CHAPTER 2

Interactivity

INTERACTIVITY IS WITHOUT DOUBT the most grossly misunderstood and callously misused term associated with computers. Everybody has been using the term for so long that people are quite sure of their appreciation of interactivity. The problem is that everybody seems to have a different conception of interactivity, and most descriptions are fuzzy and accompanied with lots of arm-waving.
Here's a prime example taken from a recent book, *Pause and Effect: The Art of Interactive Narrative*:

*Interaction can be described as many things. Catchwords abound: “engaging,” “immersive,” “participatory,” “responsive,” and “reactive.”*

*Interaction is a continuing increase in participation. It’s a bidirectional communication conduit. It’s a response to a response. It’s “full-duplex.” Interaction is a relationship. It’s good sex. It’s bad conversation. It’s indeterminate behavior, and it’s redundant result. It’s many things, none of which can be done alone. Interaction is a process that dictates communications. It can also be a communication that dictates process. It provides options, necessitates a change in pace, and changes you as you change it.*

Readers who are revolted by this description’s semantic smarminess may skip to the next section. If, however, you did not feel your gorge rising while reading the above, read on!

**How Wrong Art Thou? Let Me Count the Ways**

**Engaging:** It's true that interactivity is engaging, but then, so is a good movie. Movies aren't interactive, however. (I'll demonstrate this point a few pages further.) There's no value in characterizing interactivity by a trait (engagingness) widely shared by other media.

**Immersive:** This attribute confuses sensory completeness with interactivity. Immersiveness is an attribute of 3D graphics environments, which immerse the user in a visually complete and consistent space. But 3D graphics are neither necessary nor sufficient for interactivity; indeed, the two have little to do with each other. You can have highly interactive situations with pure text, and you can have truly crappy interactivity with a 3D engine.

**Participatory:** This attribute involves a common misunderstanding. A participant plays a part in some event. Being a part of the event does not imply any interaction: You can participate in the event by dancing along with it, but dancing to music is not an interaction. You can participate in pushing a car, but there's no significant interaction in pushing something. Interaction entails a lot more than simply being a part of something.
Responsive: This attribute hits on a fragment of the truth, but remains too vague to illuminate the nature of interactivity. Yes, interactivity requires responsiveness, but it’s the character of that responsiveness that conveys the value of interactivity.

Reactive: Again, this attribute is partially correct—but don’t make the mistake of confusing reaction with interaction. Reaction is a one-way process; interaction is a two-way process. Two people interacting are engaging in a series of reactions to each other. Reaction alone is only a subset of interaction, however. And intense reaction is not the same as interaction; you can’t turn reaction into interaction merely by turning up the volume. Reaction is to interaction as moving your left foot is to dancing.

The second paragraph of the opening quotation includes these bloopers:

Interactivity is a continuing increase in participation. This statement is flat-out nonsense. Is a "continuing increase in participation" like dancing faster and faster? Or better and better? Or singing louder and louder? If you figure out what it means, please tell me.

It’s a bidirectional communication conduit. As written, this sentence is silly; a length of copper wire in your telephone wiring is a bidirectional communication conduit. If you indulge the sloppy English, however, you can glean some indication that interactivity involves bidirectional communication, and this is indeed correct.

It's a response to a response. Not quite. The response itself is not the interaction; the interaction comprises the entire chain of responses and counter-responses.

It’s “full-duplex.” This statement is misleading: the correct term would be “duplex.” Any duplex communication is bidirectional and so meets the intent of the metaphor. Full-duplex communication permits simultaneous transmission in both directions, rather like two people talking at the same time. Half-duplex communication requires one side to shut up while the other side talks. Hence, half-duplex communication is just as sufficient for interactivity as full-duplex.

Interaction is a relationship. This statement is so stark, so lacking in further explanation or specification of the nature of the relationship, that it can be accepted only as a poetic expression; it certainly conveys nothing of any utility.
It's good sex. It's bad conversation. It's true that both sex and conversation are interactions, but assigning values of good and bad to them confuses the matter with irrelevant distinctions.

It's indeterminate behavior, and it's redundant result. This is drivel. It says nothing—but it sure sounds erudite, doesn't it?

It's many things, none of which can be done alone. The first clause might be improved with a tad more specificity, but the second clause does have some value. It says that interaction requires two agents, and that requirement shows up in my own definition.

Interaction is a process that dictates communications. It can also be a communication that dictates process. As a writer, I am offended by the sacrifice of clarity to cuteness. The use of the verb "dictates" is particularly unfortunate, as it's unclear whether the subject provides the content of the direct object or merely mitigates the action the direct object specifies. Why is the first sentence absolute and the second sentence tentative? And what relationship between process and communication do these sentences imply? I sure can't tell.

It provides options, necessitates a change in pace, and changes you as you change it. It's true that options are a factor in one step of the process of interaction, but the first clause gives no idea of how those options fit into the bigger picture. This first clause sounds to me rather like the statement "A computer has wires." Yeah, right—so what? The second clause falls outside the pale of relevant comment. What pace is the author talking about here? Why is the pace changed? Does it increase or decrease? Just what does this clause say? The third clause is equally pointless. Interactivity changes you, but every experience changes you. Staring at the wall changes you. Falling on your face changes you. Reading dreck changes you.

I have taken up your time trashing this piece because it represents a school of thought that I regard with alarm and disdain. This school approaches interactive storytelling in much the same manner that a married man regards his mistress: as a plaything, a toy not to be taken seriously. The hallmark of this school is long-winded phrasing and polysyllabic terminology that pretends to erudition through obscurity. Sloppy reasoning, slovenly wording, and the subordination of logic to cleverness are intellectual crimes.
My Definition of Interactivity

So, with the hope of appearing dressless, I offer this definition of interactivity:

A cyclic process between two or more active agents in which each agent alternately listens, thinks, and speaks.

In this definition, the terms “listen,” “think,” and “speak” must be taken metaphorically. A computer doesn’t listen in the strict sense of the term, but it does listen to its mouse and keyboard, metaphorically speaking. It may not speak, but it does something operationally similar when it displays output on its screen. And, of course, a computer never thinks in the true sense of the word, but it does process data, or calculate. I suppose I could have used the terms “accepts input,” “processes input,” and “outputs results,” but those terms are just as narrow-mindedly computerish as the earlier description’s terms are narrow-mindedly humanistic. With this proviso for the broader sense of the terms “listen,” “think,” and “speak,” the definition is a clear statement of exactly what constitutes interactivity.

The value of this definition lies in its reference to conversation, a well-known form of interaction. Our experiences with conversation offer useful guidance in software design. Obviously, the overall quality of a conversation depends on the particular quality with which each step (listening, thinking, and speaking) is carried out. Even more important is the way those three qualities combine. Many people assume that maximizing the quality of each step is all that’s required to achieve the maximum quality of interactivity, but the truth is a bit more subtle.

Consider: The overall quality of a conversation doesn’t depend on the isolated qualities of each step—each step must be executed well if the conversation is to succeed. Can you recall conversations in which your interlocutors weren’t listening to your words? In such cases, no matter how refined their thinking or eloquent their speaking, the conversations were an utter loss because without good listening, the interaction is ruined. In the same fashion, I’m sure you can recall conversations with people who were just too stupid to understand your point—and these conversations were just as frustrating and pointless as the previous type. Last, you can also recall conversations with a tongue-tied, inarticulate clod who simply couldn’t rub two words together to save his life. Again, the conversations were failures because without quality in that third step—speaking—the quality of the first two steps didn’t matter.
Therefore, Lesson #7 presents a fundamental and rarely appreciated rule of good interactivity.

**Lesson #7**

The overall quality of interactivity (human-with-human or human-with-computer) depends on the product, not the sum of the individual qualities of the three steps. You must have good listening and good thinking and good speaking to have good interaction.

My definition rejects a number of phenomena mistakenly held to be interactive. For example, reaction, no matter how intense, is not the same as interaction. If you’re watching a great movie, and your heart is pounding with excitement and your fingers trembling with emotion, you’re still not interacting with the movie because it’s not listening to what you are saying, nor is it thinking about anything. It is only speaking. It speaks well and powerfully—that’s good! But it is not interacting.

*Not so!* The viewer engages in active interpretation of the movie and, therefore, is not in a passive role.

This argument confuses the active/passive dichotomy with the interactive/reactive dichotomy. Reaction still has action inside it, but that doesn’t make it interaction. The audience can actively think, but that doesn’t change the fact that the movie isn’t thinking. The relationship between the movie and the audience is fundamentally one-sided: The movie does all the speaking, and the audience does all the listening and thinking. The audience does not *act on* the movie; it merely *reacts to* the movie.

"Interaction" requires that the "action" be "inter" (between or among) the agents. If the action all goes in one direction, it’s not "inter"; it’s "re."

I belabor this point because so many people balk at it. Perhaps they are influenced by the current status of "interactivity" as the latest buzzword and the implication that interactivity is somehow "New! Better! Hot! Cool!" My declaration that movies are not interactive becomes, by implication, an assertion that
they are "Old! Worse! Tepid!"—a suggestion that any knowledgeable person would reject. Hence, people reject the notion that movies aren't interaction.

Let me set this matter straight: I am not denigrating movies. I like movies. Some of my best friends are movies. I take a movie out to lunch every year on D.W. Griffith's birthday. Cinema is a highly developed medium that does its job very well. But we must render unto Caesar; every medium has its strengths and weaknesses. Movies aren't interactive, and interactive storytelling will never have the highly polished internal structure that movies have. They are two different media.

**Second-Person Insight**

All great artists have some special insight that gives their work profundity. A brilliant composer has an inner ear that can judge the feel of music. A painter has an eye for form, shape, and color. A deep insight into the language gives a top-notch writer the ability to come up with the perfect phrase. In the same way, the interactive artist needs a special kind of insight, an artistic acuity few others share. I call that acuity *second-person insight*. It's the ability to think primarily in terms of how an expression will be perceived by the audience.

*But every artist worries about how an expression will be perceived by the audience!*

True, but this isn't an artist's primary concern. An expository artist's main task is to get the expression right in the first place. A writer prepares a first draft and then attempts to reread it from the reader's point of view. In other words, the primary emphasis is on the expression itself, and only secondary emphasis is on the audience's perception. An artist whose work isn't understood by the masses doesn't seek the nearest tree with noose in hand. Whether it's a play, a painting, a movie, a novel, or a poem, if people don't understand it, that's their problem, not the artist's.
This is true for fine artists, but entertainers cater to the tastes of their audiences. What difference is there between the second-person insight you talk about and the sensitivity to the audience intrinsic to any good entertainer?

Entertainers need insight into how the audience will react to their creations; designers of interactive storytelling need to go even further and anticipate their players' imaginings and whims.

Therefore, second-person insight requires a fundamental and profound shift in attitude. You must go beyond the normal consideration of your audience's perceptions and make those perceptions the entire thrust of your efforts. You must develop the mental discipline to get out of your own mind and get into your audience's mind.

There are two facets to second-person insight. The first is empathy, but it goes much further than an emotional appreciation of the audience's state. It's not just the ability to empathize with their likely emotions, but the ability to empathize with emotions you wouldn't feel. You might design a corner of your storyworld with pathos in mind, but your player might react to that situation with anger. You must not reject or suppress that emotional response; you must anticipate and respect it. The second facet operates on an intellectual plane; you must be able to visualize the confusion audience members bring to the experience. What questions will be going through their heads? What assumptions will they be making? How will their minds mesh with the thinking in your work, and where will their thinking clash with yours? How can you minimize the likely clashes between your product and their thinking?

We spend so much time inside our own heads (24/7 for some people) that seeing the world through another's eyes is immensely difficult. Indeed, few people appreciate just how differently other people think. Teachers do; it's quite a job teaching your first class. You stand up in front of your students, reveal the truth to them in a few clean, simple sentences, and note with shock the utter incomprehension in their faces. So you repeat yourself with more elaboration, and behold the same blank stares. The art of teaching is mostly a matter of finding an infinite number of ways to communicate an idea. All good teachers have strong second-person insight, at least in the intellectual dimension.
A Model for Human Understanding

A detailed appreciation of the nature of human understanding will clarify the role of second-person insight and reveal the importance of interactivity. The starting point is the notion of associative memory. Information in the human mind is not stacked neatly in files and folders the way it’s organized inside a computer. No, the ideas are organized by association. For example, credit cards and bank accounts are perceptually different from money, yet most people associate credit cards and bank accounts with coins and bills, even though credit cards and bank accounts don’t contain actual coins and bills. You might imagine coins and bills moving into or out of your bank account, even though nothing is moving; it’s just numbers being added or subtracted. The mental associations spread out from there: Money flowing into accounts from your paychecks, flowing out to pay rent, gaining interest, being transferred to savings or invested in stocks—all an imaginary process carried out in your mind by associations between these concepts.

Many of these associations are natural and logical, but people put different weights on them. Perhaps your view of these associations puts your checking account at the center of a web of connections. Another person might use the credit card as the focal point. A third person, blessed with lots of financial savvy, might well refuse to think in terms of a financial center of gravity and instead connect all these ideas in a more egalitarian style, concentrating on the balance of the overall distribution of assets among stocks, bonds, T-bills, cash accounts, gold, and so forth.

Even more important for interactivity considerations is the idiosyncratic nature of many of these associations. Some people have completely different connections; some people have connections in common but put different weights on those connections. Someone who invested heavily in Enron will have strong emotional associations with stocks; another person who held lots of dotcom stocks will have different emotional associations. A person who recalls grandfather’s old safe with its pile of grand stock certificates will always associate stock with certificates; the absence of those certificates from modern stock trading might induce a certain nervousness not shared by others. And what if grandfather had often intoned in his deep, resonant voice “ Stocks, my child—you can’t go wrong with a solid portfolio?” How would that fond memory distort the web of associations in a person’s mind? And what if grandfather had died penniless?
It is this webwork of associations that constitutes human memory and human understanding. We each build our own webwork, node by node, connection by connection, as we learn and grow. Because we all live in the same universe, our webworks often share gross similarities, but the differences in our experiences ensure that each webwork’s particular structure is unique to its builder. This explains why we so often misunderstand each other. You and I might have a roughly similar overall understanding of the stock market, but your associations are so different from mine that we can come to stunningly different conclusions. You can explain your reasoning with determination and patience, but if my webwork doesn’t coincide closely with yours, I just won’t get your point.

These discrepancies of experience and understanding are just part of the human condition; we accept them, shrugging our shoulders and mumbling “De gustibus non est disputandum.” (“There’s no arguing about taste.”) If the audience rejects an artist’s work, the artist can dismiss them as obtuse cretins who simply cannot perceive his vision (webwork). Too bad for them.

The revolutionary value of interactivity lies in its ability to get past this limitation. Imagine the teaching process not as expository lecture, but as interactive conversation. The teacher probes the student’s webwork, noting carefully the deeper significance of the questions the student asks. The teacher uses that information to infer the structure of that webwork. Here is where the teacher’s second-person insight comes into play; a good teacher can quickly reconstruct the student’s webwork and identify the misplaced node or incorrectly weighted association. With the problem identified, the teacher can set to work shifting the student’s webwork. Initially, the student will resist, attempting to fit the teacher’s observations into the webwork in a manner that doesn’t stress or distort it. But the teacher presses, and suddenly the student’s webwork snaps into place. “Aha!” says the student.

This is the power of interactivity: Interaction reveals the discrepancy between the artist’s and the audience’s webworks and makes it possible for the artist to address that discrepancy. The result is an ability to reach people with tremendous impact. That’s what makes interactivity so powerful and what justifies interactive storytelling’s loss in narrative finesse.

To use interactivity effectively, you must deeply understand the human truth that people see and hear what they want to see and hear, and then you must come to
understand those desires. Being right is not good enough; you must somehow see your truth through other people’s eyes.

Second-person insight, like so many artistic gifts, involves a certain degree of mental aberration. To be of any value, the artistic expression must be unconventional, or at least non-obvious; at the same time, you must see your truth from many points of view. You must be able to see how your truth fits into many different webworks of knowledge. It’s a weird way to think, perhaps within the reach of only a gifted/cursed few.

Discipline
Another requirement for the interactive artist is an iron determination to subordinate your own desires and interests to those of your audience. You must push down the artistic egotism that glories in self-expression, replacing it with other-person perception.

So you want me to abandon my own artistic drive and instead just “give ‘em what they want.” Sounds more like Barnum and Bailey than Michelangelo.

Absolutely not. I’m not suggesting that you should abandon your own artistic interests; after all, that’s what you have to offer your audience. Yes, you want to speak your truth, but that’s the easy part; the hard part is making them hear it. Ergo, you must silence the shouts of your ego so that you can hear the whispers of your audience’s needs.

Perhaps a metaphor will help. Imagine the king of a medieval country deciding how much of the country’s wealth should be dedicated to his own comfort and pleasure. “As the king, I’m the most important decision-maker in this country, so it’s vital that I be cushioned against the distracting vexations and tribulations of life. It’s my job to concentrate on the highest-level decisions. It is better for all if I wear the finest clothes, eat the best foods, live in the most luxurious palace in the country. Some of the peasants might starve, but it’s all for the greater good.”

You can instantly see through the selfishness of this argument, but how does it differ from this one: “As the artist, my ideas are the most important in the world, so it’s vital that I be cushioned against the distracting desires and interests of my
audience. It’s my job to concentrate on the grandest artistic ideals. It is better for all if I heed my own voice, aspire to my own goals, and pursue my own interests. Some of the audience might not understand my work, but it’s all for the greater good.”

Wouldn’t this argument apply to every artist in history? If so, the success of the great artists of history would seem to refute this argument.

No, this argument doesn’t apply to all art—just to interactive art. Artists in other fields are perfectly justified in neglecting the needs and desires of their audiences because their audiences are so large that those needs and desires average out to meaningless gray muck. The great Greek sculptor Polyclitus once proved this point with a simple exercise. He showed a work in progress to a series of critics, asking each what could be done to improve the work. Then he carried out all their suggestions. The result was an ugly monstrosity. A work of expository art must have a single unifying vision; all those audience ideas and variations only muddy the waters.

Interactive art is profoundly different because it’s experienced individually by millions of people. Millions of people have seen reproductions of Michelangelo’s The Creation of Adam on the ceiling of the Sistine Chapel, and every single one of them has seen exactly the same thing because there’s just one image. But millions of people can play an interactive storyworld, and each one can experience something that nobody else has ever experienced. That’s the whole idea of interactivity: It responds to each person individually. Accordingly, you cannot hide your ego behind the argument that the audience’s needs and wishes are all averaged together. You must face each player individually.

**Degrees of Interactivity**

Interactivity is not a binary quantity like mortality (either you have it or you don’t); it’s an arithmetic quantity like weight (you can have more or less of it). My favorite example of a low-interactivity phenomenon is the refrigerator light. You open the door and the refrigerator light turns on; you close the door and it turns off. That’s interactivity! (The refrigerator light “listens” to the door switch being opened, “thinks” with the simple-minded logic of “Switch open, turn on
light" and "speaks" by turning on the light.) But it's dumb interactivity, hardly worth the candle. It might entertain a three-year-old for a little while, but even a three-year-old quickly outgrows the insipid interactivity of the refrigerator light.

At the other end of the scale, I can offer sex as an example of the most intense interactivity. Powerful lovemaking is the deepest interaction two people can have; is it any wonder that society wraps it in such grand robes? This provides a useful rule of thumb in Lesson #8.

Lesson #8

Your designs should aspire to the ideal of metaphorically having sex with your users.

Three factors determine the degree of interactivity: speed, depth, and choice.

Speed

Speed is the simplest of the three factors to understand. At the bottom end of the scale, slow applications destroy interactivity. Three examples demonstrate this point.

The first example is the spreadsheet. VisiCalc was the first spreadsheet for personal computers, and computer historians agree that this program did more to launch the PC revolution than any other. But VisiCalc wasn't the first spreadsheet—not by a long shot. There were plenty of spreadsheet programs for big mainframe computers, but they were batch-processing programs. You punched your data onto punch cards, submitted your job to the computer center, and then picked up your output the next day. You studied the printouts, made a few changes in your data, punched up the cards, and resubmitted the job. If you were lucky, or you stayed at the computer center until 3 a.m. when nobody else was submitting jobs, you could get your turnaround time down to a few hours, in which case you could run through half a dozen scenarios in one night.

VisiCalc wasn't as powerful as mainframe spreadsheets; after all, it had to run on a tiny microcomputer. Moreover, a PC's small screen showed only a fraction of a typical spreadsheet; the "real" spreadsheets at computer centers could print out their results on big sheets of paper so that you could see everything at once. VisiCalc had just one advantage over conventional mainframe spreadsheets: If
you changed a number, it processed the change immediately and presented the results in a flash. In terms of features, display, and overall computational power, VisiCalc was a loser. Its interactivity was thousands of times faster than mainframe spreadsheets, however, and that made all the difference in the world.

The second example is the BASIC programming language, developed at Dartmouth in the late 1960s. A number of languages that emphasized simplicity had been designed for students, but something quite unexpected made BASIC stand out: its interactivity. BASIC was an interpreted language, not a compiled language. Computer languages in those days, and most computer languages today, are compiled. You type up your program, submit it to the compiler (a program that translates your program into machine language), and then run your program to see how it works. The compilation step could take several minutes in the old days, so after submitting your program to the compiler, you would take a coffee break before returning to see how it came out. It probably had a few bugs, so you would fix one or two bugs, submit it again, and go have another cup of coffee. Repeat this process all day long and your eyes were bulging out of their sockets from the caffeine, and you had made only minor progress on your program.

But BASIC is interpreted: It’s designed to be run immediately, without compiling. You type up your program and run it; the results appear immediately. If there are bugs (usually the case in a first-cut program), you make a change right then, and run the program again. This process is so quick and easy that you never quit for a cup of coffee; you just sit in front of the computer, lost in intense interaction with it.

As a result, BASIC took the programming world by storm. Within just a few years, everybody was using it to teach students. It’s actually a crummy language, with all sorts of problems, and it teaches bad habits. The single factor of rapid interactivity, however, put it way ahead of everything else.

On a more modern note, the third example is the “World Wide Wait.” Remember how frustrating it was to wait for web pages to download! If you have a broadband connection, do you remember the sense of exhilaration the first time you sat down and worked with fast reaction times? That reduction in turnaround time made a big difference, didn’t it?
Lesson #9
Fast turnaround is always better than slow turnaround.

So far I have demonstrated only that moderately fast reaction times are better than very slow reaction times. What about the top end, where you're comparing fast reaction times with moderate reaction times?

Take a simple example: your word processor. When you type, the letters appear on the screen. How much delay is there between striking keys and seeing the letters on the screen? Most of the time, there isn't much delay, but my copy of Microsoft Word, running on a fairly fast Mac, does bog down when vertical scrolling is required. If my text runs over the line and spills underneath the bottom of the window, requiring vertical scrolling, there's a slight delay—perhaps half a second—while the screen scrolls. That slight delay is enough to throw off the stride of my typing; I often make typos during that period.

Or how about the task of scrolling from the top of the document to the bottom? If it's a lengthy document, you can wait a long time while the damn thing slogs through all the pages. My copy of Microsoft Word scrolls through about four pages per second. That's fast, but it's not fast enough. I wish it were faster. Don't you?

Depth
Some of the activities performed on computers are mindless. Searching through a few dozen websites to find a bit of information doesn't take a lot of concentration. A videogame might move at a frantic level, but it doesn't reach deep into the most important areas of your mentality. Other activities require more mental exertion and hence provide deeper interaction. A game of chess, for example, moves slowly but provides a deeper interaction than a game of tic-tac-toe.

By "deeper," I mean "penetrating closer to what makes you human." Computers can easily beat you at tic-tac-toe, but that wouldn't bother you because tic-tac-toe isn't that important. But what if your girlfriend ran away with a computer? "I'm sorry, Mortimer," she says, "but you're just not as exciting, not as sensitive, not as satisfying as R26a here. Sure, he's dull gray, but in every way that counts, he's a real man." Now that would strike you in the gut! This is an extreme case, but it serves to illustrate what I mean by penetrating closer to what makes you human.
Many dimensions of depth are available to the artist. Games confine themselves to a few of the simplest modalities of human cognition: hand-eye coordination, puzzle-solving, spatial reasoning, and so forth. For interactive storytelling, however, the foremost cognitive modality at play is social reasoning. The infinite complexity of the dynamics of human social relationships gives the interactive storyteller a bottomless well of material; the problem lies in getting some sort of algorithmic grasp of the problem. Reducing social machinations to mathematical form without compromising their richness, however, requires deftly combining artistic insight and mathematical fluency. This topic is addressed in the discussion on personality modeling in Chapter 11, "Personality Models."

Lesson #10
The overall quality of an interaction depends on its depth as well as its speed.

Choice
Carl Von Clausevitz, in his monumental work On War, noted that battle is to war as cash payment is to business. A businessman can make deals, write contracts, design and build products, obtain loans, and arrange foreign exchange, but in the end, cash payment is the decisive point; everything else is merely a preliminary to that moment. A general can obtain weapons, train troops, and maneuver around with clever strategy, but in the end, battle is the deciding moment. The same idea applies to the process of thinking: Choice is to thinking as battle is to war. You can philosophize and deliberate all day long, but the end result of all your mental gymnastics has to be a choice of some sort. Your choice might not seem like much of a choice (Do I eat lumpy oatmeal or pickled prunes for breakfast?), but it's still a choice, and all your mental processes are geared toward making a choice, even in the absence of clear information (When I hear footsteps behind me in the dark alley, do I run or ignore them?)

The quality of any interaction depends on the richness of choices available to the user. "Richness" breaks down into two factors:

- The functional significance of each choice
- Perceived completeness: the number of choices in relation to the number of possibilities the user can imagine
“Functional significance” means the degree to which a choice satisfies users’ desires, needs, and interests. For example, a word processor could offer a feature that randomly changes fonts and font sizes while typing, but this choice would be useless, so providing it doesn’t improve the interaction at all. A better example comes from those games that offer the player the opportunity to wander all over a huge region—but nothing interesting happens in the huge region. The poor player wastes hours of time exploring a dead space that offers no further opportunities for interaction. Sure, the game offers zillions of choices in terms of where the player might go, but none of those choices is functionally significant.

“Feature bloat” is an example of the reverse of this issue. Consider, for example, the Microsoft Word feature that allows you to add borders and shading to a document. I have never used this feature, nor do I expect to ever use it. It therefore represents a choice that has no functional significance to me. From my point of view, this choice is a liability in the program. Every time I consult the Format menu, my eye must glance at this option, and I must make a decision to ignore it. Of course, other users might love the feature, throwing in borders and shading all over the document. For them, this feature doesn’t constitute a liability—it offers an additional choice that they find functionally significant.

For the second factor, the absolute number of choices isn’t important; it’s the number of choices offered, compared to the number of possibilities the user can imagine. If the user has reached the climax of the story and must choose between leaving his girlfriend for the war or shirking his duty, having only two choices doesn’t detract from the power of the interaction; it’s difficult to imagine any other reasonable possibilities.

This brings me to the most important lesson in this book:

**Interactivity depends on the choices available to the user.**
It is my sincere hope that the font size successfully conveys the importance of this point. In case its significance remains in doubt, I offer a few variations:

- The choices available to the user determine the quality of the interactivity.
- If the user doesn’t have good choices, the interactivity stinks.
- Giving the user all the right choices makes perfect software.
- If the software is bad, it’s probably because it doesn’t let you make the choices you want.
- Denying choice to the user is the surest way to ruin the interaction.

**So What?**
All my ranting and raving about interactivity fails to address an important question raised by my Alter Ego:

*Who gives a damn about interactivity? Why bother with it?*

I can offer three reasons for getting on the interactivity bandwagon: It’s the medium’s basis of competitive advantage, it’s revolutionary, and it’s powerful.

**Incentive #1: Basis of Competitive Advantage**
One of the great rules of competitive behavior is to set the competition in the context most advantageous to you. In military science, this rule is expressed as the aphorism “Fight on the ground of your own choosing,” which means that a general should choose a battlefield best suited to the advantages and disadvantages of his own army. Political pundits always advise their candidates to “fight the campaign on your own issues, not your opponent’s.” Every MBA quickly learns to identify and exploit a company’s “basis of competitive advantage.” It’s the product or service that the company can supply better than anybody else. Concentrating your efforts on that basis of competitive advantage is the only way to profit.
The computer is a medium of expression, and the artist using this medium must understand its fundamental basis of competitive advantage: interactivity. Computers can do a lot of things well: graphics, animation, music, sound effects, and even text. Plenty of media can do these things better than computers, however. Sure, a computer can present beautiful images, but a printing press can still deliver better images for less money. A $10 calendar or a $20 poster delivers better imagery than a $1000 computer. If you want animation, you can rent a DVD for a few bucks, and it doesn’t take a computer to play that DVD—just a DVD player costing perhaps a tenth as much as the computer. You want sound or music? You can buy a CD player for even less than a DVD player. And let’s not even talk about the cost and quality of the text in a paperback book compared with what you get on a computer. In all these areas, the computer is second best, an also-ran. The computer might be a great development system for creating your masterpiece, but it’s never the delivery system of choice—not if you want to get the best possible presentation of your work.

Interactivity is another matter entirely. No other medium can deliver true red-blooded interactivity—not movies, not audio CDs, not DVDs, and certainly not books. When it comes to interactivity, computers are the only game in town. So if you truly want to get down and dirty with the computer, interactivity is what you want to concentrate on; that’s the basis of competitive advantage of this medium.

Incentive #2: Revolutionary
Hey, who wants to work in a tired old field like cinema, music, or literature? Interactive storytelling is so new that nobody has any idea of what it is or how it works. If you’re the adventurous type, it’s the field for you. Besides, opportunities to get in on the ground floor of a new medium don’t come along often. Literature was a hot new field about 3,000 years ago, and the printing press opened up a lot of opportunities 500 years ago. Movies were young and wild a century ago, radio was young in the 1930s, and television had its heyday in the 1950s. I was in on the ground floor of computer games in the early 1980s, and that was fun, but nowadays it’s just another case of Big Media, where the accountants have more sway than the designers. If you’ve got the creative itchies, interactive storytelling is the place to be.
Incentive #3: Power

Perhaps you’re the kind of artist who lusts for the power to influence people. You have something you want to say to the world, and you don’t want to whisper; you want to shout. You want your message to hit people in the gut, to knock their socks off, to take their breath away. Hearken back to the earlier section in this chapter, “A Model for Human Understanding.” Remember how I talked about the “Aha!” experience that people get when their work suddenly snaps into a new position? That’s what any great work of art does. With expository art, you get one chance to make something so powerful that in one swipe it forces the “Aha!” onto its audience. But with interactivity, you have a better chance of making that “Aha!” experience happen to your audience because they can test their webwork of ideas against yours. Isn’t that what you want?

Why not simply use the computer to enhance conventional storytelling?

The computer has been used to enhance storytelling for a long time; Jurassic Park, for example, couldn’t have been made without computers. Indeed, there’s an entire field of effort known as “digital storytelling” that attends to the problem of using computers to present conventional stories. Sure, the computer makes it possible to do the same old stuff faster and cheaper, and that’s great for accountants and creative ahdie-dudgies. So if you want to use the computer as a tool rather than a medium, be my guest—and don’t forget your Metamucil.

Wrapping Up

Now that I’ve pumped you up with revolutionary fervor, I shall cut you off at the knees with the warning that this revolutionary stuff is tough, sweaty, bloody business. The road ahead is no cakewalk; those who attempt to travel it will face innumerable difficulties. This book doesn’t walk you down that road; it can give you only general guidelines for staying alive as you stumble forward. Remember, it’s the choices you offer your players that determine the quality of the interactivity. If those choices permit players to fully engage their personal webwork of ideas with your own, then you can bestowed an “Aha!” experience on them.

CHAPTER 3
Interactive Storytelling

HAVING ESTABLISHED SOME BASIC concepts of stories and interactivity, the task now is to combine the two and ask "What is interactive storytelling? What lies at the conjunction of interactivity and stories?"

The plethora of terms used in discussing interactive storytelling indicates the confusion that surrounds the subject. Over the years, people have used "interactive story," "interactive storytelling," "interactive drama," "interactive narrative," "interactive fiction," and "interactive movies" to describe this field. I use "interactive storytelling" because it seems to be the most commonly used term.
Extrapolation from Games

When people are at a loss to understand a new phenomenon, they fall back on what they already know and describe the mysterious phenomenon in familiar terms. Therefore, the American Indians of the nineteenth century saw the railroad as an “iron horse.” Americans of the mid-twentieth century perceived the computer as a “giant mechanical brain.” In much the same way, people trying to grasp interactive storytelling fall back on games as the closest experience they can imagine. After all, interactive storytelling, like games, is played on a computer, is interactive, and is entertaining. So shouldn’t interactive storytelling be some sort of extrapolation of games?

I define a game as “a goal-oriented form of interactive entertainment in which one or more active opponents attempt to hinder the player’s attainment of his goal.” This definition could apply just as well to almost any interactive story-world. The game’s opponent is the same as the story’s antagonist. The player in the game is the protagonist in the story. The player has goals, and the opponent acts to hinder those goals. Clearly, in this definition, there’s no difference between a game and an interactive storytelling system.

The real world is a messy, complicated place, and all too often definitions run afoul of ugly reality. It’s easy to accept a mouse, a deer, or a lion as a mammal, but what about platypuses or whales? They’re mammals, too, but they certainly stretch the common notion of mammal. If you define food as a form of nutrition, does a diet soda with no nutrients constitute food? Most definitions of life have the very devil of a time dealing with fire, viruses, and prions.

So too with games. The broad definition I offered is academically correct, but the products that people actually play can be defined in much narrower terms. Here’s a definition for videogames as they are actually played:

A form of interactive entertainment involving simple and/or violent themes, relying heavily on cosmetic factors, in which players must exercise precise hand-eye coordination, puzzle solution, and resource management skills.

Although this definition doesn’t cover all games, it does a good job of covering most videogames. Perhaps it would be more accurately termed a characterization than a definition.
Now compare the reality of games with stories, piece by piece:

*simple and/or violent themes*

This piece shows a huge chasm between games and stories. Stories for young children are certainly simple, but the full range of stories is characterized by complexity of themes and story structure. Even the simplest movies, such as *The Terminator* or *Godzilla*, have more plot twists and turns than the most intricate computer game. The level of character development and plot intricacy demanded of stories goes far beyond what games can offer.

*rellying heavily on cosmetic factors*

Cosmetic factors certainly play a role in movies—lately computer graphics advances have made wondrous imagery possible. Yet movies that rely on cosmetic factors always fail at the box office. There were some fantastic dinosaur movies in the 1990s, but can you recall any of them other than the *Jurassic Park* series? The movie *Final Fantasy* explicitly relied on cosmetic factors; ads for the movie boasted that it sported the finest computer graphics ever built. It bombed. Movies will take advantage of cosmetic factors wherever possible, but they don't rely on cosmetics to sell the product. Cosmetics are a supporting element; the story comes first.

*precise hand-eye coordination*

It's true that hand-eye coordination plays a role for some characters in movies; the swordfights of the Jedi knights or the feats of any action hero come to mind. Physical prowess, however, never plays a major role in any genre but action movies, and even those movies often portray physical prowess falling prey to cleverness. The delicate damsel in *The Terminator* eventually crushes the robot in a machine, after spending the entire movie running and hiding from the monster. Luke Skywalker might have used physical prowess to destroy the Death Star in *Star Wars: A New Hope*, but his ultimate triumph came by begging his father, Darth Vader, to help him when the Emperor was torturing him to death. As far as stories are concerned, hand-eye coordination is for the kids.

*puzzle solution*

Plenty of stories focus on puzzles. All mystery stories are elaborate puzzles, and puzzles often play a role in action movies. Again, however, their role is always
subsidiary to the story, but most games include puzzles, and some games revolve around their puzzles. If you were to forbid game designers to include puzzles in games, the games industry would be crippled; if you were to forbid Hollywood from including puzzles in movies, it would lose a genre (mysteries), but little more.

*resource management skills*

Stories have always played fast and loose with resource management issues. Six-shooters always have more than six shots. In *The Lord of the Rings*, Aragorn, Legolas, and Gimli run all day long for days on end without food or water. And people never have to stop and go to the bathroom in movies! Yet games impose all manner of resource management problems on players. Stories don’t worry themselves with accounting problems (except as a secondary factor accentuating the stress on the protagonist), but game players revel in maintaining exactly the right amount of ammunition, food, and so forth as they play.

These observations point to the conclusion that stories and games, as they actually exist, are distant cousins at best. Visualizing interactive storytelling in terms of games is rather like describing a whale by using a camel as a reference. Sure, they’re both mammals, but they are so different that the effort is a waste of time and ultimately misleading.

*I have more to say on this matter in Chapter 7, “Simple Strategies That Don’t Work.”*

**Lesson #11**

*Interactive storytelling systems are not “games with stories.”*

**Interactivized Movies**

Some have pursued the notion that interactive storytelling is just like the movies, only the player gets to make all the dramatically interesting decisions. Wouldn’t it be wonderful to find yourself playing the role of Luke Skywalker in *Star Wars*, facing evil, becoming a Jedi knight, and swashbuckling across the galaxy?

This possibility has inspired a generation of would-be moviemakers shut out of Hollywood, desperate to prove their talents. The powerful tools the computer
makes available to low-budget operations encourage them to experiment, and while they’re at it, they figure they might as well toss in some interactivity. The inevitable result is what I call an *interactivized movie*: a product that is for all intents and purposes a movie, but has some interactivity tacked on.

To illustrate the core problem with interactivized movies, I’ve applied the concept schematically to *Star Wars: A New Hope*. Here is the sequence of key decisions that Luke makes during the course of the movie:

1. Agree to take Obi-Wan partway to Mos Eisley Spaceport?
2. Race home to discover the bodies of uncle and aunt?
3. Decide to accompany Obi-Wan to Alderaan?
4. Rescue Princess Leia?
5. Run away from Darth Vader?
6. Trust the force to blow up the Death Star?

Now I ask you: If you were playing Luke Skywalker and the key decisions were up to you, would you answer any of these questions in the negative? Of course not! So what decisions are available to a person playing a game based on the movie? None!

*I have more to say on decisions in Chapter 7.*

**Plot Versus Interactivity**

Comparing plot with interactivity leads many to conclude that there’s a fundamental conflict between the two. Academics prefer to use the term *agency* to refer to what most people call “interactivity” and *narrativity* to refer to what most people would call “storiness” (or “plot”). Here are some relevant quotations from various authorities:

*I will argue that there is a central contradiction within the idea of interactive narrative—that narrative form is fundamentally linear and non-interactive. The interactive story implies a form which is not that of narrative…*
In a narrative, this notion of significance seems inversely defined, since the ability to alter events in the plot actually works to diffuse the significance of the story. If viewers can change characters' actions with the wave of their hands, why should they care about the story? What indeed then is the story?^{2}

Some assert that the intersection of interactivity and story is empty:

The popularity of the concept of "interactive fiction" for computer-based stories and games is surprising. Is there anything compelling in our cultural history that suggests people want to participate in received stories? Are there stunning examples of successful interactive fictive experiences that have turned doubting Thomases into true believers? No.

It's the Myth of Interactivity again—recall that this myth tells us: Interactivity makes games better, and a game designer should try to make the experience as richly interactive as possible. And what goes for regular games goes for story games. This belief in the universal power of interactivity is what leads people to try to marry interaction and storytelling.^{3}

Dr. Glassner is correct in observing that interactive storytelling has never been done before, but then, lots of things had never been done before, such as interactive word processing, interactive database management, interactive spreadsheets, and, of course, the interactive internet. Until the advent of the computer, rich interactivity could be accomplished only by committing a human being to the process, and most of the time the human was too slow or too expensive to make the interaction worthwhile. To dismiss interactive storytelling on the grounds that it hasn't been done before is to reject the entire basis of the human intellectual adventure.

The difficulty in building interactive storytelling technology doesn't mean that interactive storytelling is impossible. There are theoretically sound reasons for the apparent conflict between interactivity and plot. The problems are best seen from the plot fiction's point of view. Plot creation is an enormously difficult task, demanding talent and creative energy. Permitting the grubby-fingered audience to interact with the carefully crafted plot will surely ruin its delicate balance. Knowing how difficult it is to get a plot to work well, writers insist that any audience intrusion into the process yields only garbage. If interactivity requires the audience to involve itself in the direction of the plot, clearly interactivity and plot are incompatible.
Adding to this apparent incompatibility is the attitude of the other side. The protagonists of interactivity tend to take a dim view of plot. The strongest example of this attitude is the possibly apocryphal story about id Software and the creation of Doom. There was, so the tale goes, some dispute within the organization about the proper role of the story in the game. One faction argued that there should be some story element to tie everything together. The other faction argued that Doom was to be an action game, pure and simple, and that they “didn’t need no stinking story.” Eventually, the anti-story faction won out, and the losers left the company. So the tale goes. Doom went on to become one of the most successful games in history, which confirmed (in the eyes of the gamers) the uselessness of storytelling.

So you have an apparent incompatibility between plot and interactivity. It would seem, from both theoretical considerations and the experiences of many failed attempts, that plot and interaction cannot be reconciled. This in turn implies that the dream of interactive storytelling is a chimera.

The central issue here isn’t new. In slightly different terms, some of the brightest minds in human history have struggled with this problem, often with illuminating results. Now, you might wonder how the problem of interactivity versus plot could have attracted the attentions of august thinkers in times past, but they were working with a bigger problem: the classic theological problem of free will versus determinism.

I’ll explain the connection using the terminology of Christian theologians who wrestled with the problem for centuries: God is omniscient and omnipotent. Every event that takes place in the universe happens according to His benevolent design. There are apparent evils in the universe, but they are all part of God’s greater intentions. But these God-willed events include the actions of people as well as natural phenomena. Thus, a terrible disaster is an “act of God,” but so is a murder. So how can human beings have any free will? They are pawns in the hands of an omnipotent God. If humans did have free will, God would be neither omnipotent nor omniscient, for then He wouldn’t control or know what we would do. But if He is neither omnipotent nor omniscient, how can He fit any definition of God? Therefore, free will clashes with determinism.

The connection with interactive storytelling should be obvious. Determinism in theology is analogous to plot in storytelling. The plot is the storyteller’s predestined plan for the story’s outcome. Free will is analogous to interaction, for how
else can players interact without exercising their free will? To make the theological analogy more explicit, view the storybuilder as the creator of a miniature universe. The storybuilder, for example, creates an imaginary universe populated by characters. Like some omnipotent god, the storybuilder decides their actions and predestines their fates. Conversely, the history of the universe is nothing more than a huge story written by God that we act out.

But wait! The game designer is also a god of sorts. He too creates a tiny universe and exercises godlike control over that universe. Yet free will seems to exist in the game universe. What’s the difference?

The difference lies in the intended experience. The game designer doesn’t specify what path the player takes to get to the victory condition, only the rules by which the player can attempt to do so. The game world is an orderly place with free will for the player. That’s because the designer’s control is exercised through the rules of the game world rather than the events of the game world. Therein lies the resolution of the dilemma of plot versus interactivity. A plot specifies events, not rules.

Therefore, the pessimists are correct: Plot and interactivity are incompatible. However, there’s something higher, more abstract than plot. Call it “metaplot,” if you like. It’s something like a plot, only it’s specified by rules, not events. And there’s no clash between interactivity and this kind of metaplot.

I’ll be expanding on these concepts in Chapter 5, “Abstraction,” after I have explained some points about abstraction.

It’s Different
The conclusion you must draw from these considerations is that interactive storytelling is a whole ‘nother ball game, a horse of a different color, a rare bird, a queer duck. You cannot apply tried and true expertise (from games or from stories) to this unprecedented medium. You’re navigating through uncharted waters, and the rules of thumb that work so well in familiar waters simply don’t work here.

So it’s back to basics—all the way back to the absolute fundamentals and working your way forward from there. The most fundamental rule is Crawford’s First
Rule of Software Design: Ask “What does the user DO?” So ask yourself “What should the user of an interactive storyworld be able to do?”

When you frame the question in that way, the answer is obvious: The user should be able to make lots of dramatically interesting decisions. Conversely, the user should not have to make boring decisions, such as when to go to the bathroom.

Three problems arise automatically from this answer:

- How do you generate enough interesting decisions?
- How do you pare away the boring decisions?
- How do you keep the storyworld interesting?

How Do You Generate Enough Interesting Decisions?

Consider the earlier example with Luke Skywalker: He made a total of only six dramatically significant decisions in the movie, and none is a particularly interesting decision because it’s implausible that Luke would have made any other choices.

This is a gigantic problem because stories as we know them are designed this way. At each step in the storyline, the character’s decisions must be so natural, so obvious, that the audience believes them. If a character violates the audience’s expectations, the story loses credibility. For this reason, storytellers bend over backward to create circumstances that make a character’s decisions believable.

For example, in *Star Wars: The Phantom Menace*, Queen Amidala violates Qui-Gon Jin’s instructions not to contact Naboo because she’s concerned about the fate of her people, but, more important, the storyteller has contrived a series of disagreements between her and Qui-Gon Jin that serve to undermine her willingness to obey his orders. In doing so, she gives away their location to the Sith Lord, who sends Darth Maul to capture her. This otherwise idiotic decision on her part had to be justified, so the storyteller contrived not one but three cases in which, with increasing rancor, she disagreed with Qui-Gon’s decisions.

Even if you could design algorithms that successfully create plot elements to justify otherwise unbelievable character decisions, you would be ill-advised to use this method, for it would rob the player of any sense of free will. Would you
really enjoy playing the role of Luke Skywalker when all your major decisions are forced on you by circumstances?

This discussion leads to one of the most important design factors in interactive storytelling. This lesson is difficult to accept because it contradicts one of the fundamental rules of conventional storytelling. The interactive storyworld must present the player with decisions that hang on a razor's edge, decisions that could readily go either way; the conventional story must give its characters decisions that can be made in only one way.

**Lesson #12**

*A storyworld is composed of closely balanced decisions that can reasonably go either way.*

You will immediately recognize Lesson #12 if you're familiar with information theory. This lesson amounts to nothing more than a dictum that the user be able to communicate significant information content to the software. If all decisions are heavily slanted in one direction, users don't get the opportunity to communicate much information reflecting their wishes. "You can have any color you want so long as it's black" is just another way of saying you have no choice, and "You may choose to fail to shoot down the enemy tie fighters" is a choice that isn't plausible because taking this choice ends the story right then and there.

Lesson #12 presents one of the most important conceptual shifts the storybuilder must make in moving from conventional stories to interactive storyworlds. A storyteller creates a conventional story by striving hard to create a sequence of entirely reasonable decisions that lead to an interesting and perhaps unexpected conclusion. The storybuilder, however, must banish such thinking and instead concentrate on decisions that could plausibly go either way. This concept is totally new in storytelling, so alien that it could excite suspicion or rejection. If you review the logic of the preceding paragraphs, however, you'll find that it's an inevitable conclusion.

Oftentimes the focal point of a story is a fundamental decision or change that a character must make. Darth Vader looks back and forth between the Emperor and Luke, trying to decide whether loyalty to the Emperor outweighs love for his son. The entire story builds up to that one decision. A storyworld must be equipped with dozens or even hundreds of such decisions. Many of these razor's-
edge choices will have less dramatic import than Vader's decision, but they must still carry some dramatic import if they are to be interesting to the player.

Clearly, the task of creating so many decisions is a gigantic one; stitching them together into a coherent whole is an even bigger task. Because these tasks are clearly the most difficult ones a storybuilder must face, they become the focus of the creative efforts in building a storyworld.

Lesson #13

*The storybuilder's most important task is creating and harmonizing a large set of dramatically significant, closely balanced choices for the player.*

**How Do You Pare Away the Boring Decisions?**

The negative side of this effort is eliminating dramatically uninteresting decisions. Actually, this task is easy to implement: You simply bundle them together as inevitable outcomes. Suppose, for example, that the villain gets the drop on the protagonist and cries "Drop your gun!" The protagonist can choose between dropping his gun or offering some kind of resistance. If the protagonist chooses to drop his gun, you don't need to follow that decision with verbs for the villain to command "Turn around and march to the dungeon!" and the protagonist to decide whether to comply. Having made the decision to surrender to the villain, these subsequent events are essentially moot. The storyworld need merely announce something like "The villain marches you to the dungeon, where he has imprisoned his other captives. You see this and that. Then the villain says some villainous words, and you decide to choose [Door A], [Door B], or [Door C].

In other words, you simply bundle together all the consequent events as part of the reaction to the protagonist's decision, jumping the story ahead to the next interesting decision. You do not saddle the player with endless trivial decisions about where his feet should be or whether he'll have one lump of sugar with his tea or two. There's no reason that an interactive storyworld can't have long chunks of noninteractive exposition—so long as these chunks are necessary to set up the context for the next stage of interaction.

Indeed, if the story is well designed, those long chunks of noninteractive exposition shouldn't be necessary. In a well-written story, the gap between the protagonist dropping his gun and finding himself in the dungeon should be minimized...
(unless, of course, the storyteller wants to introduce some interesting tidbit of information during the trip to the dungeon).

**How Do You Keep the Storyworld Interesting?**

Here lies the real meat of the storybuilder's task in interactive storytelling, and the essential task is to envision a dramatic *storyworld*, not a *storyline*. If you perceive your creation as a storyline, you are doomed to failure. If you have a story to tell, you should tell it by traditional means: cinema, literature, or theater. If you want to build an interactive storyworld, you must banish all notions of plot and storyline from your head and instead think in terms of a storyworld: a universe of dramatic possibilities, revolving around a central theme and exploring all the variations on that theme.

This topic cries out for an example. Consider, in the broadest terms, a storyworld about the Arthurian legends. It's a promising foundation to work on because a large and varied collection of stories already exists within this body of literature. If you start off thinking in terms of a single story, such as *Romeo and Juliet* or *For Whom the Bell Tolls*, your efforts are doomed because a single storyline dominates your thoughts. But the Arthurian legends offer all manner of different stories; it's impossible to think of these legends in terms of a single storyline. Yes, some dominant threads should show up in any interactive Arthurian storyworld: the love triangle involving Arthur, Guinevere, and Lancelot; the search for the Grail; the conflict with Mordred. But none of these primary themes must come out in any predetermined fashion, and the stories have other subthemes as well. It's still possible to have a worthy Arthurian storyworld without any love triangle or one in which Mordred reconciles with Arthur. This is the key to creating interactive storyworlds: multiple but connected themes. An interactive storyworld must present the possibility of romance, betrayal, battle, spiritual growth, and many other possibilities. Only in this way can the player explore a dramatically interesting universe. If the storyworld is confined to a single theme, such as a love triangle, it can develop and conclude in only a few ways.

So a simple version of the Arthurian storyworld includes the love triangle, the search for the Grail, and the final battle with Mordred. At the outset of the storyworld, young Mordred is seeking to unseat Arthur as king; Lancelot has just
arrived at Camelot; Guinevere has been Arthur’s queen for some years; and the Saxons are continually raiding the lands of Arthur’s people, killing peasants and stealing cattle. Arthur must organize war parties, lead counterattacks against the Saxons, fight battles against them, and drive them back. He must fairly distribute the spoils of war among his subordinates, rewarding those who fight well without antagonizing others. Mordred attempts to foment trouble by playing on the rivalries and resentments of those who believe Arthur hasn’t properly recognized them. Arthur must also adjudicate disputes among his people, which sometimes requires more diplomacy than justice. Meanwhile, Guinevere, as queen, is responsible for running Camelot, and her activities generate new difficulties demanding Arthur’s interventions. If Guinevere feels unsupported by Arthur, her resentment might flower into a relationship with Lancelot—assuming that he too is somewhat disenchanted with Arthur. Or perhaps it won’t. Either way, Mordred spreads tales besmirching Arthur’s reputation and Guinevere’s purity. The situation comes to a head when Mordred declares a rebellion against Arthur. The nobles choose sides, based largely on their respect and affection for Arthur. In a final battle, numbers will likely determine the outcome. Of course, if Arthur has maintained peace and prosperity for all, Mordred will never get his chance and Arthur will die in his bed, beloved of all.

This example shows only one way to build a storyworld. There are many other possibilities. The key realization is that a storyworld is a much larger creation than a story. This makes perfect sense when you realize a simple theorem about storyworlds: A single playing of any storyworld generates a single story. In other words, when a player goes through a storyworld, he produces a story. The player’s path is a linear sequence of events—a storyline. He could relate his experiences to another person, and the listener would perceive the player’s experience as a story. Different playings of the storyworld can yield many different stories, however. Hence, a storyworld contains zillions of incipient stories. Clearly, this creation is much larger than any single story. Building storyworlds is necessarily a huge task.
Atoms of Interactive Storytelling

No matter what technology is used for interactive storytelling, it must somehow assemble pieces into a complete story. There’s one exception to this simple statement, however. It’s possible to think of a computer story technology in which players make all their decisions at the outset of the story. Perhaps a player specifies some character traits for the protagonist; perhaps she answers a questionnaire. Whatever method is used, the player’s contribution is complete before the story begins. The software then creates a story using these specified parameters. This technology would certainly be interesting, but I wouldn’t accept it as interactive storytelling because it’s not interactive. The player speaks just once to the computer, and then the computer thinks it over and speaks back to the player with a long story. Interaction requires an alternating cycle of speaking, listening, and thinking. One step doesn’t cut the mustard.

For true interactive storytelling, however, you can be sure that the computer assembles the complete story out of little story fragments. This process is fundamental to computing. A computer sees an image as a big collection of little image fragments called pixels and manipulates the image by changing the individual pixels. A word processor sees a document as a collection of text characters mixed with a set of formatting commands. Deep inside the heart of every computer program is at least one central quantity or concept broken up into lots of tiny fragments, and the computer executes processes on this set of fragments to generate its output. This concept is absolutely fundamental to all computing; it applies to interactive storytelling just as well. The question, then, is “What are those little story fragments that the computer plays with?” In other words, what are the atoms of storytelling?

I use the term substory to describe the atoms of storytelling, but giving these atoms a name doesn’t answer the question. What are substories?

A substory is a single dramatic step; it’s an event or a change. It can be described in a sentence that specifies an event: “Jan realized the significance of the white dog” or “Andre lived happily in his new life.” This event can be tiny (“James sidestepped the descending sword and swung to his right”) or big (“James killed Thomas in a swordfight”).
Note that substories aren’t measured with a clock. That is, a substory cannot be a chunk of time. Stories don’t move forward in sync with the clock; they crawl through moments of intense emotion, and then leap forward hours, days, even years. Some substories can take place in a flash (“In an instant, Jan realized the significance of the white dog”); others can span years (“and so André lived happily in his new life, until one day…”).

These examples show that the data structure defining a substory is the same as that for a sentence. There must be a subject, a verb, and, most likely, a direct object. A substory probably also includes additional information in the form of prepositional phrases, adverbial phrases, and so forth. Its basic form, however, must be functionally similar to a sentence.

What about exposition? Every story has to provide context and background through straightforward exposition, and exposition doesn’t necessarily involve events. For example, “The cavern was astounding; on the walls, fist-sized jewels glistered in the light of their torches, while the path on which they walked was paved with golden bricks.”

This substory doesn’t fit the standard sentence template you described. It doesn’t represent any event or change. It’s a state. Doesn’t this invalidate your description of a substory?

I don’t think so. While working on the Erasmatron, I did encounter some problems with exposition because exposition must never be repeated. So I designed a special object called an exposition to describe some stage, actor, or prop when first encountered. But expositions never interfere with the flow of the story; the story development is independent of expositions. An exposition is, in effect, an unrepeatable substory.

The Ideal Scale of Dramatic Resolution
How big should substories be? At what level of dramatic resolution should players experience the storyworld? At one extreme, you could offer players the opportunity to make only the key decisions in the storyworld, such as the six decisions that Luke Skywalker made. This method would keep the storyworld small, but would be unsatisfying to players, as the storyworld wouldn’t offer many variations on the basic storyline. In the Luke Skywalker example, all six
decisions are simple binary decisions; therefore, the story has (theoretically speaking) only 64 possible outcomes, and in practice players would experience far fewer. After all, should a player decide not to take Obi-Wan partway to Mos Eisley, he returns home and is killed along with Uncle Owen and Aunt Beru. End of story. In truth, the original story has only eight variations, one of which matches the original movie. The other seven all end abruptly with the player being killed or living out the remainder of his life in obscurity. Therefore, restricting a storyworld to only gigantic decisions keeps things too simple to be interesting. Perhaps a simple system would be useful for children first experiencing interactive storytelling, but adults would find it dull.

At the other extreme is something like a stream of consciousness. Every experience, thought, and perception is treated as a substory and presented to the player. As with conventional stories using stream of consciousness, the result can be overwhelming, impossible to follow, and tedious.

My belief is that the size of substories is one of the fundamental artistic decisions every storyteller must make. Dramatic emphasis is achieved by using small substories; tedious material can be compressed into a single larger substory. The storyteller's ambition and effort determine the total number of substories in any storyworld. Tolstoy could have written War and Peace as a short story or regular-size novel, but he chose to write a behemoth. To each his own.

You could refer to traditional story forms to determine the ideal scale of dramatic resolution. In literature, you can choose between a sentence and a paragraph as your atoms. A typical novel has so many sentences, however, that using paragraphs is preferable; the number of paragraphs in a novel seems a manageable and appropriate number of decisions for the player to make. Again, you see that the length of a substory is variable; some paragraphs in a novel are short and some are long. Comics provide a particularly useful angle on the problem of determining the ideal scale. You can view a single frame of a comic as a substory; no other medium has such a cleanly quantifiable structure.

The conclusion is that the ideal resolution for interactive storytelling is somewhere between literature's sentence and paragraph. However, it's too early to close this topic; I suspect that creative artists will expand the boundaries of this concept.
What Can't Be Part of Interactive Storytelling

Some elements of traditional storytelling cannot be used in interactive storytelling. For example, you can't have what I call the "Third Option": the protagonist's stroke of genius that gives him a third option for escaping the sharp horns of a dilemma.

Here's a somewhat obscure example requiring some explanation. In the movie *Bless the Child*, a devil-worshiping cultist accosts a God-fearing little girl on the roof of a high building. He taunts her faith in God and forces a test upon her. Placing her on the ledge of the roof, he demands that she prove her faith. She must leap off the roof and trust God to save her, or she must reject God and declare her faith in the Devil by taking the hand of the cultist. A dark shroud of menace hangs over the scene; neither the audience nor the little girl can guess whether the cultist will throw her off the roof if she refuses to make the impossible choice he is forcing upon her. After a nerve-wracking pause, the little girl turns to the cultist, smiles, and says invitingly "After you!"

This scene actually contains two important lessons about interactive storytelling. First, consider the long logical train her response triggers. She is suggesting that the cultist should prove his own faith in his own god (the Devil) by making exactly the same leap he's trying to force on her. If the cultist is unwilling to leap off the building, how can he ask the girl to do so? He is revealed as a hypocrite, and his either-or choice is ruined. It's a complex logical twist that comes as a complete surprise to the audience. Although it's impressive work, I think you can discount the possibility of a computer coming up with a similar option. It's simply too hairy and requires too deep an understanding of human nature. Perhaps next century.

Second, even if an interactive storytelling system could concoct such a stroke of genius, it couldn't offer it to the player. If the system were to present the girl's choices in that form, the list would read:

- Leap off the building to your death.
- Reject God and embrace the Devil.
- Say "After you!"
This list doesn't present a true choice; only the third option is viable. This scene had great dramatic power in the movie, but it would fall flat on its face in an interactive storyworld. The trick lies in the fact that the audience couldn't have anticipated the third option. It was so clever that it took the audience by surprise. Suppose you restaged the scene, replacing the vulnerable little girl with, say, Arnold Schwarzenegger. Sure, the cultist might give Arnold only the two choices, but any audience could anticipate that Arnold would simply shout “Hasta la vista!” and mow down the cultist. No surprise there, and no drama to the scene.

A variation on the Third Option is the “Creative Option.” One early tester of my Erasmatron technology complained that it didn’t offer “creative options.” When I asked what that meant, she could say only that she wanted to be able to do things I might not have thought of. The problem is, how can I provide software to handle situations I haven’t thought of? There’s something of a Catch-22 here.

Another element that simply can’t be included in interactive storytelling is real-time play. This rule is a natural result of Lesson #12, which posits that a storyworld is composed of closely balanced decisions that could reasonably go either way. These decisions require thought from players; they cannot be made in a split second. If the story just keeps moving along in real time, however, players might have lost the opportunity to choose by the time they make up their minds. Therefore, the storyworld must come to a halt whenever it presents a decision to the player.

There have been some attempts at using unbroken time flow in interactive storytelling. The first was Mixed Emotions, by Rosa Freitag, produced in 1995. This product uses continuous video to tell the story of a woman facing problems in her marriage. During the course of the story, she occasionally pauses to think, at which time two icons appear over her head, one blue and the other red. The blue icon always indicates a morally conservative course of action; the red icon represents an adventurous or risky course of action. The player can click on one of these icons to guide the protagonist through the story. If the player doesn’t select an icon within a few seconds, the story proceeds using the blue icon as the default choice. The system did succeed in presenting real-time interactive storytelling, but only because the choices were so simple.
Andrew Stern and Michael Mateas have produced an interactive storytelling system (Fac/odjade) that operates in real time, but it too has restrictions. More on their technology in Chapter 19, “Story Generators.”

Wrapping Up

- Interactive storytelling systems are not “games with stories.”
- There’s a fundamental conflict between plot and interactivity, but not between metaplot and interactivity.
- A storyworld is composed of closely balanced decisions that can reasonably go either way.
- The storybuilder’s most important task is creating and harmonizing a large set of dramatically significant, closely balanced choices for the player.
- The fundamental atom of interactive storytelling is the substory, which is best imagined as a sentence.

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