined one-button responses to inventive solutions) can be seen as the range available at the level of thought. But thought counts for naught (rhyme intended) unless it can be expressed in action, and action doesn't count unless it is consequential at the level of plot. This means that enabling blathering, hand-wringing, and random smiting does not constitute robust interaction design, unless these behaviors change the course of the plot itself.

themselves into someone else for the duration of the experience.

Transformation as variety. The game experience offers a multitude of variations on a theme. The player is able to exhaustively explore these variations and thus gain an understanding of the theme.

Personal transformation. The game experience takes the player on a journey of personal transformation.



3.1 Aristotelian theory of drama

Immersion is a tricky subject. Certainly, it enhances empathy and the experience of flow. Just as Aristotle identified enactment as a key differentiator of drama from other forms of narrative, so sensory immersion may be seen to distinguish interactive drama from interactive fiction. I agree with Mateas and Murray that immersion also requires agency.

Regarding transformation, the sort of “transformation as variety” that Murray suggests (“a kaleidoscopic narrative that refuses closure”) strikes me as an exercise that would be pleasurable primarily for postmodern literary theorists. The rest of us probably prefer a more muscular form of interaction. Mateas reinforces this point when he says that the dramatic world “must provide agency *and* transformation as variety.” I would merely emphasize (again) that the

Transformation as masquerade and variety can be seen as means to effect personal transformation.

Integrating Agency into Aristotle

Murray’s categories are phenomenological categories of the interactive story experience, that is, categories describing what it *feels* like to participate in an interactive story. Aristotle’s categories (described later) are structural categories for the analysis of drama, that is, categories describing what *parts* a dramatic story is made out of. The trick in developing a theoretical framework for interactive drama is integrating the phenomenological (that is, what it feels like) aspect of first-person experiences with the structural aspects of carefully crafted stories. In attempting this integration, I first discuss the primacy of the category of agency. Second, I briefly present an interpretation of the Aristotelian categories in terms of material and formal cause. Finally, agency is integrated into this model.

Primacy of Agency

From an interactive dramatic perspective, agency is the most fundamental of Murray’s three categories. Immersion, in the form of engagement, is already implied in the Aristotelian model. Engagement and identification with the protagonist are necessary in order for an audience to experience catharsis.

agency must have real significance at the level of plot.

Mateas emphasizes the role of replayability with noticeable differences in plot as an essential characteristic of IF. Murray’s analysis seems not to address the appeal of the idea that one can reenter the world and personally (as a character) shove the plot in a different direction. Certainly, the mutability of plot as a direct result of player interaction makes re-playing a game intrinsically different than re-reading a novel or re-viewing a film. As Mateas correctly observes, within the space of a dramatic world’s potential, an interactor should be able to influence how the possible is formulated into the probably and ultimately the necessary. (For a visual representation of this, see figure 3.2 of *Computers as Theatre*).

I am delighted by Mateas and Stern’s technical

Transformation, in the form of change in the protagonist, also already exists in the Aristotelian model. Murray's discussion of transformation as variety, particularly in the form of the kaleidoscopic narrative that refuses closure, is contrary to the Aristotelian ideals of unity and intensification. To the extent that we want a model of interactive *drama*, as opposed to interactive narrative, much of Murray's discussion of transformation falls outside the scope of such a model. While immersion and transformation exist in some form in noninteractive drama, the audience's sense of having agency within the story is a genuinely new experience enabled by interactivity. For these reasons, agency will be the category integrated with Aristotle.

Aristotelian Drama

Following Laurel (1991), Aristotle's theory of drama is represented in figure 3.1. Aristotle analyzed plays in terms of six hierarchical categories, corresponding to different "parts" of a play. These categories are related via material cause and formal cause. The material cause of something is the material out of which the thing is created. For example, the material cause of a building is the building materials of which it is constructed. The formal cause of something is the abstract plan, goal, or ideal towards which something is heading. For example,

agenda. The element of "beats" in their proposed architecture sounds very promising, and their goals are right on the money. Mateas states, "We are interested in interactive experiences that appeal to the adult, non-computer-geek, movie-and-theater-going public." I can't help observing that the emphasis on relationships and narrative would be extremely appealing to women. Now wouldn't that be nice? The insistence that the player perform as protagonist will yield the most satisfying experience. It will also be the hardest to accomplish, but damn the torpedoes, as they say. I am personally elated that Mateas and Stern continue the work on the problem of IF and carry it in an interesting new direction.

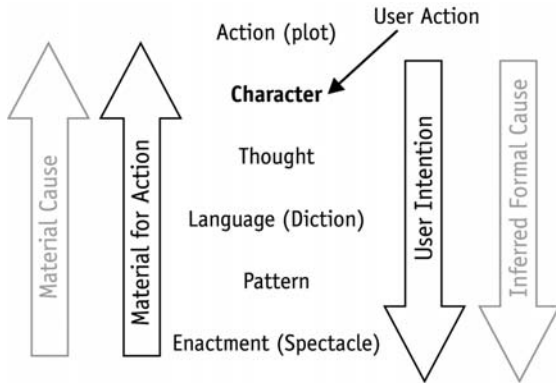
the formal cause of a building is the architectural blueprints.

In drama, the formal cause is the authorial view of the play. The author has constructed a plot that attempts to explicate some theme. The characters required in the play are determined by the plot; the plot is the formal cause of the characters. A character's thought processes are determined by the kind of character they are. The language spoken by the characters is determined by their thought. The patterns (song) present in the play are determined, to a large extent, by the characters' language (more generally, their actions). The spectacle, the sensory display presented to the audience, is determined by the patterns enacted by the characters.

In drama, the material cause is the audience's view of the play. The audience experiences a spectacle, a sensory display. In this display, the audience detects patterns. These patterns are understood as character actions (including language). Based on the character's actions and spoken utterances, the audience infers the characters' thought processes. Based on this understanding of the characters' thought processes, the audience develops an understanding of the characters, the characters' traits and propensities. Based on all this information, the audience understands the plot structure and the theme. In a successful play, the

From Gonzalo Frasca's Online Response

If, as Mateas affirms, players "should not be over-constrained by a role" and they should be encouraged "to be themselves" then they will expect a degree of freedom of action that is incompatible with Mateas' goals. Imagine, as game designer Tim Schafer once suggested to me, that you wanted to create a game where you play the role of Gandhi. How would you give agency to players while preventing them from turning peace-loving Gandhi into a *Quake*-like killing machine? The traditional solution would be to put authorial constraints and, for example, prevent the player from using potential weapons. Of course, you can try to fool the player by tricking him into doing what the author wants her to do. But, as Mateas admits, this option fails after the software is used a couple of times. I can only



3.2 Neo-Aristotelian theory of drama

audience is then able to recapitulate the chain of formal causation. When the plot is understood, there should be an “a-ha” experience in which the audience is now able to understand how the characters relate to the plot (and why they must be the characters they are), why those types of characters think the way they do, why they took the actions they did and said what they did, how their speech and actions created patterns of activity, and how those patterns of activity resulted in the spectacle that the audience saw. By a process of interpretation, the audience works up the chain of material cause in order to recapitulate the chain of formal cause.

Interactive Drama

Adding interaction to the Aristotelian model can be considered the addition of two new causal chains at the level of character.

In figure 3.2, the gray arrows are the traditional chains of material and formal causation. The player has been added to the model as a character who can choose his or her own actions. This has the consequence of introducing two new causal chains. The player’s intentions become a new source of formal causation. By taking action in the experience, the player’s intentions become the formal cause of activity happening at the levels from language down to spectacle. But this ability to take action is not completely free; it is constrained from below by material resources and from above by authorial formal causation from the level of plot.

The elements present below the level of character provide the player with the material resources (material cause) for taking action. The only actions available are the actions supported by the material resources present in the game. The notion of affordance (Norman 1988) from interface design is useful here. In interface design, affordances are the opportunities for action made available by an object or interface. But affordance is even stronger than implied by the phrase “made available”; in order for an interface to be said to afford a certain action, the interface must in some sense “cry

envision two possible solutions to this dilemma. You could either kill replayability by creating disposable software that could only be experienced once (Frasca 2001) or you could build a nonimmersive — and therefore non-Aristotelian — environment where players would not “be themselves” but rather encouraged to become aware of their own performances while trying to perform coherently to their character’s personality, as some professional role-playing game (RPG) players do.

Mateas Responds

If an interactive Gandhi story left weapons and power-ups lying about, but used some heavy-handed interaction constraint (like the cursor turning red and beeping) to prevent the player from picking them up, then the experience would certainly be offering material affordances (“here’s a gun for you to pick up — oops, not really”) not balanced by the formal affordances (the dramatic probabilities of the Gandhi story), resulting in a decrease in the feeling of user agency. If, however, the Gandhi world never provided access to such weapons, and given the plot it never made sense to think of using such weapons, the player would still experience agency, even in the absence of access to plasma cannons.

out” for the action to be taken. There should be a naturalness to the afforded action that makes it the obvious thing to do. For example, the handle on a teapot affords picking up the teapot with your hand. The handle cries out to be grasped. In a similar manner, the material resources in an interactive drama afford action. Thus these resources not only limit what actions can be taken (the negative form of constraint) but cry out to make certain actions obvious (the positive form of constraint). Several examples of the material affordances in interactive drama are provided later.

The characters in an interactive drama should be rich enough that the player can infer a consistent model of the characters’ thoughts. If the characters’ thoughts can be understood (e.g., goals, motivations, desires), then these thoughts become a material resource for player action. By reasoning about the other characters’ thoughts, the player can take actions to influence these characters, either to change their thoughts, or actively help or hinder them in their goals and plans.

The dialogue (language) spoken by the characters and the opportunities for the player to engage in dialogue are other material resources for action. Dialogue is a powerful means for characters to express their thoughts, thus instrumental for helping the player to infer a model of the characters’ thoughts. Conversely, dialogue is a powerful means to influence character behavior. If the experience makes dialogue available to the player (and most contemporary interactive experiences do not), this becomes a powerful resource for expressing player intention.

The objects available in the experience (I place the presence of interactive objects somewhere between spectacle and pattern) are yet another resource for player action.

Finally, the mechanics of interaction (spectacle) provide the low-level resources for player actions. The mechanics provide the interface conventions for taking action.

In addition to the material affordances (constraints) from below, the player experiences formal constraints from above. Of course, these constraints are not directly perceived by the player, but, just as in noninteractive drama, are understood by recapitulating

the author’s chain of formal causation by making inferences along the chain of material causation. In noninteractive drama, understanding the formal chain of causation allows the audience to appreciate how all the action of the play stems from the dramatic necessity of the plot and theme. In interactive drama, the understanding of the formal causation from the level of plot to character additionally helps the player to have an understanding of what to do, that is, why they should take action within the story world at all. Just as the material constraints can be considered as affording action from the levels of spectacle through thought, the formal constraints afford motivation from the level of plot. This motivation is conveyed as dramatic probability. By understanding what actions are dramatically probable, the player understands what actions are worth considering.

Agency

We are now ready to propose a prescriptive, structural model for agency. *A player will experience agency when there is a balance between the material and formal constraints.* When the actions motivated by the formal constraints (affordances) via dramatic probability in the plot are commensurate with the material constraints (affordances) made available from the levels of spectacle, pattern, language, and thought, then the player will experience agency. An imbalance results in a decrease in agency. This will be made clearer by considering several examples.

Many puzzle-based adventures suffer from the imbalance of providing more material affordances than formal affordances. This results in the feeling of having many things to do (places to go, objects to fiddle with) without having any sense of why any one action would be preferable to another. For example, *Zork Grand Inquisitor* offers a rich world to navigate and many objects to collect and manipulate. Yet, since there is no unity of action, there is no way to relate current actions to the eventual goal of defeating the Grand Inquisitor. This leaves the player in the position of randomly wandering about trying strange juxtapositions of objects. This detracts from the sense of agency — though the player can take action, this action is often

not tied to a high-level player intention. Notice that adding more material opportunities for action would not help the matter. The problem is not a lack of options of things to do, the problem is having insufficient formal constraint to decide between choices.

Quake (and its ilk) induce agency by providing a nice balance between material and formal constraints. The proto-plot establishes the following formal constraints (dramatic probabilities):

- Everything that moves will try to kill you.
- You should try to kill everything.
- You should try to move through as many levels as possible.

From these three principles, all the rest of the action follows. The material affordances perfectly balance these formal affordances. The player can run swiftly and smoothly through the space. The player can pick up a wide array of lethal weapons. The player can fire these weapons at monsters and produce satisfying, gory deaths. The monsters' behavior is completely consistent with the "kill or be killed" ethos. Everything that one would want to try and do given the formal constraints is doable. There are no extraneous actions available (for example, being able to strike up a conversation with a monster) that are not dictated by the formal constraints.

Note that though these example games are not specifically interactive drama, the model can still be used to analyze player agency within these games. Though the model is motivated by interactive drama, it can be used to analyze the sense of agency in any interactive experience by analyzing the experience in terms of the dramatic categories offered by the model. For example, though *Quake* has neither plot nor characters in the strict sense, there are top-down player expectations established by a "proto-plot." This "proto-plot" is communicated by the general design of the spectacle (e.g., the design of the creepy industrial mazes) as well as the actions of the characters, even if these characters do have primitive diction and thought.

Again, in order to invoke a sense of agency, an

interactive experience must strike a balance between the material and formal constraints. An experience that successfully invokes a sense of agency inhabits a "sweet spot" in design space. Trying to add additional formal constraints (more plot) or additional material constraints (more actions) to a balanced experience will likely move it out of the sweet spot.

Relationship to Immersion and Transformation

In the previous section, agency was taken as the fundamental Murray category to integrate with Aristotle. In this section, I examine what the new, integrated model has to say about immersion and transformation.

Immersion

Murray suggests three ways of inducing immersion: structuring participation with a mask (an avatar), structuring participation as a visit, and making the interaction conventions (the interface mechanics) seamless. These three mechanisms can be viewed, in turn, as a way to provide material and formal constraints, as a design suggestion for balancing the constraints, or as a design suggestion for providing effective material constraints at the level of spectacle. Agency is a necessary condition for immersion.

An avatar can provide both material and formal constraints on a player's actions. The avatar can provide character exposition through such traits as physical mannerisms and speech patterns. This character exposition helps the player to recapitulate the formal, plot constraints. Through both input and output filtering (e.g., the characters in *Everquest*, or Mateas 1997), the avatar can provide material constraints (affordances) for action.

A visit is one metaphor for balancing material and formal constraints when the material opportunities for action are limited. From the formal side, the conventions of a visit tell the player that they won't be able to do much. Visits are about just looking around, possibly being guided through a space. Given the limited expectations for action communicated by the formal constraints, the designer can get away with (and

in fact, must only) provide limited material means for action.

The mechanics provide the material resources for action at the level of spectacle (the interface can be considered part of the spectacle). Providing a clean, transparent interface insures that agency (and thus immersion) will not be disrupted.

Transformation

Most of Murray's discussion of transformation examines transformation as variety, particularly in the form of kaleidoscopic narratives that can be reentered multiple times so as to experience different aspects of the story. Agency, however, requires that a plot structure be present to provide formal constraints. An open-ended story without a clear point of view may disrupt the plot structure too much, thus disrupting agency. However, transformation as variety is necessary to make interaction really matter. If, every time a player enters the dramatic world, roughly the same story events occur regardless of the actions taken by the player, the player's interaction will seem inconsequential; the player will actually have no real effect on the story.

One way to resolve the apparent conflict between transformation and agency is to note that agency is a first-person experience induced by making moment-by-moment decisions within a balanced (materially and formally) interactive system, while transformation as variety is a third-person experience induced by observing and reflecting on a number of interactive experiences. Imagine an interactive drama system that guides the player through a fixed plot. As the player interacts in the world, the system, through a number of clever and subtle devices, moves the fixed plot forward. Given that these devices are clever and subtle, the player never experiences them as coercive; the player is fully engaged in the story, forming intentions, acting on them, and experiencing agency. Imagine an observer who watches many players interact with this system. The observer notices that no matter what the players do, the same plot happens (meaning that roughly the same story events occur in the same order, leading to the same climax).

By watching many players interact with the system, the observer has begun to discern the devices that control the plot in the face of player interaction. This observer will conclude that the player has no true agency, that the player is not able to form any intentions within the dramatic world that actually matter. But the first-time player within the world is experiencing agency. The designer of the dramatic world could conclude — because they are designing the world for the player, not for the observer — that as long as the player experiences a true sense of interactive freedom (that is, agency) transformation as variety is not an important design consideration.

The problem with this solution to the agency vs. transformation dilemma becomes apparent as the player interacts with the world a second time. On subsequent replays of the world, the player and the observer become the same person. The total interactive experience consists of both first-person engagement within the dramatic world and third-person reflection across multiple experiences in the world. In order to support the total experience, the dramatic world must support both first-person engagement and third-person reflection; must provide agency and transformation as variety.

A dramatic world supporting this total experience could provide agency (and the concomitant need to have a plot structure providing formal constraints) and transformation by actively constructing the player experience such that each run-through of the story has a clean, unitary plot structure, but multiple run-throughs have different, unitary plot structures. Small changes in the player's choices early on result in experiencing a different unfolding plot. The trick is to design the experience such that, once the end occurs, any particular run-through has the force of dramatic necessity.

The story should have the dramatic probabilities smoothly narrowing to a necessary end. Early choices may result in different necessary ends — later choices can have less effect on changing the whole story, since the set of dramatically probable events has already significantly narrowed. Change in the plot should not be traceable to distinct branch points; the player will

not be offered an occasional small number of obvious choices that force the plot in a different direction. Rather, the plot should be smoothly mutable, varying in response to some global state that is itself a function of the many small actions performed by the player throughout the experience.

The Type of Experience Informed by the Model

This neo-Aristotelian poetics clarifies a specific conceptual experiment in the space of interactive stories. Specifically, the experiment consists of creating an interactive dramatic experience with the experiential properties of traditional drama, namely enactment, intensity, catharsis, unity, and closure. The Aristotelian analytic categories describe the structure (parts and relationships) of a story experience that induces these experiential properties. The way in which interaction has been incorporated into this model clarifies what is meant by interactive dramatic experience. Here, interaction means first-person interaction as a character within the story. Further, the essential experiential property of interactivity is taken to be agency. The interactive dramatic experience should be structured in such a way as to maximize the player's sense of agency within the story. The model provides prescriptive structural guidance for maximizing agency, namely, to balance material and formal constraints. So the conceptual experiment informed by this model can be more precisely stated as follows: build a first-person, interactive dramatic world that, in addition to the classical experiential properties of Aristotelian drama, also provides the player with a strong sense of agency.

Technical Agenda

In addition to clarifying conceptual and design issues in interactive drama, the neo-Aristotelian model informs a technical agenda of AI research necessary to enable this kind of experience.

The primary heuristic offered by the model is, again, that to maintain a sense of player agency in an interactive experience, material and formal constraints must be balanced. As the sophistication of the theme and plot of an experience increases, maintaining this

balance will require characters whose motivations and desires are inferable from their actions. In addition, these characters will have to respond to the player's actions. Believable agents, that is, computer-controlled characters with rich personalities and emotions, will be necessary. Additionally, in many cases (e.g., domestic dramas in which the plot centers around relationships, trust, betrayal, infidelity, and self-deception), language is necessary to communicate the plot.

In order to convey the formal constraints provided by the plot, the characters must have a rich repertoire of dialogue available. In addition, the player must be able to talk back. One can imagine a system in which the characters can engage in complex dialogue but the player can only select actions from menus or click on hotspots on the screen; this is, in fact, the strategy employed by character-based multimedia artwork and contemporary adventure games. But this strategy diminishes agency precisely by unbalancing material and formal constraints. The characters are able to express complex thoughts through language. However, the player is not able to influence their thoughts except at the coarse level provided by the mouse-click interactivity. Thus maximizing player agency requires providing at least a limited form of natural language dialogue.

The function of interactive characters is primarily to communicate material and formal constraints. That is, the player should be able to understand why characters take the actions they do, and how these actions relate to the plot. Sengers (this volume, 1998a) provides a nice analysis of how an audience-based focus on agents as communication requires changes in agent architectures. When the focus changes from "doing the right thing" (action selection) to "doing the thing right" (action expression), the technical research agenda changes (Sengers 1998b). The neo-Aristotelian model indicates that action expression is exactly what is needed. In addition, an interactive drama system must communicate dramatic probability (likely activity given the plot) while smoothly narrowing the space of dramatic probability over time. This means that story action must be coordinated in such a way as to communicate these plot-level constraints. Thus it is not

enough for an individual character's actions to be "readable" by an observer. Multiple characters must be coordinated in such a way that their joint activity communicates both formal and material (plot and character level) affordances. This requires a technical solution that blurs the firm plot/character distinction usually made in AI architectures for interactive drama (Blumberg and Galyean 1995; Weyhrauch 1997).

Façade: An Interactive Drama Guided by the Model

The author is currently engaged in a three-year collaboration with Andrew Stern to build *Façade* (Mateas and Stern 2000, Stern this volume), an interactive story world that seeks to carry out the conceptual and technical experiment informed by the neo-Aristotelian poetics. Together we will:

Create a compelling, well-written story that obeys dramatic principles, designed with many potential ways to play out.

Build artificial intelligence (AI) that can control the behavior of real-time-animated computer characters, to be used for performing the roles of all but one of the characters in the story.

Create a user interface that allows the player to move easily within the world, and converse and gesture with the computer characters.

Build AI that can understand a natural language and gestural input within the context of the story.

Build AI that can integrate the user's interactions into the space of potential plot directions and character behaviors in the story.

Collaborate with voice actors and animators to author spoken dialogue, character behavior and story events within the engine, to construct the finished story world.

Story Requirements

The story requirements describe the properties we wish our story to have. These are not intended to be absolute requirements; that is, this is not a description of the properties that all interactive stories must have. Rather, these requirements are the set of assumptions grounding the design of the particular interactive story we intend to build.

Short One-Act Play. Any one run of the scenario should take the player 15 to 20 minutes to complete. We focus on the short story for a couple of reasons. Building an interactive story has all the difficulties of writing and producing a noninteractive story (film or play) plus all the difficulty of supporting true player agency in the story. In exploring this new interactive art form it makes sense to first work with a distilled form of the problem, exploring scenarios with the minimum structure required to support dramatically interesting interaction. In addition, a short one-act play is an extreme, contrarian response to the many hours of gameplay celebrated in the design of contemporary computer games. Instead of providing the player with 40 to 60 hours of episodic action and endless wandering in a huge world, we want to design an experience that provides the player with 15 to 20 minutes of emotionally intense, tightly unified, dramatic action. The story should have the intensity, economy, and catharsis of traditional drama.

Relationships. Rather than being about manipulating magical objects, fighting monsters, and rescuing princesses, the story should be about the emotional entanglements of human relationships. We are interested in interactive experiences that appeal to the adult, non-computer-geek, movie-and-theater-going public.

Three Characters. The story should have three characters, two controlled by the computer and one controlled by the player. Three is the minimum number of characters needed to support complex social interaction without placing the responsibility on the player to continually move the story forward. If the player is shy or confused about interacting, the two computer controlled characters can conspire to set up dramatic situations, all the while trying to get the player involved.

Player as Protagonist. Ideally the player should experience the change in the protagonist as a personal journey. The player should be more than an “interactive observer,” not simply poking at the two computer-controlled characters to see how they change.

Embodied Interaction Matters. Though dialogue should be a significant (perhaps the primary) mechanism for character interaction, it should not be the sole mechanism. Embodied interaction, such as moving from one location to another, picking up an object, or touching a character, should play a role in the action. These physical actions should carry emotional and symbolic weight, and should have a real influence on the characters and their evolving interaction. The physical representation of the characters and their environment should support action significant to the plot.

Action in a Single Location. This provides unity of space and forces a focus on plot and character interaction.

Player’s Role not Over-constrained. The amount of noninteractive exposition describing the player’s role should be minimal. The player should not have the feeling of playing a role, of actively having to think about how the character they are playing would react. Rather, the player should be able to be themselves as they explore the dramatic situation. Any role-related scripting of the interactor (Murray 1998) should occur as a natural by-product of their interaction in the world. The player should “ease into” their role; the role should be the “natural” way to act in the environment, given the dramatic situation.

Story

Our story, which satisfies these story requirements, is a domestic drama in which a married couple has invited the player over for dinner. (Assume for the moment that the player’s character is male.) Grace and Trip are apparently a model couple, socially and financial successful, well-liked by all. Grace and Trip both know the player from work. Trip and the player are friends; Grace and the player have gotten to know each other fairly recently. Shortly after arriving at their house for

dinner, Grace confesses to the player that she has fallen in love with him. Throughout the rest of the evening, the player discovers that Grace and Trip’s marriage is actually falling apart. Their marriage has been sour for years; deep differences, buried frustrations, and unspoken infidelities have killed their love for each other. How the façade of their marriage cracks, what is revealed, and the final disposition of Grace and Trip’s marriage, and Grace and the player’s relationship, depends on the actions of the player. The story’s controlling idea: to be happy you must be true to yourself.

Interface

The story world is presented to the player as an animated, three-dimensional environment. The environment and characters within the environment are rendered in an illustrative style reminiscent of graphic novels. The player is able to move about this environment from a first-person point of view, gesture and pick up objects, and converse with the other characters by typing. The computer-controlled characters look directly out of the screen to gesture and talk to the player. The conversation discourse is real-time; that is, if the player is typing, it is as if they are speaking those words in (pseudo) real-time.

Story Structure

The story is structured as a classic Aristotelian plot arc. The AI plot system explicitly attempts to change dramatic values (e.g., the love between Trip and Grace, the trust between the player and Trip) in such a way as to make a well-formed plot arc happen. In the theory of (classical) dramatic writing, the smallest unit of value change is the beat (McKee 1997). Roughly, a beat consists of an action/reaction pair between characters. Beats are sequenced to make scenes, scenes to make acts, acts to make stories. The AI plot system contains a library of beats appropriate for our story. The system dynamically sequences beats in such a way as to respond to player activity and yet maintain a well-formed plot arc. For the player, each run-through of the story should have the force of dramatic necessity.

Explicit decision points, which would highlight the nonlinearity of the story, should not be visible. However, in multiple run-throughs of the story, the player's actions have a significant influence on what events occur in the plot, which are left out, and how the story ends. Only after playing the experience six or seven times should the player begin to feel they have "exhausted" the interactive story. In fact, full appreciation of the experience requires that the story be played multiple times. In *Façade*, our goal is to create an interactive story experience that provides the player with the agency to have an effect on the trajectory of the story, yet has the feel of a traditional, linear, dramatic experience.

AI Architecture

The architecture for *Façade* is informed by the neo-Aristotelian poetics of interactive drama, specifically by the technical agenda following from the poetics to:

Support the coordination of multiple characters' actions to communicate material and formal affordances; that is, the coordination of multiple characters in carrying out dramatic action, and

Support natural language dialogue so as to maintain player agency in an interactive story with a complex theme.

Again, the architectural basis for providing each of these capabilities is the smallest unit of dramatic value change, the beat.

Beats

In *Façade*, beats are architectural entities. A beat consists of: preconditions, a description of the values changed by the beat, success and failure conditions, and joint behaviors, to coordinate the characters in order to carry out the specific beat. Scenes have a similar structure, except that instead of having joint behaviors, a scene has a collection of beats it can use to try and make the scene happen. Preconditions and effects are used to first select a scene, and then, within the scene, beats. When a beat is selected, the joint behaviors

associated with this beat are activated in the characters. These joint behaviors extend the reactive behaviors of Hap (Loyall and Bates 1991; Loyall 1997) to include explicit support for multi-agent (in our case, multicharacter) coordination in a manner similar to the STEAM architecture (Tambe 1997). As the player interacts within the beat, she will influence the specific performance of the beat. Because the beat is trying to cause specific value changes, it may turn out that there is no performance of the beat that believably incorporates player interaction while appropriately changing the values. In this case the beat is aborted and another beat is selected.

Multicharacter Coordination

Most approaches to computer-controlled characters have been driven by a notion of strong autonomy; that is, by the idea that the character independently chooses moment-by-moment what action to take next, based on local state (what has recently happened in the world). But interactive drama requires that character action make sense globally as well as locally; all of a character's actions must "add up" to a consistent set of material and formal affordances, while still providing immediate response to player interaction. Rather than putting all the "character-ness" in the characters and all the "story-ness" in a drama manager, the architectural construct of the beat tightly binds character-specific and story-specific knowledge, just as character and plot are tightly related in the neo-Aristotelian poetics. Character behavior is now organized around the dramatic functions that the behavior serves, rather than organized around a conception of the character as independent of the dramatic action.

Natural Language Dialogue

Natural language understanding is a notoriously difficult AI problem; it is commonly agreed that building a system that is as good as a human being at participating in dialogue would be tantamount to modeling all of human intelligence. Thus, on first blush, our desire to have the player engage in unrestricted dialogue with the characters seems ludicrous. But here

the fact that what we really want is dramatic dialogue within a specific story context comes to the rescue. The player's dialogue and actions are additional material causes in the story (a contribution to the material out of which the story is being built), while the player's intentions are additional formal causes in the story.

Of course these material and formal contributions must be consonant with the author-provided chains of material and formal causation. So for natural language understanding, we don't need something that can glean the open-ended meaning out of arbitrary utterances, but rather something that interprets dialogue as contributions within a specific dramatic context. This is accomplished as follows: template rules map from surface text to a small number of discourse acts (things like "praise Grace," or "praise Trip," or "mention-topic marriage"). This is a many-to-few mapping, in which a huge number of surface productions get turned into a few discourse acts out of a small set of possible acts. Forward chaining rules then map the initial discourse acts to final discourse acts in a context-specific way. Discourse context is maintained by beats; the current active beat is the current active discourse context. Associated with beats are the beat-specific mapping rules that get added to the general rules when the beat is activated. When an utterance is not understood (no mapping rule is activated), recovery mechanisms try to mask the failure to understand while moving the story forward.

Conclusion

In this essay, Murray's concept of agency was integrated into Laurel's Aristotelian structural model to yield a proposed Aristotelian interactive poetics. This model illuminates the general conditions under which a user will experience agency in any interactive experience and provides design and technology guidance for the particular case of building interactive dramatic experiences. The design of *Façade*, an interactive dramatic world being built by the author and Andrew Stern, is informed by this interactive poetics.

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