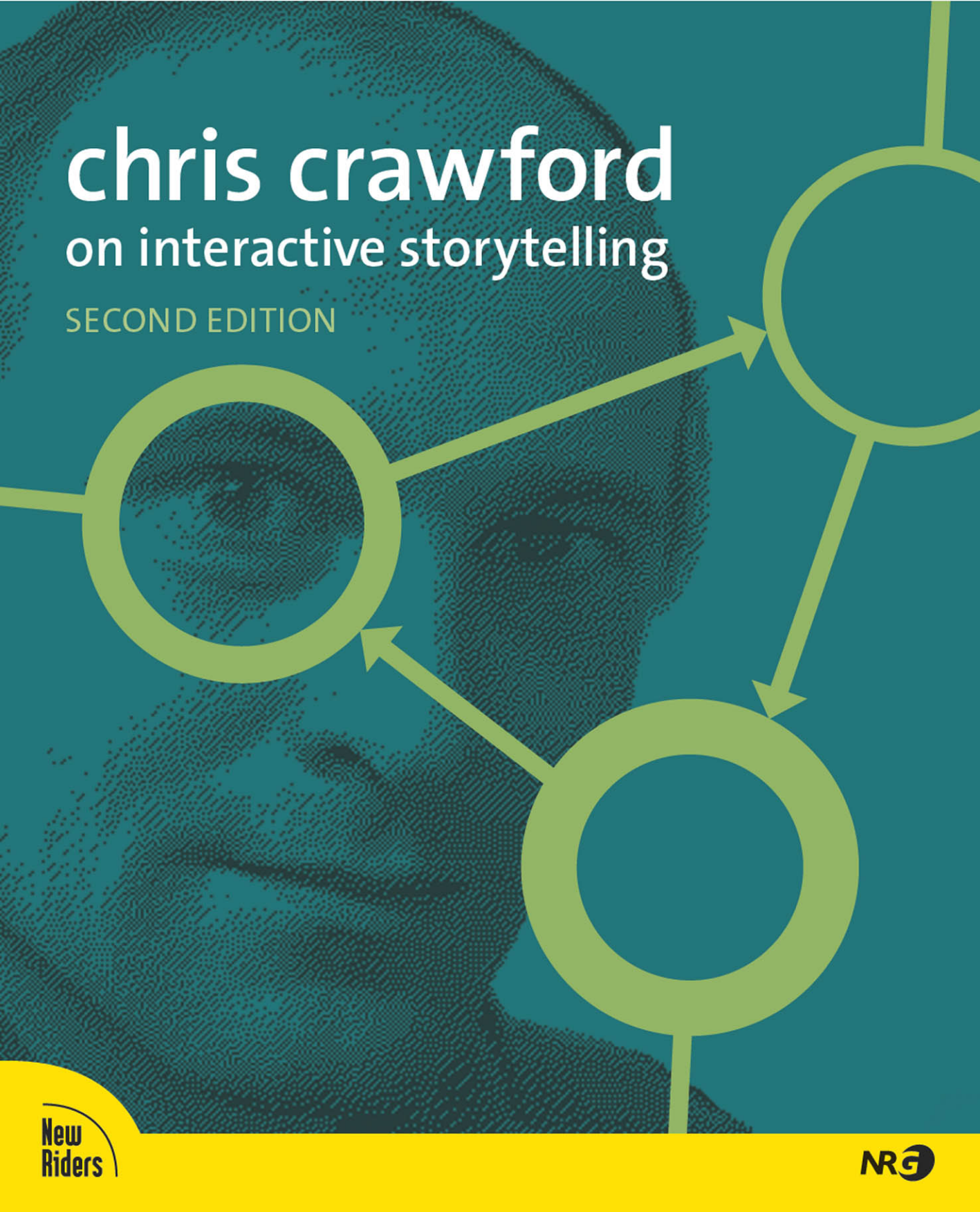
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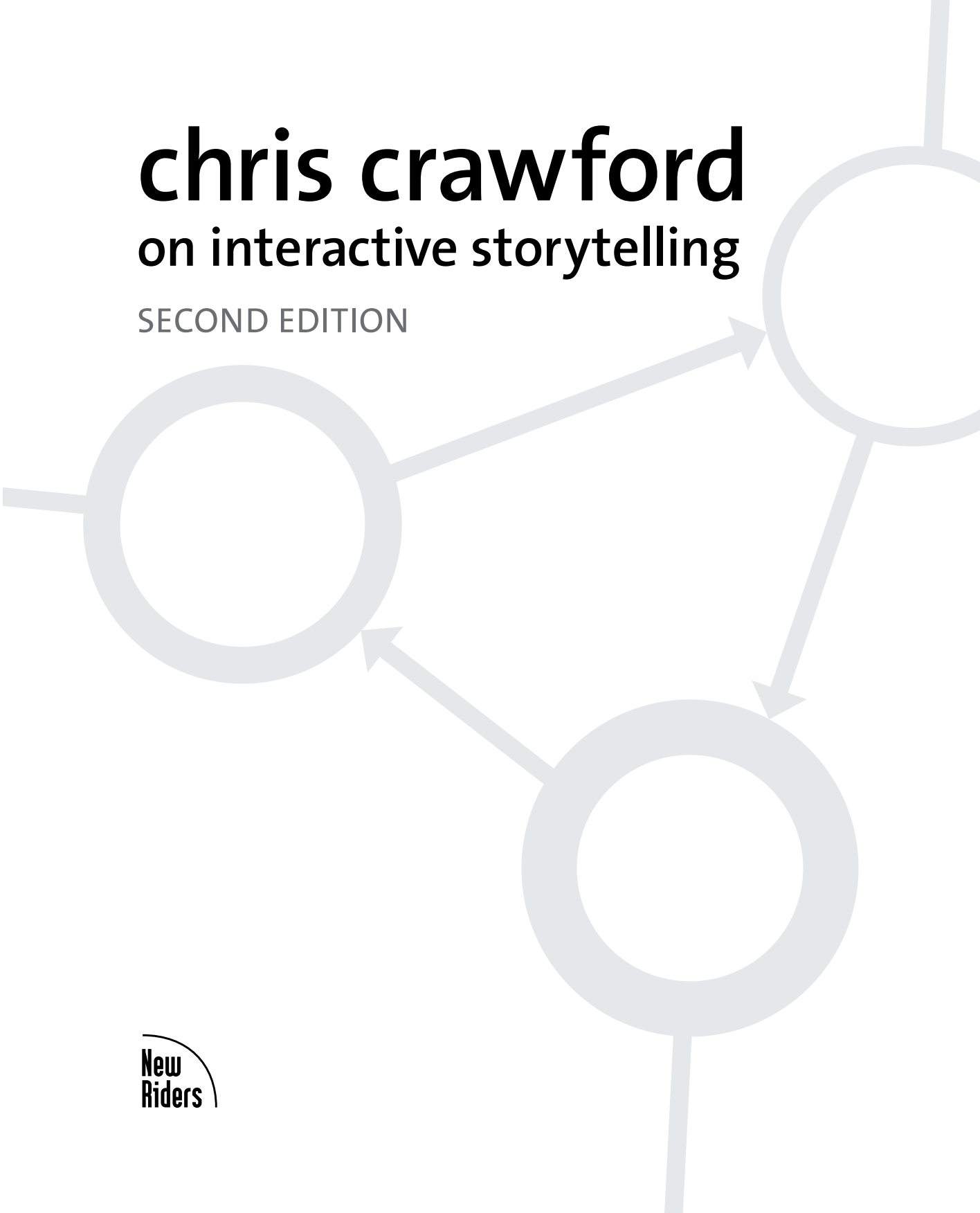

New Riders

Chris Crawford on Interactive Storytelling, Second Edition
Chris Crawford

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I dedicate this book to the Storytron development team:

Louis Dargin, Facundo Dominguez, and Laura Mixon,

who pushed the technology of interactive storytelling to new heights.

Bio

Chris Crawford earned a Master of Science degree in Physics from the University of Missouri in 1975. After teaching physics for several years, he joined Atari as a game designer in 1979. There he created a number of games: *Energy Czar*, an educational simulation about the energy crisis; *Scram*, a nuclear power plant simulation; *Eastern Front (1941)*, a wargame; *Gossip*, a social interaction game; and *Excalibur*, an Arthurian game.

Following the collapse of Atari in 1984, Crawford took up the Macintosh. He created *Balance of Power*, a game about diplomacy; *Patton Versus Rommel*, a wargame; *Trust & Betrayal*, a social interaction game; *Balance of the Planet*, an environmental simulation game; and *Patton Strikes Back*, a wargame. In 1992, Crawford decided to leave game design and concentrate his energies on interactive storytelling, a field that he believed would become important. He created a major technology for interactive storytelling systems, patenting it in 1997. He is now commercializing his technology at his company website at storytron.com.

Crawford has written five published books: *The Art of Computer Game Design*, now recognized as a classic in the field, in 1982; *Balance of Power* in 1986; *The Art of Interactive Design* in 2002; *Chris Crawford on Game Design* in 2003; and *Chris Crawford on Interactive Storytelling* in 2004.

He created the first periodical on game design, the *Journal of Computer Game Design*, in 1987. He founded and served as Chairman of the Computer Game Developers' Conference, now known as the Game Developers' Conference.

Crawford has given hundreds of lectures at conferences and universities around the world, and published dozens of magazine articles and academic papers.

Crawford served as computer system designer and observer for the 1999 and 2002 NASA Leonid MAC airborne missions; he also has done some analysis of the resulting data. He lives in southern Oregon with his wife, 3 dogs, 7 cats, and 16 ducks. You can read more about him on his website at www.erasmatazz.com.

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Introduction

Interactive storytelling is a young field; first conceived in the late 1980s and first experimented with in the 1990s, it did not attract substantial attention until the new millennium. By 2010 it had become a hot topic. The field's youth has endowed it with a diversity of ideas and a cacophony of discussions. Like the proverbial elephant, everybody perceives it from his or her own vantage point. Moviemakers see it as a form of cinema, video-game people claim it as an extension of their own field, computer scientists think of it as part of the broader field of artificial intelligence, and experts in the art of improv consider it to be the computerization of their skills.

The truth is that interactive storytelling is not an extension of or variation on any of these fields; it must be approached as something new and unique. An appreciation of all these fields (and several more) certainly helps you appreciate the challenges of interactive storytelling, but to use one of these fields as a platform from which to launch your thinking is a grievous mistake. There is no launching point; you must hurl yourself into the raging waters and kick, paddle, and swim through as best you can.

Many fields of study are based on combinations of other, more fundamental fields. A good moviemaker must understand storytelling as well as optics, the human visual system, and camera technology. A good game designer must understand programming, games, and user interface issues. Interactive storytelling is no different; indeed, it stands on the shoulders of many fields, including games, cinema, storytelling, programming, and mathematics. Because interactive storytelling is a new and poorly understood field, this book approaches it from many different angles. It also devotes space to negative viewpoints; you can better understand what interactive storytelling *is* if you appreciate what it *isn't*.

I wrote the first edition of this book in 2004; in the intervening years, everything has changed except the underlying principles. This edition of the book explains those principles with the greater clarity I have learned from eight years of work on interactive storytelling. This second edition also presents more technical details that will surely be superseded within 20 years, by which time I will have prepared a third edition.

A cautionary note: My writing style is unconventional and might set you aback. (Here I express my gratitude to my editor, Robyn Thomas, for reining in my worst excesses, straightening out my tangled prose, and saving me from my misanthropic tendencies.) My objective in writing is not to impress you with my erudition, but to help you understand a difficult subject. I will goad you to think about the material by presenting ideas in their strongest, starkest terms. I will not waste your time with qualifiers and mush-mouthing nothingburger pap. You're smart enough to fill in the exceptions for yourself. If you find yourself in agreement with everything in this book, you haven't been reading closely enough.

I'd rather serve up chili than oatmeal.

My Interactive Storytelling Journey

The starting point for my interactive-storytelling quest came way back in 1983 with the realization that when games finally matured as a medium of artistic expression, they would have to be about people, not things. All other artistic and entertainment media are fundamentally about people, but games were unique in their obsession with things. In games, you chase things, things chase you; you shoot things, and things shoot at you. You search for things, acquire things, navigate things, move things, destroy things—it's always things, things, things and never any dramatically significant interactions with people in games. That, I decided was the fundamental difference between games and other media, and that was the central problem I had to tackle.

What would a game about people look like? I came up with a simple idea for a game based on interpersonal interactions. It was called *Gossip*, and all the player did in the game was talk to people on the telephone about who likes or dislikes whom. There were eight characters on the screen; the player was the one in the upper left (**Figure 1**).

The basic concept of the game was to call up other people and gossip about who feels what about whom. By carefully calibrating your statements to the preferences of your listener, you could build up your popularity.

Sadly, *Gossip* came out not long before Atari collapsed, so it was a commercial failure.

FIGURE 1 *Gossip,* my early game about people

I made my next attempt in 1987 with the design of *Trust & Betrayal*, a strange game that I still consider to be the finest, most creative game I ever designed. By then, I had identified the central problem for games about people to be the difficulty of language. You really can't have much of an interaction with other people if you can't talk to them, so I decided that I had to come up with a language system (**Figure 2**).

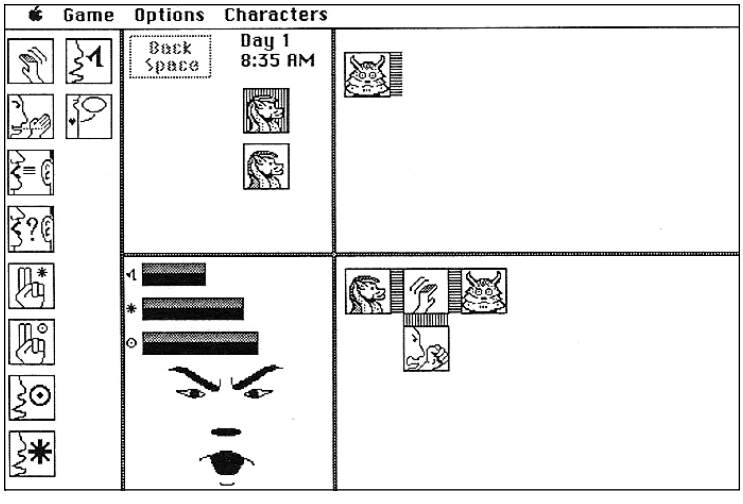

FIGURE 2 *Trust & Betrayal,* my self-professed finest and most creative game

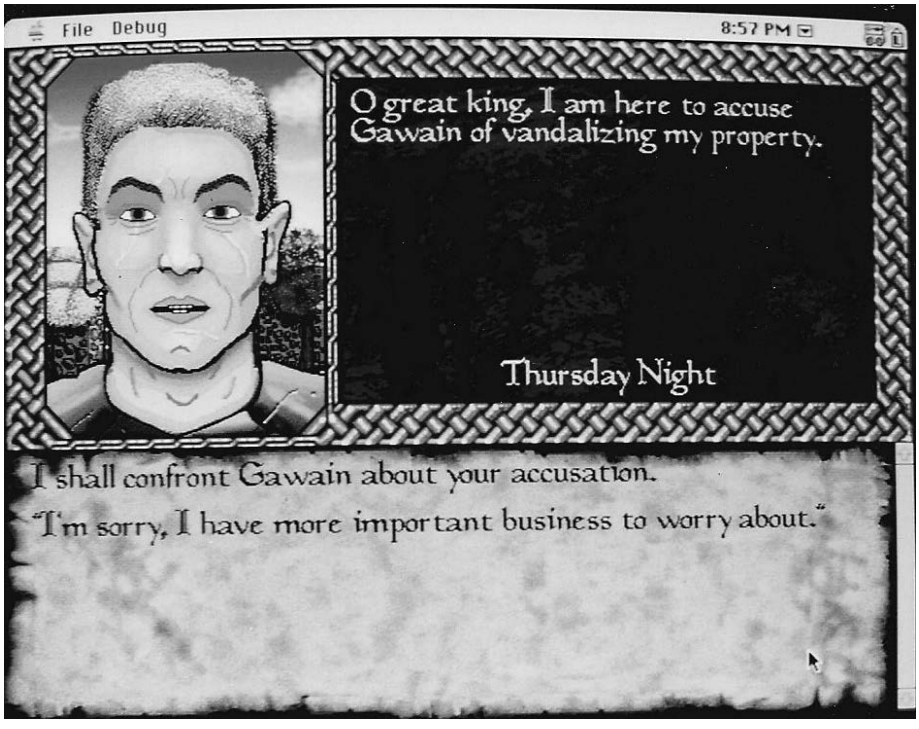

FIGURE 3 *Le Morte D'Arthur,* a game that included a graphics system for presenting individual character faces that could have different emotional expressions

This game's ploy is that it takes place on an alien world where different intelligent species communicate with each other by means of a telepathic language. I created a simple language so I could represent it with a set of 87 icons. This game also saw my first use of an inverse parser, a personality model, the emphasis on verbs, face displays with emotional expressions, and interstitial stories. It, too, was a commercial failure.

But I wasn't about to give up. In 1992, I began working on *Le Morte D'Arthur* (**Figure 3**), a game about the Arthurian legends. For this game, I developed my first general-purpose interactive storytelling engine. I also came up with a graphics system for presenting individual character faces that could have different emotional expressions.

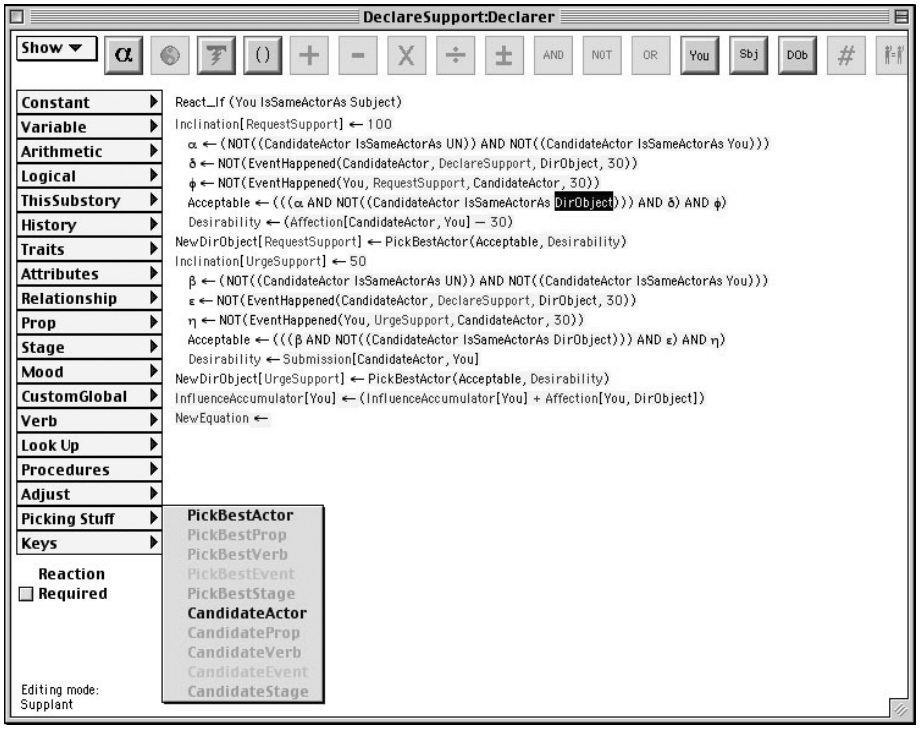

FIGURE 4 Erasmatron, a system for computer users to create their own storyworlds

Sadly, I couldn't get funding to complete the game.

A few years later, I got funding to develop an interactive storytelling system with which typical computer users could build their own storyworlds. I got carried away and built a huge system, called Erasmaton, that included a scripting language, a development editor, a powerful storytelling engine with advanced linguistic capabilities, and even an editor allowing the user to design unique faces for each character (**Figure 4**).

There was only one hitch: The system was far too complicated for anybody to use, much less a typical user. We built some interesting storyworlds with it, but they were incomplete and just weren't entertaining. Erasmatron flopped.

In 2007, I recruited Laura Mixon, Louis Dargin, and Facundo Dominguez to build the next generation of my technology, dubbed Storytron (**Figure 5**). The Storytron technology was a huge leap forward and it pioneered many of the technologies presented in this book. Indeed, the stuff we had working was more powerful than what I describe here.

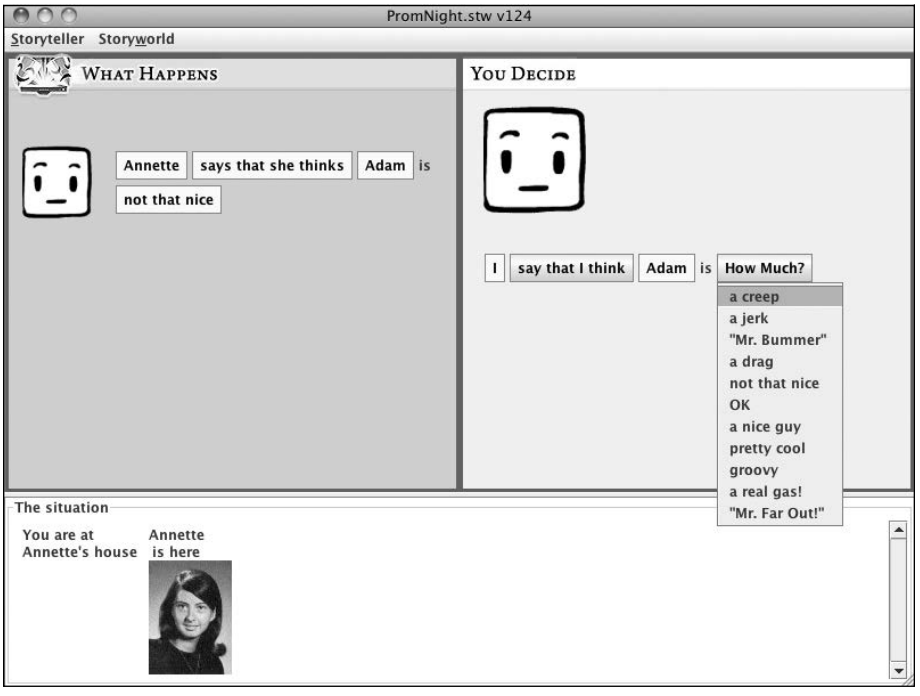

FIGURE 5 A game created in Storytron

The problem with Storytron was the same problem that killed Erasmatron—it was too complicated. Despite an avid following of determined storyworld authors, nobody was able to build a complete, working, entertaining storyworld. I built one, *Balance of Power 21st Century*. It stank. We gave up on Storytron in 2010.

Since then, I've continued thinking about interactive storytelling, and have carefully digested the many mistakes I made with previous efforts. I am resuming work on the project, with some major new design concepts. With so many failures behind me, how can I go wrong?

CHAPTER 4
Abstraction

THE PROBLEM OF PLOT VERSUS interactivity, discussed in Chapter 3, sometimes takes another form: control versus interactivity. In its simplest form, the problem is phrased as follows:

If the story is to be truly interactive, then the player must be able to change the story. But, if the player changes the story, then the artist cannot control its development and the player will likely ruin the story.

The solution to the problem is, in a word, abstraction. Let's look at some examples of how abstraction has solved some analogous problems.

Justice

The problem of exercising control over a complex system is an old one, and in every case, we find that the solution has always been to resort to higher levels of abstraction. For example, let's consider the problem of providing justice to society. In small societies, justice can be provided by a single chief. The disputants present their case to the chief, who hears each side and then pronounces judgment. All very simple. But as societies grow, the number of cases grows and the chief—now known as king—finds himself overwhelmed with an impossible caseload. The solution is to delegate his powers of adjudication to lower officials called judges. This solution, however, creates a new problem: How is the chief to maintain control over the judges to ensure justice?

The solution is law. The chief declares the rules under which the judges will operate, and those rules are then applied to all concerned. The solution is not perfect. Judges can still apply the laws unevenly (if they are biased), misinterpret the laws, or even apply the wrong law to a given situation. But disputants who believe they have been shortchanged can appeal to the king in hope of a correct application of the law.

In this manner, the king can continue to exercise control over the society. The king gives up direct control of justice for indirect control. The king's power is exerted through the laws that are applied by the judges. The ultimate power still resides with the king, whose laws control every aspect of daily life. The king may not be looking over the shoulder of each of his subjects, but he still retains indirect control.

Conflicting Laws

The problem with the use of law is not so much the application of law as the formulation of law. The king must bring great insight and wisdom to bear in creating his laws. Here's an example from the first recorded set of laws. Nearly 4000 years ago, Hammurabi of Babylonia promulgated a set of 281 laws. Here are two of them:

- If anyone steals the property of a temple or of the court, he shall be put to death, and also the one who receives the thing from him shall be put to death.

- If anyone steals cattle or sheep, or ass, or pig, or goat, if it belong to a god or to the court, the thief shall pay thirtyfold for it; if they belonged to a freed man, he shall pay tenfold; if the thief has nothing with which to pay, he shall be put to death.

These two laws contradict each other; one says that the punishment is death, the other that it is 30 times the value of the stolen item. During the process of compiling 281 laws, Hammurabi forgot about the first law when he wrote the second law. It's important that laws not contradict each other. The larger the body of law, however, the harder it is to be certain that a new law doesn't conflict with an existing law.

All-Encompassing Laws

Another problem in formulating laws is that they must properly address every possible situation in which they might be applied. There's an old, apocryphal story about the early days of the Environmental Protection Act. A provision of the law was that if a company wanted to build a factory in an air pollution administrative district, it had to compensate for any pollution the factory would make by paying another polluting company to install equipment that would reduce its pollution by the same amount that the first business was adding. In other words, if you're going to emit pollution, you've got to do something to cancel it out.

Sounds like a good idea, doesn't it? The law doesn't punish owners of old polluting factories; it requires builders of new factories to install the equipment to reduce pollution in the older factories. No new pollution is added to the air district.

Then one day a businessman in Louisiana decided that he wanted to build a furniture factory. Unfortunately, his factory would emit a small amount of heavy hydrocarbons from the varnish and other coatings necessary to manufacture the furniture. So he searched for another factory in the same air district that he could upgrade. There were no other factories because it was a poor region with no industry—but the law must be obeyed. So when some bright fellow pointed out that trees emit heavy hydrocarbons just like varnish, the businessman had his solution. He bought a large tract of forestland and cut down all the trees. Problem solved.

Obviously, it was not the intent of the U.S. Congress that forests would be cut down in the name of the Environmental Protection Act, but the wording of the law wasn't careful enough to provide for this situation.

This problem of abstracting reality to terms that can be addressed in a law haunts all lawmaking processes. Courts will sometimes annul laws that are so poorly worded that they permit entirely unintended results. It's a tough problem.

The same thing applies to interactive storytelling: If your algorithm doesn't consider all the possibilities, you'll get a nasty screwup.

Science

Let us now turn to the biggest, most complex system of all: reality. Our efforts to understand reality have yielded an increasingly complex intellectual system: science. At first, science was a great mass of disconnected tidbits of information—essentially, random fragments of truth that people had noticed over the generations. The big step forward was the realization that different tidbits of information could be connected together to form a more coherent, albeit more abstract, whole.

For example, people had long been aware that some stars in the sky moved in relation to the other stars. Some moved faster and some moved slower, and they all seemed to move along the same path. Ptolemy assembled these disparate facts into a coherent whole and suggested that these objects (the planets) circled around the earth. This was an abstraction; nobody could actually see the evidence directly. But this more abstract view of the solar system tied together a great many observations and, therefore, provided a better explanation.

That trick—finding an abstraction that ties together simpler truths—has been the basic strategy of science ever since. Chemistry stumbled forward, building up a mass of knowledge about how various chemicals reacted with each other, until the idea of atoms forming molecules took hold and explained it all in a more powerful, more unifying, and more abstract fashion. With the development of the theory of quantum mechanics, scientists were able to explain the mechanics of chemical reactions, thereby obtaining a more broadly encompassing view of chemistry—at the expense of abstractions that are more difficult for mere humans to understand. With the development of biochemistry, chemistry and biology were merged at a

fundamental level that gave us insights into the genetic processes that govern all living systems—but again, the price we paid was greater abstraction.

Meanwhile the physicists continued their search for the fundamental laws of the universe. Isaac Newton unified all motion under three simple laws. James Clerk Maxwell unified electric theory with magnetic theory and light to demonstrate that all light is an electromagnetic wave. Einstein unified electricity with magnetism by showing that magnetism is a relativistic effect of electricity. Chemistry was further unified when physicists showed that all atoms are combinations of electrons, protons, and neutrons. In probing the nature of these three particles, physicists discovered a whole zoo of new particles—and then reduced them further by showing them to be composed of yet more fundamental (and even weirder and more abstract) particles called quarks. Meanwhile, theoreticians struggled to reduce the universe to its most fundamental constants and equations, making slow and jerky progress. The end result of all these labors is a highly abstract system of ideas that explain the workings of the universe—but this system is so abstract that it lies beyond the reach of all but a few specialists.

Mathematics followed a similar course. Starting with simple counting combined with simple addition and subtraction, people developed the ideas of multiplication and division, and arithmetic was born. Algebra, a more abstract approach to mathematics, came next. Then, in the 17th century, mathematics exploded with analytic geometry, calculus, probability, and so forth. Nowadays, of course, mathematics has reached levels of abstraction utterly beyond everybody but the specialists.

In science, we see the same process that we saw in justice: As our knowledge expanded, we had to resort to ever more abstract ideas to stay on top of all that knowledge.

Finance

The earliest economic interactions were direct barter: I'll give you my goat for ten bushels of your wheat. Because such transactions are as explicit and direct as possible, they were easy to evaluate and police. One party examines the goat and the other party examines the wheat. They each see what they're getting and there is no further cause for interaction after the exchange is made. Thus, the earliest forms of financial interaction were direct, explicit, and utterly devoid of abstraction.

This was sometimes clumsy: What if you were willing to sell only five bushels of wheat? I couldn't sell you half a goat. This problem was solved by stepping up to a higher level of abstraction: the use of precious metals. I'll sell you my goat for three shekels of silver. A shekel, by the way, was originally a unit of weight, not a coin.

Problems then arose when people cheated by trying to pass off these precursors to coins that really didn't contain as much precious metal as they were supposed to contain. This required a new jump to a higher level of abstraction: the standardized coin. This was a chunk of precious metal that was manufactured by the state and guaranteed to be of pure metal and the correct weight. The proof of the value of the coin was the face of the king who issued it: "King So_And_So the Great guarantees that this coin is trustworthy."

Note how coinage moved the economy to a higher level of abstraction. At that point, all fiscal accounts were kept in the otherwise arbitrary units of coinage. A rich man might be worth 10,000 sisterces. What does that mean? It's an even more abstract concept.

Coinage worked well for a long time, until another new problem arose in the Middle Ages. Traders were traveling over longer distances, but the roads weren't particularly safe. Traveling across Europe carrying a few pounds of gold was an open invitation to highway robbery. Merchants needed a safe way to handle their transactions. Thus was born a new and even higher level of abstraction: the bill of exchange.

This was nothing more than a note saying "Joe the Merchant authorizes Fred the Banker to transfer 50 ducats from Joe's account to the account of Charlie the Merchant." In other words, the bill of exchange was basically the same thing as an endorsed check. This meant that merchants could carry around pieces of paper rather than coins, making them robber-proof.

This was an immensely important leap in abstraction because, for the first time, the concept of value was divorced from a tangible object. Instead of transferring wealth through tangible intermediaries such as precious metals, wealth could now be transferred through a piece of paper. This represented a higher level of abstraction of the concept of wealth.

These bills of exchange stimulated the European economy and pretty soon they were flying all over Europe. Keeping track of them was becoming quite a hassle.

If a bill of exchange bounced (due to insufficient funds), it was a huge hassle to track down the deadbeat and get your money.

Banks solved this problem by issuing generic bills of exchange. These were notes from a bank promising that the bank itself would pay the bearer a standard amount of coin. There were notes for one ducat, five ducats, ten ducats, and so forth. You gave your coins to the bank, and they gave you bank notes equivalent in value (after bank charges) to your coins. Then you paid other merchants with the bank notes. The merchants didn't have to trust you; they had only to trust the bank that issued the note.

Of course, there was even more abstraction involved in this solution: Now the value existed in a bank that didn't actually have the money. The prudent banker loaned out most of its money to get interest, and kept only a small amount in reserve to handle payments. So now you had to think in terms of value that resided in a bank and value that consisted of all the bank's assets, most of which weren't even coins.

This worked well, but there was still a problem: Sometimes banks would go bankrupt and the people holding all the banknotes from that bank lost their money. So then governments stepped in and established national banks, which were guaranteed not to go bankrupt. The banknotes issued by those national banks are what we now call paper currency. If you read your dollar bill carefully, you'll see that it's really a "Federal Reserve Note"—a banknote from the Federal Reserve Bank.

This idea of a national bank pushed the abstraction up another notch. As you might guess, a new problem arose: Those paper notes could be stolen just like the coins. So people learned to keep most of their money in banks and use banknotes only for "walking around money." This pushed the abstraction even further: Now your wealth wasn't measured by the banknotes in your possession, but by a number in the bank's records for your account. You could have a million dollars in the bank but only a hundred dollars in your pocket. So now money had become *really* abstract—just a number stored in a book somewhere.

The next step in the process was the credit card. This is nothing more than a piece of plastic with your account number on it. You charge something to your credit card, and your signature constitutes a promise to pay that amount. The bank that issued your credit card pays the merchant and deducts that amount from your credit card account.

Let's trace the levels of abstraction at work here: Your credit card points to your credit card account, which you pay off with money from your regular bank account. Your regular bank account contains a number that represents the amount of money that you have deposited with the bank. The money represents some amount of precious metal—well, it used to do that—which in turn represents a concept called wealth. Whew! That's a lot of indirection!

Thus, as economies grew larger and more complex, the financial system underlying them grew more and more abstract.

The Moral of These Stories

Over and over we see the same idea: To grow intellectually, and to understand and cope with more complex problems, we always move to higher levels of abstraction. This can be summarized in a simple lesson.

> ***Lesson 16***
> ***When you can't work through a problem, go over its head.***

Recall that in Chapter 3, "Interactive Storytelling," Lesson 13 resolves the dilemma of control versus interactivity: "There is no conflict between process-driven narrative and interactivity." The solution to the dilemma is to exert control at a higher level of abstraction. As with all the examples, that abstraction will be more difficult to understand, but it will extend our intellectual reach. Many storytellers, locked in the traditions of conventional storytelling, will be unable (and perhaps unwilling) to grasp such abstractions and will reject the whole concept. No matter—there will always be plenty of room in this world for traditional stories. But interactive storytelling demands that we move to a higher level of abstraction.

To understand the abstractions presented in this book, you must first let go of the very notion of plot. A plot is a fixed sequence of events that communicates some larger message about the human condition. In interactive storytelling, we replace the plot with a web of possibilities that comprise the same truth. Since this concept confuses most people, let's look at a number of examples at different levels.

Let's use the classic movie *Star Wars: A New Hope* as our starting point. Here is the direct representation (sequence) of the story:

1. Luke Skywalker leaves home, meets Obi-Wan, travels with him to Mos Eisely spaceport, and flies away in a spaceship. But their ship is captured by the bad guys; they fool the bad guys, rescue Princess Leia, and escape from the Death Star. The bad guys attack the last bastion of the rebels, and Luke helps to attack the Death Star. Luke destroys the Death Star and gets rewarded by the princess.

Now let's look at the same story in a more abstract fashion:

2. A young man ventures out into the world, makes new friends, and experiences many adventures. He learns much and triumphs over adversity, winning the admiration of a pretty girl.

Now let's make it even more abstract:

3. A boy confronts the challenge of growing up to become a man. He faces many difficulties, but ultimately triumphs over adversity and establishes his manhood.

It is at these higher levels of abstraction that we design storyworlds. Instead of thinking about Luke Skywalker, we think about a young man—any young man. Instead of thinking about space combat, we think about adventures—many different kinds of adventures. Instead of thinking about blowing up the Death Star, we think about triumphing over adversity.

We don't assemble storyworlds event by event. Instead, our high-level design requires us to construct storyworlds concept by concept. There aren't many variations of "rescue Princess Leia," but there are millions of versions of "faces many difficulties." Put another way, there is only one version of the first story, but there are thousands of versions of the second story and millions of versions of the third story. For now, the third level of the story is too abstract. But, if you think in terms of the second level, then you can design a storyworld that can generate thousands of different stories. Remember, there's no such thing as an interactive story; if it's already a story, then it has been nailed down and you can't interact with it. Instead, we're pursuing the concept of interactive *storytelling,* which springs from a storyworld—and a storyworld is what you create, not a story.

As long as you think in terms of a strict sequence of events (a plot), then you'll never understand the concept of interactive storytelling. Instead, you must think in terms of an entire dramatic universe of potential stories: a storyworld.

Can you be more specific?

Sure. Consider these sentences from different stories:

"You look magnificent, darling!"

"I don't think I've ever seen anybody as beautiful as you."

"You're such a dashing fellow!"

"Ooh! You're so strong and brave!"

I'm sure that you've read thousands of variations on these sentences, all of them cleverer than these. They all boil down to this single statement:

"I compliment you."

Yuck! The abstract version is cold, lifeless, and utterly mechanical. You can't seriously propose that we present something like this to our audience!

No, I'm not proposing that we present "something like this" to our audience. Instead, we have to use one of several strategies for presenting the idea behind it. Internally, our interactive storytelling engine will still be thinking in terms of "I compliment you," but the presentation of that idea can be dressed up into a more palatable form. (I explain how to do this in Chapter 18, "Scripting Languages.")

Playing God

The same concept of resorting to a higher level of abstraction provides a partial solution to the knotty problem of free will versus determinism discussed in Chapter 3. This solution embraces physics and rationalizes faith. It says that God is omnipotent with respect to process, not data. That is, God controls the universe through its laws, but not through the details. God does not dictate the position and velocity of every electron and proton in the universe; instead, he

merely declares, "Let there be physics" and then allows the clockwork of the universe to run according to his laws. In an indirect way, we could say that he does control everything that happens in the universe, but it is abstract control. God determines the principles under which the universe operates, but grants us free will to choose as we wish within that universe. He even works a little randomness—in the form of quantum mechanics—into the system to ensure that we aren't automatons responding robot-like to our environments. The important point is this: God is an abstract designer!

The king who formulates laws is controlling his kingdom in a similar way. He doesn't wander through the kingdom, ordering people to reap this crop, milk those cows, or build that house. Instead, he creates a set of rules constraining their behavior. His rule can be benevolent or harsh, but it is always abstract and indirect.

And the same resolution works with the apparent conflict between plot and interactivity. If you are a data-intensive designer, then you are a deterministic one. Like some Bible-thumping fundamentalist, you insist that every single word you write be obeyed literally by the characters in the story. The fundamentalist focuses all his or her beliefs in the explicit data of the Bible rather than the abstract processes behind it.

But if you are a process-intensive designer like God, then the characters in your universe can have free will within the confines of your laws of "dramatic physics." You must abandon the self-indulgence of direct control and instead rely on indirect, abstract control. That is, instead of specifying the data of the plotline, you must specify the processes of the dramatic conflict. Instead of defining who does what to whom, you must define how people can do different things to each other.

This is too esoteric, too indirect to allow the richness of tone that a good story requires.

True, but consider what a story really communicates. A story is an instance that communicates a principle. Moby Dick is not about a whale; it is about obsession. Luke Skywalker never really existed; the truths about growing up and facing the challenges of manhood are the movie's real messages. Stories are false at the direct level yet true at the abstract level. The instances they relate never happened, but the abstract principles they embody are the truth that we appreciate. They are false in their data but true in their process.

Given this, consider the nature of the communication between storyteller and audience. The storyteller seeks to communicate some truth, some principle of the human condition. Rather than communicate the truth itself, he creates a particular set of circumstances that instantiate the truth he seeks to communicate. This instantiation is what he communicates to his audience. The audience then interprets the story; it figures out the higher, more abstract principles from the story's details. Note, however, the circumlocution of this process. The storyteller seeks to communicate some truth of the human condition; the audience seeks to learn the same. Instead of just telling the principle, the storyteller translates the principle into an instantiation, then communicates the instantiation; the audience then translates the instantiation back into a principle. This is truly a roundabout way to get the job done.

Interactive storytelling alters this process in two important ways. First, the process of translating principle into instance is delegated to the computer. The storyteller retains full artistic control, but now she must exercise that control at a more abstract level. The basic process of translating principle into instance is retained, but is now performed by the computer in partnership with the player. This, of course, entails considerable effort in algorithm creation. The second difference is that, because the story is generated in direct response to the player's actions, the resultant story is customized to the needs and interests of the player. Thereby, the story more than makes up for any loss in polish with its greater emotional involvement.

Translating Principle into Instance

The key to applying abstraction is the process of converting principle into instance. The author must be able to express a principle in a form the computer can process, then provide algorithms that translate that principle into instances that are specific to the context. Here's a very simple example:

Principle: Women dislike unwanted attentions.

First draft articulation: "Unwanted attentions" are actions of a romantic nature by a man to a woman that do not naturally flow from previous events. Women react to unwanted attentions by rejecting the man.

Second draft: "Unwanted attentions" comprise any form of touch with sexual or romantic connotations, or overt expressions of sexual desire. A woman's

rejection of unwanted attentions is proportional to the degree of inappropriateness of the unwanted attentions.

Third draft: The verbs that can constitute unwanted attentions are *kiss*, any form of the verb *touch*, and any instance of *declare*, *inquire*, or *demand* taking as a secondary verb any verb with sexual content. The verbs that can be used to express rejection are *declare* (dislike), *declare* (shock), *state imperative* (desist), and *strike* (with hand).

This example serves only to show, in a general way, how to go about solving the problem. Details of how to implement this kind of approach appear in later chapters.

This is great theory, but in practice, the act of reducing storytelling to grand principles is beyond human intellectual ability. Nobody could ever handle so deeply intellectual a process.

This process-intensive style of storytelling is done all the time—and by amateurs, no less. Here's Grandpa taking little Annie up to bed:

> *"Tell me a story, Grandpa!" she asks.*
>
> *"OK," he replies. "Once upon a time there was a pretty little girl who had a pony…"*
>
> *"Was it a white pony?" Annie interrupts.*
>
> *"Oh, my, yes, it was as white as snow. It was so white that the sunlight reflected off its coat dazzled the eye. And the little girl and the pony would go riding along the beach…"*
>
> *"Did they go riding in the mountains, too?"*
>
> *"Why yes, as a matter of fact, they did. After riding along the beach, they would ride up the green canyons, jumping over the brush and ducking under tree branches, until they came to the very top of the mountains. And there they would play at jumping over boulders…"*
>
> *"I don't like to jump."*
>
> *"Well then, instead of jumping, she would let her pony graze in the rich deep grass on the mountain's summit while she sat in the sun…"*

And so the story goes on. Note that Grandpa does not respond to Annie's interruptions with, "Shuddup, kid, you're messing up my carefully prepared plot!" He wants those interruptions; his storytelling thrives on them. Grandpa does not enter the room with a carefully planned and polished plot, all set to dazzle Annie. Grandpa knows basic principles of storytelling, and then he makes up the story as he goes along—in response to Annie's needs and interests. The story is the joint creation of Grandpa and Annie. It is their very special story, just for Annie and Grandpa, and no other story will ever be the same. Because it is their very special story, it means more and has more emotional power than any high-tech Hollywood extravaganza. Yes, it lacks the careful plotting, the intricate development, and the glorious special effects of the Hollywood product. But its roughness is more than compensated for by its customization. Sure, Annie likes *The Lion King*—but she treasures *Annie and the White Pony*.

Everybody understands the basic principles of storytelling. Everybody tells stories many times a day. Everybody knows how to translate the basic principles of storytelling into specific stories. If an amateur storytelling Grandpa can pull that off, why can't we big-shot professionals do the same?

Conclusions

Abstraction is the means by which we can transcend distracting arguments over plot versus interactivity. Instead of thinking about a specific instance (a plot), we must learn to think in terms of something more abstract. I refuse to resort to the pseudointellectual term "metaplot." Instead, "storyworld" describes the same concept more clearly. A storyworld is a complete, closed dramatic universe of ideas about a specific theme. "The Human Condition" is the largest storyworld of all. "Romance" is a smaller storyworld; "Tragic Romance" is an even smaller storyworld. For now, we shall have to confine our efforts to tiny storyworlds that address narrow themes.

Each storyworld contains within it myriad possible plotlines. Just as the variable *x* can hold an infinity of possible numbers, or a law can address a passel of possible actions, or a scientific law can describe zillions of possible physical actions, or a bank account can hold many different amounts of money, a storyworld contains implicit within it the possibility of many different plots.

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